

## Department of Computer Science & Engineering (Data Science)

### Academic Year 2024-25



3<sup>rd</sup> and 4<sup>th</sup> Semester Scheme & Syllabus BATCH: 2023-27 CREDITS: 160

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## **NEW HORIZON COLLEGE OF ENGINEERING**

## VISION

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

## **MISSION**

• To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.

• To encourage long-term interaction between the academia and industry through their involvement in the design of curriculum and its hands-on implementation.

• To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities

## **QUALITY POLICY**

To provide educational services of the highest quality both curricular and cocurricular to enable students integrate skills and serve the industry and society equally well at global level.

## VALUES

- Academic Freedom
- Integrity
- Inclusiveness
- Innovation
- Professionalism
- Social Responsibility

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

## **PROGRAM OUTCOMES (POs)**

**PO1 Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex Computer Science and Data Science engineering problems.

**PO2 Problem Analysis:** Identify, formulate, review research literature and analyze complex Computer Science and Data Science engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

**PO3 Design / Development of Solutions:** Design solutions for complex Computer Science and Data Science engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

#### **PO4 Conduct Investigations of Complex Problems:**

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

**PO5 Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex Computer Science and Data Science engineering activities with an understanding of the limitations.

**PO6 The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in Computer Science and Data Science Engineering.

**PO7 Environment and sustainability:** Understand the impact of the professional engineering solutions in Computer Science and Data Science engineering in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8 Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9 Individual and Team Work:** Function effectively as an individual and as a member or leader to diverse teams, and in multidisciplinary settings.

**PO10 Communication:** Communicate effectively on complex Computer Science and Data Science engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective report and design documentation, make effective presentations, and give and receive clear instructions.

**PO11 Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12 Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## **PROGRAM SPECIFIC OUTCOMES (PSOs)**

| PSO1 | Apply Computer Science and Data Science principles,<br>practices, and mechanisms to produce sustainable products<br>and use knowledge in various domains to identify research<br>gaps and hence provide solution to new ideas and innovations. |
|------|--|
| PSO2 | Collaborate proficiently with experts from diverse fields and<br>actively engage in continuous professional growth in the<br>domain of computing.  |

#### NEW HORIZON COLLEGE OF ENGINEERING B. E. in Computer Science and Engineering (DATA SCIENCE) Scheme of Teaching and Examinations for 2023- 2027 BATCH (2022 Scheme)

|     | III Semester                      |  |  |                                     |     |             |   |   |         |         |       |       |       |
|-----|-----------------------------------|--|--|-------------------------------------|-----|-------------|---|---|---------|---------|-------|-------|-------|
| S.  | Course and Course Title Bos Distr |  |  |                                     |     |             |   |   | Overall | Contact |       | Marks |       |
| No. | Cours                             | e Code                                   | Course Title   | BoS                                 | Dis | istribution |   |   | Credits | Hours   | 015   | OPP   | m . 1 |
|     |                                   | Γ  |  |                                     |     | 5           |   |   | CIE     | SEE     | Total |       |       |
| 1   | BSC                               | 22MAC31                                  | Mathematical<br>Foundation for<br>Computing Sciences | BS                                  | 2   | 1           | 0 | 0 | 3       | 4       | 50    | 50    | 100   |
| 2   | PCC                               | 22CDS32                                  | Advanced Data<br>Structures                          | DS                                  | 3   | 0           | 0 | 0 | 3       | 3       | 50    | 50    | 100   |
| 3   | PCCL                              | 22CDL32                                  | Advanced Data<br>Structures Lab                      | DS                                  | 0   | 0           | 1 | 0 | 1       | 2       | 50    | 50    | 100   |
| 4   | PCC                               | 22CDS33                                  | Database Management<br>Systems                       | DS                                  | 3   | 0           | 0 | 0 | 3       | 3       | 50    | 50    | 100   |
| 5   | PCCL                              | 22CDL33                                  | Database<br>Management SystemsLab                    | DS                                  | 0   | 0           | 1 | 0 | 1       | 2       | 50    | 50    | 100   |
| 6   | ESC                               | 22CDS34X                                 | Programming Language<br>Course                       | DS                                  | 2   | 0           | 1 | 0 | 3       | 4       | 50    | 50    | 100   |
| 7   | AEC                               | 22CDS35X                                 | Ability EnhancementCourse<br>– III                   | DS                                  | 0   | 0           | 1 | 0 | 1       | 2       | 50    | 50    | 100   |
| 8   | BSC                               | 22BIK36                                  | Bio Inspired Designand<br>Innovation                 | Any<br>Dept.                        | 3   | 0           | 0 | 0 | 3       | 3       | 50    | 50    | 100   |
| 9   | UHV                               | 22UHK37                                  | Universal Human<br>Values And Life Skills            | Any Dept                            | 1   | 0           | 0 | 0 | 1       | 2       | 50    | 50    | 100   |
|     |                                   | 22NSS30 National Service<br>Scheme (NSS) |  | NSS<br>coordinator                  |     |             |   |   |         |         |       |       |       |
| 10  | NCMC                              | 22PED30                                  | Physical Education<br>(PE) (Sports and<br>Athletics) | Physical<br>Education 0<br>Director | 0   | 0           | 0 | 0 | 2       | 50      |       | 50    |       |
|     |                                   | 22YOG30                                  | Yoga   | Yoga<br>Teacher                     |     |             |   |   |         |         |       |       |       |
|     |                                   |  | Total  |                                     |     |             |   |   | 19      | 27      | 500   | 400   | 950   |
| 11  | NCMC                              | 22DMAT31*                                | Basic Applied  | BS                                  | 0   | 0           | 0 | 0 | 0       | 2       | FO    |       | FO    |
|     |                                   |  | Mathematics -I                                       |                                     | U   | U           | U | U | U       | ۷.      | 50    |       | 50    |

**BSC**: Basic Science Course, **PCC**: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **NCMC**: Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **L**: Lecture, **T**: Tutorial, **P**:Practical **S**: **SDA**: Self Study for Skill Development, **K**: This letter in the course code indicates common to all the stream ofengineering .**ESC**: Engineering Science Course, **ETC**: Emerging Technology Course, **PLC**: Programming Language Course,

**CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation.

22DMAT31\*: This non-credit mandatory course to be offered with only CIE and no SEE to Lateral entry students.

| Programming Language Course (PLC) |                          |          |                                 |  |  |  |  |  |  |
|-----------------------------------|--------------------------|----------|---------------------------------|--|--|--|--|--|--|
| 22CDS341                          | Linux System Programming | 22CDS343 | Advanced Excel for Data Science |  |  |  |  |  |  |
| 22CDS342                          | Web Design Technologies  | 22CDS344 | Ruby Programming                |  |  |  |  |  |  |

| Ability Enhancement Course-III (For CSE(DS), all are laboratory courses 0-0-1-0) |                             |          |                    |  |  |  |  |  |  |  |
|--|-----------------------------|----------|--------------------|--|--|--|--|--|--|--|
| 22CDS351   | Python for Data Analytics   | 22CDS353 | PHP Programming    |  |  |  |  |  |  |  |
| 22CDS352   | Project Management with Git | 22CDS354 | GoLang Programming |  |  |  |  |  |  |  |

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely

National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for theaward of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the

calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

| Credit Definition: 1-hour Lecture                                 | 03-Credits courses are to be designed for 40 hours inTeaching-Learning          |
|---|---|
| (L) per week=1Credit 2-hoursTutorial(T) per                       | Session   |
| week=1Credit  | 02- Credits courses are to be designed for 25 hours ofTeaching-Learning         |
| 2-hours Practical / Drawing (P) per week=1Credit2-hous Self Study | Session   |
| for Skill Development (SDA) perweek = 1 Credit                    | 01-Credit courses are to be designed for 15 hours of Teaching-Learning Sessions |

#### NEW HORIZON COLLEGE OF ENGINEERING B. E. in Computer Science and Engineering (DATA SCIENCE) Scheme of Teaching and Examinations for 2023- 2027 BATCH (2022 Scheme)

|     |       |          |  | IV Se  | emester | r            |          |   |         |       |     |      |       |       |
|-----|-------|----------|--|--|---------|--------------|----------|---|---------|-------|-----|------|-------|-------|
| S.  |       |          | Credi  | t  |         | Overall      | Contact  |   | Marks   |       |     |      |       |       |
| No. | Cours | e Code   | Course Title                                     | BoS  | -       | Distribution |          | C | Credits | Hours | CIE | CEE  | Total |       |
|     |       |          | Discrete Mathematics                             |  |         | L            | 1        | P | 3       |       |     | CIE  | SEE   | Total |
| 1   | BSC   | 22MAC41  | and GraphTheory                                  | BS   |         | 2            | 1        | 0 | 0       | 3     | 4   | 50   | 50    | 100   |
| 2   | РСС   | 22CDS42  | Object Oriented<br>Programming usingJava         | DS   |         | 3            | 0        | 0 | 0       | 3     | 3   | 50   | 50    | 100   |
| 3   | PCCL  | 22CDL42  | Object Oriented Programming<br>using<br>Java Lab | DS   |         | 0            | 0        | 1 | 0       | 1     | 2   | 50   | 50    | 100   |
| 4   | РСС   | 22CDS43  | Logic Design and<br>Computer<br>Organization     | DS   |         | 3            | 0        | 0 | 0       | 3     | 3   | 50   | 50    | 100   |
| 5   | PCCL  | 22CDL43  | Logic Design Lab                                 | DS   |         | 0            | 0        | 1 | 0       | 1     | 2   | 50   | 50    | 100   |
| 6   | PCC   | 22CDS44  | Operating Systems                                | DS   |         | 3            | 0        | 0 | 0       | 3     | 3   | 50   | 50    | 100   |
| 7   | PCCL  | 22CDL44  | Operating Systems<br>Lab                         | DS   |         | 0            | 0        | 1 | 0       | 1     | 2   | 50   | 50    | 100   |
| 8   | ESC   | 22CDS45X | Programming Language<br>Course                   | DS   |         | 2            | 0        | 1 | 0       | 3     | 4   | 50   | 50    | 100   |
| 9   | AEC   | 22CDS46X | Ability EnhancementCourse<br>– IV                | DS   |         | 0            | 0        | 1 | 0       | 1     | 2   | 50   | 50    | 100   |
| 10  | UHV   | 22SCK47  | Social Connect and<br>Responsibility             | Any De   | ept     | 0            | 0        | 1 | 0       | 1     | 2   | 50   |       | 50    |
| 11  | PROJ  | 22CDS48  | Mini Project-I                                   | DS   |         | 0            | 0        | 1 | 0       | 1     | 0   | 50   | 50    | 100   |
|     |       | 22NSS40  | National Service<br>Scheme (NSS)                 | NSS<br>coordina                                      | ator    |              |          |   |         |       |     |      |       |       |
| 12  | NCMC  | 22PED40  | Physical Education(PE)<br>(Sports and Athletics) | Physical<br>Education<br>Director<br>Yoga<br>Teacher |         | 0            | 0 0      | 0 | 0       | 0     | 2   | 50   |       | 50    |
|     |       | 22Y0G40  | Yoga   |  |         |              |          |   |         |       |     |      |       |       |
|     |       |          | Total  |  |         |              |          |   |         | 21    | 29  | 600  | 500   | 1100  |
| 12  | NCMC  | 220MAT41 | * Dagia Applied Mathematica                      | TT I   | г       | DC           | <u> </u> | 0 | 0       |       | 0   |      | - 1   |       |
| 15  | NUMU  | ZZDMAT41 | basic Applied Mathematics -                      | 11   | 1       | D3           |          | U | U       | 0 0   | U   | 2 50 |       | 50    |

BSC: Basic Science Course, PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, NCMC: Non-Credit Mandatory Course, AEC: Ability Enhancement Course, L: Lecture, T: Tutorial, P: Practical S:SDA: Self Study for Skill Development, K: This letter in the course code indicates common to all the stream of engineering. ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course,

CIE:

Continuous Internal Evaluation, SEE: Semester End Evaluation.

22DMAT41\*: This non-credit mandatory course to be offered with only CIE and no SEE to Lateral entry students.

| Programming Language Course(PLC) |                                |          |                                  |  |  |  |  |  |  |  |
|----------------------------------|--------------------------------|----------|----------------------------------|--|--|--|--|--|--|--|
| 22CDS451                         | IoT Programming                | 22CDS453 | Programming for UI and UX design |  |  |  |  |  |  |  |
| 22CDS452                         | R Programming for Data Science | 22CDS454 | C# and .NET                      |  |  |  |  |  |  |  |

| Ability Enhancement Course-IV (For CSE(DS) , all are LaboratoryCourses0-0-1-0) |                                 |          |                                     |  |  |  |  |  |  |  |
|--|---------------------------------|----------|-------------------------------------|--|--|--|--|--|--|--|
| 22CDS461   | Data Visualization with Tableau | 22CDS463 | Cloud-based Collaborative Workspace |  |  |  |  |  |  |  |
| 22CDS462   | Ethical Hacking Practices       | 22CDS464 | File Structures                     |  |  |  |  |  |  |  |

Mini-project work: Mini Project is a laboratory-oriented/hands on course that will provide a platform to students to enhancetheirpracticalknowledgeandskillsby the development of small systems/applicationsetc. Based on the

ability/abilities of the student/sand recommendations of the mentor. A student can do mini project as

(i) A group of 2 if mini project work is single discipline (applicable to all IT allied branches)

(ii) A group of 2-4 if mini project work is single discipline (applicable to all Core Branches)

(iii) A group of 2 -4 students if the Mini Project work is a multidisciplinary (Applicable to all Branches)

#### CIE procedure for Mini-project:

(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratioof50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project. The CIE marks awarded for the Mini-project, shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the percentage ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates

**National Service Scheme /Physical Education/Yoga:** All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

| Credit Definition:   | 03-Credits courses are to be designed for 40 hours inTeaching-Learning           |
|--|--|
| 1-hour Lecture (L) per week=1Credit 2-hours                      | Session  |
| Tutorial(T) per week=1Credit                                     | 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session |
| 2-hours Practical / Drawing (P) per week=1Credit                 | 01-Credit courses are to be designed for 15 hours of Teaching-Learning Sessions  |
| 2-hous Self Study for Skill Development (SDA) perweek = 1 Credit |  |
|  |  |

## III Semester

| MATHEMATICAL FOUNDATION FOR COMPUTING SCIENCES<br>(Common to AIM, CEE, CSE, CDS, ISE) |  |                      |                      |                |            |                       |                       |                      |                      |             |                     |                |
|---|--|----------------------|----------------------|----------------|------------|-----------------------|-----------------------|----------------------|----------------------|-------------|---------------------|----------------|
| Course Code   | 22MAC  | 31                   |                      | (001           |            |                       |                       | IE Mark              | <u>, 2)</u><br>(S    |             |                     | 50             |
| L:T:P:S   | 2:1:0:0  |                      |                      |                |            |                       | S                     | EE Mar               | 50                   |             |                     |                |
| Hrs. / Week   | 4 Total Marks  |                      |                      |                |            |                       |                       |                      |                      |             |                     | 100            |
| Credits   | 03   | 03 Exam Hours 03     |                      |                |            |                       |                       |                      |                      |             |                     |                |
| Course outcomes:  |  |                      |                      |                |            |                       |                       |                      |                      |             |                     |                |
| At the end of the course, the student will be able to:                                |  |                      |                      |                |            |                       |                       |                      |                      |             |                     |                |
| 22MAC31.1   | Use app  | ropriat              | e numei              | rical meth     | lods to s  | solve al              | gebraic e             | equation             | s and tr             | anscende    | ental equations.    |                |
| 22MAC31.2   | Solve in<br>numeric  | itial val<br>cally.  | ue prob              | lems usir      | ng appro   | opriate               | numerica              | al metho             | ds and               | also Evalı  | uate definite integ | rals           |
| 22MAC31.3   | Demons   | strate th            | ie idea c            | of Linear I    | Depend     | ence an               | d Indepe              | endence              | of sets i            | n the vec   | tor space.          |                |
| 22MAC31.4   | Gain abi   | ility to u           | ise prob             | ability di     | stributi   | ons to a              | inalyze a             | nd solve             | e real tir           | ne proble   | ems                 |                |
| 22MAC31.5   | Justify t  | he conc              | ept of sa            | ampling c      | listribut  | tion to s             | olve the              | enginee              | ring pro             | oblems.     |                     |                |
| 22MAC31.6   | Use the  | large/s              | mall sar             | nples to a     | analyse    | the data              | a to make             | e decisio            | n about              | the hypo    | othesis.            |                |
| Mapping of Cou  | irse Outo  | comes                | to Prog              | ram Out        | tcomes     | :                     |                       |                      |                      |             |                     |                |
|   | P01  | P02                  | P03                  | P04            | P05        | P06                   | P07                   | P08                  | P09                  | P010        | P011                | P012           |
| 22MAC31.1   | 3  | 3                    | -                    | -              | -          | -                     | -                     | -                    | -                    | -           | -                   | -              |
| 22MAC31.2   | 3  | 3                    | -                    | -              | -          | -                     | -                     | -                    | -                    | -           | -                   | -              |
| 22MAC31.3   | 3  | 3                    | -                    | -              | -          | -                     | -                     | -                    | -                    | -           | -                   | -              |
| 22MAC31.4   | 3  | 3                    | -                    | -              | -          | -                     | -                     | -                    | -                    | -           | -                   | -              |
| 22MAC31.5   | 3  | 3                    | -                    | -              | -          | -                     | -                     | -                    | -                    | -           | -                   | -              |
| 22MAC31.6   | 3  | 3                    | -                    | -              | -          | -                     | -                     | -                    | -                    | -           | -                   | -              |
|   |  |                      | FTUOD                | 0.4            |            |                       |                       |                      |                      |             | 222440244           | 0.11.          |
| MODULE-1  | NUMER  | ICAL M               | EIHUL                | 1 <b>5-1</b>   | 1          | ana Da                | aula fala             | :                    | d and N              | aristan Da  | ZZMAC31.1           | 8 Hours        |
| Interpolation, No   | on of alge   | braic ar             | id trans             | cendenta       | l equati   | ons: Re               | gula-fais             | l method             | a and No             | ewton-Ka    | ipnson Method-Pro   | opiems.        |
| Lagrange's inver  | se interno   | lation f             | or unea              | ual interv     | vals (wit  | thout n               | roofs)-Pi             | ns, Newi<br>cohlems  | on uivit             | leu uniei   | ence, Lagrange 5 h  | of filula allu |
| Case Study  | Case sti   | idv on               | Numeri               | cal Analy      | vais (wi   | inout p               | 10013) 11             | obieiii5.            |                      |             |                     |                |
| Text Book   | Text Bo  | ok 1: 28             | .2. 28.3             | . 29.6. 29     | .10.29.1   | 11.29.1               | 3. Text B             | look 2: 1            | 9.2.19.              | 3.          |                     |                |
| MODULE-2  | NUMER  | ICAL M               | ETHOD                | )S-2           |            |                       | 0, 10110 2            |                      | <i></i> , <i>_</i> , |             | 22MAC31.2           | 8 Hours        |
| Numerical solution  | on of ordi   | nary dif             | fferentia            | al equatio     | ns of fir  | st orde               | r and of              | first deg            | ree: Tay             | lor's seri  | es method, Modifi   | ed Euler's     |
| method and Run  | ge-Kutta r   | nethod               | of fourt             | h-order-l      | Problem    | ns. Milne             | e's predi             | ctor and             | correct              | or metho    | ds-Problems.        |                |
| Numerical integr  | ation: Sin   | npson's              | 1/3 <sup>rd</sup> rı | ıle, Simps     | son's 3/   | 8 <sup>th</sup> rule, | Weddle                | 's rule (v           | without              | proofs)-F   | Problems.           |                |
| Applications  | Applicat   | tion of r            | numeric              | al integra     | ation to   | velocity              | <sup>,</sup> of a par | ticle and            | l volum              | e of solids | 5.                  |                |
| Text Book   | Text Bo  | ok 1: 32             | .3, 32.5             | , 32.7, 32     | .9, 30.7,  | 30.8, 3               | 0.10, Tex             | t Book 2             | 2: 19.5, 2           | 21.1.       |                     |                |
| MODULE-3  | VECTO  | R SPAC               | ES                   |                |            |                       |                       |                      |                      |             | 22MAC31.3           | 8 Hours        |
| Vector Space de   | finition a   | nd exar              | nples, S             | ubspace        | s and Sp   | panning               | g sets, Li            | near De              | pender               | ice and Ir  | ndependence, Lin    | ear            |
| Independence a  | nd Spann   | ing Set              | s, Bases             | : Orthog       | onal an    | d Ortho               | onormal               | bases a              | nd Dim               | ension.     |                     |                |
| Text Book   | Text Bo  | ok 3: 4              | 1, 4.2, 4            | 4.3, 4.4, 4    | <u>.5.</u> |                       |                       |                      |                      |             |                     |                |
| MODULE-4  | PROBA  | BILITY               | AND JO               | <u>INT PRO</u> | BABILI     | TY DIS                | TRIBUT                | IONS                 |                      |             | 22MAC31.4           | 8 Hours        |
| Kandom variable   | es (discre   | te and               | continu              | iousj, pro     | Droblon    | y densi               | ty functi             | ons, mo<br>Probabili | ment g               | enerating   | g function. Discret | e Probability  |
| Concept of joint  | nrohahilit   | u Poisse<br>tv-Ioint | nrohah               | ility dist     | ribution   | Discre                | te and I              | ndenend              | lont ran             | dom vari    | iables Expectation  | Covariance     |
| Correlation coeff   | icient.  | ty-joint             | probab               | inty uist      | ibution    | , Discre              |                       | nuepenu              |                      |             |                     | i, covariance, |
| Case Study  | Case stu   | ıdy on D             | listribut            | tions.         |            |                       |                       |                      |                      |             |                     |                |
| Text Book   | Text Book 1: 26.8, 26.9, 26.10, 26.11, 26.12, 26.14, 26.15, 26.16. |                      |                      |                |            |                       |                       |                      |                      |             |                     |                |
| MODULE-5  | SAMPL  | ING TH               | IEORY                | •              |            |                       |                       |                      |                      |             | 22MAC31.5           | 8 Hours        |
| Sampling Sampli   | ng distrik   | nutions              | test of l            | wnothee        | is of lar  | Je camr               | les for m             | leans an             | d prope              | rtione Ir   | 22MAC31.6           | nce and        |
| proportion Cent   | ral limit th   | heorem               | (withou              | it proof)      | confide    | nce lim               | its for m             | eans. Sti            | ident's              | t-distrihu  | tion. F-distributio | n and Chi-     |
| square distributi   | on for tes   | t of goo             | dness o              | f fit for sr   | nall sam   | nples.                |                       | 24110, 011           | acrit 5              |             | and a serioutio     |                |
| Case Study  | Case Stu   | idies on             | sampli               | ng theory      | and sig    | nifican               | t measur              | es of sco            | ores.                |             |                     |                |
| Text Book   | Text Bo  | ok 1: 27             | .2, 27.3             | , 27.4, 27     | .5, 27.6   | 27.7.2                | 7.8, 27.9             | 27.10.2              | 27.11.2              | 7.12.27.1   | 4, 27.15, 27.16, 27 | 7.19.          |
| <b>CIE Assessment</b>   | Pattern  | (50 Ma               | rks – Tł             | neory)         | , ,        | , –                   | , -,                  | -,-                  | , –                  | ,           | . , _,              |                |

|                 |  |                            | Marks Distri               | ibutio        | n             |   |
|-----------------|--|----------------------------|----------------------------|---------------|---------------|---|
|                 | <b>RBT Levels</b>                                    | Test (s)                   | Qualitat<br>Assessmer      | ive<br>1t (s) | MCQ's         |   |
|                 |  | 25                         | 15                         |               | 10            |   |
| L1              | Remember   | 5                          | 5                          |               | -             |   |
| L2              | Understand   | 5                          | 5                          |               | -             |   |
| L3              | Apply  | 10                         | 5                          |               | 10            |   |
| L4              | Analyze  | 2.5                        | -                          |               | -             |   |
| L5              | Evaluate   | 2.5                        | -                          |               | -             |   |
| L6              | Create   | -                          | -                          |               | -             |   |
| SEE As          | ssessment Pattern (5                                 | 0 Marks – T                | Гheory)                    | -             |               |   |
|                 | <b>RBT Levels</b>                                    | Exam                       | Marks                      |               |               |   |
|                 |  | Distribu                   | ition (50)                 | -             |               |   |
|                 | Remember   |                            | 10                         | _             |               |   |
|                 | Understand   |                            | 10                         |               |               |   |
|                 | Apply  |                            | <u>20</u>                  | _             |               |   |
|                 | Analyze  |                            | 5                          |               |               |   |
| L3<br>16        | Create   |                            | <u> </u>                   | -             |               |   |
|                 | stad Learning Resou                                  | Ircos:                     |                            |               |               |   |
| Text F          | Steu Lear ning Kesot<br>Sooks:                       |                            |                            |               |               |   |
| 1) B. S         | . Grewal, Higher Engi                                | neering Ma                 | thematics, K               | hanna         | Publishers    | Forty fourth Edition, 2022,                       |
| 2) Erw          | vin Kreyszig, Advance                                | d Engineer                 | ing Mathema                | atics, V      | Viley-India   | Publishers, Tenth Edition, Reprint                |
| 201<br>2) Dav   | 6, ISBN: 9/88126554                                  | ł232.<br>ra and ite ar     | plications A               | dicon         | Waclow Dub    | lichars Fourth Edition 2012                       |
| SJ Dav<br>ISBN  | 10 C Lay, Lillear Aigebr                             | a anu its ap               | opiications, At            | Juison        | -wesley rul   | ilisiieis, Foului Euluoli, 2012,                  |
| Refer           | ence Books:  |                            |                            |               |               |   |
| 1) Glyr         | 1 James, Advanced Mod                                | dern Engine                | ering Mather               | natics,       | Pearson Ed    | ucation, Fourth Edition,                          |
| 201<br>2) B. V  | . Ramana, Higher Engi                                | neering Mat                | thematics, Mo              | Graw          | Hill Educatio | on (India) Private Limited,                       |
| Fou<br>3) H. K  | rth Edition, 2017, ISBN<br>I. Dass, Advanced Engi    | 1: 97800706<br>neering Mat | 534190.<br>thematics, S. ( | Chand         | & Company     | Ltd., Twenty Second Edition, 2018,                |
| ISBI            | N: 9789352533831.                                    |                            |                            |               |               |   |
| 4) N.P.<br>Edit | Bali and Manish Goyal                                | , A Text Boo<br>131808320  | ok of Enginee              | ring Ma       | athematics, I | Laxmi Publications (P) Ltd., Ninth                |
| Wehl            | inks and Video Lect                                  | ures (e-Re                 | sources).                  |               |               |   |
| 1)https:        | //voutu.be/IgoIV4g                                   | 0LM?si=I0                  | 1 bklvMR8xl                | lC0V          |               |   |
| 2)https:        | //youtu.be/mIFwzg1                                   | 1u04?si=X                  | d13dh0eNlr                 | nIswP         | S             |   |
| B)https:        | //youtu.be/74g5_3T                                   | C-tQ?si=yB                 | 2PHVGr4hxI                 | lqPo          |               |   |
| 4)https:        | //youtu.be/QQFIWw                                    | DA9NM?si                   | =3wJrtlm1N                 | dPSbX         | mB            |   |
| 5)https:        | //youtu.be/5817fLm                                   | isTGE?si=Y                 | 70RyV2ETS                  | CxZRA         | Z             |   |
| 6)https:        | //youtu.be/q3xj16sh                                  | nDuw?si=ev                 | wdlKAC8UEc                 | :60RQV        | /             |   |
| 7)https:        | //youtu.be/89Z0tOv                                   | HjNU?si=3j                 | T-oriJZaC1k                | Szx           |               |   |
| B)https:        | //youtu.be/dOr0NKy                                   | /D31Q?si=o                 | MBU-BXGd                   | GL6jIZ        | у             |   |
| 9)https:        | //youtu.be/BR1nN8                                    | DW2Vg?si=                  | melzz97Sqh                 | K3wr-         | -             |   |
| 10)http         | s://youtu.be/ugd4k3                                  | dC_8Y?si=>                 | kF5U2gjIgP0                | woDQt         | t             |   |
| 11)http         | s://youtu.be/z0Ry_3                                  | _qhDw?si=                  | 6IG2a65BZg                 | dbaKsi        | 1             |   |
| 12)http         | s://youtu.be/36cAE1                                  | Ovpq4?si=                  | JfR8gkFmM(                 | JCKWN         | NZ_           |   |
| 13)http         | s://youtu.be/vFz2FG                                  | 65HBC/SI=                  | SCH13Y1XuH                 | lWg-pl        | 21            |   |
| Activi          | s://youtu.be/2Ds2112                                 | $\frac{2DJ51}{Suggested}$  | AILUE-IIIKJS               |               | )/Dractica    | Deced Learning                                    |
|                 | Contents related as                                  | tivities (Ac               | tivity-based               | i uidss       | sions)        | i Dascu Leai IIIIg.                               |
| •               | <ul> <li>For active par</li> </ul>                   | ticipation                 | of students,               | instru        | ct the stud   | ents to prepare Algorithms/Flowcharts/Programming |
|                 | Codes  |                            |                            |               | 1.            |   |
|                 | <ul> <li>Organizing Gro</li> <li>Seminars</li> </ul> | oup wise di                | scussions on               | i relate      | a topics      |   |

|  |   |                       |                      |                        | ADVAN                 | NCED DA              | TA STR                | UCTUR                | ES                    |                        |                        |                        |                     |                 |  |
|--|---|-----------------------|----------------------|------------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|------------------------|------------------------|------------------------|---------------------|-----------------|--|
| Course Code  | 22  | CDS32                 |                      |                        |                       |                      |                       | C                    | IE Mark               | S                      |                        | 50                     |                     |                 |  |
| L:T:P:S  | 3:0   | ):0:0                 |                      |                        |                       |                      |                       | S                    | EE Mark               | ĸs                     |                        | 50                     | 50                  |                 |  |
| Hrs / Week   | 3   |                       |                      |                        |                       |                      |                       | Т                    | Total Marks 100       |                        |                        |                        |                     |                 |  |
| Credits  | 03  |                       |                      |                        |                       |                      |                       | E                    | xam Ho                | urs                    |                        | 03                     |                     |                 |  |
| Course outcon  | nes: At t   | the end               | of the co            | urse, the              | student               | will be a            | able to:              |                      |                       |                        |                        |                        |                     |                 |  |
| 22CDS32.1  | Under<br>solving  | stand th<br>g.        | e fundar             | nentals o              | of data s             | tructure             | s and th              | eir appl             | ications              | essential              | for Prog               | ramming                | /probler            | n               |  |
| 22CDS32.2  | 2 Examine the operational aspects of linear data structures: stacks, queues in Problem solving.                                     |                       |                      |                        |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| 22CDS32.3  | 2.3 Implement the linked list data structure in Problem solving.  |                       |                      |                        |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| 22CDS32.4  | Inspec  | t the op              | erationa             | l aspects              | of non-l              | inear da             | ta struct             | ures: Ti             | rees, Gra             | phs in Pro             | oblem so               | lving.                 |                     |                 |  |
| 22CDS32.5  | CDS32.5 Apply appropriate data structures for a specified application.  |                       |                      |                        |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| 22CDS32.6  | Analyz  | ze the so             | rting alg            | orithms                | and app               | roximati             | on algor              | ithms.               |                       |                        |                        |                        |                     |                 |  |
| Mapping of Co  | ourse O   | utcom                 | es to Pr             | ogram (                | Outcom                | es and I             | Program               | n Speci              | fic Outc              | omes:                  |                        |                        |                     |                 |  |
|  | P01   | P02                   | P03                  | P04                    | P05                   | P06                  | P07                   | P08                  | P09                   | P010                   | P011                   | P012                   | PS01                | PSO2            |  |
| 22CDS32.1  | 3   | 3                     | 2                    | 1                      | -                     | -                    | -                     | -                    | -                     | -                      | -                      | 3                      | 2                   | 2               |  |
| 22CDS32.2  | 3   | 2                     | 2                    | 3                      | -                     | -                    | -                     | -                    | -                     | -                      | -                      | 2                      | 2                   | 2               |  |
| 22CDS32.3  | 2   | 2                     | 2                    | 2                      | -                     | -                    | -                     | -                    | -                     | -                      | -                      | 3                      | 2                   | 2               |  |
| 22CDS32.4  | 3   | 2                     | 2                    | 3                      | -                     | -                    | -                     | -                    | -                     | -                      | -                      | 2                      | 2                   | 2               |  |
| 22CDS32.5  | 3   | 3                     | 3                    | 3                      | -                     | -                    | -                     | -                    | -                     | -                      | -                      | 3                      | 2                   | 2               |  |
| 22CDS32.6  | 3   | 3                     | 1                    | 2                      | -                     | -                    | -                     | -                    | -                     | -                      | -                      | 2                      | 2                   | 2               |  |
| MODULE-1   |   |                       |                      | BASIC                  | CONCE                 | PTS                  |                       |                      |                       | 220                    | CDS32.1                |                        | 8 H                 | ours            |  |
| Data Structures  | s, Classi   | fications             | (Primiti             | ive &Nor               | ı Primiti             | ve), Data            | a Structu             | re Oper              | ations, F             | Review of              | Arrays, S              | Strings, S             | tructures           | s,Self-         |  |
| Referential Str  | uctures,  | and Un                | ions. Po             | inters -F              | Pointer a             | as functi            | on argui              | nents, I             | Dynamic               | Memory                 | Allocati               | on Funct               | ions,               |                 |  |
| Sparse Matrix.   |   |                       |                      |                        |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| Text Book  | Text B  | ook 1: 2              | .1, 2.2,2.           | 3 & Text               | Book 2:               | 1.1-1.5,2            | .1-2.3                |                      |                       |                        |                        |                        |                     |                 |  |
| MODULE-2   |   |                       | ST.                  | ACKS AI                | ND QUE                | UES                  |                       |                      |                       | 22                     | 2CDS32.                | 2                      | 8                   | Hours           |  |
| Stacks, Applica<br>representation,<br>Applications of  | tions of<br>, Primiti<br>queues   | f stacks:<br>ve opera | Recursi<br>ations or | on, Eval<br>1 queue, a | uation o<br>array rej | f Expres<br>presenta | sions, F<br>tion of q | actorial<br>ueues, ( | , Tower<br>Circular o | of Hanoi<br>queue, Pri | . Multipl<br>ority que | e Stacks.<br>eue, Doul | Queues<br>ole endec | Queue<br>queue, |  |
| Text Book  | Text B  | ook 1:3.              | 1.3.3.3.4            | Text Boo               | ok 2: 4.5             | 1.4.5.3.4            | .5.4.4.5.             | 6.5.1-5.4            | 4.6.4.1.6             | 4.3.6.4.4              |                        |                        |                     |                 |  |
| MODULE-3   |   |                       | , ,                  | LINK                   | ED LIST               | Г <mark>S</mark>     | ,                     | ,                    | , ,                   | 22                     | 2CDS32.                | 3                      | 8                   | Hours           |  |
| Introduction to  | linked  | list, Rep             | resentat             | ion of lin             | ked list i            | in memo              | ry, primi             | itive ope            | erations              | on linked              | list, sear             | ching a li             | nked list           | doubly          |  |
| linked list, hea<br>Representation   | der linl<br>1, Applic   | ked list,<br>ations o | Linked<br>f Linked   | represer<br>List.      | ntation (             | of stack,            | Linked                | represe              | entation              | of queue               | , circula              | r linked               | list- Poly          | /nomial         |  |
| Text Book  | Text B  | ook 1: 4              | .1,4.2,4.4           | 4.5,4.8                |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| MODULE-4   | in a wear T   | noos Di               |                      | T                      | REES                  | woodod               | Dimowry 7             | Tuona II             | aana Di               | 22                     | CDS32.                 | 4<br>- Colocti         | 8                   | Hours           |  |
| Introduction, Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Heaps. Binary Search Trees, Selection Trees,<br>Forests, Balanced Trees, AVL Trees, Single rotation, Double rotation, Splay Trees, Red-Black Trees. |   |                       |                      |                        |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| Text Book  | Text B  | ook 1: 5              | .1,5.2,5.3           | 3,5.4,5.5,             | 5.6, Tex              | t Book 2             | : 10.1, 10            | ).3, 10.5            | , 10.7                |                        |                        |                        |                     |                 |  |
| MODULE-5   |   |                       | GR/                  | APHS AN                | ND SOR'               | ГING                 |                       |                      |                       | 22CDS3                 | 2.5, 22C               | DS32.6                 | 8                   | Hours           |  |
| Definitions, Ter   | minolo  | gies, Ma              | trix and .           | Adjaceno               | cy List R             | epresent             | ation Of              | Graphs               | , Elemen              | itary Grap             | oh operat              | tions, Tra             | versal m            | ethods:         |  |
| Breadth First S  | Breadth First Search and Depth First Search. Sorting-Internal Sorting, External Sorting, Insertion Sort, Selection Sort, Stable vs. |                       |                      |                        |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| Unstable sort, Linear Programming, Approximation Algorithms. Sets, Dictionaries, Hashing: The symbol table,  |   |                       |                      |                        |                       |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| Hashing Functi   | ons, Col  | lision Re             | esolution            | Technic                | ques.                 |                      |                       |                      |                       |                        |                        |                        |                     |                 |  |
| Text Book  | Text B  | ook 1:6.              | 1,6.2,7.1            | ,8.1,8.2 8             | & Text B              | ook 2:10             | .1,10.2               |                      |                       |                        |                        |                        |                     |                 |  |
| Case Study /   | Create<br>print t   | e a menu<br>the data  | ı driven<br>. Furthe | travel a<br>r search   | pplicati<br>the dat   | on progi<br>a based  | am and<br>on the k    | apply a<br>eyword    | appropri<br>ds.       | iate sorti             | ng techn               | iques to               | retrieve            | and             |  |

#### CIE Assessment Pattern (50 Marks - Theory) -

|    |            | N        | larks Distributio                | n     |
|----|------------|----------|----------------------------------|-------|
| R  | BT Levels  | Test (s) | Qualitative<br>Assessment<br>(s) | MCQ's |
|    |            | 25       | 15                               | 10    |
| L1 | Remember   | 5        | -                                | -     |
| L2 | Understand | 5        | -                                | -     |
| L3 | Apply      | 5        | 5                                | 5     |
| L4 | Analyze    | 5        | 5                                | 5     |
| L5 | Evaluate   | 5        | 5                                | -     |
| L6 | Create     | -        | -                                | -     |

#### SEE Assessment Pattern (50 Marks - Theory)

| R  | BT Levels  | Exam Marks        |
|----|------------|-------------------|
|    |            | Distribution (50) |
| L1 | Remember   | 10                |
| L2 | Understand | 10                |
| L3 | Apply      | 10                |
| L4 | Analyze    | 10                |
| L5 | Evaluate   | 10                |
| L6 | Create     |                   |

#### Suggested Learning Resources:

#### **Text Books:**

- 1. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Fundamentals of Data Structures in C. University Press, 2012, **ISBN-13**: 978-0716782506
- 2. Debasis Samanta: Classic Data Structures, 2<sup>nd</sup> Edition, PHI, 2009, **ISBN-13**: 978-8120337312

#### **Reference Books:**

1. Yedidyah, Augenstein, Tannenbaum: "Data Structures using C and C++,2nd Edition, Pearson Education, 2003,

ISBN :8131702294, 788131702291

- 2. Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Cengage Learning, 2005, **ISBN-13**: 978-8131503140
- 3. Reema Thareja: "Data Structures Using C", Oxford university Press (2021), **ISBN-13**: 978-0198099307

#### Web links and Video Lectures (e-Resources):

- 1. <u>https://www.udemy.com/course/datastructurescncpp/</u>
- 2. https://www.coursera.org/specializations/data-structures-algorithms
- 3. <u>https://nptel.ac.in/courses/106102064</u>

#### Activity-Based Learning (Suggested Activities in Class)

- Case Studies
- Problem Solving Exercises
  - <u>https://github.com/bollwarm/DataStructuresAlgorithms</u>
  - <u>https://www.hackerrank.com/domains/datastructures</u>

|               |   |  |           |            | ADVAN          | CED DAT    | 'A STRU    | CTURES    | LAB        |           |                  |         |         |      |  |  |
|---------------|---|--|-----------|------------|----------------|------------|------------|-----------|------------|-----------|------------------|---------|---------|------|--|--|
| Course Code   |   | 220  | CDL32     |            |                |            |            | CIE M     | arks       |           | 50               |         |         |      |  |  |
| L:T:P:S       |   | 0:0  | :1:0      |            |                |            |            | SEE M     | arks       |           | 50               |         |         |      |  |  |
| Hrs / Week    |   | 2  |           |            |                |            |            | Total     | Marks      |           | 100              |         |         |      |  |  |
| Credits       |   | 03   |           |            |                |            |            | Exam      | Hours      |           | 03               |         |         |      |  |  |
| Course outcom | ies: At   | the en   | d of the  | course, tl | he stude       | nt will be | able to:   |           |            |           |                  |         |         |      |  |  |
| 22CDL32.1     | Appl  | y the c  | oncepts   | of data st | tructures      | s that are | essentia   | l for Pro | grammi     | ng and P  | Problem Solving. |         |         |      |  |  |
| 22CDL32.2     | Exan  | nine th  | e operat  | ional asp  | ects of li     | near data  | a structu  | res: stac | ks, queu   | es in Pro | roblem solving.  |         |         |      |  |  |
| 22CDL32.3     | Impl  | ement  | the linke | ed list da | ta struct      | ure in Pro | oblem so   | lving.    |            |           |                  |         |         |      |  |  |
| 22CDL32.4     | Inspe   | ect the  | operatio  | onal aspe  | cts of no      | n-linear o | data stru  | ctures: 7 | Гrees, Gr  | aphs in F | Problem s        | olving. |         |      |  |  |
| Mapping of Co | of Course Outcomes to Program Outcomes and Program Specific Outcome |  |           |            |                |            |            |           | omes:      | -         |                  |         |         |      |  |  |
|               | P01   | 1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO           3         2         1         1         -         -         -         -         -         - |           |            |                |            |            |           |            | P010      | P011             | P012    | PS01    | PSO2 |  |  |
| 22CDL32.1     | 3   | 3     2     1     1     -     -     -       2     2     3     1     -     -     -  |           |            |                |            |            |           | -          | -         | 3                | 2       | 2       |      |  |  |
| 22CDL32.2     | 3   | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |           |            |                |            |            |           | -          | -         | 2                | 2       | 2       |      |  |  |
| 22CDL32.3     | 22CDL32.3 2 2 2 2 2   |  |           |            |                |            | -          | -         | 3          | 2         | 2                |         |         |      |  |  |
| 22CDL32.4     | 3   | 2  | 2         | 3          | 2              | -          | -          | -         | -          | -         | -                | 2       | 2       | 2    |  |  |
| Pgm. No.      |   |  |           |            | List           | of Prog    | ams        |           |            |           | Hours            |         | Cos     |      |  |  |
| 0             | I   |  |           |            | J              | Prerequi   | isite Pro  | grams     |            |           |                  |         |         |      |  |  |
|               |   | •  | Basic (   | Program    | ns             |            |            |           |            |           |                  |         |         |      |  |  |
|               |   | Basic C Programs     (Arrays, User defined Functions, Structures, Pointers)  |           |            |                |            |            |           |            |           | 2                |         | NA      |      |  |  |
|               |   | Basic Commands in Linux  |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               |   |  |           |            |                | Р          | ART-A      |           |            |           |                  |         |         |      |  |  |
|               | ]   | Design   | , Develo  | p and Ir   | nplemen        | it a meni  | u driven   | Program   | m in C f   | or the    |                  |         |         |      |  |  |
|               | t   | following array operations. a. Creating an array of N Integer Elements   |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
| 1             | 1   | b. Display of array Elements with Suitable Headings c. Inser   |           |            |                |            |            |           |            |           | 2                | 2       | 2001.32 | 1    |  |  |
| 1             | ]   | Element (ELEM) at a given valid Position (POS) d. Deleting an  |           |            |                |            |            |           |            |           | -                |         | 202102. | 1    |  |  |
|               | i   | a given valid Position (POS) e. Exit. Support the program  |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               |   | Design Develop and Implement a Program in C to create a structure to   |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               |   | besign, Develop and Implement a Program in C to create a structure to  |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               |   | 10) and store their information 1 - Write a function to print the pames of   |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
| 2             |   | all the customers having balance lessthan\$2002 - Write afunction to   |           |            |                |            |            |           |            |           | 2                | 2       | 2CDL32. | 1    |  |  |
|               | ä   | add \$100 in the balance of all the customers having morethan \$1000 ir  |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               | 1   | heir b   | alance a  | nd then p  |                |            |            |           |            |           |                  |         |         |      |  |  |
|               | 1   | their balance  |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               | ]   | Design   | , Develo  | p and Ir   | nplemen        | it a meni  | u driven   | Program   | m in C f   | or the    |                  |         |         |      |  |  |
|               | 1   | followi  | ing oper  | ations of  | n STACK        | C of Integ | gers (Arr  | ay Impl   | lementat   | tion of   |                  |         |         |      |  |  |
| 2             | 1   | Stack v  | with max  | simum siz  | ze MAXJ        | a. Push a  | n Elemei   | it on to  | Stack b.   | Popan     | n                | 2       | 2001.22 | า    |  |  |
| 3             | 1   | Element from Stack c. Demonstrate how Stack can be used  |           |            |                |            |            |           |            |           | Z                | ۷       | 200132. | 2    |  |  |
|               |   | Paindrome d. Demonstrate Overflow and Underflow situations of<br>e. Display the status of Stack f. Exit Support the program with   |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               |   | appropriate functions for each of the above operations   |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
|               | ]   | Design   | , Develoj | p and Im   | plement        | a Progra   | am in C f  | for conv  | verting a  | n Infix   |                  |         |         |      |  |  |
|               | ]   | Expression to Postfix Expression. Program should support for both  |           |            |                |            |            |           |            |           |                  |         |         |      |  |  |
| 4             | ]   | parenthesized and free parenthesized expressions with theoperators: +, 2 22CDL3  |           |            |                |            |            |           |            |           |                  | 2CDL32. | 2       |      |  |  |
|               | -   | ·, *, /,   | % (Ren    | nainder),  | ^ (Pow         | er) and a  | alphanun   | neric     |            |           |                  |         |         |      |  |  |
|               | (   | operar   | ids.      |            | l- :           | - D        |            |           | -11        | Ch. 1     |                  |         |         |      |  |  |
|               |   | Design   | , Develo  | p and Im   | of Post        | i a Progra | am in Cf   | or the f  | digit or a | Stack     |                  |         |         | _    |  |  |
| 5             |   | and on   | auon: Ev  | aiuauon    | $0$ $^{\circ}$ | ix expres  | SIOII WILI | single    | uigit ope  | anus      | 2                | 2       | 2CDL32. | 2    |  |  |
|               |   | ina op   |           | רן ביי     | 70 <b>,</b> .  |            |            |           |            |           |                  |         |         |      |  |  |

|    | (                 | Design, Develop and Implement a Program in C for the following                                     | 2          | 22CDL32.2         |
|----|-------------------|--|------------|-------------------|
|    | 6                 | Stack Application: Solving Tower of Hanoi problem with n disks.                                    | Z          |                   |
|    |                   | PART-B   |            |                   |
|    |                   | Design, Develop and Implement a menu driven Program in C for the                                   |            |                   |
|    |                   | following operations on Circular QUEUE of Characters (Array  |            |                   |
|    |                   | Implementation of Queue with maximum size MAX) a. Insert an  |            |                   |
|    | -                 | Element on to Circular QUEUE b. Delete an Element from Circular                                    | 2          |                   |
|    | 7                 | QUEUE c. Demonstrate Overflow and Underflow situations on  | Z          | 22CDL32.2         |
|    |                   | Circular QUEUE d. Display the status of Circular QUEUE e. Exit                                     |            |                   |
|    |                   | Support the program with appropriate functions for each of the above                               |            |                   |
|    |                   | Operations   |            |                   |
|    |                   | Design, Develop and Implement a menu driven Program in C for the                                   |            |                   |
|    |                   | following operations on Singly Linked List (SLL) of Student Data with                              |            |                   |
|    |                   | the fields: USN, Name, Branch, Sem, PhNo a. Create a SLL of N Students                             |            |                   |
|    | 8                 | Data by using front insertion. b. Display the status of SLL and count                              | 2          | 22CDL32.3         |
|    |                   | the number of nodes in it c. Perform Insertion / Deletion at End of SLL                            |            |                   |
|    |                   | d. Perform Insertion / Deletion at Front of SLL(Demonstration of                                   |            |                   |
|    |                   | stack) e. Exit   |            |                   |
|    |                   | Design, Develop and Implement a menu driven Program in C for the                                   |            |                   |
|    |                   | following operations on Doubly Linked List (DLL) of Employee Data                                  |            |                   |
|    |                   | with the fields: SSN, Name, Dept, Designation, Sal, PhNo a. Create a                               |            |                   |
|    | 9                 | DLL of N Employees Data by using end insertion. b. Display the status                              | 2          | 22CDL32.3         |
|    | -                 | of DLL and count the number of nodes in it c. Perform Insertion and                                |            |                   |
|    |                   | Deletion at End of DLL d. Perform Insertion and Deletion at Front of                               |            |                   |
|    |                   | DLL e. Demonstrate how this DLL can be used as Double Ended  |            |                   |
|    |                   | Queue. f. Exit   |            |                   |
|    | 10                | Using circular representation for a polynomial, design, develop, and                               | 2          | 2200122.2         |
|    | 10                | execute a program in C to accept two polynomials, add them, and then                               | Z          | 22CDL32.3         |
|    |                   | print the resulting polynomial.  |            |                   |
|    |                   | besign, Develop and Implement a menu driven Program in C for the                                   |            |                   |
|    | 11                | Create a PST of N Integers: 6.0 E 2.9 1E 24.14.7.9 E 2 h Traverse                                  | 2          | 22001 22 4        |
|    | 11                | the BST in Inorder, Preorder and Post Order c. Search the BST for a                                | 2          | 22CDL52.4         |
|    |                   | given element (KFV) and report the appropriate message d. Evit                                     |            |                   |
|    |                   | Demonstrate hinary search algorithm using anyone of the sorting                                    |            |                   |
|    | 12                | techniques   | 2          | 22CDL32.4         |
|    |                   | PART-C   |            |                   |
|    |                   | Beyond Syllabus Virtual Lab Content  |            |                   |
|    |                   | (To be done during Lab but not to be included for CIE or SE  | E)         |                   |
| 1. | https://ds        | 1-iiith.vlabs.ac.in/exp/poly-arithmetic/polynomial-arithmetic-linked-lis                           | t/multipli | ication-of-       |
|    | polynomia         | <u>als.html</u> : Implement polynomial multiplication using linked lists.                          | _          |                   |
| 2. | <u>https://ds</u> | <u>1-iiith.vlabs.ac.in/exp/depth-first-search/dfs/dfs-demo.html</u> Implen                         | nent Dept  | h First Search in |
| 2  | bttps://do        | 1 jijith ylahe ac in /ayn /hach tahlae /hach tahlae /hach tahlae anarstiana                        | htmlDom    | netrato Hach      |
| J. | Table             | <u>וווווייזמטאמניוון פאטן וומאויינמטופא וומאויינמטופא וומאויינמטופא וומאויינמטופא-סטפרמנוסווא.</u> | Demo       | nisuate nasil     |
|    | TUDIC             |  |            |                   |
|    |                   |  |            |                   |

#### CIE Assessment Pattern (50 Marks - Lab)

|    | DDT Lovale | Test (s) | Weekly Assessment |
|----|------------|----------|-------------------|
|    | KDI Levels | 20       | 30                |
| L1 | Remember   | -        | -                 |
| L2 | Understand | -        | 5                 |
| L3 | Apply      | 5        | 10                |
| L4 | Analyze    | 10       | 10                |
| L5 | Evaluate   | 5        | 5                 |
| L6 | Create     |          |                   |

#### SEE Assessment Pattern (50 Marks - Lab)

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | -                               |
| L2 | Understand | 10                              |
| L3 | Apply      | 10                              |
| L4 | Analyze    | 20                              |
| L5 | Evaluate   | 10                              |
| L6 | Create     |                                 |

#### Suggested Learning Resources Reference Books:

3. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Fundamentals of Data Structures in C. University Press, 2012, **ISBN-13**: 978-0716782506

1. Debasis Samanta: Classic Data Structures, 2<sup>nd</sup> Edition, PHI, 2009, **ISBN-13**: 978-8120337312

2. Yedidyah, Augenstein, Tannenbaum: "Data Structures using C and C++,2nd Edition, Pearson Education, 2003, ISBN 8131702294, 9788131702291

3. Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Cengage Learning, 2005, **ISBN-13**: 978-8131503140

4. Reema Thareja: "Data Structures Using C", Oxford university Press (2021), **ISBN-13**: 978-0198099307

#### Web links and Video Lectures (e-Resources):

- 1. <u>https://www.udemy.com/course/datastructurescncpp/</u>
- 2. <u>https://www.coursera.org/specializations/data-structures-algorithms</u>
- 3. <u>https://nptel.ac.in/courses/106102064</u>

|  |   |  |           |            | DATA      | ABASE N   | ANAG      | EMENT     | SYSTE    | MS          |                    |             |            |           |
|--|---|--|-----------|------------|-----------|-----------|-----------|-----------|----------|-------------|--------------------|-------------|------------|-----------|
| Course Code  | 22CD  | S33  |           |            |           |           |           |           | CIE M    | larks       |                    | 50          |            |           |
| L:T:P:S  | 3:0:0:  | :0   |           |            |           |           |           |           | SEE N    | larks       |                    | 50          |            |           |
| Hrs / Week   | 3   | -  |           |            |           |           |           |           | Tota     | Marks       |                    | 100         | )          |           |
| Credits  | 03  |  |           |            |           |           |           |           | Exan     | Hours       |                    | 03          |            |           |
| Course outcom  | es:   |  |           |            |           |           |           |           | -        |             |                    |             |            |           |
| At the end of the  | e course  | e, the st  | udent v   | vill be al | ole to:   |           |           |           |          |             |                    |             |            |           |
| 22CDS33.1  | Illustr   | ate the  | e ER mo   | del and    | relation  | al data 1 | nodel to  | o real wo | ord scer | narios.     |                    |             |            |           |
| 22CDS33.2  | Interp  | Interpret the DBMS components and concurrency control. |           |            |           |           |           |           |          |             |                    |             |            |           |
| 22CDS33.3  | Analyze the database using relational algebra and query language.   |  |           |            |           |           |           |           |          |             |                    |             |            |           |
| 22CDS33.4  | Evaluate the database using SQL key constraints and nested queries and normalization techniques to refine databases.          |  |           |            |           |           |           |           |          |             |                    |             |            |           |
| 22CDS33.5  | Infer the concepts of joins and nested queries for various databases.   |  |           |            |           |           |           |           |          |             |                    |             |            |           |
| 22CDS33.6  | Apply the database processing techniques to ensure correctness through retrievals, insertions, deletions and updates.         |  |           |            |           |           |           |           |          |             |                    |             |            |           |
| Mapping of Co  | urse O  | utcom  | es to P   | rogran     | 1 Outco   | mes ar    | nd Prog   | ram Sp    | ecific ( | Dutcome     | s:                 |             |            |           |
|  | P01   | P02  | P03       | P04        | P05       | P06       | P07       | P08       | P09      | P010        | P011               | P012        | PS01       | PSO2      |
| 22CDS33.1  | 3   | -  | -         | -          | -         | -         | -         | -         | -        | -           | -                  | 1           | 3          | 2         |
| 22CDS33.2  | 2   | -  | -         | -          | -         | -         | -         | -         | -        | -           | -                  | 1           | 3          | 2         |
| 22CDS33.3  | 3   | 3  | -         | -          | -         | -         | -         | -         | -        | -           | -                  | 1           | 3          | 2         |
| 22CDS33.4  | 3   | 3  | 3         | 3          | -         | -         | -         | -         | -        | -           | -                  | 1           | 3          | 2         |
| 22CDS33.5  | 3   | 3  | -         | -          | -         | -         | -         | -         | -        | -           | -                  | 1           | 3          | 2         |
| 22CDS33.6  | 3   | -  | -         | -          | -         | -         | -         | -         | -        | -           | -                  | 1           | 3          | 2         |
| MODULE-1   |   | 1  |           | INT        | RODU      | CTION     |           |           | 1        |             | 22CDS33<br>22CDS33 | 8.1,<br>8.2 | <b>8</b> H | lours     |
| Introduction to  | Databa  | se: Ch   | aracteri  | stics, ac  | lvantage  | es of DE  | BMS AD    | oroach.   | Hierarc  | hical. Net  | work and           | Relation    | al Model   | s. Three- |
| schema archite   | cture ai  | nd data  | a indep   | endence    | , DBMS    | compo     | nent m    | odules,   | Databa   | se langua   | ges. Datal         | base desig  | gn and El  | R Model:  |
| Introduction, El   | R-Mode  | l conce  | epts, Co  | nstraint   | s, weak   | entity t  | types, n  | otation   | for ER   | diagram,    | -<br>ER-Diagra     | ams, map    | ping       |           |
| constraints.   |   |  | -         |            |           | -         |           |           |          | -           | -                  |             |            |           |
| Case Study   | Create  | e an ER  | diagrai   | m for a ı  | universi  | ty mana   | igement   | system    | involve  | es defining | g entities         | like stude  | nts, cours | ses,      |
|  | profes  | ssors, a   | nd depa   | artment    | s, along  | with the  | eir relat | ionships  | 5.       |             |                    |             |            |           |
| Text Book  | Text B  | Book 1:  | 1,2,3     |            |           |           |           |           |          |             |                    |             |            |           |
|  |   | TION   |           |            | EL AND    |           | TIONA     |           |          |             | 22CDS3             | 3.1,        | 0          | Lours     |
| MODULE-2   | KELA  |  | AL DA I   | AMOD       | CL ANI    | J KELA    | TIONA     | LALGEI    | DKA      |             | 22CDS3             | 3.3         | 0          | nours     |
| Relational data  | model   | concep   | ts, Rela  | tional n   | nodel co  | nstrain   | ts and r  | elationa  | l datab  | ase schen   | nas, Upda          | te operat   | ions, Trai | nsactions |
| and dealing wit  | h const   | raints.  | Relatio   | onal Alg   | ebra: Se  | lection   | and pro   | ojection, | set op   | erations, 1 | renaming           | , Joins, Di | vision, O  | perators, |
| grouping and u   | ngroupi   | ng, rela   | ational   | compari    | son. Cal  | culus: T  | uple re   | lational  | calculu  | s, Domain   | relationa          | 1           |            |           |
| Calculus.  | 1   |  |           |            |           |           |           |           |          |             |                    |             |            |           |
| Case Study   | Create  | e a rela   | ational o | databas    | e for an  | Invento   | ory Mar   | nagemen   | it Syste | m involve   | es definin         | g tables f  | or Produ   | cts,      |
|  | Suppli  | iers, Oi   | ders, ai  | nd Custo   | omers w   | ith appi  | ropriate  | constra   | aints. U | se relatio  | hal algebr         | a operatio  | ons like   |           |
| Tart Da ala  | select  | 10n, pro   | 5 o       | , and joi  | ns to ma  | anage da  | ata.      |           |          |             |                    |             |            |           |
| Text Book  | Text B  | 500K 1:  | 5,8       |            |           |           |           |           |          |             | 220002             | <u></u>     |            |           |
| MODULE-3         SQL-1         22CDS33.3,<br>22CDS33.4         8 Hours |   |  |           |            |           |           |           |           |          |             |                    |             |            |           |
| Introduction, So   | QL data   | types,   | Data D    | efinitio   | n Langu   | age (DI   | DL), Dat  | a Manip   | oulation | Languag     | e (DML),           | keys, inte  | egrity rul | es,       |
| Integrity constr   | Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints. Querying in SQL - basic |  |           |            |           |           |           |           |          |             |                    |             |            |           |
| select-from-who  | ere bloc  | k and i  | ts sema   | ntics, Vi  | ews.      |           |           |           |          |             | -                  |             |            |           |
| Case Study   | Desig   | n a hos  | pital ma  | inageme    | ent syste | em datal  | base inc  | ludes tal | bles for | Patients,   | Doctors, A         | ppointme    | ents, Med  | ical      |
|  | Kecor   | ds, and  | i Depar   | tments,    | with co   | onstrain  | ts to en  | sure da   | ta integ | rity. Use   | SQL state          | ments (D    | DL, DML    | to        |
|  | enable  | e data i   | nanage    | ment.      |           |           |           |           |          |             |                    |             |            |           |
| l'ext Book   | Text B  | sook 1:  | 6,7       |            |           |           |           |           |          |             |                    |             |            |           |

| MODULE-4  |  | SQL·                | ·2 AND NOI                    | RMA             | LIZATION                   | ſ  | 220<br>220                   | CDS33.4,<br>CDS33.5                      | 8 Hours             |  |  |
|---|--|---------------------|-------------------------------|-----------------|----------------------------|--|------------------------------|--|---------------------|--|--|
| Joins and its ty<br>Functional dep<br>BCNF).  | pes, Nested que<br>endencies, feat   | ries - c<br>ures of | orrelated an<br>good relatio  | nd ur<br>onal c | ncorrelated<br>database de | , aggregation func<br>esign, atomic doma | tions, group<br>ain and Norr | o by and having cl<br>malization (1NF, 2 | auses.<br>2NF, 3NF, |  |  |
| Text Book   | Text Book 1:7  | ,14                 |                               |                 |                            |  |                              |  |                     |  |  |
| MODULE-5  | TRANSAC  | TION                | IANAGEME<br>CONT              | ENT A           | AND CONC<br>L              | URRENCY                                  | 220<br>220                   | CDS33.2,<br>CDS33.6                      | 8 Hours             |  |  |
| Transaction pro<br>concurrency co<br>database recov   | I ransaction processing and Error recovery - concepts of transaction processing, ACID properties, and serializability concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, and database recovery Management, RAID. |                     |                               |                 |                            |  |                              |  |                     |  |  |
| Text Book   | Text Book 1: 2   | 21,22,2             | 3                             |                 |                            |  |                              |  |                     |  |  |
| CIE Assessmer   | nt Pattern (50   | Marks               | - Theory) -                   | -               |                            |  |                              | 1  |                     |  |  |
|   |  |                     |                               | -               | N                          | larks Distributio                        | n                            | -  |                     |  |  |
|   |  | R                   | BT Levels                     |                 | Test (s)                   | Assessment                               | MCQ's                        |  |                     |  |  |
|   |  |                     |                               | -               | 25                         | 15                                       | 10                           | -  |                     |  |  |
|   |  | L1                  | Rememb                        | er              | -                          | -  | -                            |  |                     |  |  |
|   |  | L2                  | Understa                      | nd              | 5                          | -  | -                            | -  |                     |  |  |
|   |  | L3                  | Apply                         |                 | 10                         | 10                                       | 5                            |  |                     |  |  |
|   |  | L4                  | Analyze                       | è               | 5                          | 5  | 5                            |  |                     |  |  |
|   |  | L5                  | Evaluate                      | e               | 5                          | -  | -                            | _  |                     |  |  |
|   |  | L6                  | Create                        |                 | -                          | -  | -                            |  |                     |  |  |
| SEE Assessme  | nt Pattern (50   | Marks               | s – Theory)                   |                 |                            |  |                              |  |                     |  |  |
|   |  |                     | RB                            | BT Le           | evels                      | Exam Marks<br>Distribution<br>(50)       |                              |  |                     |  |  |
|   |  |                     | L1 J                          | Rem             | ember                      | -  |                              |  |                     |  |  |
|   |  |                     | L2 [                          | Unde            | erstand                    | 10                                       |                              |  |                     |  |  |
|   |  |                     | <b>L3</b>                     | Appl            | ly                         | 15                                       |                              |  |                     |  |  |
|   |  |                     | L4 /                          | Anal            | lyze                       | 15                                       |                              |  |                     |  |  |
|   |  |                     | L5 I                          | Eval            | uate                       | 10                                       |                              |  |                     |  |  |
|   |  |                     | L6 (                          | Crea            | ite                        | -  |                              |  |                     |  |  |
| Suggested Lea<br>Text Books:  | rning Resourc  | es:                 |                               |                 |                            |  |                              |  |                     |  |  |
| 1. Rame<br>Wesl   | ez Elmasri, Shar<br>ey, 7th Edition I  | nkant I<br>2021, I  | 3. Navathe, "<br>SBN: 10: 0-1 | 'Fun<br>136-(   | damentals<br>08620-9       | of Database Syster                       | ns" , Sixth E                | dition, Pearson /                        | Addison -           |  |  |
| <ol> <li>Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw<br/>Hill, 2013, ISBN-13: 978-9332901384</li> </ol>                                   |  |                     |                               |                 |                            |  |                              |  |                     |  |  |
| <ol> <li>Hector Garcia-Molina, Jeff Ullman, and Jennifer Wisdom, Database System, Pearson, 2nd EditionC.J. Date, An<br/>Introduction to Database Systems, 8th Edition, ISBN-13: 978-0131873254</li> </ol> |  |                     |                               |                 |                            |  |                              |  |                     |  |  |
| 3. Ragh<br>0072   | u Ramakrishna<br>465631  | n, "Data            | abase Manaş                   | geme            | ent Systems                | ", Third Edition, M                      | IcGraw Hill,                 | , 2013., <b>ISBN-13</b>                  | 978-                |  |  |

#### Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- 1. Self-study to explore various types of databases
- 2. Case Study- Designing a relational database for the given scenario
- 3. Problem solving activities (Activity-based discussions)

|  |                        |  |  | DA  | TABAS  | <u>E MAN</u> A                   | AGEMEN  | <u>NT SYS</u> T  | EMS LA   | В                                 |                                 |               |              |              |  |  |
|--|------------------------|--|--|---|--|----------------------------------|---|--|--|-----------------------------------|---------------------------------|---------------|--------------|--------------|--|--|
| Course Code                              | 2                      | 22CDL3   | 3  |   |  |                                  |   |  | CIE M  | larks                             |                                 | 50            |              |              |  |  |
| L:T:P:S                                  | 0:0:1:0     SEE Marks  |  |  |   |  |                                  |   |  |  |                                   |                                 |               |              |              |  |  |
| Hrs / Week                               | 2                      | 2  |  |   | 100  |                                  |   |  |  |                                   |                                 |               |              |              |  |  |
| Credits                                  | 0                      | )1   |  |   |  |                                  |   |  | Exan   | n Hours                           |                                 | 03            |              |              |  |  |
| <b>Course outcom</b><br>At the end of th | es:<br>ne cour         | <b>s:</b><br>e course, the student will be able to:                          |  |   |  |                                  |   |  |  |                                   |                                 |               |              |              |  |  |
| 22CDL33.1                                | 0                      | Create a   | datab  | ase as p  | er the g   | iven req                         | uireme  | nts using  | g DDL.   |                                   |                                 |               |              |              |  |  |
| 22CDL33.2                                | N                      | Manipulate the given database using DML.                                     |  |   |  |                                  |   |  |  |                                   |                                 |               |              |              |  |  |
| 22CDL33.3                                | A                      | Apply the concept of operators and functions for a given scenario using SQL. |  |   |  |                                  |   |  |  |                                   |                                 |               |              |              |  |  |
| 22CDL33.4                                | l                      | Jse nest   | ed and   | d correla   | ated que   | eries to i                       | retrieve  | the data   | from th  | ne databas                        | e.                              |               |              |              |  |  |
| Mapping of Co                            | urse C                 | )utcom   | les to   | Progra  | m Outo   | comes a                          | and Pro   | gram S   | pecific  | Outcome                           | S:                              | <b>D0</b> 4 0 | <b>D</b> 204 | <b>D</b> 600 |  |  |
|  | P01                    | P02  | P03  | P04   | P05  | P06                              | <b>PO</b> 7   | P08  | P09  | P010                              | P011                            | P012          | PS01         | PS02         |  |  |
| 22CDL33.1                                | 3                      | 3  | 3  | 3   | 3  | -                                | -   | -  | -  | -                                 | -                               | 1             | 3            | 2            |  |  |
| 22CDL33.2                                | 2                      | 2  | 2  | 2   | 2  | -                                | -   | -  | -  | -                                 | -                               | 1             | 2            | 2            |  |  |
| 22CDL33.3                                | 3                      | 3  | 3  | 3   | 3  | -                                | -   | -  | -  | -                                 | -                               | 1             | 3            | 2            |  |  |
|  |                        |  |  |   |  |                                  |   |  |  |                                   |                                 |               | •            |              |  |  |
| Pgm. No.                                 |                        |  |  |   |  | List of I                        | Program   | ıs   |  |                                   |                                 | Hours         |              | COs          |  |  |
|  |                        |  |  |   |  | Prere                            | equisite  | Progra   | ms   |                                   |                                 |               |              |              |  |  |
|  |                        | Crea<br>con<br>Con<br>Dev<br>HAV   | ation o<br>straint<br>nmand<br>elopin<br>/ING.   | of tables<br>ts while<br>ls.<br>ng Quer   | , inserti<br>e creatin<br>ies usin   | on of va<br>ng table<br>ng claus | llues wit<br>es) and<br>es SELI   | h Data I<br>exercis<br>ECT, FR   | Definitio<br>es on I<br>OM, WI                 | on Comma<br>Data Mani<br>HERE, GR | nds (use<br>pulation<br>OUP BY, | 2             |              | NA           |  |  |
|  |                        |  |  |   |  |                                  | PAR   | Г-А  |  |                                   |                                 |               |              |              |  |  |
| 1  | Intro                  | duction  | to SQ  | L Comm  | ands: D  | DL (Dat                          | ta Defini   | tion Lan   | iguage),                                       |                                   |                                 | 2             | 220          | 22CDL33.1    |  |  |
| 2  | DML<br>Delet           | (Data M<br>te. Retri   | lanipu<br>eval o   | lation La<br>f data fr  | anguage<br>om a sir  | e):Imple                         | mentati<br>e using  | on of Se<br>simple c   | lect, Inso<br>Jueries                          | ert, Updat                        | e,                              | 2 220         |              | DL33.2       |  |  |
| 3  | Impl                   | ementa   | tion of  | frelatio  | nal and l  | logical o                        | perator   | s  |  |                                   |                                 | 2 22CDL3      |              | DL33.3       |  |  |
| 4  | Impl                   | ementa   | tion of  | f SQL Fu  | nctions  |                                  |   |  |  |                                   |                                 | 2             | DL33.4       |              |  |  |
| 5  | Imple<br>Coml<br>Claus | ementa<br>bining t<br>se),(Cre   | tion of<br>ables a<br>ate vie  | f Constra<br>and exec<br>ews and  | aints: N<br>cution o<br>triggers   | OT NUL<br>f querie<br>s)         | L, Prima<br>s on suc  | ry Key, l<br>h tables  | Foreign<br>(Group                              | Key, Uniq<br>by and Ha            | ue.<br>ving                     | 2             | 220          | DL33.3       |  |  |
| 6  | Crea                   | 1. Ca<br>2. Sh<br>3. Sh<br>4. Di<br>5. Sh<br>6. Ho                           | rtmen<br>Nam<br>Dep<br>Dep<br>Loc<br>lculate<br>ow the<br>ree pe<br>splay e<br>partm<br>ow that<br>ow ma | t table v<br>ne<br>otNo.<br>otName<br>ation<br>e the ave<br>e averag<br>e averag<br>ople.<br>employe<br>ent 30<br>at value<br>ny days | erage sa<br>erage sa<br>e salary<br>e salary<br>ees who<br>returne<br>betwee | followin                         | ng struc<br>Type<br>Varchar2<br>Varchar2<br>Varchar2<br>each dif<br>job exc<br>lepartm<br>ore than<br>m (n) fun<br>birth to | 2(20)<br>2(20)<br>ferent jo<br>luding m<br>ents em<br>the low<br>nction. | ob.<br>nanager.<br>ploying<br>est salan<br>ate | more than                         | 1                               | 2             | 220          | DL33.3       |  |  |

| 7  | <ul> <li>Consider the following schema for a Library Database:BOOK</li> <li>(Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS</li> <li>(Book_id, Author_Name)</li> <li>PUBLISHER (Name, Address, Phone)</li> <li>BOOK_COPIES (Book_id, Programme_id, No-of_Copies)</li> <li>BOOK_LENDING (Book_id, Programme_id, Card_No, Date_Out, Due_Date)</li> <li>LIBRARY_PROGRAMME (Programme_id, Programme_Name, Address)</li> <li>1. Insert at least 5 records for each table. Add appropriate database constraints</li> <li>2. Retrieve details of all books in the library - id, title, name of publisher, authors, number of copies in each Program, etc.</li> <li>3. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.</li> <li>4. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.</li> <li>5. Create a view of all books and its number of copies that are currently available in the Library.</li> </ul> | 2 | 22CDL33.3<br>22CDL33.4 |
|----|---|---|------------------------|
| 8  | <ul> <li>Consider the following schema for Order Database:</li> <li>SALESMAN (Salesman_id, Name, City, Commission)</li> <li>CUSTOMER (Customer_id, Cust_Name, City,</li> <li>Grade,Salesman_id)</li> <li>ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)Write</li> <li>SQL queries to <ol> <li>Insert at least 5 records for each table. Add appropriate database constraints</li> <li>Count the customers with grades above Bangalore's average.</li> <li>Find the name and numbers of all salesmen who had more than one customer.</li> <li>List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)</li> <li>Create a view that finds the salesman who has the customer with the highest order of a day.</li> <li>Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.</li> </ol> </li> </ul>   | 2 | 22CDL33.3<br>22CDL33.4 |
| 9  | <ul> <li>Consider the schema for Movie Database:</li> <li>ACTOR (Act_id, Act_Name, Act_Gender) DIRECTOR (Dir_id, Dir_Name, Dir_Phone) MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)</li> <li>MOVIE_CAST (Act_id, Mov_id, Role)</li> <li>RATING (Mov_id, Rev_Stars)</li> <li>Insert at least 5 records for each table. Add appropriate database constraints.</li> <li>Write SQL queries to <ol> <li>List the titles of all movies directed by 'Hitchcock'.</li> <li>Find the movie names where one or more actors acted in two or more movies.</li> <li>List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).</li> <li>Find the title of movies and number of stars for each movie that hasat least one rating and find the highest number of stars that movie received. Sort the result by movie title.</li> </ol> </li> </ul>   | 2 | 22CDL33.3<br>22CDL33.4 |
| 10 | Consider the schema for College Database:<br>STUDENT (USN, SName, Address, Phone, Gender)<br>SEMSEC (SSID, Sem, Sec)<br>CLASS (USN, SSID)<br>SUBJECT (Subcode, Title, Sem, Credits)<br>IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)<br>Insert at least 5 records for each table. Add appropriate database constraintsWrite<br>SQL queries to  | 2 | 22CDL33.3<br>22CDL33.4 |

| 1       Lots an the student details students and tenale students in each semister and in each section.         2       Compute the total number of male and tenale students in each semister and in each section.         3       Create a view of TestI marks of student USN '1B115CS101' in all subjects.         4       Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.         5       Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = 0 verage' if FinalIA - 12 then CAT = 1 weak' (five these details only for 8th semister A, B, and C section students.         11       EMPLOYETE (SN, Name, Address, Sex, Slary, SuperSSN, No)         DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc)         PROLOFET (SN, Name, Address, Sex, Slary, SuperSSN, DNo)         DEPARTMENT (DNo, Name, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc)         PROLOFET (SN, Name, Address, Sex, Slary, SuperSSN, David, ConstraintsWrite SQL queries to         1       Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.         2       Structure the address and the maximum salary. the minimum salary, and the average salary in this department.         3       Find the sum of the salaries of all employees working on the 'IOT' projects' controlled by department number of patients, whowere admitted on the recommendation of their own CP and confirmed by a consutant employed by the Hospital . On admission, the perso   |   | 1 List all the student details studying in fourth competen "C'section   |              |           |
|--|---|---|--------------|-----------|
| <ul> <li>2. Compare the total number of mate and remains students in each a semester and in each section.</li> <li>3. Create a view of Test1 marks of student USN 'IBH15CS101' in all subjects.</li> <li>4. Calculate the Finalh (average of best two test marks) and update the corresponding table for all students.</li> <li>5. Categorize students based on the following criterion: If FinallA = 17 to20 then CAT = Outstanding I' FinallA = 12 to 16 then CAT = 'Average' I' FinallA = 12 then CAT = 'Werage' I' FinallA = 13 then CAT = 'Werage' I' FinallA = 12 then CAT = 'Werage' I' FinallA = 13 th</li></ul>   |   | 1. List all the student details studying in four th semester 't section.  |              |           |
| Seliester and in text student USN '1B115CS101' in all subjects.     Subjects.     Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.     Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.     Calculate the FinalIA = 12 to 16 then CAT = 'Average' If FinalIA = 12 to 16 then Table' and the count of the row of the count's that countries the project.     So the resulting salarities if every employee working on the 'IOT' project is given a 10 percent traise' department and the result is of a lemployee who works on all the project: controlled by department number of a count and the same than five employee who works on all the project's controlled by department number of patients, whowere admitted on the recommendation of their own (P and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store their denormation of the cases and many be loading consultants for a number of patients, whowere admitted on the recommend  |   | 2. Compute the total number of male and female students in each   |              |           |
| <ul> <li>Clobel a view of rest in fails of student ON Thi LSLS101 in all subjects.</li> <li>Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.</li> <li>Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = "Average' If FinalIA&lt;12 to 16 then CAT = Average' If FinalIA&lt;1</li></ul>  |   | Semester and in each section.   |              |           |
| a       Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.         b       Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.         c       Calculate the FinalIA = 12 to 15 then CAT = 'Average' If FinalIA = 12 to 15 then CAT = 'Average' If FinalIA = 12 to 15 then CAT = 'Average' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA = 12 to 10 then CAT = 'Weak' (but these details only for 8th senseter A, 8, and C. section students.         11       EMPLOYEE (SSN Name, Address, Sex, Salary, SuperSSN, DNo)         DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc)         PROJECT (PNo, PName, PLocation, DNo)         WORKS, ON (SSN, PNo, Hours)         Insert at least 5 records for each table. Add appropriate database constraintsWrite SQL queries to         1.       Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department, and the salaries of all employees or the 'Accounts' department, a work on all the projects         2.       Show the resulting salaries if every employee working on the 'IOT' project is given a 10 percent raise       2         3.       Find the sum of the salaries of all employees of the 'Accounts' department, a work on all the projects       2         2.       (ase NOT FINITY) CBENEAL (ADSPITAL       4.       4.         4.       Retrieve the agartement number and then number of its employees who are making more than 8s,   |   | 3. Create a view of festi marks of student USN TBITSCSTUT in all  |              |           |
| <ul> <li>Calculate the Phash (averge 0 best to test marks) and update the corresponding table for all students.</li> <li>Categorize students based on the following criterion: IF FinallA = 17 to 20 then CAT = 0 version of the test of a certain students.</li> <li>EMPLOYEE (SSN Name, Address, Sex, Salary, SuperSSN, DNO)</li> <li>DEPARTINET (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNO, DLOC)</li> <li>PROJECT (PNo, PName, PLocation, DNO)</li> <li>WORKS, ON (SSN, PNo, Hours)</li> <li>Insert at least 5 records for each table. Add appropriate database constraints Write SQL queries to</li> <li>Make a list of all project numbers for projects that involve an employee whose last name is 'Soctf, either as a worker or as a manager of the department that controls the project.</li> <li>Show the resulting stafresi i every employee working on the 'IOT' project is given a 10 percent raise</li> <li>Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, andthe average salary in this department to the abartes of all employee who works on all the projects controlled by department number and the number of the tests undertaken and the results of a prescribed treatment number and the projects controlled by department number and the number of the tests undertaken and the results of a prescribed treatment number and the number of the tests undertaken and the results of a prescribed treatment number and the number of the tests and by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of patients, not ecessarily from the same ward.</li> <li>An analyze the data required.</li> <li>An oranize the attributes.</li> <li>Create the logical data model using F-R diagrams</li> <li>Create the logical data model using F-R diagrams.</li></ul>   |   | Subjects.   |              |           |
| 1       Conversioning under to have students.         1       Final A: 12 then CAT = "Outstanding IIF Final A = 12 to 16 then CAT = "Average" II Final A: 12 then CAT = "Weak" (Sive these details only for 8th semester A, B, and C section students.         11       EMPLOYEE (SSN Name, Address, Sex, Slavp, SuperSSN, NDo)         DEPEARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo, DLoc)         NOBECT (PNo, PName, PLocation, DNo)         WORKS, ON (SSN, PNo, Hours)         1.       Insert at least 5 records for each table. Add appropriate database constraintsWrite SQL queries to         1.       Make a list of all project numbers for projects that involve an employee whose last name is "Scott", either as a worker or as a manager of the department that controls the project.         2.       Show the resulting salaries if every employee working on the "lot" project is given al 10 percent raise         3.       Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, andthe average salary in this department number and the number of its employees, retrieve the department number and the number of its employees, who are making more than Rs, 6,0,0,00         12       CASESTUPU's GENERAL (ADSPTAL         14       Retrieve the adarted as a number of patients, not necessarily from the same ward.         12       CASESTUPU's GENERAL (ADSPTAL         14       A ceneral Hospital consists of a number of patients, not necessarily from the same ward.         12   |   | 4. Calculate the Finalia (average of best two test marks) and update the  |              |           |
| 1       5. Categorize students based on the forwing the form of the form of the order of the form  |   | Corresponding table for all students.<br>F = Catagoriza students based on the following criterion: If Finall A = 17 to 20                                 |              |           |
| 11       Under GAT = Weak (Give these details only for 8th semester A, B, and C section students.         11       EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)         DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo, DLoc)         PROJECT (PNo, PName, PLocation, DNo)         W00KS_ON (SN, NPo, Hours)         Insert at least 5 records for each table. Add appropriate database constraintsWrite SQL queries to         1.       Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.         2.       Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise         3.       Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, and the average salary in this department         4.       Retrieve the name of each employee who works on all the projects         5.       (use NOT EXISTS operator). For each department mumber of its employees, retrieve the department number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, whowere admitted on the recommendation of their own G Pad confirmed by a consultant employee by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be easamited by a consultened by a consultant by an   |   | 5. Categorize students based on the following criterion: If Finalia = $1/1020$<br>then CAT = (Autotanding' If Finalia = 12 to 16 then CAT = (Autorage' If |              |           |
| 11       EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)         11       EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)         DEPARTNENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION<br>(DNo,DLoc)       PROJECT (PNo, PName, PLocation, DNo)         WORKS, ON (SSN, PNo, Hours)       Insert at least 5 records for each table. Add appropriate database constraintsWrite<br>SQL queries to       1         1       Make a list of all project numbers for projects that involve an employee<br>whose last name is 'Scott', either as a worker or as a manager of the<br>department that controls the project.       2       22CDL33.3         2       22CDL33.4       22CDL33.4         9       Find the sum of the salaries of reach table. Add appropriate database constraintsWrite<br>squeare salary in this department for the salaries of reach department table average salary in this department number are as a manager of the<br>department, as well as the maximum salary, the minimum salary, and the<br>average salary in this department number and the number of its<br>employees, retrieve the dapartment number and the number of its<br>employees, retrieve the dapartment number and the number of its<br>employees, retrieve the dapartment number and the number of its<br>employees, retrieve the dapart than 8.6,00,000       2         12       CASE STUDY: GENERAL HOSPITAL<br>A General Hospital con admission, the personal details of every patient are recorded. A<br>separate register is to be held to store theinformation of the tests undertaken and<br>the results of a prescribed treatment. A number of patients, whowere admitted<br>on the recommendation of their own GP and confirmed by a consultant employeed<br>by the Hospital. On admission, the personal  |   | Finally $z = 0$ utstanting in Finally – 12 to 10 then $CAT = Average in Finally z = 0$  |              |           |
| 11       EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)         DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION       DDPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION         (DNo,DLoc)       PROJECT (PNo, PName, PLocation, DNo)       WORKS, SON (SSN, PNo, Nours)         Insert at least 5 records for each table. Add appropriate database constraintsWrite       SQL queries to       2         1.       Make a list of all project numbers for projects that involve an employee whose last name is "Scott", either as a worker or as a manager of the department that controls the project.       2       22CDL33.3         2       Show the resulting salaries if every employee working on the "IoT" project is given a 10 percent raise       3       22CDL33.4         3.       Find the sum of the salaries of all employees of the 'Accounts' department number       5       (use NOT EXISTS operator). For each department that has more than five employees who are making more than Rs.6,00,000         12       CASE STUDY: GENERAL HOSPITAL       A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, whowere admitted on the resoults of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.       2       22CDL33.3         12       CASE STUDY: Case stu  |   | semester A. B. and C section students.  |              |           |
| DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION<br>(DNo,DLoc)       DEPARTMENT (DNo, DName, PLocation, DNo)         WORKS_ON (SSN, PNo, Hours)       Insert at least 5 records for each table. Add appropriate database constraints/Write<br>SQL queries to       1. Make a list of all project numbers for projects that involve an employee<br>whose last name is "Scott", either as a worker or as a manager of the<br>department that controls the project.       2       22CDL33.3         2       22CDL33.4       2       22CDL33.4         3       Find the sum of the salaries of all employee working on the 'IoT'<br>project is given a 10 percent raise       2       22CDL33.4         3       Find the sum of the salaries of all employees of the 'Accounts'<br>department, as well as the maximum salary, the minimum salary, andthe<br>average salary in this department       2       22CDL33.4         12       CASE STUDY: GENERAL HOSPITAL<br>A General Hospital consists of a number of specialized wards (such as Maternity,<br>Pediatric, Oncolog, etc.)       2       22CDL33.3         12       CASE STUDY: GENERAL HOSPITAL<br>A General Hospital. On admission, the personal details of every patient are recorded. A<br>separate register is to be held to store of patients, whowere admitted<br>on the recommendation of their own GP and confirmed by a consultant employed<br>by the Hospital. On admission, the personal details of every patient are recorded. A<br>separate register is to be held to store the information of the tests undertaken and<br>the results of a prescribed treatment. A number of fests may be conducted for each<br>patient. Each patient is assigned to one leading consultant but may be examined by<br>another doctor, if required. Docto   | 11  | EMPLOYEE (SSN. Name, Address, Sex, Salary, SuperSSN, DNo)   |              |           |
| (DNo.DLoc)       PROJECT (PNo, PName, PLocation, DNo)         WORKS, ON (SSN, PNo, Hours)       Insert at least 5 records for each table. Add appropriate database constraintsWrite SQL queries to       2       22CDL33.3         1       Make a list of all project numbers for projects that involve an employee whose last name is 'Sout', either as a worker or as a manager of the department that controls the project.       2       22CDL33.4         2       Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, andthe average salary in this department and the projects controlled by department       2       22CDL33.4         1       Retrieve the name of each employee who works on all the projects controlled by department number       2       22CDL33.4         12       CASE STUDY: CENERAL HOSPITAL       A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, whowere admitted on the recommendation of the irow GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded.A separate register is to be held to store are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.       2         12       Lab Assignment:       1. Analyze the data required.       2       22CDL33.3         2       Z2CDL33.4       2       22CDL33.4         3       Dirot, Case Study. Develop a conceptual schem  |   | DEPARTMENT (DNo. DName, MgrSSN, MgrStartDate) DLOCATION   |              |           |
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| Insert at least 5 records for each table. Add appropriate database constraintsWrite SQL queries to       2       22CDL33.3         Image: Solid queries to the state of all project numbers for projects that involve an employee whose last name is 'Sout', either as a worker or as a manager of the department that controls the project.       2       22CDL33.3         Image: Solid queries to the salaries of every employee working on the 'lot" project is given a 10 percent raise       2       22CDL33.4         Image: Solid queries to the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department       3       4       4         Image: Retrieve the name of each employee who works on all the projects controlled by department number       5       (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000       12       CASE STUDY: GENERAL HOSPITAL       A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of tests undertaken and the results of a prescribed treatment. A number of tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialisti is nome branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.       2       22CDL33.3         Lab Assignment:       1. Analyze the data required.       <  |   | WORKS_ON (SSN, PNo, Hours)  |              |           |
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| 1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.       2       22CDL33.3         2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise       2       22CDL33.4         3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department number       2       22CDL33.4         6. Retrieve the name of each employee who works on all the projects controlled by department number       2       22CDL33.4         7       0. (use NOT ExUSTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000       2       22CDL33.4         12       CASE STUDY: GENERAL HOSPITAL       A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, whowere admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient: is assigned to one leading consultant but may be examined by a another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.       2       22CDL33.3 <tr< td=""><td></td><td>SQL queries to</td><td></td><td></td></tr<>  |   | SQL queries to  |              |           |
| whose last name is 'Scott', either as a worker or as a manager of the<br>department that controls the project.       2       22CDL33.3         2       22CDL33.4       2       22CDL33.4         3       Find the sum of the salaries if every employee working on the 'IoT'<br>project is given a 10 percent raise       2       22CDL33.4         3       Find the sum of the salaries of all employees of the 'Accounts'<br>department, as well as the maximum salary, the minimum salary, andthe<br>average salary in this department       4       Retrieve the name of each employee who works on all the projects<br>controlled by department number       5       (use NOT EXISTS operator). For each department that has more than five<br>employees who are making more than Rs.6,00,000       2       CASE STUDY: GENERAL HOSPITAL<br>A General Hospital consists of a number of specialized wards (such as Maternity,<br>Pediatric, Oncology, etc). Each ward hosts a number of patients, whowere admitted<br>on the recommendation of their own OP and confirmed by a consultant employeed<br>by the Hospital. On admission, the personal details of every patient are recorded. A<br>separate register is to be held to store theinformation of the tests undertaken and<br>the results of a prescribed treatment. A number of tests may be conducted for each<br>may be leading consultants for a number of patients, not necessarily from the same<br>ward.       2       22CDL33.3         Lab Assignment:<br>1. Analyze the data required.<br>2. Normalize the attributes.<br>3. Create the logical data model using E-R diagrams       2       22CDL33.4         PART-C<br>Beyond Syllabus Virtual Lab Content <br< td=""><td></td><td>1. Make a list of all project numbers for projects that involve an employee</td><td></td><td></td></br<>   |   | 1. Make a list of all project numbers for projects that involve an employee   |              |           |
| department that controls the project.     2     22CDL33.3       2     22CDL33.4     22CDL33.4       3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department     4       4. Retrieve the name of each employee who works on all the projects controlled by department number     5       5. (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department namber of its employees, retrieve the department namber of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, whowere admitted on the recommendation of their own QP and confirmed by a consultant employeed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of patients, who were admitted on the recommendation of the on QP and confirmed by a consultant employeed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by a nother doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.     2     22CDL33.3       Lab Assignment:     1     Analyze the data required.     2     22CDL33.4       .     Normalize the atrinputes.     3     Create the logical da   |   | whose last name is 'Scott', either as a worker or as a manager of the   |              |           |
| 2. Show the resulting salaries if every employee working on the 'loT'       2       22CDL33.4         project is given a 10 percent raise       3. Find the sum of the salaries of all employees of the 'Accounts'       22CDL33.4         average salary in this department       average salary in this department       4.         Retrieve the name of each employee who works on all the projects controlled by department number       5.       (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000       12       CASE STUDY: GENERAL HOSPITAL       A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, whowere admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each may be leading consultants for a number of patients, summer by a consultant but may be examined by a may be leading consultants for a number of patients, not necessarily from the same ward.       2       22CDL33.3         Lab Assignment:       1. Analyze the data required.       2       22CDL33.4         Ward.       2       Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)       2         1.       htttp://vlabsi.itkgp.ernet.in/se/4/case. study: Create and manipulat  |   | department that controls the project.   | 2            | 22CDL33.3 |
| a)       Find the sum of the salaries of all employees of the 'Accounts'<br>department, as well as the maximum salary, the minimum salary, andthe<br>average salary in this department         4)       Retrieve the name of each employee who works on all the projects<br>controlled by department number         5.       (use NOT EXISTS operator). For each department that has more than five<br>employees who are making more than Rs.6,00,000         12       CASE STUDY: GENERAL HOSPITAL<br>A General Hospital consists of a number of specialized wards (such as Maternity,<br>Pediatric, Oncology, etc). Each ward hosts a number of patients, whowere admitted<br>on the recommendation of their own GP and confirmed by a consultant employed<br>by the Hospital. On admission, the personal details of every patient are recorded. A<br>separate register is to be held to store theinformation of the tests undertaken and<br>the results of a prescribed treatment. A number of tests may be conducted for each<br>patient. Each patient is assigned to one leading consultant but may be examined by<br>another doctor, if required. Doctors are specialists in some branch of medicine and<br>may be leading consultants for a number of patients, not necessarily from the same<br>ward.       2       22CDL33.3<br>22CDL33.4         PART-C<br>Beyond Syllabus Virtual Lab Content<br>(To be done during Lab but not to be included for CIE or SEE)         1       http://vlabsi.itkgp.ernet.in/se/4/case_study: Develop a conceptual schema for Library Information System       1         1       http://vlabs.itkgp.ernet.in/se/4/case_study: Create and manipulate the database for Student Information<br>System       3.  |   | 2. Show the resulting salaries if every employee working on the 'IoT'   | 2            | 22CDL33.4 |
| 3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department         4. Retrieve the name of each employee who works on all the projects controlled by department number         5. (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000         12       CASE STUDY: GENERAL HOSPITAL         A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, whowere admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of patients, not necessarily from the same ward.       2       22CDL33.3         Lab Assignment:       1. Analyze the data required.       2       22CDL33.4          PART-C       Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)       1         1. http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information System       1       http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information System   |   | project is given a 10 percent raise   |              |           |
| department, as well as the maximum salary, the minimum salary, and the average salary in this department         4. Retrieve the name of each employee who works on all the projects controlled by department number         5. (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees, retrieve the department number of patients, whowere admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant to may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.       2       22CDL33.3         Lab Assignment:         1. Analyze the data required.       2. Normalize the attributes.       3. Create the logical data model using E-R diagrams       2       22CDL33.4         PART-C         Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)         1. http://vlabs.itkgp.ernet.in/se/4/case study: Develop a conceptual schema for Library Information System       1         3. http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information System       3. http://vlabs.iitkgp.ernet.in/se/4/case  |   | 3. Find the sum of the salaries of all employees of the 'Accounts'  |              |           |
| average salary in this department         4. Retrieve the name of each employee who works on all the projects<br>controlled by department number         5. (use NOT EXISTS operator). For each department that has more than five<br>employees, retrieve the department number and the number of its<br>employees who are making more than Rs.6,00,000         12       CASE STUDY: GENERAL HOSPITAL<br>A General Hospital consists of a number of patients, whowere admitted<br>on the recommendation of their own GP and confirmed by a consultant employed<br>by the Hospital. On admission, the personal details of every patient are recorded. A<br>separate register is to be held to store theinformation of the tests undertaken and<br>the results of a prescribed treatment. A number of tests may be conducted for each<br>patient. Each patient is assigned to one leading consultant but may be examined by<br>another doctor, if required. Doctors are specialists in some branch of medicine and<br>may be leading consultants for a number of patients, not necessarily from the same<br>ward.       2         Lab Assignment:       1. Analyze the data required.       2. Normalize the attributes.         3. Create the logical data model using E-R diagrams       2         PART-C       Beyond Syllabus Virtual Lab Content<br>(To be done during Lab but not to be included for CIE or SEE)         1. http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information<br>System         2. http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information<br>System   |   | department, as well as the maximum salary, the minimum salary, and the  |              |           |
| 4. Retrieve the name of each employee who works on all the projects<br>controlled by department number         5. (use NOT EXISTS operator). For each department that has more than five<br>employees, retrieve the department number and the number of its<br>employees, retrieve the department number and the number of its         12       CASE STUDY: GENERAL HOSPITAL<br>A General Hospital consists of a number of specialized wards (such as Maternity,<br>Pediatric, Oncology, etc). Each ward hosts a number of patients, whowere admitted<br>on the recommendation of their own GP and confirmed by a consultant employed<br>by the Hospital. On admission, the personal details of every patient are recorded. A<br>separate register is to be held to store theinformation of the tests undertaken and<br>the results of a prescribed treatment. A number of tests may be conducted for each<br>patient. Each patient is assigned to one leading consultant but may be examined by<br>another doctor, if required. Doctors are specialists in some branch of medicine and<br>may be leading consultants for a number of patients, not necessarily from the same<br>ward.       2       22CDL33.3         Lab Assignment:       1. Analyze the data required.       2.<br>Normalize the attributes.       3. Create the logical data model using E-R diagrams       2         PART-C       Beyond Syllabus Virtual Lab Content<br>(To be done during Lab but not to be included for CIE or SEE)       1.<br>http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information<br>System         1.       http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information<br>System       3.   |   | average salary in this department   |              |           |
| controlled by department number         5. (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees, retrieve the department number and the number of its employees, who are making more than Rs.6,00,000         12       CASE STUDY: GENERAL HOSPITAL         A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, whowere admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by a nother doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.       2       22CDL33.3         Lab Assignment:       1. Analyze the data required.       2. Normalize the attributes.       2       22CDL33.4         Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)       1. <a href="http://vlabs.iitkgp.ernet.in/se/4/case_study">http://vlabs.iitkgp.ernet.in/se/4/case_study</a> : Create and manipulate the database for Student Information System         1. <a href="http://vlabs.iitkgp.ernet.in/se/4/case_study">http://vlabs.iitkgp.ernet.in/se/4/case_study</a> : Create and manipulate the database for Student Information System   |   | 4. Retrieve the name of each employee who works on all the projects   |              |           |
| 5. (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000         12       CASE STUDY: GENERAL HOSPITAL         A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, whowere admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store theinformation of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.       2       22CDL33.3         Lab Assignment:       1. Analyze the data required.       2       22CDL33.4         PART-C       Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)       1. <a href="http://vlabs.iitkgp.ernet.in/se/4/case_study">http://vlabs.iitkgp.ernet.in/se/4/case_study: Develop a conceptual schema for Library Information System</a> 1.       http://vlabs.iitkgp.ernet.in/se/4/case_study: Create and manipulate the database for Student Information System         3.       http://vlabs.iitkgp.ernet.in/se/4/exercise       3.   |   | controlled by department number   |              |           |
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| 12       CASE STUDY: GENERAL HOSPITAL         12       CASE STUDY: GENERAL HOSPITAL         A General Hospital consists of a number of specialized wards (such as Maternity,<br>Pediatric, Oncology, etc). Each ward hosts a number of patients, whowere admitted<br>on the recommendation of their own GP and confirmed by a consultant employed<br>by the Hospital. On admission, the personal details of every patient are recorded. A<br>separate register is to be held to store theinformation of the tests undertaken and<br>the results of a prescribed treatment. A number of tests may be conducted for each<br>patient. Each patient is assigned to one leading consultant but may be examined by<br>another doctor, if required. Doctors are specialists in some branch of medicine and<br>may be leading consultants for a number of patients, not necessarily from the same<br>ward.       2       22CDL33.3         Lab Assignment:       1. Analyze the data required.       2       22CDL33.4         PART-C       Beyond Syllabus Virtual Lab Content<br>(To be done during Lab but not to be included for CIE or SEE)       1         1. http://vlabs.iitkgp.ernet.in/se/4/case study: Develop a conceptual schema for Library Information System       1         1. http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information<br>System       1         3. http://vlabs.iitkgp.ernet.in/se/4/exercise       3       2   |   | employees, retrieve the department number and the number of its   |              |           |
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| System   |   | by the Hospital On admission the personal details of every national are recorded A  |              |           |
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| 2 22CDL33.3<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4<br>22CDL33.4 |   | the results of a prescribed treatment. A number of tests may be conducted for each  |              |           |
| another doctor, if required. Doctors are specialists in some branch of medicine and<br>may be leading consultants for a number of patients, not necessarily from the same<br>ward.       22CDL33.4         Lab Assignment:       1. Analyze the data required.       2. Normalize the attributes.         3. Create the logical data model using E-R diagrams       2000000000000000000000000000000000000  |   | patient. Each patient is assigned to one leading consultant but may be examined by  | 2            | 22CDL33.3 |
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| ward.       Lab Assignment:         1. Analyze the data required.         2. Normalize the attributes.         3. Create the logical data model using E-R diagrams         PART-C         Beyond Syllabus Virtual Lab Content         (To be done during Lab but not to be included for CIE or SEE)         1. <a href="http://vlabs.iitkgp.ernet.in/se/4/case_study">http://vlabs.iitkgp.ernet.in/se/4/case_study</a> : Develop a conceptual schema for Library Information System         2. <a href="http://vlabs.iitkgp.ernet.in/se/4/case_study">http://vlabs.iitkgp.ernet.in/se/4/case_study</a> : Create and manipulate the database for Student Information System         3. <a href="http://vlabs.iitkgp.ernet.in/se/4/exercise">http://vlabs.iitkgp.ernet.in/se/4/exercise</a>  |   | may be leading consultants for a number of patients, not necessarily from the same  |              |           |
| Lab Assignment:       1. Analyze the data required.         1. Analyze the data required.       2. Normalize the attributes.         3. Create the logical data model using E-R diagrams       1.         PART-C         Beyond Syllabus Virtual Lab Content         (To be done during Lab but not to be included for CIE or SEE)         1.        http://vlabs.iitkgp.ernet.in/se/4/case study: Develop a conceptual schema for Library Information System         2.        http://vlabs.iitkgp.ernet.in/se/4/case study: Create and manipulate the database for Student Information System         3.        http://vlabs.iitkgp.ernet.in/se/4/exercise   |   | ward.   |              |           |
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| 3. Create the logical data model using E-R diagrams         PART-C         Beyond Syllabus Virtual Lab Content         (To be done during Lab but not to be included for CIE or SEE)         1. <a href="http://vlabs.iitkgp.ernet.in/se/4/case_study">http://vlabs.iitkgp.ernet.in/se/4/case_study</a> : Develop a conceptual schema for Library Information System         2. <a href="http://vlabs.iitkgp.ernet.in/se/4/case_study">http://vlabs.iitkgp.ernet.in/se/4/case_study</a> : Create and manipulate the database for Student Information System         3. <a href="http://vlabs.iitkgp.ernet.in/se/4/exercise">http://vlabs.iitkgp.ernet.in/se/4/exercise</a>   |   | 2. Normalize the attributes.  |              |           |
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| <ol> <li>Beyond Syllabus Virtual Lab Content<br/>(To be done during Lab but not to be included for CIE or SEE)</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/case_study</u>: Develop a conceptual schema for Library Information System</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/case_study</u>: Create and manipulate the database for Student Information System</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/exercise</u></li> </ol>  |   | PART-C  |              |           |
| <ol> <li><u>http://vlabs.iitkgp.ernet.in/se/4/case_study</u>: Develop a conceptual schema for Library Information System</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/case_study</u>: Create and manipulate the database for Student Information System</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/exercise</u></li> </ol>   |   | Beyond Syllabus Virtual Lab Content   |              |           |
| <ol> <li><u>http://vlabs.iitkgp.ernet.in/se/4/case_study</u>: Develop a conceptual schema for Library Information System</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/case_study</u>: Create and manipulate the database for Student Information System</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/exercise</u></li> </ol>   |   | (To be done during Lab but not to be included for CIE or SEE)   |              |           |
| <ol> <li><u>http://vlabs.iitkgp.ernet.in/se/4/case_study</u>: Create and manipulate the database for Student Information<br/>System</li> <li><u>http://vlabs.iitkgp.ernet.in/se/4/exercise</u></li> </ol>  | 1 http://s  | zahs jitkon ernet in /se/4/case_study: Develon a concentual schema for Library Inform   | ation Syster | n         |
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| 3. http://vlabs.iitkgp.ernet.in/se/4/exercise  | Svstem  | meeningprenneum/se/ 1/ case_study . Greate and manipulate the database for student  | mormation    |           |
|  | 3. <u>http://v</u>                                    | <u>/labs.iitkgp.ernet.in/se/4/exercise</u>  |              |           |

#### CIE Assessment Pattern (50 Marks – Lab)

|    | -          |          |                   |
|----|------------|----------|-------------------|
|    | DDT Lovele | Test (s) | Weekly Assessment |
|    | RD1 Levels | 20       | 30                |
| L1 | Remember   | -        | -                 |
| L2 | Understand | -        | -                 |
| L3 | Apply      | 10       | 10                |
| L4 | Analyze    | 5        | 10                |
| L5 | Evaluate   | 5        | 10                |
| L6 | Create     |          |                   |

#### SEE Assessment Pattern (50 Marks - Lab)

|    | <b>RBT Levels</b> | Exam Marks        |
|----|-------------------|-------------------|
|    |                   | Distribution (50) |
| L1 | Remember          | -                 |
| L2 | Understand        | -                 |
| L3 | Apply             | 20                |
| L4 | Analyze           | 20                |
| L5 | Evaluate          | 10                |
| L6 | Create            |                   |

#### Suggested Learning Resources:

**Reference Books:** 

- 1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson / Addison -Wesley, 7th Edition 2021, ISBN 13: 978-0-136-08620-8
- 2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill,
- 2013, **ISBN-13**: 978-9332901384 •

|   |  |           |  |            | LINU              | X SYSTI    | EM PRO    | GRAMM     | AING     |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
|---|--|-----------|--|------------|-------------------|------------|-----------|-----------|----------|--------------|-----------|------------|-------------|----------------------------------|--|--|--|--|--|--|--|--|
| Course Code   | 22CD   | S341      |  |            |                   |            |           |           | CIE M    | larks        |           | 50         |             |                                  |  |  |  |  |  |  |  |  |
| L:T:P:S   | 2:0:1:   | 0         |  |            |                   |            |           |           | SEE N    | Marks        |           | 50         | 50          |                                  |  |  |  |  |  |  |  |  |
| Hrs / Week  | 2+2  |           |  |            |                   |            |           |           | Tota     | l Marks      |           | 100        | 00          |                                  |  |  |  |  |  |  |  |  |
| Credits   | 03   |           |  |            |                   |            |           |           | Exan     | n Hours      |           | 03         |             |                                  |  |  |  |  |  |  |  |  |
| Course outcome<br>At the end of the   | s:<br>course   | , the stu | ıdent v  | vill be a  | ble to:           |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 22CDS341.1  | Under  | stand t   | he fun   | damenta    | als of M          | ulti-Use   | r Opera   | ting syst | tem and  | d comman     | ds.       |            |             |                                  |  |  |  |  |  |  |  |  |
| 22CDS341.2  | Apply the file manipulation commands and file APIs.  |           |  |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 22CDS341.3  | Analyze the mechanism of process creation and process APIs.  |           |  |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 22CDS341.4  | Relate   | the net   | tworki   | ng comi    | mands a           | and IPC    | mechan    | ism.      |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 22CDS341.5  | Imple  | ment sh   | nell scr   | ipts effe  | ectively.         |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 22CDS341.6  | Exami  | ine awk   | progr  | ams for    | various           | real-tin   | ne appli  | cations.  |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| Mapping of Cou  | rse Ou   | tcomes    | s to Pr  | ogram      | Outco             | mes an     | d Progi   | am Spe    | ecific O | )utcomes     | :         |            |             |                                  |  |  |  |  |  |  |  |  |
|   | P01  | P02       | P03  | P04        | P05               | P06        | P07       | P08       | P09      | P010         | P011      | P012       | PSO1        | PSO2                             |  |  |  |  |  |  |  |  |
| 22CDS341.1  | 3  | 2         | 2  | 2          | -                 | -          | -         | -         | -        | -            | -         | 2          | 3           | 3                                |  |  |  |  |  |  |  |  |
| 22CDS341.2  | 2  | 3         | 2  | 2          | -                 | -          | -         | -         | -        | -            | -         | 2          | 3           | 3                                |  |  |  |  |  |  |  |  |
| 22CDS341.3  | 3  | 3         | 3  | 2          | -                 | -          | -         | -         | -        | -            | -         | 2          | 3           | 3                                |  |  |  |  |  |  |  |  |
| 22CDS341.4  | 2  | 3         | 3  | 3          | -                 | -          | -         | -         | -        | -            | -         | 2          | 3           | 3                                |  |  |  |  |  |  |  |  |
| 22CDS341.5  | 3  | 3         | 3  | 3          | -                 | -          | -         | -         | -        | -            | -         | 2          | 3           | 3                                |  |  |  |  |  |  |  |  |
| 22CDS341.6  | 3  | 3         | 3  | 3          | -                 | -          | -         | -         | -        | -            | -         | 2          | 3           | 3                                |  |  |  |  |  |  |  |  |
|   |  |           |  |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| MODULE-1GENERAL PURPOSE UTILITIES22CDS341.16 Hours                            |  |           |  |            |                   |            |           |           | ours     |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| Getting Started<br>POSIX Standards<br>General Purpos                          | <b>Getting Started &amp; Understanding LINUX Commands:</b> LINUX Operating System, LINUX architecture, Features of LINUX, The POSIX Standards, API Common Characteristics. |           |  |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| passwd, uname,  | who .da  | ate.      |  |            | <i>y</i> , 10011, |            | po, erea  | i unu op  | ao, and  |              | cul, culo |            |             | , eer 1p e,                      |  |  |  |  |  |  |  |  |
| Laboratory Con  | iponen   | it:       |  |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 1. Execution  | n of vari  | ious ger  | ieral p  | urpose     | utility c         | omman      | ds        |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 2. Execution  | n of vari  | ious filt | er com   | mands      | 5                 |            |           |           |          |              |           |            | 3 H         | ours                             |  |  |  |  |  |  |  |  |
| 3. Execution  | n of vari  | ious file | /direc   | tory hai   | ndling c          | omman      | ds        |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| Text Book   |  |           | Text   | Book 1     | Chapte            | r 1 ,2     |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| MODULE-2  |  |           | FILE S   | SYSTEM     | AND A             | ATTRIE     | BUTES     |           |          |              | 22CDS34   | 41.2       | 6 Ho        | ours                             |  |  |  |  |  |  |  |  |
| File System and   | d Attrik   | outes: I  | ntrodı   | iction to  | o LINUX           | K file sys | stem, in  | ode, File | e Types  | s, File Attr | ibutes, A | pplicatior | n program   | 1                                |  |  |  |  |  |  |  |  |
| Interface to Files  | s, LINUX   | kernel    | suppo  | ort for fi | les.              | , ad m     | intf num  | d mledi   | n nm di  | n ad filo    | and dive  | atows nor  | missions    |                                  |  |  |  |  |  |  |  |  |
| chmod,file owne   | ership-c   | hown, c   | , cat, i<br>hgrp, i  | umask,t    | ar,gzip,          | unlink,d   | u,df, fin | d, file m | odifica  | tion and a   | ccess tim | es-touch.  | IIIISSIOIIS | -                                |  |  |  |  |  |  |  |  |
| Laboratory Con  | iponen   | it:       | 0 1  |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 1. Write a p  | rogram   | to emu    | late th  | e ln con   | nmand.            |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 2. Write a program to read the alternate nth byte and writeit in another file |  |           |  |            |                   |            |           | 0.1170    |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| 3. Write a p  | 3. Write a program that creates a zombie and then calls system to execute the ps command to verify that the  |           |  |            |                   |            |           |           | ours     |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| process is zombie.  |  |           |  |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| Text Book   | Text F   | Rook 1 (  | I EXL BOOK 1 UNAPTER 3,4       DDOCESS       22CDS241 2       6 Hourse |            |                   |            |           |           |          |              |           |            |             |                                  |  |  |  |  |  |  |  |  |
| Text Book<br>MODULE-3   | Text E   | 3ook 1 (  | Lhapte   | r 3,4      | PROCI             | 727        |           |           |          |              | 22CDS34   | 41.3       | 6 Ha        | MODULE-3PROCESS22CDS341.36 Hours |  |  |  |  |  |  |  |  |
| Text Book<br>MODULE-3<br>PROCESS: Proce                                       | Text E   | 300k 1 (  | hapte  | r 3,4      | PROC              | ESS        | ress att  | ihutee    | nroces   | stable vie   | 22CDS34   | 11.3       | 6 Ho        | ours                             |  |  |  |  |  |  |  |  |

| Laboratory Con  | nponent:                                       |                             |                    |                           |   |                |         |  |
|---|--|-----------------------------|--------------------|---------------------------|---|----------------|---------|--|
| 1. Write a  | program to                                     | implement the syst          | em function.       |                           |   |                |         |  |
| 2. Writeap  | rogramwhi                                      | ichdemonstratesinte         | er-                |                           |   | 3              | Hours   |  |
| process   | Communica                                      | ationbetweenareade          | erprocessanda      | writerprocess.            |   |                |         |  |
| 3. Write as   | shell script                                   | to accept a file and o      | check If it Is ex  | ecutable. If not make     | it executable.                          |                |         |  |
| Text BOOK   | Text Book                                      | x 1, Chapter 5,6 Tex        | RT BOOK 2 Chaj     | pter 3 ,4                 | 2200624                                 |                | laura   |  |
| MODULE-4  |  | NETWORKI                    | NG COMMAN          | DS                        | 2200534                                 |                | Hours   |  |
| Networking con  | nmanas: if                                     | config, ulimit, finger      | r, arp, ftp, teine | et, nostname, trace rol   | ute, ping, netstat, i<br>O Maggaga Quay | islookup       | agand   |  |
| msgrcv, msgctl  | ommunica                                       | <b>ition:</b> Pipe, process | pipes, pipeca      | n, Named Pipes – Fir      | O, Message Queu                         | es – msgget, m | isgsna, |  |
| Laboratory Con  | nponent:                                       |                             |                    |                           | 1 11                                    |                |         |  |
| I. Wr   | ite a shell s                                  | crip to accept a file a     | and check if it    | is executable. If not m   | ake it executable.                      |                |         |  |
| 2. Wr   | ite a shells                                   | cript which displays        | s a list of all th | e files in the current c  | lirectory to which                      | you            |         |  |
| a liav<br>3 Wr  | ite a shell s                                  | cript which gets eve        | cuted the mor      | nent the user logsin It   | should display th                       | e 3            | Hours   |  |
| me  | ssage.   | eript which gets exe        | cuteu the mor      | nent the user logsmin     | should display th                       | c 5            |         |  |
| "Go   | odMorning                                      | g", "GoodAfternoo           | on", " Good Ev     | ening", depending up      | on the time at whi                      | ch the         |         |  |
| use   | r logs in.                                     |                             | -                  |                           |   |                |         |  |
| Text Book   | Text Bool                                      | x 1, Chapter 7 ,8           |                    |                           |   |                |         |  |
| MODULE-5  | SHELL & AWK PROGRAMMING 22CDS341.5, 22CDS341.6 |                             |                    |                           |   |                |         |  |
| Shell Programming: Shell variables, shellscripts, read, positional parameters, exit status, logical operators, exit, if |  |                             |                    |                           |   |                |         |  |
| conditions, test and [], case, expr, sleep and wait, while and for.   |  |                             |                    |                           |   |                |         |  |
| AWK Programn  | ing: Splitt                                    | ing line into fields, p     | orintf-formatt     | ing output, comparisc     | on operators, num                       | ber processing | , BEGIN |  |
| and END section,  | positional                                     | parameters, getline         | , built-invaria    | bles and functions.       |   |                |         |  |
| Laboratory Con  | nponent:                                       |                             |                    |                           |   |                |         |  |
| 1. Write a s  | script to de                                   | monstrate built-inv         | ariables availa    | ble in AWK                |   | 3              | Hours   |  |
| 2. Write a s  | script to de                                   | monstrate builtin fu        | nctions availa     | ble in AWK                |   |                |         |  |
| 3. Write a s  | shell script                                   | which accepts any r         | number of arg      | uments and prints the     | min reverseorder                        | ſ              |         |  |
| Text Book   | Text Bool                                      | x 2 Chapter 5,6,7           |                    |                           |   |                |         |  |
| CIE Assessment  | Pattern (5                                     | 50 Marks – Theory           | and Lab)           |                           |   |                |         |  |
|   |  |                             |                    |                           |   |                |         |  |
|   |  |                             |                    |                           |   |                |         |  |
|   |  |                             |                    | Marks Distri              | bution                                  |                |         |  |
|   |  | <b>RBT Levels</b>           | Test (s)           | Qualitative<br>Assessment | Lab                                     |                |         |  |
|   |  |                             | 25                 | 05                        | 20                                      |                |         |  |
|   | L1   | Remember                    | 5                  | -                         | -                                       |                |         |  |
|   | L2   | Understand                  | 5                  | 2                         | -                                       |                |         |  |
|   | L3 Apply 5 3 10                                |                             |                    |                           |   |                |         |  |
|   | L4   | Analyze                     | 5                  | -                         | 10                                      |                |         |  |
|   | L5   | Evaluate                    | 5                  | -                         | -                                       |                |         |  |
| L6 Create   |  |                             |                    |                           |   |                |         |  |
|   |  |                             |                    |                           |   |                |         |  |
|   |  |                             |                    |                           |   |                |         |  |
|   |  |                             |                    |                           |   |                |         |  |
|   |  |                             |                    |                           |   |                |         |  |

#### SEE Assessment Pattern (50 Marks - Theory)

|    | <b>RBT Levels</b> | Exam Marks<br>Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember          | 10                              |
| L2 | Understand        | 10                              |
| L3 | Apply             | 10                              |
| L4 | Analyze           | 10                              |
| L5 | Evaluate          | 10                              |
| L6 | Create            |                                 |

#### Suggested Learning Resources:

#### **Text Books:**

- 1. Linux for Beginners: A Practical and Comprehensive Guide to Learn Linux, Ethem Mining, ISBN:978-1671228085, 2019.
- 2. Your UNIX–The ultimate Guide, SUMITABHADAS, TATA McGraw Hill Edition, 4th Edition Paperback2017, McGrawHill, ISBN:978-0070446878

#### **Reference Books:**

- 1. UNIX System Programming Using C++, Terrence Chan, Prentice-Hall of India Private Limited, ISBN: 978-332549975, 2015.
- 2. Advanced Programming in the UNIX Environment, W Richard Stevens and Stephen A Rago, Addison Wesley Publications, Third Edition, 2013, ISBN: 978-0321637734.
- 3. UNIX and SHELL Programming, Richard F Gilberg and Behrouz A Forouzan, 15<sup>th</sup>impression, 2015, Cengage Learning, ISBN: 978-8131503256

#### Web links and Video Lectures (e-Resources):

- 1. https://nptel.ac.in/courses/117106113
- 2. https://web.njit.edu/~alexg/courses/cs332/OLD/F2020/hand3f20/Linux-Tutorial.pdf
- 3. https://www.youtube.com/watch?v=8lwx0AecpLQ

#### Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- 1. Online tests to enhance learning [https://app.staging.testdome.com/screening/challenge/81?hard=false Certificate for top 25% will be issued]
- 2. Practical Based learning like "creating and configuring a monitoring system in Linux", "web programming with Linus OS".

| WEB DESIGN TECHNOLOGIES  |   |   |                             |                                 |   |   |  |                                 |                                       |   |  |                                      |                                     |                          |
|--|---|---|-----------------------------|---------------------------------|---|---|--|---------------------------------|---------------------------------------|---|--|--------------------------------------|-------------------------------------|--------------------------|
| Course Code  | 22CDS3  | 342   |                             |                                 |   |   |  | CIE                             | Marks                                 |   | 50                                       | 50                                   |                                     |                          |
| L:T:P:S  | 2:0:1:0   |   |                             |                                 |   |   |  | SEE                             | E Marks                               |   | 50                                       |                                      |                                     |                          |
| Hrs / Week   | 2+2   |   |                             |                                 |   |   |  | Tot                             | al Mark                               | S                                       | 100                                      |                                      |                                     |                          |
| Credits  | 03  |   |                             |                                 |   |   |  | Exa                             | m Hour                                | S                                       | 03                                       |                                      |                                     |                          |
| <b>Course outcomes</b><br>At the end of the  | :<br>course, t                                      | he stud   | lent wi                     | ll be ab                        | le to:                                      |   |  |                                 |                                       |   |  |                                      |                                     |                          |
| 22CDS342.1   | Underst   | tand th   | e synta                     | ax and s                        | emantic                                     | s of desi                                     | gning t  | he web                          | pages usi                             | ing XHTM                                | L and HT                                 | ML5.                                 |                                     |                          |
| 22CDS342.2   | Apply C   | Apply Cascading Style Sheets to format the layout of webpages.        |                             |                                 |   |   |  |                                 |                                       |   |  |                                      |                                     |                          |
| 22CDS342.3   | Develop   | Develop JavaScript programs to validate and create dynamic Web Pages. |                             |                                 |   |   |  |                                 |                                       |   |  |                                      |                                     |                          |
| 22CDS342.4   | Develop   | o serve   | r side p                    | orogran                         | ns using l                                  | PHP and                                       | laccess  | ing data                        | abase thr                             | ough PHP                                | ).                                       |                                      |                                     |                          |
| 22CDS342.5   | Describ   | e the m   | nethod                      | s to han                        | dle data                                    | through                                       | n the we   | eb and d                        | lesign XM                             | IL docum                                | ent.                                     |                                      |                                     |                          |
| 22CDS342.6   | Inspect<br>which fa                                 | the ma<br>acilitat  | nagem<br>es deve            | nent of s<br>eloper t           | state in w<br>to focus o                    | veb appl<br>on core f                         | ication<br>feature   | s and Ja<br>s.                  | va Script                             | framewo                                 | rks like j(                              | Query and                            | Backbo                              | ne                       |
| Mapping of Cour  | se Outc   | omes t  | to Pro                      | gram (                          | Outcom                                      | es and I                                      | Progra   | m Spe                           | cific Out                             | comes:                                  |  |                                      |                                     |                          |
|  | P01   | P02   | P03                         | P04                             | P05   | P06   | P07  | P08                             | P09                                   | P010                                    | P011                                     | P012                                 | PSO1                                | PSO2                     |
| 22CDS342.1   | 2   | 2   | 2                           | 1                               | 2   | -   | -  | -                               | -                                     | -                                       | -  | 1                                    | 2                                   | 2                        |
| 22CDS342.2   | 2   | 2   | 2                           | 1                               | 2   | -   | -  | -                               | -                                     | -                                       | -  | 2                                    | 2                                   | 2                        |
| 22CDS342.3   | 3   | 2   | 2                           | 3                               | 2   | -   | -  | -                               | -                                     | -                                       | -  | 2                                    | 2                                   | 2                        |
| 22CDS342.4   | 3   | 2   | 2                           | 1                               | 3   | -   | -  | -                               | -                                     | -                                       | -  | 2                                    | 2                                   | 2                        |
| 22CDS342.5   | 3   | 2   | 2                           | 2                               | 2   | -   | -  | -                               | -                                     | -                                       | -  | 2                                    | 2                                   | 2                        |
| 22CDS342.6   | 3   | 2   | 2                           | 2                               | 3   | -   | -  | -                               | -                                     | -                                       | -  | 3                                    | 2                                   | 2                        |
| MODULE-1   |   |   |                             | XI                              | HTML  |   |  |                                 |                                       | 22CDS34<br>22CDS34                      | 2.1,<br>12.2                             |                                      | 6 Hours                             |                          |
| Basic syntax, Stand<br>differences betwee<br>Selector forms, Th<br>Elements, Floating  | dard XHT<br>en HTML<br>e Box mo<br>g Element        | ГМL do<br>and XI<br>odel, Ba<br>ts.                                   | ocumer<br>HTML .<br>Ickgrou | nt struc<br>Cascad<br>und ima   | ture; Bas<br>l <b>ing Styl</b><br>ages, The | sic text<br>e <b>Sheet</b><br>e <span></span> | markuj<br><b>s:</b> Intro<br>• and <o< td=""><td>o, Image<br/>duction<br/>liv&gt; tag</td><td>es; Hyper<br/>a, Levels o<br/>s, Advano</td><td>rtext Link<br/>of style sh<br/>ced CSS: I</td><td>s, Lists, T<br/>leets, Styl<br/>Layout, No</td><td>ables, Fo<br/>e specific<br/>ormal Flo</td><td>rms, Syn<br/>ation for<br/>w, Positio</td><td>tactic<br/>mats,<br/>oning</td></o<> | o, Image<br>duction<br>liv> tag | es; Hyper<br>a, Levels o<br>s, Advano | rtext Link<br>of style sh<br>ced CSS: I | s, Lists, T<br>leets, Styl<br>Layout, No | ables, Fo<br>e specific<br>ormal Flo | rms, Syn<br>ation for<br>w, Positio | tactic<br>mats,<br>oning |
| Laboratory Comp1.Develop and d2.Design a Shop3.Design a Ticket   | <b>oonent:</b><br>lemonstr<br>ping web<br>et Bookin | ate a X<br>o site us<br>g Web   | HTML<br>sing H7<br>site us  | file that<br>FML and<br>ing XH' | t creates<br>d DHTM<br>FML, Use             | a colleg<br>L. Use Ba<br>e various            | e web s<br>asic tex<br>s level o   | site with<br>t Forma<br>of CSS. | n forms, f<br>atting, Im              | rames, lir<br>ages.                     | ıks, tables                              | 5.                                   | 3 Hours                             |                          |
| TEXTBOOK   | TEXTBO<br>TEXTBO                                    | JOK 1 :<br>JOK 1 :  | 2.1-2.<br>3.1-3.            | .9<br>.13                       |   |   |  |                                 |                                       |   |  |                                      |                                     |                          |
| MODULE-2   |   |   |                             | H                               | FML 5                                       |   |  |                                 |                                       | 22CDS3                                  | 342.1                                    |                                      | 6 Hou                               | rs.                      |
| Detecting HTML 5 features – Canvas, video, local storage, web workers, offline applications, geo-location, input types. What does itall mean – doctype, root, headers, articles, dates and times, navigation and footers. Let's call it drawing surface -  |   |   |                             |                                 |   |   |  |                                 |                                       |   |  |                                      |                                     |                          |
| Laboratory Component:         1. Develop and demonstrate a XHTML file with Canvas and local storage concepts.         2. Develop and demonstrate XHTML Sections.         3. Develop and demonstrate a XHTML file that creates a Computer Science Book repository web site with XHTMLforms. When a user enters the specific book with an ID or Title the contents of the book to be retrieved.         TEXTROOK |   |   |                             |                                 |   |   |  |                                 |                                       |   |  |                                      |                                     |                          |
| IEAIDUUK   | ICVIR   | JOK 3 :   | chapt                       | er 2,3,4                        | 5,7   |   |  |                                 |                                       |   |  |                                      |                                     |                          |

| MODULE-3              | JAVASCRIPT  | 22CDS342.3                    | 6 Hours                  |  |  |  |  |  |  |
|-----------------------|---|-------------------------------|--------------------------|--|--|--|--|--|--|
| Overview of JavaS     | cript, General syntactic characteristics, Screen output and ke    | eyboard input, Control sta    | tements, Object creation |  |  |  |  |  |  |
| and modification,     | Arrays, Functions, Constructor, Pattern matching using regular    | expressions.                  |                          |  |  |  |  |  |  |
| JavaScript and DI     | ITML Documents: The Document Object Model, Element access         | s in JavaScript, Events and e | event handling. Moving   |  |  |  |  |  |  |
| elements, Element     | visibility, Dynamic content, Slow movement of elements.           |                               |                          |  |  |  |  |  |  |
| Laboratory Comp       | oonent:   |                               |                          |  |  |  |  |  |  |
| 1. Develop and der    | nonstrate a XHTML file that includes Javascript script for the    |                               |                          |  |  |  |  |  |  |
| followingproblem      | S:  |                               |                          |  |  |  |  |  |  |
| a) Input: A numbe     | r n   |                               |                          |  |  |  |  |  |  |
| obtained using prompt |   |                               |                          |  |  |  |  |  |  |
| Output: The first n   |   |                               |                          |  |  |  |  |  |  |
| Fibonacci number      |   |                               |                          |  |  |  |  |  |  |
| b) Input: A numbe     | r n obtained using prompt   |                               |                          |  |  |  |  |  |  |
| Output: A table of    | numbers from 1 to n and their squares using alert box.            |                               |                          |  |  |  |  |  |  |
| 2. a) Develop and     | demonstrate, using Javascript script, a XHTML document that       | collects the USN ( the        |                          |  |  |  |  |  |  |
| valid format is: A d  | ligit from 1 to 4 followed by two upper-case characters followed  | l by two digits followed      |                          |  |  |  |  |  |  |
| by two upper-case     | e characters followed by three digits; no embedded spaces allow   | wed) of the user. Event       | 3 Hours                  |  |  |  |  |  |  |
| handler must be       | included for the form element that collects this information      | to validate the input.        |                          |  |  |  |  |  |  |
| Messages in the al    | ert windows must be produced when errors are detected.            |                               |                          |  |  |  |  |  |  |
| b) Modify the abov    | re program to get the current semester also (restricted to be a r | number from 1 to8)            |                          |  |  |  |  |  |  |
| 3. a) Develop and     | demonstrate, using Javascript script, a XHTML document tha        | it contains three short       |                          |  |  |  |  |  |  |
| paragraphs of text    | t, stacked on top of each other, with only enough of each show    | ving so that the mouse        |                          |  |  |  |  |  |  |
| cursor can be plac    | ed over some part of them. When the cursor is placed over the     | he exposed part of any        |                          |  |  |  |  |  |  |
| paragraph, it shou    | Id rise to the top to become completely visible.                  | 1                             |                          |  |  |  |  |  |  |
| b) Modify the above   | e document so that when a paragraph is moved from the top st      | tacking position, it returns  |                          |  |  |  |  |  |  |
| nosition rather the   | an to the hottom  |                               |                          |  |  |  |  |  |  |
| ТЕХТВООК              | TEXTBOOK 1 : 4.1- 4.12, TEXTBOOK 1 : 5.1- 5.4, TEXTBOOK 1         | : 6.1- 6.10                   |                          |  |  |  |  |  |  |
| MODULE-4              | PHP Programming   | 22CDS342.4                    | 6 Hours                  |  |  |  |  |  |  |
| Origins and uses o    | f DHD Quarview of DHD Conoral syntactic characteristics Quite     | ut Control statements Arr     | ave Eunctione Dattorn    |  |  |  |  |  |  |
| matching, Form ha     | andling, Files, Cookies, Session tracking, Database access with F | PHP and MySQL.                | ays, Functions, Fattern  |  |  |  |  |  |  |
| Laboratory Comr       | ponent:   |                               |                          |  |  |  |  |  |  |
| 1. 1. Write a         | PHP program to store current date-time in a COOKIE and dis        | play the 'Last visited        |                          |  |  |  |  |  |  |
| on' date-t            | ime on the web page upon reopening of the same page.              |                               |                          |  |  |  |  |  |  |
| 2. 2. Write a         | PHP program to store page views count in SESSION, to increme      | ent the count on each         | 3 Hours                  |  |  |  |  |  |  |
| refresh, a            | nd to show the count on web page.                                 |                               | 0 110 110                |  |  |  |  |  |  |
| 3. 3. Write a         | PHP program to insert name and age information entered by t       | the user into a table         |                          |  |  |  |  |  |  |
| TEXTBOOK              | TEXTBOOK 1 : 9.1-9.12. TEXTBOOK 1 : 13.5                          |                               |                          |  |  |  |  |  |  |
|                       |   |                               |                          |  |  |  |  |  |  |
| MODULE-5              | XML   | 22CDS342.5,                   | 6 Hours                  |  |  |  |  |  |  |
| MODULE-5              |   | 22CDS342.6                    | 0 11001 3                |  |  |  |  |  |  |
| Introduction to XM    | IL, The Syntax of XML, Document structure, Document Type De       | finition (DTD), Displaying    | XML documents with       |  |  |  |  |  |  |
| CSS, XSLT style sh    | eets.   |                               |                          |  |  |  |  |  |  |
| Managing State,       | Passing Information via Query Strings, Passing Information        | via the URL Path, Serial      | ization, jQuery          |  |  |  |  |  |  |
| Foundations, AJAX     | a, Animation, JSON.   |                               |                          |  |  |  |  |  |  |

# `Laboratory Component: Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include 100 USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

- 2. Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.
- 3. Demonstrate jQuery serialize() method.

#### **TEXTBOOK** TEXTBOOK 1 : 7.1- 7.9, TEXTBOOK 1 : chapter 10

#### CIE Assessment Pattern (50 Marks – Theory)

|            | RRT Lovals |          | <b>Marks Distribution</b> |     |  |  |  |  |  |
|------------|------------|----------|---------------------------|-----|--|--|--|--|--|
|            |            |          | Qualitative               | Lah |  |  |  |  |  |
| KDI LEVEIS |            | 1651 (5) | Assessment                | Lau |  |  |  |  |  |
|            |            | 25       | 05                        | 20  |  |  |  |  |  |
| L1         | Remember   | 5        | -                         | -   |  |  |  |  |  |
| L2         | Understand | 5        | 2                         | -   |  |  |  |  |  |
| L3         | Apply      | 5        | 3                         | 10  |  |  |  |  |  |
| L4         | Analyze    | 5        | -                         | 10  |  |  |  |  |  |
| L5         | Evaluate   | 5        | -                         | -   |  |  |  |  |  |
| L6         | Create     | -        | -                         | -   |  |  |  |  |  |

#### SEE Assessment Pattern (50 Marks - Theory)

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | 10                              |
| L2 | Understand | 10                              |
| L3 | Apply      | 10                              |
| L4 | Analyze    | 10                              |
| L5 | Evaluate   | 10                              |
| L6 | Create     | -                               |

#### Suggested Learning Resources:

#### Text Books:

- 1. RobertW.Sebesta, "ProgrammingtheWorldWideWeb", 8<sup>th</sup> Edition, PearsonEducation, 2015, ISBN-13:978-8131764589
- 2. RandyConnolly,RicardoHoar,"FundamentalsofWebDevelopment",4stEdition,Pearson Education India, 2016, ISBN :9789332575271
- **3.** MarkPilgrim,"HTML5:UpandRunning:DiveintoHTML5",1<sup>st</sup>Edition O'Reilly, Google Press Publishers & DistributorsPvt Ltd, 2010, ISBN-10:**0596806027**

#### **Reference Books:**

- 1. Paul Deitel, HarveyDeitel, Abbey Deitel, "Internet & World Wide Web Howtoprogram", 5th Edition, Pearson Education/PHI, 2012, **ISBN-13**: 978-0130161437
- 2. Erik Bruchez, Danny Ayers, Eric Van Der Vlist, "Professional Web 2.0 Programming",1<sup>st</sup>Edition, Wiley India Pvt. Ltd, 2014, **ISBN-13**: 978-0470087886
- 3. Randal L. Schwartz, brian d foy, Tom Phoenix, "Learning Perl " 6th Edition, Released June 2011, Publisher(s): O'Reilly Media, Inc., ISBN: 9781449303587

#### Web links and Video Lectures (e-Resources):

- 1. https://developer.mozilla.org/en-US/docs/Web/XML/XML\_introduction
- 2. https://www.browserstack.com/guide/top-html5-features
- 3. https://www.w3schools.com/php/php\_intro.asp
- 4. https://www.w3schools.com/js/js\_operators.asp
- 5. https://onlinecourses.swayam2.ac.in/aic20\_sp11/preview

| ADVANCED EXCEL FOR DATA SCIENCE                     |  |                   |                     |                    |                     |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
|---|--|-------------------|---------------------|--------------------|---------------------|-------------------|-------------------|---------------------|-------------------|--------------------|---------------------------|-------------------------|------------------------|-------------------------|--|
| Course Code   | <b>22C</b>                                     | DS343             | ;                   |                    |                     |                   |                   |                     | CIE M             | 1arks              |                           | 50                      |                        |                         |  |
| L:T:P:S   | 2:0:   | 1:0               |                     |                    |                     |                   |                   |                     | SEE N             | Marks              |                           | 50                      | 50                     |                         |  |
| Hrs / Week  | 2+2  |                   |                     |                    |                     |                   |                   |                     | Tota              | l Marks            |                           | 100                     | )                      |                         |  |
| Credits   | 03   |                   |                     |                    |                     |                   |                   |                     | Exan              | n Hours            |                           | 03                      |                        |                         |  |
| Course outcomes                                     | : At the                                       | e end o           | of the c            | ourse, t           | he stud             | ent will          | l be able         | e to:               |                   |                    |                           |                         |                        |                         |  |
| 22CDS343.1  | Unde   | rstand            | to the              | use of F           | Excel sp            | readsh            | eets and          | l variou            | s basic           | data func          | tions of Ex               | kcel.                   |                        |                         |  |
| 22CDS343.2  | Demo   | onstrat           | e the o             | peratio            | ns relat            | ed to C           | olumns            | & Rows              | 5.                |                    |                           |                         |                        |                         |  |
| 22CDS343.3  | Demo<br>and S                                  | onstrate<br>PSS.  | e SPSS              | and its            | operatio            | ons, rep          | oresenti          | ng data             | diagran           | nmaticall          | y and grap                | ohically us             | sing MS-E              | XCEL                    |  |
| 22CDS343.4  | Comp<br>analy                                  | oute ab           | solute              | and rel            | lative m<br>and SPS | ieasure<br>S      | s of cer          | itral ten           | dency             | and dispe          | ersion, cor               | relation a              | and regre              | ssion                   |  |
| 22CDS343.5  | Under<br>SPSS.                                 | rstand            | the co              | ncepts             | related             | to hyp            | othesis           | , compu             | itation           | of large s         | sample tes                | sts using I             | MS-EXCE                | L and                   |  |
| 22CDS343.6  | comp   | ute sm            | all san             | aple tes           | ts, Chi-s           | square f          | tests us          | ing MS-I            | EXCEL a           | and SPSS           |                           |                         |                        |                         |  |
| Mapping of Cour                                     | rse Ou   | tcome             | es to P             | rogran             | n Outco             | omes a            | nd Pro            | gram S              | pecific           | : Outcon           | nes:                      | _                       |                        |                         |  |
|   | P01  | P02               | P03                 | P04                | P05                 | P06               | P07               | P08                 | P09               | P010               | P011                      | P012                    | <b>PSO1</b>            | PSO2                    |  |
| 22CDS343.1  | 3  | 3                 | 3                   | 2                  | -                   | -                 | -                 | -                   | -                 | -                  | -                         | 2                       | 2                      | 2                       |  |
| 22CDS343.2  | 2  | 2                 | 3                   | 3                  | -                   | -                 | -                 | -                   | -                 | -                  | -                         | 2                       | 2                      | 2                       |  |
| 22CDS343.3  | 2  | 3                 | 3                   | 3                  | -                   | -                 | -                 | -                   | -                 | -                  | -                         | 2                       | 2                      | 2                       |  |
| 22CDS343.4  | 3  | 3                 | 3                   | 3                  | -                   | -                 | -                 | -                   | -                 | -                  | -                         | 2                       | 2                      | 2                       |  |
| 22CDS343.5  | 3  | 3                 | 3                   | 3                  | -                   | -                 | -                 | -                   | -                 | -                  | -                         | 2                       | 2                      | 2                       |  |
| 22CDS343.6  | 2  | 3                 | 3                   | 3                  | -                   | -                 | -                 | -                   | -                 | -                  | -                         | 2                       | 2                      | 2                       |  |
| MODULE-1  | 10DULE-1Introduction to Excel22CDS343.16 Hours |                   |                     |                    |                     |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
| About Excel & M<br>Formatting Toolba<br>& sheets.   | licroso<br>ar, the                             | ft, Use<br>Ribbor | s of E<br>1, File I | xcel, E<br>Fab and | kcel sof<br>Backst  | tware,<br>age Vie | Spread<br>w, Forr | sheet w<br>nula Bai | vindow<br>r, Work | pane, T<br>book Wi | itle Bar, M<br>ndow, Stat | Menu Bar<br>tus Bar, Ta | , Standaı<br>ask Pane, | 'd Toolbar,<br>Workbook |  |
| Laboratory Com                                      | poner  | it: (Pr           | ogran               | 1S)                |                     |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
| 1. Apply  | / the Ba                                       | asic fur          | ictions             | ; in Exce          | el, arithr          | metic fu          | inction           | 5.                  |                   |                    |                           |                         | 3                      | Hours                   |  |
| 2. Apply  | / the va                                       | arious l          | logical             | functio            | ns.                 | _                 |                   |                     |                   | _                  | _                         |                         |                        |                         |  |
| 3. Using  | g formu  | ılas in I         | Excel a             | nd their           | r copy a            | nd past           | te using          | absolut             | te and r          | elative re         | eferencing                |                         |                        |                         |  |
| TEXT BOOK:  | TEX  | T BOO             | K 1: Cl             | napter             | 1                   |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
| MODULE-2  |  |                   |                     | Co                 | lumns               | & Row             | S                 |                     |                   |                    | 22CDS34                   | 43.2                    | 6                      | Hours                   |  |
| Selecting Column                                    | s & Rov  | ws, Cha           | anging              | Colum              | ı Width             | & Row             | Height            | , Auto fi           | tting Co          | olumns &           | Rows, Hic                 | ling/Unhi               | ding Colu              | ımns&                   |  |
| Rows, Inserting &                                   | Deleti   | ng Colı           | umns &              | ۶ Rows,            | Cell, Ac            | dress             | of a cell         | , Compo             | onents o          | of a cell –        | - Format, v               | value, forr             | nula, Use              | of                      |  |
| paste and paste sp                                  | ecial  |                   |                     |                    |                     |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
| Laboratory Com                                      | poner  | ıt: (pr           | ogran               | 1S)                |                     |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
| 1. Apply the  | conce  | pt to Cl          | hange               | the Colı           | umn Wie             | dth & R           | low Hei           | ght.                |                   |                    |                           |                         | 3 Hoi                  | ırs                     |  |
| 2. Apply the concept to Hide/Unhide Columns & Rows. |  |                   |                     |                    |                     |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
| 3. Create a r                                       | iew row  | w &Col            | umn a               | nd dele            | te a row            | 7 &Colu           | mn.               |                     |                   |                    |                           |                         |                        |                         |  |
| TEXT BOOK:  | TEX  | T BOO             | K 1: Cl             | napter             | 2                   |                   |                   |                     |                   |                    |                           |                         |                        |                         |  |
| MODULE-3  |  | SPREA             | DSHE                | ET FUN             | CTION:              | S TO O            | RGANIZ            | ZE DATA             | Ą                 |                    | 22CDS34<br>22CDS34        | 13.3,<br>13.4           | 6                      | Hours                   |  |
| Various Excel func                                  | tions t  | o organ           | nize an             | d query            | <i>i</i> data. L    | earner            | s are int         | roduced             | d to the          | IF, neste          | d IF, VLOO                | KUP and                 | the HLOO               | KUP                     |  |
| functions of Excel.                                 | Conca  | tenate,           | , Match             | ı, Count           | if, Text,           | Trim.             |                   |                     |                   |                    |                           |                         |                        |                         |  |

| Laboratory Component: (programs)        |               |                    |              |               |                           |                  |            |                 |  |  |
|---|---------------|--------------------|--------------|---------------|---------------------------|------------------|------------|-----------------|--|--|
| 1. Apply IF and the nested IF functions |               |                    |              |               |                           |                  |            | 3 Hours         |  |  |
| 2. Apply VLO                            | OKUP and H    | ILOOKUP.           |              |               |                           |                  |            |                 |  |  |
| 3. Apply The                            | RANDBETV      | VEEN functi        | on.          |               |                           |                  |            |                 |  |  |
| TEXT BOOK:                              | TEXT BOC      | 0K 1: Chapt        | er 2         |               |                           |                  |            |                 |  |  |
| MODULE-4                                | INTRODU       | CTION TO           | FILTERIN     | G, PIVOT TA   | ABLES, AND                | 22CDS343         | .5         | 6 Hours         |  |  |
| Various data filterii                   | UTAKIS        | ies of Excel       | filters in   | data to selec | tively access data the P  | ivot Table Creat | ting Chart | s Different     |  |  |
| types of chart. Forr                    | natting Chai  | rt Objects. C      | hanging t    | he Chart Tvi  | ne. Showing and Hiding    | the Legend, Sho  | wing and   | Hiding the Data |  |  |
| Table.                                  |               | ,-                 | 88           |               | ,                         |                  |            |                 |  |  |
| Laboratory Comp                         | oonent: (pr   | rograms)           |              |               |                           |                  |            |                 |  |  |
| 1. Usage of D                           |               | 3 Hours            |              |               |                           |                  |            |                 |  |  |
| 2. Use of Pivo                          | ot tables wit | h categorica       | al as well a | as numerical  | data.                     |                  |            |                 |  |  |
| 3. Create the                           | different ty  | pes of chart       | s.           |               |                           |                  |            |                 |  |  |
| TEXT BOOK:                              | TEXT BOC      | OK 1: Chapt        | er 3         |               |                           |                  |            |                 |  |  |
| MODULE-5                                |               | SPR                | EADSHE       | ET TOOLS      |                           | 22CDS343         | .6         | 6 Hours         |  |  |
| Moving between S                        | preadsheets   | s, Selecting       | Multiple S   | Spreadsheets  | s, Inserting and Deletin  | g Spreadsheets   | Renaming   | g Spreadsheets, |  |  |
| Splitting the Screer                    | n, Freezing I | Panes, Copy        | ing and P    | asting Data l | oetween Spreadsheets,     | Hiding and Prot  | ecting     |                 |  |  |
| worksheets.                             |               |                    |              |               |                           |                  |            |                 |  |  |
| Laboratory Comp                         | oonent: (pi   | ograms)            | _            |               | _                         |                  |            |                 |  |  |
| 1. Movin                                | g between c   | one Spreads        | heet to an   | other and Co  | opying and Pasting Data   | between Spread   | dsheets.   | 3 Hours         |  |  |
| 2. Apply                                | the concept   | of Inserting       | g & Deletin  | ng Spreadsh   | eets and Renaming Spre    | eadsheets.       |            |                 |  |  |
| 3. Usage                                | of Splitting  | the Screen,        | Freezing     | Panes.        |                           |                  |            |                 |  |  |
| TEXT BOOK:                              | TEXT BOC      | OK 1: Chapt        | er 5         |               |                           |                  |            |                 |  |  |
| CIE Assessment Pa                       |               | arks – The         | eory) –      |               |                           |                  |            |                 |  |  |
|   |               |                    |              |               | Marks Distribution        |                  |            |                 |  |  |
|   |               | RBT Leve           | ls           | Test (s)      | Qualitative<br>Assessment | Lab              |            |                 |  |  |
|   |               |                    |              | 25            | 05                        | 20               |            |                 |  |  |
|   | L1            | Rememb             | er           | 5             | -                         | -                |            |                 |  |  |
|   | L2            | Understa           | nd           | 5             | 2                         | -                |            |                 |  |  |
|   | L3            | Apply              |              | 5             | 3                         | 10               |            |                 |  |  |
|   | L4            | Analyze            |              | 5             | -                         | 10               |            |                 |  |  |
|   | L5            | Evaluate           |              | 5             | -                         | -                |            |                 |  |  |
|   | LO            | Create             |              | -             | -                         | -                |            |                 |  |  |
| SEE Assessment P                        | attern (50    | Marks – Th         | eory)-       |               |                           |                  |            |                 |  |  |
|   |               |                    |              |               | Exam Marks                | 7                |            |                 |  |  |
| RBT Levels Distribution (50)            |               |                    |              |               |                           |                  |            |                 |  |  |
|   |               |                    |              |               |                           |                  |            |                 |  |  |
|   |               | L2 Understand 15   |              |               |                           |                  |            |                 |  |  |
|   |               | <b>L3 Apply</b> 15 |              |               |                           |                  |            |                 |  |  |
|   |               | L4 Analyze 10      |              |               |                           |                  |            |                 |  |  |
|   |               | L5                 | Evaluat      | e             | 10                        |                  |            |                 |  |  |
|   |               | L6                 | Create       |               | -                         |                  |            |                 |  |  |

#### Suggested Learning Resources:

**Text Books:** 

- 1. Data Analysis with Microsoft Excel Paperback Import, 25 March 2003 by <u>K. Berk</u> (Author), <u>Partrick Carey</u> (Author), ISBN-10 : 0534407145
- 2. Excel 2019 Bible, Michael Alexander, 1st edition, John Wiley & Sons Inc, ISBN: 9781119514787.

#### **Reference Books:**

1. Richard Levin & David S.Rubin (2012): Statistics for Management, 7<sup>th</sup> Edition, Pearson,

ISBN :8177585843,9788177585841

- 2. J K Sharma (2012): Business statistics, Second Edition- Pearson Education,
- ISBN :8131798666, 9788131798669
  - 3. Andy field (2013): Discovering statistics using IBM SPSS statistics, 4th Edition , SAGE Publications, **ISBN-13**: 978-9351500827
  - 4. Cunningham, B.J (2012):Using SPSS: An Interactive Hands-on Approach,
- ISBN 1412995159, 9781412995153
  - 5. K.V.S. Sarma: Statistics made simple: do it yourself on PC. PHI, ISBN-10: 9788120340176

#### Web links and Video Lectures (e-Resources):

- 1. https://www.coursera.org/learn/excel-data-analysis#syllabus
- 2. https://www.udemy.com/course/data-analytics-in-excel/
- 3. Excel Data Analytics Full Course | Essential Skills For Data Analysis In Excel | Simplilearn, https://www.youtube.com/watch?v=00WAk2aLEfk
- 4. Beginner to Pro FREE Excel Data Analysis Course, https://www.youtube.com/watch?v=v2oNWja7M2E&list=PLmejDGrsgFyBCxF37lewZtX6c1kJXyLt3

#### Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning.

- Contents related activities (Activity-based discussions)
- > For active participation of students, instruct the students to prepare various charts and Handouts.
- > Organizing Group wise discussions on issues

|  | _   |                        |                   |                       |                   | RUBY P    | ROGRA                 | MMING     | ,<br>[             |                     |               |             |          |                |  |
|--|---|------------------------|-------------------|-----------------------|-------------------|-----------|-----------------------|-----------|--------------------|---------------------|---------------|-------------|----------|----------------|--|
| Course Code  | 22CDS344  |                        |                   |                       |                   |           |                       |           |                    | larks               |               | 50          | 50       |                |  |
| L:T:P:S  | 2:0:1:0   |                        |                   |                       |                   |           |                       |           | SEE Marks          |                     |               |             | 50       |                |  |
| Hrs / Week   | 2+2   |                        |                   |                       |                   |           |                       |           | Total Marks        |                     |               | 100         | 100      |                |  |
| Credits  | 03 Exam Hours 03  |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| course outcomes: At the end of the course, the student will be able to:                                      |   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 22CDS344.1   | Understand the fundamentals of Ruby Programming essential for problem solving.                          |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 22CDS344.2   | Examine the operational aspects of Strings and Arrays in Ruby Programming                               |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 22CDS344.3   | Inspect the concept of Classes and Objects in Ruby Programming.   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 22CDS344.4   | Analyze the Web-App Framework of Ruby on Rails.   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 22CDS344.5   | Understand Ruby Tk Programming.   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 22CDS344.6   | Exam  | ine the                | conce             | pts of ex             | ktended           | Ruby p    | rogram                | ming.     |                    |                     |               |             |          |                |  |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:                                |   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
|  | P01   | P02                    | <b>PO3</b>        | P04                   | P05               | P06       | P07                   | P08       | P09                | P010                | P011          | P012        | PSO1     | PSO2           |  |
| 22CDS344.1   | 3   | 3                      | 3                 | 3                     | 1                 | -         | -                     | -         | -                  | -                   | -             | 2           | 2        | 2              |  |
| 22CDS344.2   | 3   | 3                      | 3                 | 3                     | 1                 | -         | -                     | -         | -                  | -                   | -             | 2           | 2        | 2              |  |
| 22CDS344.3   | 3   | 3                      | 3                 | 3                     | 1                 | -         | -                     | -         | -                  | -                   | -             | 2           | 2        | 2              |  |
| 22CDS344.4   | 3   | 3                      | 3                 | 3                     | 1                 | -         | -                     | -         | -                  | -                   | -             | 2           | 2        | 2              |  |
| 22CDS344.5   | 3   | 3                      | 3                 | 3                     | 1                 | -         | -                     | -         | -                  | -                   | -             | 2           | 2        | 2              |  |
| MODULE-1   | 5   | J                      | ntrod             | uction                | to Ruby           | / Progr   | ammin                 | -<br>o    | _                  | _                   | 2200534       | 4 1         | 6 Ho     |                |  |
| Ruby –Overview, Syntax, Variables, Operators, Comments, Control Statements, Loops, Methods, Blocks, Modules. |   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          | <u></u>        |  |
| Laboratory Com   | ponen   | t: (pro                | gram              | s)                    |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 1. Write Rub   | 1. Write Ruby program to get ruby version with patch number.  |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          | 3 Hours        |  |
| 2. Write a Ru  | Ruby program to display the current date and time.  |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 3. Write a Ru  | 3. Write a Ruby program which accept the radius of a circle from the user and compute the parameter and |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| area.  |   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| TEXT BOOK:   | TEX   | TEXT BOOK 1: Chapter 1 |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| MUDULE-Z   | by Clas   | <b>S</b>               | tring             | S-Array               | vs, clas          | ses an    | a Objec               | ts        | onting (           | biosts C            | ZZCDS34       | <b>14.2</b> | 6 HOL    | Irs<br>Mothodo |  |
| in Ruby, Member H  | <sup>F</sup> unctio   | ns in Ri               | uby Cla           | asses.                | iiing me          | ethous, i | iew met               | .1100, CI | eating C           | Djects, C           | reating OD    | Jects using | g custom | Methous        |  |
| Laboratory Com   | ponen   | t: (pro                | gram              | s)                    |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 1. Write a Ruby program to create a new string which is n copies of a given string where n is a non-         |   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| negat  | ive inte  | ger.                   |                   |                       |                   |           |                       | _         |                    |                     |               | _           |          |                |  |
| 2. Write   | a Ruby  | y progr                | am to             | check v               | whether           | r a strin | g 'Ruby               | ' appear  | rs at ind          | dex 1 in            | a given sti   | ng, if      | 3 H      | ours           |  |
| 'Ruby  | ' appea   | ars retu               | rn the            | string v              | without           | 'Ruby'    | otherwi               | se retur  | n the st           | ring unc            | hanged.       |             |          |                |  |
| 3. Write   | a Ruby<br>a space   | v progra<br>betwee     | am wh<br>en thei  | iich acce<br>n.       | ept the           | user's fi | rst and               | last nam  | ie and p           | orint thei          | m in revers   | e order     |          |                |  |
| <b>TEXT BOOK:</b> TEXT BOOK 1: Chapter 5,6   |   |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| MODULE-3   | Ruby and Rails22CDS344.3,22CDS244.4   |                        |                   |                       |                   |           |                       |           |                    | 4.3,                | 6 Hours       |             |          |                |  |
| Ruby Rails The structure and Execution of Ruby Programs Package Management with RIIRYCEMS Ruby and           |   |                        |                   |                       |                   |           |                       |           | bv and w           | eb: Writing CGI     |               |             |          |                |  |
| scripts, cookies, Ch   | noice of  | Webse                  | ervers,           | SOAP a                | nd web            | service   | s.                    | 1 1411480 |                    | 101 110 2           | 1 0.21 10,110 | og and m    |          | 8 001          |  |
| Laboratory Com   | ponen   | t: (pro                | gram              | s)                    |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 1. Write a Ru  | Ruby program to create a class with data members and initialize using initialize ( ) method             |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| 2. Write a Ru  | uby program to initialize instance variables using the constructor.                                     |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          | ours           |  |
| 3. Build a Ra  | ils application to accept book information viz. Accession number, title, authors, edition and           |                        |                   |                       |                   |           |                       |           |                    |                     |               |             |          |                |  |
| title speci  | fied by   | web pa                 | ige and<br>er and | i store t<br>to displ | ine into ay the s | earch r   | i in a da<br>esults w | ith pror  | na to s<br>er head | earcn for<br>lings. | a dook wi     | un the      |          |                |  |
| TEXT BOOK:   | TEX'  | ГВООГ                  | K 1: Cł           | apter 1               | 6                 |           |                       | r-sr      |                    | 0.2                 |               |             | 1        |                |  |
|  | 1   |                        |                   | r                     |                   |           |                       |           |                    |                     |               |             |          |                |  |
| RubyTe - Simple Tk Application, widgets, Binding events, Carvas, scrolling.         Laboratory Component (programs)         1         Demonstrate Ruby/Tk Widget Classes         2         Demonstrate Ruby/Tk Widget Classes         2         Demonstrate Ruby/Tk Event Handling         TEXT BOOK:         TEXT BOOK 1: Chapter 8         MODULE-5         Extending Ruby         AZCDS344.6         6 Hours         Ruby TK Event Handling         TEXT BOOK:         TEXT BOOK I: Chapter 16         Component: (programs)         A more state Embedding Ruby Interpreter.         TEXT BOOK: TEXP BOOK 1: Chapter 16         TEXT BOOK: TEXP BOOK 1: Chapter 16         TEXT BOOK: TEXP BOOK: 1: Chapter 16         RBE desessment Pattern(50 Marks - Theory) -         KBT Levels         Exam Marks         Lit 2 Understand 5         10         Lit 2 Understand 5         10         Lit 2 Understand 5   | MODULE-4   |   | Introduction to Ruby Tk 22CDS344.5 |                   |               |                    |                      |           |                |  |  |  |
|---|--|---|------------------------------------|-------------------|---------------|--------------------|----------------------|-----------|----------------|--|--|--|
| Laboratory Component: (programs)       3 Hours         1. Demonstrate Ruby/TK Event Handling       3 Hours         3. Demonstrate Ruby/TK Event Handling       22CDS344.6       6 Hours         TEXT BOOK:       TEXT BOOK: 1 Chapter 8       6 Hours         MODULE-5       Extending Ruby       22CDS344.6       6 Hours         Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding Ruby Interpreter.       3 Hours         Laboratory Component: (programs)   | RubyTk – Simple T  | ubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.                      |                                    |                   |               |                    |                      |           |                |  |  |  |
| 1.       Demonstrate Sudard Configuration Options       3       Hours         3.       Demonstrate Ruby/Tk Event Handling       TEXT BOOK       TEXT BOOK 1: Chapter 8         MODULE-5       Extending Ruby       22CDS344.6       6         Ruby Objects in C, the Juckbox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.       3         Laboratory Component: (programs)       Laboratory Components (programs)       3         Laboratory Component: (programs)       3       Hours         1.       Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.       3         2.       Demonstrate Embedding Ruby Interpreter.       3         TEXT BOOK       TEXT BOOK 1: Chapter 16         CTE Assessment Pattern(50 Marks - Theory) -       Test (s)       Assessment       Lab         1.1       Remember       5       -       -         1.2       Understand       5       2       -         1.6       Create       -       -       -         1.6       Create       -       -       -         1.1       Remember       -       -       -         1.2       Understand       10       -       - <t< td=""><td colspan="11">Laboratory Component: (programs)</td></t<>   | Laboratory Component: (programs)   |   |                                    |                   |               |                    |                      |           |                |  |  |  |
| <ul> <li>2. Demonstrate Standard Configuration Options</li> <li>3. Demonstrate Kuby/TE Event Handing</li> <li>TEXT BOOK: TEXT BOOK 1: Chapter 8 Note: Constrate Kuby Programs (Constrate Kuby Programs)</li> <li>2. Demonstrate Kuby Programs)</li> <li>2. Write Ruby roograms (Constraints)</li> <li>3. Bernonstrate Memory allocation (Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.</li> <li>2. Demonstrate Memory allocation (Inctions.</li> <li>3. Demonstrate Memory allocation (Inctions.)</li> <li>3. Demonstrate Memory allocation (Inctions.)</li> <li>3. Demonstrate Memory allocation (Inctions.)</li> <li>4. Analyze in the second of th</li></ul>                            | 1. Demonstrate Ruby/Tk Widget Classes3 Hours2. Demonstrate Standard Configuration Options3 Hours |   |                                    |                   |               |                    |                      |           |                |  |  |  |
| 3. Demonstrate Ruby/Tk Event Handling         TEXT BOOK:       TEXT BOOK 1: Chapter 8         MODULE-5       Extending Ruby       22CDS344.6       6 Hours         Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.       3 Hours         Laboratory Component: (programs)       1. Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.       3 Hours         3. Demonstrate Embedding Ruby Interpreter.       3 Hours         TEXT BOOK:       TEXT BOOK 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -       Marks Distribution         RBT Levels       Test (s)       Qualitative Assessment Lab         1.1       Remember       5       -         1.2       Understand       5       -         1.3       Apply       5       3       10         1.4       Analyze       5       -       -         1.6       Create       -       -       -         1.6       Create       -       -       -         1.2       Understand       10       -       -         1.3       Apply       15       -       -         1.4       Analyze  | 2. Demonstra   | ate Standard  | Configura                          | tion Optio        | ns            |                    |                      |           |                |  |  |  |
| TEXT BOOK:       TEXT BOOK 1: Chapter 8         MODULE-5       Extending Ruby       22CDS344.6       6 Hours         Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.       3 Hours         Laboratory Component: (programs)       1.       Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.       3 Hours         2.       Demonstrate Memory allocation functions.       3       3 Hours         3.       Demonstrate Memory allocation functions.       3       3         1.       TEXT BOOK:       TEXT BOOK 1: Chapter 16       3         CIE Assessment Pattern(50 Marks - Theory) -       Marks Distribution       Lab         1.1       Remember       5       -       -         1.2       Understand       5       2       -       -         1.3       Apply       5       3       10       -  | 3. Demonstra   | ate Ruby/Tk   | Event Har                          | ndling            |               |                    |                      |           |                |  |  |  |
| MODULE-5       Extending Ruby       22CDS344.6       6 Hours         Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding at Ruby Interpreter.       Laboratory Component (programs)       3         1. Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.       3       Hours         2. Demonstrate Embedding Ruby Interpreter.       3       Hours       3         TEXT BOOK:       TEXT ROCK 1: Chapter 16       1       Cle Assessment Pattern(50 Marks - Theory) -         Cle Assessment Pattern(50 Marks - Theory) -         Kernember 5       -       -         1.3       Apply       5       3       10         1.4       Remember       5       -       -       -         1.4       Analyze       5       -       10       -   | TEXT BOOK:   | TEXT BOO  | K 1: Chap                          | ter 8             |               |                    |                      | I         |                |  |  |  |
| Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.       Imbedding a Ruby Interpreter.         Laboratory Component: (programs)       1. Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.       3 Hours         3. Demonstrate Memory allocation functions.       3. Demonstrate Memory allocation functions.       3 Hours         3. Demonstrate Memory allocation functions.       3 Hours       3 Hours         CIEA Assessment Pattern(50 Marks - Theory) -       Image: Component: (Dot 1: Chapter 16)       1 EXT BOOKS.         CIEA Assessment Pattern(50 Marks - Theory) -       Image: Component: (Dot 1: Chapter 16)       1 EXT BOOKS.         SEE Assessment Pattern (50 Marks - Theory) -       Image: Component: (Dot 1: Chapter 16)       1 EXT BOOKS.         Stee Assessment Pattern (50 Marks - Theory)-         Exam Marks         L4       Analyze       1 Component: (Dot 1)         L5       Evaluate       5       -         L6       Create       -       -         L1       Remember       -       -         L2       Understand       10       13         L3       Apply       15       14         L4       Analyze       15       15   | MODULE-5 Extending Ruby 22CDS344.6   |   |                                    |                   |               |                    |                      |           |                |  |  |  |
| Embedding a Ruby Interpreter.       Laboratory Component: (programs)       3 Hours         1. Write a Ruby programs to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.       3 Hours         2. Demonstrate Memory allocation functions.       3 Hours         3. Demonstrate Embedding Ruby Interpreter.       100         TEXT BOOK:       TEXT BOOK 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Image: Colspan="2">Marks Distribution         RBT Levels       Test (s)         Qualitative       Lab         L3       Apply         L4       Analyze         5       -         L5       Evaluate         5       -         L6       Create         1.5       Evaluate         1.6       Create         1.1       Remember         1.2       Understand         1.3       Apply         1.4       Analyze         1.5       Evaluate         1.6       Create         1.7       Ruberoscie         Suggested Learning Resources:         Test Books:         1.8       Rivalatate       10         1.4   | Ruby Objects in C.   | the lukebo  | x extensio                         | n. Memory         | v allocation. | Ruby Type Syster   | m. Embedding Rub     | v to Oth  | er Languages.  |  |  |  |
| Laboratory Component: (programs)         1. Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.         2. Demonstrate Remory allocation functions.         3. Demonstrate Remodeding Ruby Interpreter.         TEXT BOOK: 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Marks Distribution         TEXT BOOK: 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Marks Distribution         Laboratory Company of the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.         Demonstrate Remodeding Ruby Interpreter.         TEXT BOOK: 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         ER Assessment Pattern (50 Marks - Theory)-         SEE Assessment Pattern (50 Marks - Theory)-         Examples Kindle Edition by Nathan Herzler Chapter 10         L2       Understand       10         L3       Exam Marks         Suggested Learning Resources:         Text Books:         1.       RBT Levels       Exam Marks         L6       Create       - <td>Embedding a Ruby</td> <td>Interpreter.</td> <td></td> <td>, ,</td> <td>,,</td> <td></td> <td></td> <td>,</td> <td></td>   | Embedding a Ruby   | Interpreter.  |                                    | , ,               | ,,            |                    |                      | ,         |                |  |  |  |
| 1. Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.       3 Hours         2. Demonstrate Emodeling Ruby Interpreter.       3 Hours         TEXT BOOK:       TEXT BOOK 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Image: Colspan="2">Marks Distribution         RBT Levels       Test (s)         Qualitative       Lab         12 Understand       5         13 Apply       5         14 Analyze       -         16 Create       -         16 Create       -         13 Apply       15         14 Analyze       15         15 Evaluate       15         16 Create       -         16 Create       -         15 Evaluate       10         16 Create       -         17 Understand       10   | Laboratory Com   | aboratory Component: (programs)   |                                    |                   |               |                    |                      |           |                |  |  |  |
| a given array of integers.       3 Hours         2. Demonstrate Memory allocation functions.       3 Hours         3. Demonstrate Embedding Ruby Interpreter.       TEXT BOOK:       TEXT BOOK 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Warks Distribution         RBT Levels       Warks Distribution         11       Remember       5       -         12       Understand       5       2       -         13       Apply       5       3       10         14       Analyze       5       -       10         15       Evaluate       5       -       -         16       Create       -       -       -         Suggested Learning Resources:         Text Books:         Nuby Programming for Beginners: An Introduction to Learning Ruby Programming with Tutorials and Hands-On Examples Kindle Editon by Nathan Metzler (Author), ISBN-13 : 979-8648692756         Text Books:         1. Ruby Programming for Beginners: An Introduction to Learning Ruby Programming with Tutorials and Hands-On Examples Kindle Editon by Nathan Metzler (Author), ISBN-13 : 979-8648692756         Text Books:         1. Ruby Programming for Beginners: An Introduction to Learning Ruby Programming wi   | 1. Write a Ru  | 1. Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in |                                    |                   |               |                    |                      |           |                |  |  |  |
| 2. Demonstrate Memory allocation functions.         3. Demonstrate Embedding Ruby Interpreter.         TEXT BOOK. TEXT BOOK 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Marks Distribution         Qualitative Lab         Lab         Marks Distribution         Lab         <   | a given arr  | ray of intege   | rs.                                |                   | -             |                    |                      |           | <b>3 Hours</b> |  |  |  |
| 3. Demonstrate Embedding Ruby Interpreter.         TEXT BOOK I Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Marks Distribution         RBT Levels       Marks Distribution         RBT Levels       Qualitative       Lab         Lab       Qualitative       Lab         Lab       Qualitative         Lab       Case  | 2. Demonstra   | 2. Demonstrate Memory allocation functions.   |                                    |                   |               |                    |                      |           |                |  |  |  |
| TEXT BOOK 1: Chapter 16         CIE Assessment Pattern(50 Marks - Theory) -         Marks Distribution         RBT Levels       Marks Distribution         Lab         Lab       Qualitative         Lab       Calitation         Lab       RBT Levels       Marks Distribution (50)         Lit       RBT Levels       Exam Marks         Distribution (50)         Lab       Calitation   | 3. Demonstra   | ate Embeddi   | ng Ruby Ir                         | nterpreter.       |               |                    |                      |           |                |  |  |  |
| CIE Assessment Pattern (50 Marks - Theory) -         Marks Distribution         RBT Levels       Marks Distribution         Lab       Marks  | TEXT BOOK:   | TEXT BOO  | K 1: Chapt                         | ter 16            |               |                    |                      |           |                |  |  |  |
| Marks Distribution         RBT Levels       Marks Distribution         25       05       20         L1       Remember       5       -         L2       Understand       5       2       -         L3       Apply       5       3       10         L4       Analyze       5       -       -         L4       Analyze       5       -       -         L4       Analyze       5       -       -         L6       Create       -       -       -         L6       Create       -       -       -         L2       Understand       10       -       -         L1       RBT Levels       Exam Marks       Distribution (50)         L1       Remember       -       -       -         L2       Understand       10       -       -         L3       Apply       15       -       -         L4       Analyze       15       -       -         L6       Create       -       -       -         L4       Analyze       15       -       -       - </td <td>CIE Assessment Pa</td> <td>attern(50 N</td> <td>larks – Th</td> <td>eorv) -</td> <td></td> <td></td> <td></td> <td></td> <td></td>   | CIE Assessment Pa  | attern(50 N   | larks – Th                         | eorv) -           |               |                    |                      |           |                |  |  |  |
| Marks Distribution         RBT Levels       Test (s)       Multiplication         RBT Levels       Test (s)       Assessment         L1       Remember       5       -         L2       Understand       5       -         L2       Understand       5       -         L2       Understand       5       -         L2       Understand       10         L5       Exam Marks         L6       Create       -         L4       Analyze       Test Marks         L1       RBT Levels       Exam Marks         L4       Analyze       Test Marks         L1       RBT Levels       Exam Marks       Test Book         Suggested Learning Resources:         Text Books:         1       Ruby Programming for Beginners: An Introduction to Learning Ruby Programming with Tutorials and Hands-On Exa  |  |   |                                    |                   |               | Morke Dietribu     | ition                |           |                |  |  |  |
| RBT Levels       Test (s)       Qualitative<br>Assessment       Lab         11       Remember       5       20         12       Understand       5       2       -         13       Apply       5       3       10         14       Analyze       5       -       -         16       Create       -       -       -         16       Create       -       -       -         11       Remember       -       -       -         16       Create       -       -       -         16       Create       -       -       -         11       Remember       -       -       -         12       Understand       10       -       -         15       Evaluate       10       -       -         15       Evaluate       10       -       -         15       Evaluate       10       -       -         16       Create       -       -       -         Suggested Learning Resources:       Text Books:       -       -       -         15       Evaluate       10       -       -  |  |   |                                    |                   |               | Mai KS Disti ibt   |                      |           |                |  |  |  |
| Image: Content of the set of the se |  |   | <b>RBT</b> Leve                    | els               | Test (s)      | Qualitative        | Lab                  |           |                |  |  |  |
| L1       Remember       5       -       -         L2       Understand       5       2       -         L3       Apply       5       3       10         L4       Analyze       5       -       10         L5       Evaluate       5       -       -         L6       Create       -       -       -         L6       Create       -       -       -         L2       Understand       10       -       -         L2       Understand       10       -       -         L2       Understand       10       -       -         L4       Analyze       15       -       -         L3       Apply       15       -       -         L4       Analyze       15       -       -         L4       Analyze       15       -       -         L5       Evaluate       10       -       -         L6       Create       -       -       -         Suggested Learning Resources:       -       -       -         Text Books:       -       -       -       -   |  | Assessment Lab  |                                    |                   |               |                    |                      |           |                |  |  |  |
| L1Refinement3L2Understand52-L3Apply5310L4Analyze5-10L5Evaluate5L6CreateL6CreateL6CreateSEE Assessment Pattern (50 Marks - Theory)-SEE Assessment Pattern (50 Marks - Theory)-RBT LevelsExam Marks<br>Distribution (50)L1RememberL2Understand10L3Apply15L4Analyze15L5Evaluate10L6Create-Suggested Learning Resources:-Text Books:1Ruby Programming for Beginners: An Introduction to Learning Ruby Programming with Tutorials and Hands-<br>On Examples Kindle Edition by Nathan Metzler (Author), ISBN-13 : 978-86466927562The Ruby Programming Language: Everything You Need to Know 1st Edition by David<br>Flanagan (Author), Yukihiro Matsumoto (Author), ISBN-13 : 978-8184044928Web links and Video Lectures (e-Resources):1https://www.codecademy.com/learn/learn-ruby3https://www.codecademy.com/learn/learn-ruby3https://www.codecademy.com/learn/learn-ruby3https://www.udemy.com/course/ruby-for-absolute-beginners/Activery-Based Learning (Suggested Activities in Class)/ Practical Based learning.1Contents related activ  |  | 11  | Domom                              | han               | 25<br>F       | 05                 | 20                   |           |                |  |  |  |
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| Course Code   | 2               | 22CDS351 CIE Marks   |                    |                       |                      |                     |           |                      |                       |                          |            | 50          |            |         |  |
| L:T:P:S       | (               | ):0:1:0  |                    |                       |                      |                     |           |                      | SEE N                 | Marks                    |            | 50          |            |         |  |
| Hrs / Week    | 2               | 2  |                    |                       |                      |                     |           |                      | Tota                  | l Marks                  |            | 100         |            |         |  |
| Credits       | 1               | 1  |                    |                       |                      |                     |           |                      | Exan                  | n Hours                  |            | 03          |            |         |  |
| Course outcom | es: At          | the end  | l of the           | e course,             | , the stu            | dent wil            | l be abl  | e to:                |                       |                          |            |             |            |         |  |
| 22CDS351.1    | Ι               | Demonstrate the basics of Python Programming.  |                    |                       |                      |                     |           |                      |                       |                          |            |             |            |         |  |
| 22CDS351.2    | A               | Apply in   | herita             | nce and               | overloa              | ding for            | the giv   | en probl             | em.                   |                          |            |             |            |         |  |
| 22CDS351.3    | A<br>C          | Analyzii<br>operatio   | ng the<br>ons fro  | data for<br>m pythc   | missing<br>on librar | value a<br>ies.     | nd corre  | elation a            | mong th               | ne parame                | ters consi | dered wit   | h essentia | al      |  |
| 22CDS351.4    | Ι               | Demons   | trate t            | he conce              | ept of Da            | ata Visu            | alizatio  | n using I            | Python l              | ibraries.                |            |             |            |         |  |
| Mapping of Co | urse C          | )utcom   | es to              | Progra                | m Outc               | omes a              | nd Pro    | gram S               | pecific               | Outcome                  | S:         |             |            |         |  |
|               | P01             | P02  | P03                | P04                   | P05                  | P06                 | P07       | P08                  | P09                   | P010                     | P011       | P012        | PS01       | PSO2    |  |
| 22CDS351.1    | 3               | 3  | 3                  | 2                     | 3                    | -                   | -         | -                    | -                     | -                        | -          | 2           | 3          | 3       |  |
| 22CDS351.2    | 3               | 3  | 3                  | 2                     | 3                    | -                   | -         | -                    | -                     | -                        | -          | 2           | 3          | 3       |  |
| 22CDS351.3    | 3               | 3  | 3                  | 2                     | 3                    | -                   | -         | -                    | -                     | -                        | -          | 2           | 3          | 3       |  |
| 22CDS351.4    | 3               | 3  | 3                  | 2                     | 3                    | -                   | -         | -                    | -                     | -                        | -          | 2           | 3          | 3       |  |
| Pgm. No.      |                 |  |                    |                       | ]                    | List of P           | Program   | ns                   |                       |                          |            | Hours       |            | COs     |  |
|               |                 |  |                    |                       |                      | Prere               | auisite   | Progra               | ms                    |                          |            |             |            |         |  |
|               |                 | <ul> <li>Basics of Python Programming</li> <li>Programs dealing with libraries: NumPy, Pandas, Matplotlib, SciPy,Scikit-<br/>Learn.</li> </ul> |                    |                       |                      |                     |           |                      |                       |                          |            | 2           | 2 NA       |         |  |
|               | PART-A          |  |                    |                       |                      |                     |           |                      |                       |                          |            |             |            |         |  |
| 1             | Write<br>funct  | e a pytl<br>tion.  | hon pi             | ogram t               | to find s            | sum of 1            | n natura  | al numb              | ers usir              | ng recursiv              | /e         | 2 22CDS35   |            | DS351.1 |  |
| 2             | Write<br>as W   | e a Pyth<br>ords St  | on Pro<br>arting   | ogram to<br>with tha  | Create a<br>at Chara | a Diction<br>cter.  | ary wit   | h Key as             | First Ch              | aracter an               | ldValue    | 2           | DS351.1    |         |  |
| 3             | Impl<br>store   | ement <i>a</i><br>e them i   | n Pytho<br>n a dio | on progra<br>ctionary | am to co<br>data str | unt the<br>ucture   | number    | rs of chai           | racters i             | n the strin              | g and      | 2 22CDS351  |            | DS351.1 |  |
| 4             | Desig<br>of a I | gn and<br>List Usir  | Develong Class     | op a Pyt<br>sses and  | hon Pro<br>Objects   | ogram to            | o Apper   | nd, Dele             | te and I              | DisplayEle               | ments      | 2 22CDS351. |            | DS351.2 |  |
| 5             | Dem<br>Pyth     | onstrat<br>on Prog   | e the c<br>ram.    | oncept o              | of Metho             | od Resol            | ution o   | rder in r            | nultiple              | inheritan                | cein       | 2           | 22C        | DS351.2 |  |
| 6             | Desig<br>mult   | gn and<br>iplicatio  | Implei<br>on of t  | ment a P<br>wo comp   | Python F<br>plex nun | Program<br>nbers us | to perf   | form add<br>ary oper | dition, s<br>ators ov | ubtraction<br>verloading | l,         | 2           | 22C        | DS351.2 |  |
|               | •               |  |                    |                       |                      |                     | PART      | Г-В                  |                       |                          |            |             |            |         |  |
| 7             | Dem<br>using    | onstrat<br>g nump  | e with<br>y array  | a pytho<br>y.         | n progr              | am to sł            | now the   | speed c              | of execut             | tion is mo               | rewhen     | 2           | 22C        | DS351.3 |  |
| 8             | Write           | e a pro<br>ability,  | gram<br>joint p    | 2                     | 22C                  | DS351.3             |           |                      |                       |                          |            |             |            |         |  |
| 9             | Write           | e a prog<br>ing data   | gram t<br>a.       | o analys              | e the gi             | ven data            | and pe    | erform tl            | he opera              | ation to fir             | ndthe      | 2           | 22C        | DS351.3 |  |
| 10            | Read<br>in lib  | l the da<br>raries.  | ta set a           | and perf              | orm sca              | tter plo            | t, Histog | gram an              | d Bar pl              | ot usingM                | atplotlib  | 2           | 22CE       | )S351.4 |  |
| 11            | Read<br>seab    | l the da<br>orn libr   | ita set<br>ary.    | and pe                | rform s              | catter p            | lot, His  | togram               | and Ba                | r plot s u               | sing       | 2           | 22CE       | )S351.4 |  |
| 12            | Read            | l the dat  | ta set a           | and perfo             | orm Box              | and wh              | iskers p  | olot usin            | g seabo               | rn library.              |            | 2           | 22CE       | )S351.4 |  |

### PART-C Beyond Syllabus Virtual Lab Content

- (To be done during Lab but not to be included for CIE or SEE)
- 1. https://www.simplilearn.com/tutorials/data-analytics-tutorial/data-analytics-with-python.
- 2. https://python-iitk.vlabs.ac.in/List%20of%20experiments.html

| <b>CIE Assessment Pattern</b> | (50 Marks - L | ab) |
|-------------------------------|---------------|-----|
|-------------------------------|---------------|-----|

|    | DDT Lovala | Test (s) | Weekly Assessment |
|----|------------|----------|-------------------|
|    | RD1 Levels | 20       | 30                |
| L1 | Remember   | -        | -                 |
| L2 | Understand | -        | 5                 |
| L3 | Apply      | 10       | 15                |
| L4 | Analyze    | 5        | 5                 |
| L5 | Evaluate   | 5        | 5                 |
| L6 | Create     | -        | -                 |

### SEE Assessment Pattern (50 Marks - Lab)

|    | <b>RBT Levels</b> | Exam Marks<br>Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember          | -                               |
| L2 | Understand        | 05                              |
| L3 | Apply             | 15                              |
| L4 | Analyze           | 20                              |
| L5 | Evaluate          | 10                              |
| L6 | Create            | -                               |

### **Suggested Learning Resources:**

### **Reference Books:**

- 1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Publisher: Shroff/ O'Reilly Publishers, 2nd edition, 2022, ISBN-10: 1636390471, ISBN-13: 978-1636390475
- 2. Mark Lutz, "Programming Python", O'Reilly Media, 4th edition, 2010, ISBN: 9780596158101
- 3. Jake Vander plas, "Python Data Science Handbook: Essential tools for working with data", O'Reilly Publishers, I Edition, **ISBN-10**: 9352134915
- 4. Wes Mc Kinney, "Python for Data Analysis", O'Reilly Media, 2012Mark Lutz, "Programming Python", O'Reilly Media, 4th edition, 2010, ISBN: 9781491957660
- 5. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", Apress, 1st edition, 2009, ISBN-13: 978-1430216322
- 6. Magnus Lie Hetland, "Beginning Python: From Novice to Professional", Apress, Second Edition, 2005, ISBN-13 (electronic): 978-1-4302-0634-7
- 7. ShaiVaingast, "Beginning Python Visualization Crafting Visual Transformation Scripts", Apress, 2nd edition, 2014, ISBN-13 (electronic): 978-1-4302-1844-9

### Web links and Video Lectures (e-Resources):

- 1. https://onlinecourses.nptel.ac.in/noc23\_cs99/preview
- 2. https://www.youtube.com/watch?v=\_uQrJ0TkZlc
- 3. https://www.python.org/

### Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Demonstration of mini projects using python for Data Analytics for .[ Exploring Data, Handling missing data forIRIS and Hosing data]

| PROJECT MANAGEMENT WITH Git |   |  |                 |                     |               |                      |            |            |            |             |        |       |                              |          |
|-----------------------------|---|--|-----------------|---------------------|---------------|----------------------|------------|------------|------------|-------------|--------|-------|------------------------------|----------|
| Course Code                 | 2   | PROJECT MANAGEMENT WITH Git 22CDS352 CIE Marks |                 |                     |               |                      |            |            |            |             |        |       |                              |          |
| L:T:P:S                     | (   | 0:0:1:0 SEE Marks                              |                 |                     |               |                      |            |            |            |             |        |       |                              |          |
| Hrs / Week                  | 2   | 2  |                 |                     |               |                      |            |            | Total      | Marks       |        | 100   |                              |          |
| Credits                     | 1   | 1  |                 |                     |               |                      |            |            | Exam       | Hours       |        | 03    |                              |          |
| Course outcom               | es: At  | the end  | of the          | course,             | the stud      | dent wil             | l be able  | e to:      |            |             |        |       |                              |          |
| 22CDS352.1                  | I   | Demons   | trate t         | he basic            | comma         | ind of Gi            | it and m   | anage bi   | anches     | in Git.     |        |       |                              |          |
| 22CDS352.2                  | I   | Apply th                                       | e proc          | cess of co          | ollabora      | ting and             | d workir   | ng with r  | emote r    | epositorie  | es.    |       |                              |          |
| 22CDS352.3                  | I   | nspect   | the adv         | vanced (            | Git opera     | ations.              |            |            |            |             |        |       |                              |          |
| 22CDS352.4                  | I   | Analyze  | the ve          | ersion co           | ntrollin      | g comm               | ands in    | Git.       |            |             |        |       |                              |          |
| Mapping of Co               | urse (  | Dutcom   | les to          | Progra              | m Outc        | omes a               | nd Pro     | gram S     | pecific    | Outcome     | s:     |       |                              |          |
|                             | P01   | P02  | P03             | P04                 | P05           | P06                  | P07        | P08        | P09        | P010        | P011   | P012  | PSO1                         | PSO2     |
| 22CDS352.1                  | 2   | 2  | 2               | 2                   | 2             | -                    | -          | -          | -          | -           | -      | 3     | 3                            | 3        |
| 22CDS352.2                  | 3   | 3  | 3               | 3                   | 2             | -                    | -          | -          | -          | -           | -      | 3     | 3                            | 3        |
| 22CDS352.3                  | 2   | 2  | 2               | 2                   | 2             | -                    | -          | -          | -          | -           | -      | 3     | 3                            | 3        |
| 22CDS352.4                  | 2   | 3  | 3               | 3                   | 2             | -                    | -          | -          | -          | -           | -      | 3     | 3                            | 3        |
| Pgm. No.                    |   |  |                 |                     | ]             | List of F            | Progran    | ns         |            |             |        | Hours |                              | COs      |
|                             | 1   |  |                 |                     |               | Prere                | quisite    | Progra     | ms         |             |        |       |                              |          |
|                             |   | 1. Sof   | tware           | Develop             | ment P        | rocess               |            | 0          |            |             |        |       |                              |          |
|                             |   | 2. A c   | omma            | nd line i           | nterface      | e.                   |            |            |            |             |        |       |                              |          |
|                             |   | 3. A te  | ext edi         | tor of yo           | our choi      | ce (VS C             | lode).     |            |            |             |        | 2     |                              | NA       |
|                             |   | 4. A GitHub account.                           |                 |                     |               |                      |            |            |            |             |        |       |                              |          |
|                             | PART-A  |  |                 |                     |               |                      |            |            |            |             |        |       |                              |          |
|                             | Initialize a new Git repository in a directory. Create a new file and add it to the |  |                 |                     |               |                      |            |            |            |             |        |       |                              |          |
| 1                           | stagi   | ng area  | and co          | ommit th            | e chang       | es with              | an appr    | opriate    | commit     | message.    |        | 2     | 220                          | DS352.1  |
| 2                           | Crea  | te a nev                                       | v bran          | ch name             | ed "featı     | ıre-brar             | nch." Sw   | ritch to t | he "mas    | ter" branc  | ch.    | 2     | 220                          | DC2521   |
| L                           | Merg  | ge the "f                                      | eature          | e-branch            | " into "r     | naster."             | 1          |            |            |             |        | 2     | 2 22003532.1                 |          |
| 3                           | Writ  | e the co                                       | mmar            | nds to st           | ash you       | r chang              | es, swito  | ch branc   | hes, and   | l then app  | ly the | 2     | 22C                          | DS352.1  |
| 1                           | Stash   | ied chai                                       | iges.           | roposit             | orutow        | ourloca              | Imachi     | 20         |            |             |        | 2     | 220                          |          |
| 4                           | Eetc  | h the la                                       | test c          | hanges              | $\frac{1}{1}$ | romoto               | reposit    | tory and   | l robase   | vour loc    |        | Ζ     | 220.                         | 03352.2  |
| 5                           | bran  | ch onto  | the ur          | nanges<br>odated r  | emote b       | ranch.               | reposi     | lory and   | rebase     | your loc    | ai     | 2     | 22C                          | DS352.2  |
|                             | Writ  | e the co                                       | mman            | d to me             | rge "fea      | ture-bra             | anch" in   | to "mast   | er" whi    | le providi  | ng     |       |                              |          |
| 6                           | a cus   | stom co  | nmit r          | nessage             | for the       | merge.               |            |            |            | -           | -      | 2     | 220                          | DS352.2  |
|                             |   |  |                 |                     |               |                      | PART       | Г-В        |            |             |        |       |                              |          |
| 7                           | Writ  | e the co                                       | mman            | id to cre           | ate a lig     | htweigh              | nt Git tag | g named    | "v1.0" f   | or a comn   | nit    | 2     | 220                          | DS3523   |
|                             | in yo   | ur local                                       | repos           | itory.              |               |                      |            |            |            |             |        |       |                              |          |
| 8                           | Writ  | e the co                                       | mman            | id to che           | erry-pic      | k a rang             | ge of con  | nmits fro  | om "sou    | rce-branc   | h"     | 2     | 22C                          | DS352.3  |
|                             | to th   | e currei                                       | nt brar         | hch.                |               |                      |            |            |            |             |        |       |                              |          |
| 9                           | Give  | n a com<br>mit_incl                            | mit ID<br>uding | , how w<br>the auth | ould you      | use Gil              | t to view  | the det    | ails of th | iat specifi | 0      | 2     | 22C                          | DS352.4  |
|                             | Writ  | e the co                                       | mmar            | nd to list          | all com       | $\frac{1}{1}$ mits m | ade hv t   | he autho   | or "Iohn   | Doe" hetw   | veen   |       |                              |          |
| 10                          | "202  | 3-01-01  | 1" and          | "2023-1             | 2-31."        |                      | uue by e   | ne uutii   | , joini    | boe beer    | cen    | 2     | 22CE                         | 0\$352.4 |
| 11                          | Writ  | e the co                                       | mman            | d to dis            | play the      | last five            | e commi    | ts in the  | reposit    | ory's histo | ory.   | 2     | 22CI                         | )\$352.4 |
| 12                          | Writ<br>"abc  | e the co<br>123"                               | ommar           | nd to un            | do the d      | changes              | introdu    | iced by t  | he com     | mit with t  | he ID  | 2     | 2 22CDS352.4<br>2 22CDS352.4 |          |

### PART-C Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)

# 1. https://github.com/topics/virtual-lab

| <b>CIE Assessment Pattern (50 M</b> | Marks – | Lab)       |          |                   |
|-------------------------------------|---------|------------|----------|-------------------|
|                                     |         | DDT Lavala | Test (s) | Weekly Assessment |
|                                     |         | RB1 Levels | 20       | 30                |
|                                     | L1      | Remember   | -        | -                 |
|                                     | L2      | Understand | -        | 5                 |
|                                     | L3      | Apply      | 10       | 10                |
|                                     | L4      | Analyze    | 5        | 10                |
|                                     | L5      | Evaluate   | 5        | 5                 |
|                                     | L6      | Create     | -        | -                 |

# SEE Assessment Pattern (50 Marks - Lab)

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | -                               |
| L2 | Understand | 05                              |
| L3 | Apply      | 15                              |
| L4 | Analyze    | 20                              |
| L5 | Evaluate   | 10                              |
| L6 | Create     | -                               |

# Suggested Learning Resources:

### **Reference Books:**

- **1.** Version Control with Git, 3rd Edition, by Prem Kumar Ponuthorai, Jon Loeliger Released October 2022, Publisher(s): O'Reilly Media, Inc, ISBN-13:**978-1492091196**
- 2. Pro Git book, written by Scott Chacon and Ben Straub and published by Apress, <u>https://gitscm.com/book/en/v2</u> ISBN: 978-1484200773

### Web links and Video Lectures (e-Resources):

- 1. Ben Straub and published by Apress, <u>https://gitscm.com/book/en/v2</u>
- 2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex\_auth\_0130944433473699842782\_share d /overview.
- 3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex\_auth\_01330134712177459211926\_shar e d/overview.

# Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

• Group activity for uploading files/programs and manage version control in GIT

| PHP PROGRAMMING |        |  |          |           |            |           |            |            |           |             |                |            |           |          |
|-----------------|--------|--|----------|-----------|------------|-----------|------------|------------|-----------|-------------|----------------|------------|-----------|----------|
| Course Code     | 2      | 22CDS353         CIE Marks         50           0:0:1:0         SFF Marks         50 |          |           |            |           |            |            |           |             |                |            |           |          |
| L:T:P:S         | (      | 0:0:1:0 SEE Marks 50   |          |           |            |           |            |            |           |             |                |            |           |          |
| Hrs / Week      | 2      | 2  |          |           |            |           |            |            | Total     | Marks       |                | 100        |           |          |
| Credits         | 1      | L  |          |           |            |           |            |            | Exam      | n Hours     |                | 03         |           |          |
| Course outcom   | es: At | the end  | l of the | course    | , the stu  | dent wi   | ll be abl  | e to:      |           |             |                |            |           |          |
| 22CDS353.1      | A      | Apply th   | e basi   | c syntax  | and set    | mantics   | of PHP     | Program    | ıming.    |             |                |            |           |          |
| 22CDS353.2      | Ι      | Demons   | trate t  | he conc   | epts of o  | control s | structur   | es, struc  | ctured d  | ata (objec  | ct) and data i | items (arr | ay) in PH | IP.      |
| 22CDS353.3      | I      | Examine  | e the fi | le hand   | ling meo   | hanism    | and reg    | gular exp  | pression  | is concept  | in PHP.        |            |           |          |
| 22CDS353.4      | Ι      | nspect   | basic c  | oncepts   | s of PHP   | for web   | progra     | m devel    | oping.    |             |                |            |           |          |
| Mapping of Co   | urse ( | Dutcon   | ies to   | Progra    | am Out     | comes     | and Pro    | ogram S    | Specific  | : Outcom    | es:            |            |           |          |
|                 | P01    | P02  | P03      | P04       | P05        | P06       | P07        | P08        | P09       | P010        | P011           | P012       | PSO1      | PSO2     |
| 22CDS353.1      | 3      | 2  | 2        | 2         | 2          | 1         | -          | -          | -         | -           | -              | 2          | 2         | 2        |
| 22CDS353.2      | 3      | 2  | 2        | 2         | 2          | 1         | -          | -          | -         | -           | -              | 2          | 2         | 2        |
| 22CDS353.3      | 3      | 2  | 2        | 2         | 2          | 1         | -          | -          | -         | -           | -              | 2          | 2         | 2        |
| 22CDS353.4      | 3      | 2  | 2        | 2         | 2          | 1         | -          | -          | -         | -           | -              | 2          | 2         | 2        |
|                 | 1      |  |          |           |            |           | _          |            |           |             |                |            | -1        |          |
| Pgm. No.        |        |  |          |           |            | List of   | Progra     | ms         |           |             |                | Hours      |           | COs      |
|                 |        |  |          | 6.0       |            | Prer      | equisite   | e Progra   | ıms       |             |                | 2          |           |          |
|                 |        | • B  | asics c  | of Progra | amming     |           | DAD        | <b>T</b> A |           |             |                | 2          |           | NA       |
|                 |        | 1 0  |          | <u> </u>  | 1 1        |           |            | <u>T-A</u> |           | 1           |                | -          |           |          |
| 1               | Deve   | elop a Pl  | HP pro   | ogram to  | o calcula  | ite areas | s of Tria  | ngle and   | Rectan    | gle.        |                | 2          | 22CI      | 0\$353.1 |
| 2               | Deve   | elop a l   | РНР Р    | rogram    | to com     | pute th   | e roots    | of a qu    | uadratic  | equation    | ı by           | 2          | 22CI      | DS353.1  |
|                 | acce   | pting th   | e coef   | ficients. | Print th   | e appro   | priate n   | nessages   | s.        |             |                |            |           |          |
|                 | Dem    | Demonstrating the various forms to concatenate multiple stringsDevelop               |          |           |            |           |            |            |           |             |                |            |           |          |
|                 | prog   | ram(s)   | to den   | ionstra   | te conca   | tenatio   | n of strii | ngs:       |           |             |                |            |           |          |
|                 | (i) St | rings re   | eprese   | nted wi   | th litera  | ls (singl | e quote    | or doub    | ole quote | e)          |                |            |           |          |
| 3               | (ii) S | trings a   | s varia  | ables     |            |           |            |            |           |             |                | 2          | 22CI      | 0\$353.2 |
|                 | (iii)  | Multiple   | e strin  | gs repr   | esented    | with lit  | erals (s   | ingle qu   | ote or d  | louble qu   | ote)and        | _          |           |          |
|                 | varia  | ables  |          |           |            |           |            |            |           |             |                |            |           |          |
|                 | (iv) S | Strings a  | and str  | ing vari  | ables co   | ntaining  | g single o | quotes a   | s part st | ring cont   | ents           |            |           |          |
|                 | (v) S  | trings c   | ontain   | ing HTI   | ML segn    | ients ha  | ving ele   | ments w    | vith attr | ibutes      |                |            |           |          |
|                 | Deve   | elop a PI  | HP app   | lication  | that rea   | ads scor  | es betw    | een 0 an   | d 100 (j  | possibly in | ncluding       |            |           |          |
|                 | both   | 0 and 1  | .00)an   | d create  | es a histo | ogram a   | rray wh    | ose elen   | nents co  | ontain the  | number         |            |           |          |
| 4               | of sc  | ores be  | tween    | 0 and 9   | 9, 10 an   | d19, etc  | . The la   | st "box"   | inthe l   | nistogram   | should         | 2          | 22CI      | 0\$353.2 |
|                 | inclu  | de sco   | res bet  | ween 9    | 90 and     | 100. Us   | e a func   | tion       |           |             |                |            |           |          |
|                 | To g   | enerate  | the hi   | stogran   | 1.         |           |            |            |           |             |                |            |           |          |
|                 | Deve   | elop a P   | HP pr    | ogram t   | hat illus  | strates t | he conc    | ept of cl  | lasses a  | nd object   | s byreading    |            |           |          |
| 5               | and    | orinting   | empl     | oyee da   | ta, inclu  | ding Em   | p_Name     | e, Emp_II  | D, Emp_   | Dept,       |                | 2          | 22CI      | DS353.2  |
|                 | Emp    | _Salary,   | and E    | mp_D0     | J.         |           |            |            |           |             |                |            |           |          |
|                 | a. De  | evelop F   | PHP pr   | ogram     | to demo    | onstrate  | the dat    | e() with   | n differe | nt param    | eter           |            |           |          |
| 6               | optic  | ons.   |          |           |            |           |            |            |           |             |                | Э          | 2201      | 16252.2  |
| 0               | b. De  | evelop a   | I PHP    | progran   | n to gen   | erate th  | ne Fibor   | nacci ser  | ies usir  | ng a recur  | sive           | 2          | 2201      | 03333.2  |
|                 | func   | tion.  |          |           |            |           |            |            |           |             |                |            |           |          |
|                 |        |  |          |           |            |           | PAR'       | T-B        |           |             |                |            |           |          |
|                 | Deve   | elop a Pl  | HP pro   | gram to   | accept     | the file  | and per    | form the   | e follow  | ing         |                |            |           |          |
| 7               | (i) Pi | rint the   | first N  | lines o   | f a file   |           |            |            |           |             |                | 2          | 22CI      | DS353.3  |
|                 | (ii) U | Ipdate/  | Add th   | ie conte  | nt of a f  | ile       |            |            |           |             |                |            |           |          |
| Q               | Deve   | elop a $\overline{P}$  | HP pro   | ogram to  | o read tl  | ne conte  | ent of th  | e file and | d print   | the freque  | ency           | 2          | 2201      | 122233   |
| 0               | ofoc   | currenc  | e of th  | ie word   | accepte    | d by the  | e user in  | the file.  | ·         |             |                | ۷          | 2201      | 00000    |

| 9   | PHP program to ch  | eck a ca  | se insensitive sub  | string exists  | within the given string         | 2            | 22CDS353.3  |  |  |  |  |  |  |
|---|--|-----------|---------------------|----------------|---------------------------------|--------------|-------------|--|--|--|--|--|--|
|   | 9     2     22CDS353.3       10     Develop a PHP program to find the occurrences of a given pattern and replacethem     2     22CDS353.3  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| 10  | 10         Develop a PHP program to find the occurrences of a given pattern and replacethem         2         22CDS353.3           10         Develop a PHP program to count the occurrences of Addheer I numbers present         2         22CDS353.3 |           |                     |                |                                 |              |             |  |  |  |  |  |  |
|   | 11     With a text       11     Develop a PHP program to count the occurrences of Aadhaar [ numbers present       2     22CDS353.3   |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| 11  | 11 beverspar in program to count the occurrences of Auditalia [Indinbers present 2 22CDS353.3]   |           |                     |                |                                 |              |             |  |  |  |  |  |  |
|   | Develop a PHP pr   | ogram     | to read the cont    | ents of a HT   | MI form and display the         |              |             |  |  |  |  |  |  |
| 12  | 12 contents on a browser 2 22CDS353.4  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
|   |  |           | ]                   | PART-C         |                                 |              |             |  |  |  |  |  |  |
|   |  |           | Beyond Syllabu      | is Virtual La  | b Content                       |              |             |  |  |  |  |  |  |
|   | (То  | be don    | e during Lab but    | not to be in   | cluded for CIE or SEE)          |              |             |  |  |  |  |  |  |
| 1. [h   | ttps://html-iitd.vlabs   | s.ac.in/I | list%20of%20exp     | periments.htr  | nl]: Create a XHTML form wit    | h Name, Ado  | dress Line  |  |  |  |  |  |  |
| 1,  | Address Line 2, and I  | E-mail t  | ext fields. On subi | mitting, store | the values in MySQL table. R    | etrieve and  | display the |  |  |  |  |  |  |
| da<br>D   | ita based on Name.   | ! . /1    | :-+0/20-60/20       |                |                                 |              | 4 -         |  |  |  |  |  |  |
| 2. [n   | ttps://ntml-litd.vlabs   | s.ac.in/I | List%200f%20exp     | title authors  | nIJ : USING PHP and MySQL, d    | evelop a pro | ogram to    |  |  |  |  |  |  |
| st  | ore the information in   | n a data  | base and to search  | h for a book v | with the title specified by the | i web page a | display the |  |  |  |  |  |  |
| se  | arch results with pro  | per hea   | dings.[             |                | the file openied by the         |              | anopiaj ano |  |  |  |  |  |  |
| <b>CIE Assessme</b>   | nt Pattern (50 Mark  | s – Lab   | )                   |                |                                 |              |             |  |  |  |  |  |  |
|   |  | DDT       | Lovolc              | Test (s)       | Weekly Assessment               |              |             |  |  |  |  |  |  |
|   | RBT Levelsrest (s)weekiy Assessment2030  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| L1 Remember   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
|   | L2 Understand - 5  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
|   | L3   | Ap        | ply                 | 10             | 15                              |              |             |  |  |  |  |  |  |
|   | L4   | Ana       | alyze               | 5              | 5                               |              |             |  |  |  |  |  |  |
|   | L5   | Eva       | luate               | 5              | 5                               |              |             |  |  |  |  |  |  |
|   | L6   | Cre       | ate                 | -              | -                               |              |             |  |  |  |  |  |  |
| SEE Assessme  | nt Pattern (50 Mark  | s – Lab   | )                   |                |                                 |              |             |  |  |  |  |  |  |
|   |  |           | <b>RBT Levels</b>   | D:             | Exam Marks                      |              |             |  |  |  |  |  |  |
|   |  | 11        | Domomhor            |                |                                 |              |             |  |  |  |  |  |  |
|   |  | 12        | Understand          |                | 10                              |              |             |  |  |  |  |  |  |
|   |  | L2<br>L3  | Annly               |                | 10                              |              |             |  |  |  |  |  |  |
|   |  | L4        | Analyze             |                | 20                              |              |             |  |  |  |  |  |  |
|   |  | L5        | Evaluate            |                | 10                              |              |             |  |  |  |  |  |  |
|   |  | L6        | Create              |                | -                               |              |             |  |  |  |  |  |  |
| Suggested Lea   | arning Resources:  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| Suggesten Leai ning Resources:<br>Reference Books   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| <b>Reference Books:</b><br>1. Programming in HTML and PHP (Coding for Scientists and Engineers, BY DEVID R BROOKS, Springer |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| International Publishing AG 2017, <b>ISBN-10</b> : 3319569724   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
|   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| 2. The Complete Reference PHP, Steven Holzner, Mc Graw Hill, ISBN: 9780070223622,   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| Wah links and Vidao Lasturas (a-Rasourcas):   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| wed links and video Lectures (e-Resources):   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| 1. https://www.w3schools.com/php/   |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| 2. https://   | 2. https://www.tutorialspoint.com/php/index.htm  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| 3. https://www.w3schools.com/html/  |  |           |                     |                |                                 |              |             |  |  |  |  |  |  |
| Activity-Base   | d Learning (Sugges   | sted Ac   | tivities in Class]  | / Practical    | Based learning                  |              |             |  |  |  |  |  |  |
| 1 147 1   | philications with thr  | oo tior   | architecture in g   | roune          |                                 |              |             |  |  |  |  |  |  |

|               |  |                      |                  |                      |                     | GOLAN     | G PROC    | GRAMMI                | NG                  |                     |             |         |      |         |
|---------------|--|----------------------|------------------|----------------------|---------------------|-----------|-----------|-----------------------|---------------------|---------------------|-------------|---------|------|---------|
| Course Code   | 2  | 22CDS354   CIE Marks |                  |                      |                     |           |           |                       |                     |                     |             | 50      |      |         |
| L:T:P:S       | (  | 0:0:1:0 SEE Marks    |                  |                      |                     |           |           |                       |                     |                     |             | 50      |      |         |
| Hrs / Week    | 2  | 2                    |                  |                      |                     |           |           |                       | Total               | Marks               |             | 100     |      |         |
| Credits       | (  | )1                   |                  |                      |                     |           |           |                       | Exam                | n Hours             |             | 03      |      |         |
| Course outcom | ies:<br>A  | t the en             | d of th          | e course             | e, the stu          | udent w   | ill be ab | le to:                |                     |                     |             |         |      |         |
| 22CDS354.1    | A  | Apply th             | ie basi          | c progra             | mming               | Go Lang   | g constr  | ucts to d             | evelop s            | standalone          | e applicati | ons.    |      |         |
| 22CDS354.2    | I  | Apply th             | ie con           | cept of fu           | unctions            | and ree   | cursive   | functions             | s in GoL            | ang progr           | amming      |         |      |         |
| 22CDS354.3    | I  | Develop              | appli            | cations ι            | ising Go            | Routin    | es and c  | hannels               |                     |                     |             |         |      |         |
| 22CDS354.4    | S  | Solve th             | e real-          | world c              | oncurre             | ncy issu  | ies using | g concuri             | ency w              | ith go con          | cepts.      |         |      |         |
| Mapping of Co | urse (   | Dutcon               | ies to           | Progra               | m Outo              | comes a   | and Pro   | gram S                | pecific             | Outcome             | S:          |         |      |         |
|               | P01  | P02                  | P03              | P04                  | P05                 | P06       | P07       | P08                   | P09                 | P010                | P011        | P012    | PS01 | PSO2    |
| 22CDS354.1    | 2  | 2                    | 2                | 2                    | 2                   | -         | -         | -                     | -                   | -                   | -           | 2       | 3    | 3       |
| 22CDS354.2    | 2  | 2                    | 2                | 2                    | 2                   | -         | -         | -                     | -                   | -                   | -           | 2       | 3    | 3       |
| 22CDS354.3    | 3  | 3                    | 3                | 3                    | 2                   | -         | -         | -                     | -                   | -                   | -           | 2       | 3    | 3       |
| 22003334.4    | 5  | 5                    | 5                | 5                    | 2                   | _         |           |                       | _                   | _                   | _           | 2       | 5    | 5       |
| Pgm. No.      |  |                      |                  |                      |                     | List of F | Program   | ns                    |                     |                     |             | Hours   |      | COs     |
|               |  |                      |                  |                      |                     | Prere     | equisite  | Progra                | ms                  |                     |             |         |      |         |
|               |  | • Hel                | lo Wo            | orld pro             | gram ir             | ı GoLan   | g and E   | ditors f              | ro GoLa             | angProgra           | amming      | 2       | 2 NA |         |
|               |  |                      |                  |                      |                     |           | PAR       | Г-А                   |                     |                     |             |         |      |         |
| 1             | Design and Implement a Go program to print the name of the months and number of<br>days based on user input number. Apply switch statement to implement theZ |                      |                  |                      |                     |           |           |                       |                     | 2                   | 22C         | DS354.1 |      |         |
| 2             | Same   | ement                | a calc           | ulator n             | rogram              | that di   | enlave a  | menu                  | with on             | tions               |             |         |      |         |
| 2             | mpi  | cincin               | a calc           | 1.Adu                | d 2.Sub 2           | 3.Mul 4.  | Div       | menu                  | with op             | 0113                |             |         |      |         |
|               | Read   | l2numb               | ersan            | dperfor              | nthe rel            | evant o   | peration  | n. After n            | erform              | ing the op          | eration.    |         |      |         |
|               | the p  | orogram              | n shou           | ld ask th            | ie user i           | f he wai  | nts to co | ontinue. l            | f the us            | er presse           | s y or Y,   | 2       | 220  | DS354.1 |
|               | then<br>prog   | the pro<br>ram sho   | gram<br>ould te  | should c<br>erminate | continue            | e display | ving the  | menu el               | se the              |                     |             |         |      |         |
| 3             | Acce   | pt an a              | rray o           | of 5 pos             | itive in            | tegers. ( | Create a  | progra                | m to fi             | nd the sm           | allest      |         |      |         |
|               | posit  | tive inte            | eger in          | the use              | r input a           | array w   | hich car  | not be f              | ormed f             | from the s          | um of2      | 2       | 22C  | DS354.1 |
|               | num  | bers in              | the ar           | ray.                 |                     |           |           |                       |                     |                     |             |         |      |         |
| 4             | Deve   | elop a Go            | o Prog           | ram to c             | heck wh             | ether th  | ie user g | iven ma               | trix is a           | sparse or           | not.        |         | 220  | DS354.1 |
| 5             | Desi   | gn and<br>ating ch   | develo           | op a sim             | iple Go             | functior  | n to find | l the lon             | gest sul            | bstring wi          | ithout      | 2       | 22C  | DS354.2 |
| 6             | Illus  | trate th             | e diffe          | erent tvr            | bes of re           | ecursion  | n in Gov  | with suit             | able pr             | ograms. E           | )irect.     |         |      |         |
|               | Indir  | ·ect, Tai            | l and l          | Head Re              | cursion             |           |           |                       | •                   | 0                   | ŗ           | 2       | 22C  | DS354.2 |
|               | •  |                      |                  |                      |                     |           | PAR       | Г-В                   |                     |                     |             |         |      |         |
| 7             | Desig  | gn a sti<br>lovee in | ructur<br>stance | e Emplo<br>es. Print | oyee wi<br>the deta | th name   | e and s   | alary as<br>er the av | its file<br>erage s | d. Create<br>alary. | three       | 2       | 220  | DS354.2 |
| 8             | Crea   | te a pro             | gram             | to swap              | two nui             | nbers u   | sing poi  | nters in              | Go.                 |                     |             | 2       | 220  | DS354.2 |
| 9             | Appl   | y point              | er to            | structur             | e conce             | pt to p   | rint the  | details               | of 3 stu            | ident reco          | ords.       | -       | 220  |         |
| 10            | Assu   | me Stu               | dent re          | ecord to             | contain             | USN, na   | ame and   | marks.                |                     |                     |             | ۷       | 220  | 03334.3 |
| 10            | Deve   | elop a pi            | rogran           | n to illus           | trate ho            | ow to cre | eate an a | anonymo               | ous Go r            | outine.             |             | 2       | 220  | DS354.3 |
| 11            | Deve   | elop a pi            | rogran           | n to illus           | trate ho            | w to sta  | art mult  | iple Go r             | outines             |                     |             | 2       | 220  | DS354.4 |
| 12            | Solve  | e Produ              | cer Co           | nsumer               | concuri             | rency iss | sue usin  | g Go con              | currenc             | cy concept          |             | 2       | 22C  | DS354.4 |

### PART-C Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)

1. https://go.dev/solutions/case-studies

# CIE Assessment Pattern (50 Marks – Lab)

|    | DDT Lovale | Test (s) | Weekly Assessment |
|----|------------|----------|-------------------|
|    | KD1 Levels | 20       | 30                |
| L1 | Remember   | -        | -                 |
| L2 | Understand | -        | -                 |
| L3 | Apply      | 10       | 10                |
| L4 | Analyze    | 5        | 10                |
| L5 | Evaluate   | 5        | 10                |
| L6 | Create     | -        | -                 |

# SEE Assessment Pattern (50 Marks - Lab)

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | -                               |
| L2 | Understand | -                               |
| L3 | Apply      | 15                              |
| L4 | Analyze    | 20                              |
| L5 | Evaluate   | 15                              |
| L6 | Create     | -                               |

# Suggested Learning Resources:

Text Books:

1.Alan A. A Donovan, Brian W. Kernighan, "The Go Programming Language", Addison-Wesley ProfessionalComputing Series ,2016(Reprint), **ISBN-13**: 978-9332569713

### **E-Reference Books:**

- 1. www.tutorialgateway.org/go-programs
- 2. https://gobyexample.com

|   | BIO INSPIRED DESIGN AND INNOVATION  |                     |                         |                          |                      |                     |                  |                      |                      |                         |                         |                                   |
|---|---|---------------------|-------------------------|--------------------------|----------------------|---------------------|------------------|----------------------|----------------------|-------------------------|-------------------------|-----------------------------------|
| Course Code   | 22BIK36   | )                   |                         |                          |                      |                     | CIE N            | CIE Marks 50         |                      |                         |                         |                                   |
| L:T:P:S   | 3:0:0:0   |                     |                         |                          |                      |                     | SEE              | Marks                |                      | 50                      | 50                      |                                   |
| Hrs / Week  | 3   |                     |                         |                          |                      |                     | Tota             | l Marks              |                      | 100                     |                         |                                   |
| Credits   | 03  |                     |                         |                          |                      |                     | Exam Hours 03    |                      |                      |                         |                         |                                   |
| <b>Course outcomes:</b><br>At the end of the course, the student will be able to: |   |                     |                         |                          |                      |                     |                  |                      |                      |                         |                         |                                   |
| 22BIK36.1   | Verify the biomimetics principles in relation to the needs at that moment.                    |                     |                         |                          |                      |                     |                  |                      |                      |                         |                         |                                   |
| 22BIK36.2   | Evaluate the Bio-material properties for health care applications.                            |                     |                         |                          |                      |                     |                  |                      |                      |                         |                         |                                   |
| 22BIK36.3   | Investigate novel bioengineering initiatives by evaluating design and development principles. |                     |                         |                          |                      |                     |                  |                      | S.                   |                         |                         |                                   |
| 22BIK36.4   | Investigate creative bio based solutions for socially vital issues with critical thought.     |                     |                         |                          |                      |                     |                  |                      |                      |                         |                         |                                   |
| 22BIK36.5   | Understa  | nd the b            | io compu                | iting opti               | mizatio              | n throu             | igh rese         | earch and            | l experie            | ntial lear              | ning.                   |                                   |
| 22BIK36.6   | Explain th  | he funda            | mental b                | iological                | ideas th             | rough               | pertine          | ent indust           | trial app            | lications a             | and case                | studies.                          |
| Mapping of Co   | urse Outc   | omes to             | o Progra                | m Outco                  | omes a               | nd Pro              | gram             | Specific             | Outcom               | les:                    |                         |                                   |
|   | P01   | P02                 | P03                     | P04                      | P05                  | P06                 | P07              | P08                  | P09                  | P010                    | P011                    | P012                              |
| 22BIK36.1   | 3   | 3                   | 3                       | 3                        | 2                    | -                   | 2                | -                    | 1                    | -                       | -                       | 2                                 |
| 22BIK36.2   | 3   | 3                   | 3                       | 3                        | 2                    | -                   | 2                | -                    | 1                    | -                       | -                       | 2                                 |
| 22BIK36.3   | 3   | 3                   | 3                       | 3                        | 2                    | -                   | 2                | -                    | 1                    | -                       | -                       | 2                                 |
| 22BIK36.4   | 3   | 3                   | 3                       | 3                        | 2                    | -                   | 2                | -                    | 1                    | -                       | -                       | 2                                 |
| 22BIK36.5   | 3   | 3                   | 3                       | 3                        | 2                    | -                   | 2                | -                    | 1                    | -                       | -                       | 2                                 |
| 22BIK36.6   | 3   | 3                   | 3                       | 3                        | 2                    | -                   | 2                | -                    | 1                    | -                       | -                       | 2                                 |
|   |   |                     |                         |                          |                      |                     |                  |                      |                      |                         |                         |                                   |
| MODULE-1BIO-INSPIRED DESIGN AND ENGINEERING22BIK36.18 Hours                       |   |                     |                         |                          |                      |                     | 8 Hours          |                      |                      |                         |                         |                                   |
| Bio-Inspired En<br>Classifications, N   | ngineering<br>Need for Bio  | and de<br>o-Inspire | esign, His<br>ed Design | story, Ev<br>1s. Bio ins | volution<br>spired A | ı, Basio<br>dditive | cs of H<br>manuf | Bio mim<br>facturing | etics an<br>techniqu | d other<br>1es, (self-l | Disciplir<br>1ealing, s | nes, Rawling's<br>self-assembly). |
| Self-study / Cas  | e Study /   | Inves               | stigate th              | e Challe                 | nges of              | Bio ins             | spired           | design, C            | ompare               | with trac               | ditional a              | areas of                          |
| Applications  |   | scien               | ice and e               | ngineeri                 | ng.                  |                     |                  |                      |                      |                         |                         |                                   |
| Text Book   |   | Text                | Book 1: 1               | 2, 1.3, 1                | .4, 1.13,            | 1.15, 1             | .16              |                      |                      |                         |                         |                                   |
| MODULE-2  | BIO MAT   | <b>FERIAL</b>       | S AND BI                | IO HEAL                  | THCAF                | RE DES              | IGN              |                      | 2                    | 2BIK36.2                | 2                       | 8 Hours                           |
| Biomaterials, De  | esign of For  | ms- (He             | xagonal u               | ınit cells,              | Intrinsi             | c disor             | der, ani         | isotropy)            | , Design             | of materia              | als- (Hier              | archy, fracture tough             |
| materials, struc  | tural colou   | rs, Actua           | ating Mat               | erials, Bi               | o-Comp               | atible l            | Materia          | als). Bio-N          | Mechanio             | cs, Applica             | ations of               | Biomaterials and Bio              |
| systems in Heal   | th care desi  | ign (Hur            | nan Pros                | thetics, P               | arasitic             | Wasp-               | Inspire          | ed Needle            | , Octopu             | s-Inspire               | d                       |                                   |
| Sucker for Tissu  | ie Grafting,  | Peacock             | -Inspired               | l Biosens                | ors, Geo             | cko-Ins             | pired S          | urgical G            | lue) Rob             | otics, Mar              | ine and A               | Aeronautical.                     |
| Self-study / Cas  | e Study /   | I                   | nvestigat               | te Bio-Co                | ompatib              | le alloy            | ys and           | polymer              | s for hui            | nan impl                | ants and                | l health care                     |
| Applications  |   | a                   | pplicatio               | ons.                     |                      |                     |                  |                      |                      |                         |                         |                                   |
| Text Book   |   | Т                   | 'ext Book               | 1: 2.2, 2.               | .3, 2.4 to           | 2.15                |                  |                      |                      |                         |                         |                                   |
| MODULE-3  | BIO SUS   | TAINAE              | BLE DEVI                | ELOPME                   | ENT                  |                     |                  |                      | 22                   | BIK36.3                 | ,                       | 8 Hours                           |
|   |   |                     |                         |                          |                      |                     |                  |                      | 22                   | BIK36.4                 |                         |                                   |
| Innovations in  | Energy (Te  | ermite n            | nound ins               | spired sh                | nopping              | (malls)             | , Innov          | vations ir           | Resour               | ce-Air (p               | urificati               | on, filtration), Dew              |
| water collection  | n systems,  | water p             | ourificatio             | on, desal                | ination              | , Mana              | gemen            | t of space           | es, desig            | ns for me               | ega stru                | ctures.                           |
| Self-study /  |   | _                   | _                       |                          | _                    |                     |                  |                      | _                    |                         |                         |                                   |
| Case Study /  | Explore t   | he Bio i            | nspired e               | environr                 | nental o             | constru             | ictions          | and dev              | elopmer              | nt.                     |                         |                                   |
| Applications  | <b>T</b> . ( <b>D</b> )   | - 2 2 4             | <u></u>                 | 7 2 4 2                  |                      |                     |                  |                      |                      |                         |                         |                                   |
| I EXT BOOK  | 1 ext Bool  | к 2: 3.1,           | 3.3, 3.5, 3             | 6.7, 3.10                |                      |                     |                  |                      |                      |                         |                         |                                   |
| MODULE-4  | BIO COMPUTING AND OPTIMISATION22BIK36.58 Hours  |                     |                         |                          |                      |                     |                  |                      |                      | 8 Hours                 |                         |                                   |

No Free Lunch Theorem, Bat Algorithm, Flower Pollination Algorithm, Genetic Algorithm- Crossover and Mutation Operations. Bio-Inspired Optimisation, Ant Colony Optimisation (ACO), Swam Intelligence- Particle Swam Optimisation (PSO).

| Self-study /<br>Case Study /<br>Applications | Scrutinize the Different types of Optimization techniques, genetic research. |
|--|--|
| Text Book                                    | Text Book 1: 6.1, 6.3, 6.5, 6.7, Text Book 2: 10.1, 10.3, 10.5, 10.7         |

# MODULE-5APPLICATIONS OF BIO-INSPIRED INNOVATIONS22BIK36.68 Hours

Bioinspired innovations in– Automotive, Automation, Materials and Manufacturing, Sensors, Controllers,Communications, Healthcare, Agriculture, food production, and Sports, Environment infrastructure.

Carbon Neutral Solutions (Coral Reefs, Eco-cements), Carbon Free Solutions (Lotus leaf inspired paints), eco-restorations (Eco-friendly pesticide).

| Self-study /<br>Case Study /<br>Applications | Survey on Bio inspired Innovations, design, applications and case studies of the same. |
|--|--|
| Text Book                                    | Text Book 2: 12.1 to 12.10   |

# CIE Assessment Pattern (50 Marks - Theory) -

|    |            | Marks Distribution |                               |       |  |  |  |  |  |
|----|------------|--------------------|-------------------------------|-------|--|--|--|--|--|
|    | RBT Levels | Test (s)           | Qualitative<br>Assessment (s) | MCQ's |  |  |  |  |  |
|    |            | 25                 | 15                            | 10    |  |  |  |  |  |
| L1 | Remember   | -                  | -                             | -     |  |  |  |  |  |
| L2 | Understand | 5                  | -                             | -     |  |  |  |  |  |
| L3 | Apply      | 10                 | 5                             | 5     |  |  |  |  |  |
| L4 | Analyze    | 5                  | 5                             | 5     |  |  |  |  |  |
| L5 | Evaluate   | 5                  | 5                             | -     |  |  |  |  |  |
| L6 | Create     | -                  | -                             | -     |  |  |  |  |  |

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | 10                              |
| L2 | Understand | 10                              |
| L3 | Apply      | 10                              |
| L4 | Analyze    | 10                              |
| L5 | Evaluate   | 10                              |
| L6 | Create     |                                 |

### Suggested Learning Resources:

# **Text Books:**

- 1. Helena Hashemi Farzaneh, Udo Lindemann, A Practical Guide to Bio-inspired Design, Springer Vieweg, 1st edition 2019, ISBN-10 : 366257683X, ISBN-13 : 978-3662576830
- Torben A. Lenau, Akhlesh Lakhtakia, Biologically Inspired Design: A Primer (Synthesis Lectures on Engineering, Science, and Technology, Publisher: Morgan & Claypool Publishers, 2021, ISBN-10: 1636390471, ISBN-13: 978-1636390475

# **Reference Books:**

- 1. French M, Invention and evolution: Design in Nature and Engineering, Publisher: Cambridge University Press, 2020, ISBN-13:978-0521469111
- Pan L., Pang S., Song T. and Gong F. eds, Bio-Inspired Computing: Theories and Applications, 15th International Conference, BIC-TA 2020, Qingdao, China, October 23-25, 2020, Revised Selected Papers (Vol. 1363). Springer Nature, 2021, ISBN-13: 978-9811613531
- 3. Wann D, Bio Logic: Designing with nature to Protect the Environment, Wiley Publisher, 1994, **ISBN-10** : 9781555661229

### Web links and Video Lectures (e-Resources):

- 1. https://onlinecourses.nptel.ac.in/noc22\_ge24/preview
- 2. https://biodesign.berkeley.edu/bioinspired-design-course/
- 3. https://www.youtube.com/watch?v=cwxXY9Qe8ss
- 4. https://www.youtube.com/watch?v=V2GvQXvjhLA
- https://nsf-gov-resources.nsf.gov/2023-03/Bio-inspired%20Design %20Workshop%20Report\_2232327\_October%202022\_Final.508.pdf

- > Presenting students with bio-inspired design challenges and asking them to come up with solutions.
- > Create physical models or prototypes that mimic biological structures or functions.
- > Organizing Group wise discussions on issues
- Seminars

|   | UNIVERSAL HUMAN VALUES AND LIFE SKILLS   |  |                           |                          |                         |                        |                       |                         |                                  |                          |                         |          |
|---|--|--|---------------------------|--------------------------|-------------------------|------------------------|-----------------------|-------------------------|----------------------------------|--------------------------|-------------------------|----------|
| Course Code   | 22UHK3   | 7  |                           |                          |                         |                        | CIE Ma                | rks                     |                                  | 50                       |                         |          |
| L:T:P:S   | 1:0:0:0  |  |                           |                          |                         |                        | SEE Ma                | arks                    |                                  | 50                       | 50                      |          |
| Hrs / Week  | 2  |  |                           |                          |                         |                        | Total N               | Marks                   |                                  | 100                      |                         |          |
| Credits   | 01   |  |                           |                          |                         |                        | Exam                  | Hours                   |                                  | 02                       |                         |          |
| At the end of the cou   | rse, the stu   | dent will  | be able to:               | :                        |                         |                        |                       |                         |                                  |                          |                         |          |
| 22UHK37.1   | Underst  | Understand the concept and significance of life skills and universal human values.           |                           |                          |                         |                        |                       |                         |                                  |                          |                         |          |
| 22UHK37.2   | Develop  | Develop Self-awareness and Self-management skills to promote personal growth.                |                           |                          |                         |                        |                       |                         |                                  |                          |                         |          |
| 22UHK37.3   | Apply C  | Apply Critical and Creative thinking and ethical decision-making skills in various contexts. |                           |                          |                         |                        |                       |                         |                                  |                          |                         |          |
| 22UHK37.4   | Promote teamwork and collaboration while respecting diversity and inclusivity. |  |                           |                          |                         |                        |                       |                         |                                  |                          |                         |          |
| Mapping of Course   | Outcomes   | to Prog  | am Outc                   | omes an                  | d Progr                 | am Spe                 | cific Ou              | tcomes:                 |                                  |                          |                         |          |
|   | P01  | P02  | P03                       | P04                      | P05                     | P06                    | P07                   | P08                     | P09                              | P010                     | P011                    | P012     |
| 220HK37.1   | -  | -  | -                         | -                        | -                       | 3                      | 1                     | 3                       | -                                | 2                        | -                       | 2        |
| 22UHK37.2   | -  | -  | -                         | -                        | -                       | 1                      | <u> </u>              | 1                       | -                                | 2                        | -                       | 2        |
| 22011K37.3  |  | -  | -                         | -                        | -                       | 2                      | 1                     | 1                       | 1                                | 2                        | -                       | 2        |
| 22011137.1  |  |  |                           |                          |                         | 4                      | 4                     | 1                       | 5                                | 5                        |                         | 5        |
| MODULE-1  | S  | elf-Awai   | reness an                 | d Self-M                 | anagen                  | nent                   |                       | 22                      | 2UHK3<br>2UHK3                   | 7.1<br>7.2               | 3 H                     | ours     |
| Emotional Intelligence  | Techniqu   | les of self  | awarenes                  | s SWOT                   | and IOH                 | ARIWIN                 | DOWS S                | tress mai               | nageme                           | nt and cou               | ning out (              | of       |
| comfort zone, managi  | ng failure. T  | Гіте Man   | agement t                 | o recalibi               | ate prio                | rities.                | 20110,0               |                         | nugeme                           |                          | ining out               | 01       |
| Self-Exploration as a   | process of   | Value Ed   | ucation, tl               | ne basic ł               | uman A                  | spiration              | ns: Pros              | perity and              | d Happi                          | ness, und                | erstandir               | ıg       |
| infatuation.  |  |  |                           |                          |                         | •                      |                       | , j                     |                                  | ÷                        |                         | 0        |
| Self-study / Role play  |  |  | Underst<br>growth;        | and qual<br>participa    | ities of l<br>ate in ro | Role Moo<br>le play a  | dels, exp<br>ind pres | olore self<br>entations | and do<br>s to com               | SWOT an<br>le out of c   | alysis for<br>comfort z | r<br>one |
| MODULE-2  |  |  | Towar                     | ds Yours                 | elf                     |                        |                       | 2<br>2                  | 2UHK3<br>2UHK3                   | 7.1<br>7.3               | 3 H                     | lours    |
| Exploring opportuniti<br>Professional, aligning                       | es, unders<br>Personal a   | tanding e<br>nd Profes   | xpectation<br>sional goa  | ns and se<br>ls for grea | lf for rig<br>ater achi | ght fitme<br>evement   | nt in pro<br>. Mind-N | ofession,<br>Japs as a  | Goal Se <sup>.</sup><br>tool for | tting - Pe<br>Goal Setti | rsonal an<br>ng         | d        |
| Self-study / Mind<br>Maps   | Unders   | tand indu  | ustry expe                | ectations                | to set p                | rofession<br>ul living | al goals              | ; realizin              | g conne                          | ection bet               | ween                    |          |
|   | person   | -  |                           | gouision                 | peacer                  | ui iiv iiig            |                       | 2                       | <b>2UHK</b> 3                    | 7.3                      |                         |          |
| MODULE-3  |  | Lea  | ding self                 | to lead o                | thers                   |                        |                       | 2                       | <b>2UHK</b> 3                    | 7.4                      | 31                      | lours    |
| Quality analysis of lea<br>thinking and Creative<br>making frameworks | ader and so<br>e thinking :<br>and princi                                      | elf-evalua<br>for contri<br>ples   | ation, Crit<br>ibution to | ical think<br>technica   | ing, Cre<br>l world,    | ative thi<br>Six thin  | nking aı<br>king hat  | nd Ethica<br>s, Explor  | l decisio<br>ing ethi            | on makin<br>cal decisi   | g, Critical<br>Ion-     | l        |
| Activities / Case   | Case stud  | dies for C   | ritical thi               | nking and                | lactiviti               | es for Cr              | eative t              | hinking                 |                                  |                          |                         |          |
| study/Applications  |  |  |                           | 0                        |                         |                        |                       | C                       |                                  |                          |                         |          |
|   |  |  |                           |                          |                         |                        |                       | n                       |                                  |                          |                         |          |
| MODULE-4  | 0,   | wnershi  | p toward                  | s Family                 | and So                  | ciety                  |                       | 2<br>2<br>2             | 2UHK3<br>2UHK3<br>2UHK3          | 57.2<br>57.3<br>57.4     | 3 H                     | lours    |
| Responsibility, Diver   | sity and Ir  | nclusivity<br>g teamw  | r: Underst                | anding p                 | ersonal                 | and soc                | cial resp             | onsibility<br>ferences  | y; Appr                          | eciating o               | liversity               | and      |
| Solf-study / Interview  | Working  | on Task  | har team                  | huilding                 | activiti                | s: Intor               | viowing               | Cornerat                | o ovnov                          | te to und                | orstand                 |          |
| with  | expectati  | ions   | uai, teaili               | Dunung                   | activitio               | es, interv             | lewing                | Corporat                | e exper                          |                          | erstanu                 |          |
| corporate people  | onpootati  |  |                           |                          |                         |                        |                       |                         |                                  |                          |                         |          |
| MODULE-5  |  | Towa   | rds Natu                  | re and Ir                | ndustry                 |                        |                       | 22                      | 2UHK3<br>2UHK3                   | 37.3<br>37.4             | 3 H                     | lours    |
| Personal code of cond   | duct for ha  | rmony be   | etween se                 | lf and na                | ture, res               | sisting ex             | kternal p             | oressures               | , negoti                         | ation and                | d conflict              |          |
| resolution, assertive   | ness and en  | mpathy, o  | change ma                 | anageme                  | nt                      |                        |                       |                         |                                  |                          |                         |          |
| Role play   | Role play  | to unde  | rstand coi                | ntributio                | ns to na                | ture and               | industr               | У                       |                                  |                          |                         |          |

| CIE Assessment Pattern (50 Marl | ks – Theory) –         |                    |                               |  |  |  |
|---------------------------------|------------------------|--------------------|-------------------------------|--|--|--|
|                                 |                        | Marks Distribution |                               |  |  |  |
|                                 | <b>RBT Levels</b>      | Test (s)           | Alternative<br>Assessment (s) |  |  |  |
|                                 |                        | 25                 | 25                            |  |  |  |
| L                               | 1 Remember             | -                  | -                             |  |  |  |
| L                               | 2 Understand           | 7                  | 6                             |  |  |  |
|                                 | 3 Apply                | 8                  | 7                             |  |  |  |
| L                               | 4 Analyze              | 10                 | 7                             |  |  |  |
| L                               | 5 Evaluate             | -                  | 5                             |  |  |  |
| L                               | 6 Create               | -                  | -                             |  |  |  |
|                                 |                        |                    |                               |  |  |  |
| SEE Assessment Pattern (50 Mar  | ks - Group Discussion) |                    |                               |  |  |  |

|    | <b>RBT Levels</b> | Exam Marks<br>Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember          | 10                              |
| L2 | Understand        | 10                              |
| L3 | Apply             | 20                              |
| L4 | Analyze           | 10                              |
| L5 | Evaluate          |                                 |
| L6 | Create            |                                 |

### Suggested Learning Resources: Reference Books:

- 1. The 7 Habits of Highly Effective People, Stephen R Covey, Neha publishers, **ISBN-13**: 978-2133487538
- 2. Seven Habits of Highly Effective Teens, Convey Sean, New York, Fireside Publishers, 1998, **ISBN-13**: 978-1471136870
- 3. Emotional Intelligence, Daniel Coleman, Bantam Book, 2006, ISBN-13: 978-0553804911
- **4.** How to win friends and influence people, Dale Carnegie, ISBN-13:**978-0671027032**
- 5. BHAGAVADGITA for college students, Sandeepa Gunt reddy, ISBN-13:979-8713958503

- 1. Conduct interviews with HR personnel of corporate to understand expectations in terms of Soft Skills and Values
- 2. Participate in role plays and presentations to come out of comfort zone
- 3. Talk to industry people to understand opportunities available
- 4. Make a short movie to display creativity
- 5. Use Mind maps to plan successful completion of semester
- 6. Actively participate in Group Discussions and JAM sessions

|  | BASIC APPLIED MATHEMATICS-I<br>(Common to all Branches)   |  |  |  |  |   |  |  |   |  |   |  |   |
|--|---|--|--|--|--|---|--|--|---|--|---|--|---|
| Course   | e Code  | 22DM   | AT31   |  |  | (com  |  |  | TE Marl   | <b>7</b> 5                                     |   |  | 100   |
| L:T:P:S  | 5   | 0:0:0:0:0  | )  |  |  |   |  |  | EE Mar  | ks   |   |  |   |
| Hrs. /   | Week  | 3  |  |  |  |   |  | 1  | Fotal Ma  | irks   |   |  | 100   |
| Credit   | s   | 00   | 00 Exam Hours  |  |  |   |  |  |   |  |   |  |   |
| Course   | ourse outcomes:   |  |  |  |  |   |  |  |   |  |   |  |   |
| At the e   | At the end of the course, the student will be able to:  |  |  |  |  |   |  |  |   |  |   |  |   |
| 22DN   | MAT31.1   | Know   | the prir   | nciples o  | of enginee   | ering ma  | themat   | ics thro   | ugh calcu   | ulus   |   |  |   |
| 22DN   | MAT31.2   | Detern   | nine the   | e power  | series ex  | pansion   | of a fu  | nction   |   |  |   |  |   |
| 22DN   | MAT31.3   | Find th<br>differe   | Find the definite integrals with standard limits and also develop the ability to solve different types of differential equations   |  |  |   |  |  |   |  |   |  |   |
| 22DN   | MAT31.4   | Apply i<br>Eigen v   | ideas fr<br>/ectors  | om line<br>of a ma   | ar algebr<br>trix  | a in solv   | ing sys  | tems of l  | inear eq  | uations  | and dete                                    | rmine the Eigen val  | ues and   |
| Маррі  | ing of Cour   | se Outc  | omes   | to Prog  | ram Out  | tcomes  |  |  |   |  |   |  |   |
|  | ~   | P01  | P02  | P03  | P04  | P05   | P06  | P07  | P08   | P09  | P010  | P011   | P012  |
| 22DM   | MAT31.1   | 3  | 3  |  |  |   | -  | -  | -   | -  | -   |  |   |
| 22DN   | MAT31.2   | 3  | 3  | -  | -  | -   | -  | -  | -   | -  | -   | -  | -   |
| 22DN   | MAT31.3   | 3  | 3  | -  | -  | -   | -  | -  | -   | -  | -   | -  | _   |
| 22DN   | MAT31.4   | 3  | 3  | -  | -  | -   | -  | -  | -   | -  | -   | -  | _   |
|  |   | U  | U  |  |  |   |  |  |   |  |   |  |   |
| MOI  | DULE-1  | DIFFE  | DIFFERENTIAL CALCULUS 22DMAT31.1 8 Hours 22DMAT31.2  |  |  |   |  |  |   |  |   | 8 Hours  |   |
| Polar C  | Curves-Prob   | lems on  | angle k  | between  | n the radi   | us vecto  | r and t  | angent, A  | Angle be  | tween t  | wo curve                                    | s-Problems, Pedal o  | equation for  |
| polar c  | polar curves-Problems. Maclaurin's theorem for function of one variable (statement only)-Problems.  |  |  |  |  |   |  |  | •   |  |   |  |   |
| Text Bo  | ook   | Text B   | ook 1: 4   | ł.4, 4.7,  | 4.8, Text  | Book 2:   | Text Book 1: 4.4, 4.7, 4.8, Text Book 2: 15.4  |  |   |  |   |  |   |
| MODU   |   | PARTIAL DIFFERENTIATION 22DMAT31.1 8 H   |  |  |  |   |  |  |   |  |   |  |   |
| MODU   | ILE-Z   | PARTI  | AL DIF   | FEREN  | TIATION  |   |  |  |   |  |   | 22DMAT31.1   | 8 Hours   |
| Definit  | ILE-2<br>ion and Sim  | PARTI<br>ple prob  | <b>AL DIF</b><br>olems, E  | <b>FEREN</b><br>Euler's t  | <b>TIATION</b><br>heorem fo  | or Homo   | ogeneou  | ıs functi  | on (NO I  | Derivati                                       | on and N(                                   | <b>22DMAT31.1</b><br>D extended theorem  | <b>8 Hours</b><br>)-Problems,   |
| Definit<br>Jacobia   | ILE-2<br>ion and Sim<br>ans of order  | PARTI<br>ple prob<br>two - de  | <b>AL DIF</b><br>lems, E<br>finition   | ' <b>FEREN</b> '<br>Euler's tl<br>1 and pr   | <b>TIATION</b><br>heorem fo<br>oblems.   | or Homo   | geneou   | ıs functi  | on (NO I  | Derivati                                       | on and N(                                   | <b>22DMAT31.1</b><br>) extended theorem  | 8 Hours<br>)-Problems,  |
| Definit<br>Jacobia<br>Text Bo  | ILE-2<br>ion and Sim<br>ans of order<br>ook   | PARTI<br>ple prob<br>two - de<br>Text B  | AL DIF<br>olems, E<br>finition<br>ook 1:   | <b>FEREN</b><br>Suler's the set of the se | TIATION<br>heorem fo<br>oblems.<br>,   | or Homo   | ogeneou  | ıs functi  | on (NO I  | Derivati                                       | on and N(                                   | 22DMAT31.1<br>) extended theorem   | 8 Hours<br>)-Problems,  |
| Definit<br>Jacobia<br>Text Bo  | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3  | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG   | AL DIF<br>olems, E<br>finition<br>ook 1:<br>RAL C  | FEREN<br>Culer's t<br>and pr<br>5.4, 5.7<br>ALCUL  | TIATION<br>heorem fe<br>oblems.<br>,<br>US AND   | or Homo<br>DIFFER   | ogeneou<br>ENTIA   | ıs functi<br>L EQUA  | on (NO I<br>TIONS   | Derivati                                       | on and N(                                   | 22DMAT31.1<br>) extended theorem<br>22DMAT31.3   | 8 Hours<br>)-Problems,<br>8 Hours   |
| Definit<br>Jacobia<br>Text Bo<br>MODU<br>Proble  | ILE-2<br>ion and Sim<br>ons of order<br>ook<br>ILE-3<br>ms on evalu   | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o   | AL DIF<br>olems, E<br>finition<br>ook 1:<br>GRAL C<br>f sin n  | FEREN<br>Culer's the<br>and pr<br>5.4, 5.7<br>ALCUL  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND<br>os n x int   | or Homo<br>DIFFER<br>regrals v  | ogeneou<br><b>ENTIA</b><br>vith sta  | ıs functi<br>L EQUA<br>ndard li  | on (NO I<br>TIONS<br>mits (0  | Derivation                                     | on and NC                                   | 22DMAT31.1<br>) extended theorem<br>22DMAT31.3<br>n of first order and   | 8 Hours<br>)-Problems,<br>8 Hours<br>first-                                     |
| Definit<br>Jacobia<br>Text Bo<br><b>MODU</b><br>Proble<br>degree   | ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>differentia  | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati   | AL DIF<br>olems, E<br>finition<br>ook 1:<br>GRAL C.<br>f sin n<br>ons-Va   | FEREN<br>Culer's the<br>and pr<br>5.4, 5.7<br>ALCUL<br>x and contribute set  | TIATION<br>heorem fe<br>oblems.<br>,<br>US AND<br>os n x int<br>separable  | or Homo<br>DIFFER<br>egrals v<br>e, Linea   | ogeneou<br>ENTIA<br>vith sta<br>r and E  | ıs functi<br>L EQUA<br>ndard li<br>xact diff   | on (NO I<br>TIONS<br>mits (0<br>erential                                    | Derivation<br>to π/2)<br>equation              | on and NC<br>. Solution<br>ons.             | 22DMAT31.1<br>) extended theorem<br>22DMAT31.3<br>n of first order and   | 8 Hours<br>)-Problems,<br>8 Hours<br>first-                                     |
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| MODU         Definit         Jacobia         Text Bo         MODU         Proble         degree         Text Bo         MODU         Proble         Proble         Proble         Text Bo         MODU         Linear         Text Bo         CIE Ass                                      | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>e differentia<br>ook<br>ILE-4<br>ms on rank o<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>sessment P<br>RBT Leve  | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern (  | AL DIF<br>here a second state of the second stat   | FEREN         and pr         5.4, 5.7         ALCUL         x and corriable s         6.2, 11.         EBRA-2         lementa         2.7, 28.         EBRA-2         es and F         2.11, 2.         =100 M         st (s)  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Eigen Vec<br>13, Text<br>larks – T<br>Aarks Dis<br>Qualit  | DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2:<br>heory)<br>stributi<br>tative   | ENTIA<br>vith sta<br>and E<br>ext Boo<br>ns, Solu<br>7.3, 7.4<br>quare r<br>7.9, 8.7<br>on<br>M(   | L EQUA<br>ndard li<br>xact diff<br>k 2: 1.3,<br>ution of s<br>natrix-P<br>L.   | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system o            | Derivation                                     | on and NG                                   | 22DMAT31.1<br>2 extended theorem<br>22DMAT31.3<br>n of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4 | 8 Hours )-Problems,  8 Hours first-  8 Hours on method-  8 Hours                |
| MODU         Definit         Jacobia         Text Bo         MODU         Proble         Text Bo         MODU         Proble         Text Bo         MODU         Linear         Text Bo         CIE Ass   | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>oms on evalue<br>e differentia<br>ook<br>ILE-4<br>ms on rank of<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>sessment P<br>RBT Leve  | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat:<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern ( | AL DIF<br>lems, E<br>finition<br>ook 1:<br>RAL C<br>f sin n<br>ons-Va<br>ook 1:<br>RALG<br>en valu<br>ook 1:<br>SO X 2<br>Te:<br>Te:   | FEREN         Culer's the second price         5.4, 5.7         ALCUL         x and contrable second price         6.2, 11.         EBRA-2         lementa         2.7, 28.         EBRA-2         es and F         2.11, 2.         =100 M         N         st (s)         25  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Eigen Vec<br>13, Text<br>Iarks – T<br>Jarks Dis<br>Qualit<br>Assessm   | or Homo<br>DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7  | ENTIA<br>vith star<br>and E:<br>ext Boo<br>ons, Solu<br>7.3, 7.4<br>quare r<br>7.9, 8.1<br>on  | L EQUA<br>ndard li<br>xact diff<br>k 2: 1.3,<br>ution of s<br>natrix-P<br>l.   | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system c            | Derivation                                     | on and NG                                   | 22DMAT31.1<br>2 extended theorem<br>22DMAT31.3<br>a of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4 | 8 Hours )-Problems,  8 Hours first- 8 Hours on method- 8 Hours                  |
| MODU         Definit:         Jacobia         Text Bo         MODU         Proble         degree         Text Bo         MODU         Proble         Proble         Proble         Text Bo         MODU         Linear         Text Bo         CIE Ass                                     | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>differentia<br>ook<br>ILE-4<br>ms on rank of<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>sessment P<br>RBT Leve   | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern (  | AL DIF<br>AL DIF   | FEREN         Suler's the second price         5.4, 5.7         ALCUL         x and contrast         x and contrast         6.2, 11.         EBRA-2         lementa         2.7, 28.         EBRA-2         es and H         2.11, 2.         =100 M         N         st (s)         5  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Eigen Vec<br>13, Text<br>larks – T<br>Jarks Dis<br>Qualit<br>Assessm<br>1  | or Homo<br>DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7  | egeneou<br>ENTIA<br>vith stat<br>and E:<br>ext Boo<br>ons, Solu<br>7.3, 7.4<br>quare r<br>7.9, 8.2<br>on<br>0n<br>M(   | L EQUA<br>ndard li<br>kact diff<br>k 2: 1.3,<br>ution of s<br>natrix-P<br>l.   | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system o            | Derivation                                     | on and NG                                   | 22DMAT31.1<br>2 extended theorem<br>22DMAT31.3<br>n of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4 | 8 Hours )-Problems,  8 Hours first- 8 Hours on method- 8 Hours                  |
| MODU         Definit         Jacobia         Text Bo         MODU         Proble         degree         Text Bo         MODU         Proble         Proble         Proble         Proble         Text Bo         MODU         Linear         Text Bo         CIE Ass         L1         12 | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>differentia<br>ook<br>ILE-4<br>ms on rank of<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>Sessment P<br>RBT Leve<br>Remembe  | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern (  | AL DIF<br>AL DIF   | FEREN         Culer's the second present of the secon  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Eigen Vec<br>13, Text<br>larks – T<br>Marks Dis<br>Qualit<br>Assessn<br>1  | DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2:<br>heory)<br>stributi<br>tative<br>nent (s)<br>5  | ENTIA<br>vith sta<br>and E<br>ext Boo<br>ons, Solu<br>7.3, 7.4<br>quare r<br>7.9, 8.7<br>on<br>0n  | L EQUA<br>ndard li<br>xact diff<br>k 2: 1.3,<br>ution of s<br>natrix-P<br>l.<br>CQ's   | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system o            | Derivation<br>to π/2)<br>equation<br>of linear | on and NO                                   | 22DMAT31.1<br>2 extended theorem<br>22DMAT31.3<br>n of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4 | 8 Hours )-Problems,  8 Hours first- 8 Hours on method- 8 Hours                  |
| MODU         Definit         Jacobia         Text Bo         MODU         Proble         degree         Text Bo         MODU         Proble         Proble         Proble         Text Bo         Linear         Text Bo         CIE Ass         L1         L2         L3                  | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>e differentia<br>ook<br>ILE-4<br>ms on rank of<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>sessment P<br>RBT Leve<br>Remembe<br>Understaa<br>Annly                                  | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern (  | AL DIF<br>AL DIF   | FEREN         Culer's the second present of the secon  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND 1<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Eigen Vec<br>13, Text<br>Iarks – T<br>Marks Dis<br>Qualit<br>Assessm<br>1<br>5<br>5  | DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2:<br>heory)<br>stributi<br>tative<br>nent (s)<br>5  | ext Boo<br>rand E<br>ext Boo<br>rns, Solu<br>7.3, 7.4<br>quare r<br>7.9, 8.7<br>on<br>M(   | L EQUA<br>ndard li<br>xact diff<br>k 2: 1.3,<br>ution of s<br>natrix-P<br>L.<br>CQ's<br>-<br>-<br>-<br>0   | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system o            | Derivation                                     | on and NO                                   | 22DMAT31.1<br>2 extended theorem<br>22DMAT31.3<br>a of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4 | 8 Hours )-Problems,  8 Hours first- 8 Hours on method- 8 Hours                  |
| MODUDefinitJacobiaText BoMODUProbledegreeText BoMODUProblemText BoMODULinearText BoCIE AssL1L2L3L4   | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>e differentia<br>ook<br>ILE-4<br>ms on rank of<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>sessment P<br>RBT Leve<br>RBT Leve<br>Remembe<br>Understan<br>Apply                      | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern (  | AL DIF<br>AL DIF   | FEREN         Suler's the second present of the secon  | TIATION<br>heorem for<br>oblems.<br>J<br>US AND<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Sigen Vec<br>13, Text<br>larks – T<br>Marks Dis<br>Qualit<br>Assessn<br>1<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5 | or Homo<br>DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2:<br>heory)<br>stributi<br>tative<br>nent (s)<br>5   | ENTIA           vith star           and Er           ext Boo           ons, Solu           7.3, 7.4           quare r           7.9, 8.7           on           MC           1           1           1 | L EQUA<br>ndard li<br>xact diff<br>k 2: 1.3,<br>ution of s<br>natrix-P<br>L.<br>CQ's<br>0<br>-<br>-<br>-<br>-<br>0   | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system o            | Derivation                                     | on and NO                                   | 22DMAT31.1<br>2 extended theorem<br>22DMAT31.3<br>n of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4 | 8 Hours )-Problems,  8 Hours first-  8 Hours on method-  8 Hours                |
| MODUDefinitJacobiaText BoMODUProbleText BoMODUProbleText BoMODULinearText BoCIE AssL1L2L3L4L5  | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>e differentia<br>ook<br>ILE-4<br>ms on rank of<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>sessment P<br>RBT Leve<br>Remembe<br>Understaa<br>Apply<br>Analyze<br>Evaluate           | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat:<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern ( | AL DIF<br>AL DIF<br>finition<br>ook 1:<br>RAL C<br>f sin n<br>ons-Va<br>ook 1:<br>RALG<br>rix by e<br>ook 1:<br>RALG<br>en valu<br>ook 1:<br>Te:<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7  | FEREN         Suler's the second price         5.4, 5.7         ALCUL         x and contrable second price         6.2, 11.         EBRA-2         lementa         2.7, 28.         EBRA-2         es and F         2.11, 2.         =100 M         St (s)         5         5         10         2.5         2.5  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND for<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Eigen Vec<br>13, Text<br>Iarks – T<br>Jarks Dis<br>Qualit<br>Assessm<br>1<br>5<br>5<br>5<br>5<br>5<br>5<br>5   | or Homo<br>DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Book 2: 7  | ENTIA           vith star           and E:           ext Boo           ons, Solu           7.3, 7.4           quare r           7.9, 8.1           on           1           1           1           1  | L EQUA<br>ndard li<br>xact diff<br>k 2: 1.3,<br>ation of s<br>ation of s<br>natrix-P<br>L.   | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system o            | Derivation                                     | on and NO                                   | 22DMAT31.1<br>22DMAT31.3<br>a of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4                       | 8 Hours )-Problems,  8 Hours first-  8 Hours on method-  8 Hours                |
| MODUDefinit:JacobiaText BoMODUProbledegreeText BoMODUProblenProblenProblenText BoMODULinearText BoCIE AssCIE AssL1L2L3L4L5L6   | ILE-2<br>ion and Sim<br>ans of order<br>ook<br>ILE-3<br>ms on evalue<br>e differentia<br>ook<br>ILE-4<br>ms on rank of<br>ms.<br>ook<br>ILE-5<br>transformat<br>ook<br>sessment P<br>RBT Leve<br>Remembe<br>Understan<br>Apply<br>Analyze<br>Evaluate<br>Create | PARTI<br>ple prob<br>two - de<br>Text B<br>INTEG<br>uation o<br>l equati<br>Text B<br>LINEA<br>of a mat<br>Text B<br>LINEA<br>tion, Eig<br>Text B<br>attern (  | AL DIF<br>AL DIF   | <b>FEREN</b> Culer's the second price         5.4, 5.7 <b>ALCUL</b> x and contrable second price         6.2, 11. <b>EBRA-</b> lementa         2.7, 28. <b>EBRA-</b> lementa         2.7, 28. <b>EBRA-</b> lementa         2.7, 28. <b>EBRA- EBRA-</b> st (s)         25         5         10         2.5         2.5  | TIATION<br>heorem fo<br>oblems.<br>,<br>US AND<br>os n x int<br>separable<br>6, 11.9, 1<br>1<br>ary transf<br>6, Text B<br>2<br>Eigen Vec<br>13, Text<br>larks – T<br>Jarks Dis<br>Qualit<br>Assessn<br>1<br>5<br>5<br>5<br>5<br>5<br>5  | DIFFER<br>egrals v<br>e, Lineau<br>1.11, Te<br>formatic<br>ook 2: 7<br>tors of s<br>Book 2: 7<br>tors of s<br>Boo | egeneou<br>ENTIA<br>vith stat<br>and E:<br>ext Boo<br>ons, Solu<br>7.3, 7.4<br>quare r<br>7.9, 8.2<br>on<br>01<br>1  | IS function<br>L EQUA<br>INDARIA II<br>Kact diff<br>k 2: 1.3,<br>ution of s<br>ution of s<br>natrix-P<br>L.<br>CQ'S<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- | on (NO I<br>TIONS<br>mits (0<br>erential<br>1.4, 1.5<br>system o            | Derivation                                     | on and NO                                   | 22DMAT31.1<br>2 extended theorem<br>22DMAT31.3<br>n of first order and<br>22DMAT31.4<br>s by Gauss eliminati<br>22DMAT31.4 | 8 Hours )-Problems,  8 Hours first- 8 Hours on method- 8 Hours                  |

### **Suggested Learning Resources: Text Books:** 1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491. 2) Erwin Krevszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, Reprint 2016. ISBN: 9788126554232. **Reference Books:** 1) Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236. 2) B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190. 3) H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831. 4) N.P.Bali and Manish Goval, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320. Web links and Video Lectures (e-Resources): 1)https://youtu.be/IUV0\_Nj4d1s?si=e03s7keCbC01\_jcz 2)https://youtu.be/VzUcs7aiqgg?si=YLtTUGr4Xp88KGY3 B)https://youtu.be/LDBnS4c7YbA?si=udUOdJ-u0ZxFmBAW 4)https://youtu.be/palSdK9P-ns?si=7A8\_VSxEI4lGvksB 5)https://youtu.be/Bw5yEqwMjQU?si=jzbklZmVev1w8K2S 6)https://youtu.be/LBqdGn1r f0?si=DWcAliFnosT7zikY 7)https://youtu.be/N5YCGOyTSuU?si=Wsf75V5fkUpfVVxr B)https://youtu.be/gd1FYn86P0c?si=7drzBEqVFSv6sQeZ 9)https://youtu.be/cSj82GG6MX4?si=4QN1DFXEqaJoUBn7 10)https://youtu.be/0c3yq9btr3A?si=jIoz8eu5TgV7mh8G 1)https://voutu.be/PhfbEr2btG0?si=HVK1uk65oHph0t8G Activity-Based Learning (Suggested Activities in Class)/Practical Based Learning: Contents related activities (Activity-based discussions) > For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming

- CodesOrganizing Group wise discussions on related topics
- Seminars

# IV Semester

|                                       | DISCRETE MATHEMATICS AND GRAPH THEORY<br>(Common to AIM, CEE, CSE, CDS, ISE)   |                   |                      |                          |                    |                      |                       |                         |                     |                           |  |                 |
|---------------------------------------|--|-------------------|----------------------|--------------------------|--------------------|----------------------|-----------------------|-------------------------|---------------------|---------------------------|--|-----------------|
| Course Code                           | 22MAC4   | 41                |                      | (                        |                    | ,                    | ,,                    | CIE Mark                | S                   |                           |  | 50              |
| L:T:P:S                               | 2:1:0:0  |                   |                      |                          |                    |                      | 5                     | SEE Mark                | ĸs                  |                           |  | 50              |
| Hrs. / Week                           | 4  |                   |                      |                          |                    |                      | 1                     | Fotal Ma                | 100                 |                           |  |                 |
| Credits                               | 03 Exam Hours  |                   |                      |                          |                    |                      |                       |                         |                     |                           |  | 03              |
| Course outcome                        | s:   |                   |                      |                          |                    |                      |                       |                         |                     |                           |  |                 |
| At the end of the                     | course, th   | e stude           | nt will b            | e able to:               |                    |                      |                       |                         |                     |                           |  |                 |
| 22MAC41.1                             | Justify the arguments with propositional and predicate logic and from truth tak  |                   |                      |                          |                    |                      |                       |                         | uth tables          | 5.                        |  |                 |
| 22MAC41.2                             | Illustrat  | e the pr          | inciple              | of Inclusi               | on and I           | Exclusio             | n                     |                         |                     |                           |  |                 |
| 22MAC41.3                             | Apply Pigeon hole principle to solve real life problems. Solve the engineering problems involving relations and functions. |                   |                      |                          |                    |                      |                       |                         |                     |                           |  |                 |
| 22MAC41.4                             | Analyze  | the con           | nputer s             | science pr               | oblems             | by usin              | g graph               | theory te               | chniqu              | es.                       |  |                 |
| 22MAC41.5                             | Illustrat  | e the fu          | ndamer               | ital conce               | pts of tr          | ees, con             | nectivit              | y and pla               | narity              | graphs                    |  |                 |
| 22MAC41.6                             | Ability to   | o repres          | sent and             | l apply gr               | aph the            | orv in s             | olving co             | omputer                 | science             | problems                  | 5.                                     |                 |
| Mapping of Cou                        | rse Outc   | omes t            | o Prog               | ram Out                  | comes:             | 019 11 0             |                       |                         |                     | <u>probioiii</u>          |  |                 |
|                                       | P01  | PO2               | P03                  | P04                      | P05                | P06                  | P07                   | P08                     | P09                 | P010                      | P011                                   | P012            |
| 22MAC411                              | 3  | 3                 | -                    | -                        | -                  | -                    | -                     | -                       | -                   | -                         | -                                      | -               |
| 22MAC41.2                             | 3  | 3                 | -                    | -                        | -                  | -                    | -                     | -                       | -                   | -                         | -                                      | -               |
| 22MAC41.3                             | 3  | 3                 | -                    | -                        | -                  | -                    | -                     | -                       | -                   | -                         | _                                      | -               |
| 22MAC41.4                             | 3  | 3                 | -                    | -                        | -                  | -                    | -                     | -                       | -                   | -                         | -                                      | -               |
| 22MAC41.5                             | 3  | 3                 | -                    | -                        | -                  | -                    | -                     | -                       | -                   | -                         | -                                      | -               |
| 22MAC41.6                             | 3  | 3                 | -                    | -                        | -                  | -                    | -                     | -                       | -                   | -                         | -                                      | -               |
|                                       |  |                   |                      |                          |                    |                      |                       |                         |                     |                           |  |                 |
| MODULE-1                              | MATHE  | MATIC             | AL LOG               | IC                       |                    |                      |                       |                         |                     |                           | 22MAC41.1                              | 9 Hours         |
| Basic Connective                      | s and Tru  | th Tabl           | es, Tau              | tology an                | d Contr            | adiction             | , Logic               | Equivaleı               | nce, Th             | e Laws of                 | Logic, Converse,                       | Inverse and     |
| Contra positive, L                    | ogical Im  | plicatio          | n, Rules             | of Infere                | nce.               |                      |                       |                         |                     |                           |  |                 |
| Case Study                            | Case stu   | dies on           | roles of             | f logic in s             | specifica          | tion of o            | computa               | tion.                   |                     |                           |  |                 |
| Text Book                             | Text Boo   | ok 1: 2.1         | l, 2.2, 2.           | 3.                       |                    |                      |                       |                         |                     |                           |  |                 |
| MODULE-2                              | PRINCIE  | PLES OI           | F COUN               | TING                     |                    |                      |                       |                         |                     |                           | 22MAC41.2                              | 9 Hours         |
| Catalan Numbers                       | , Ramsey   | Numbe             | rs, Stirli           | ng Numb                  | ers and            | Bell Nu              | nbers, T              | 'he princi              | ple of I            | nclusion a                | and Exclusion, Gen                     | eralizations of |
| the principle, Der                    | angement   | ts, Rook          | -Polync              | omials, Ar               | rangem             | ents wit             | h Forbio              | dden Pos                | itions.             |                           |  |                 |
| Text Book                             | Text Bo  | ok 1: 1.          | 5, 8.1, 8            | 3.2, 8.3, 8              | .4, 8.5.           |                      |                       |                         |                     |                           |  |                 |
| MODULE-3                              | RELATI   | ONS A             | ND FUN               | ICTIONS                  |                    |                      |                       |                         |                     |                           | 22MAC41.3                              | 9 Hours         |
| Cartesian Produc                      | ts and Rel   | ations,           | One-to-              | One and o                | onto fun           | ctions.              | Гhe Pige              | on hole F               | Principl            | e, Functio                | n Composition and                      | d Inverse       |
| Functions. Proper                     | rties of Re  | lations,          | Equiva               | lence Rel                | ations a           | nd Parti             | tions.                |                         |                     |                           |  |                 |
| Text Book                             | Text Bo  | ok 1: 5.          | 1, 5.2, 5            | 5.3, 5.4, 5              | .5, 5.6, 7         | 7.4.                 |                       |                         |                     |                           |  |                 |
| MODULE-4                              | GRAPH  | THEOR             | RY                   |                          |                    |                      |                       |                         |                     |                           | 22MAC41.4<br>22MAC41.6                 | 9 Hours         |
| Graphs-Definition                     | is and ex  | amples            | . Sub g              | raphs. Wa                | alks. Pa           | ths. Cire            | cuits. Co             | onnected                | ness. C             | omponen                   | ts, graph isomorp                      | hism. Euler     |
| graphs, Hamilton                      | ian paths  | and cyc           | les.                 | 1                        | ,                  | ,                    |                       |                         | ,                   | 1                         |  | ,               |
| Case Study                            | Case stu   | dies on           | Networ               | ·k Analysi               | is.                |                      |                       |                         |                     |                           |  |                 |
| Text Book                             | Text Bo  | ok 1: 1           | 1.1, 11.2            | 2, 11.3, 1               | 1.5. Tex           | t Book 2             | 2: 2.1, 2             | .2, 2.3, 2.             | 4, 2.5, 2           | 2.6, 2.7, 2               | .8, 2.9.                               |                 |
| MODULE-5                              | TREES,   | CONNI             | ECTIVI               | ΓY AND I                 | PLANAI             | RITY                 |                       |                         |                     |                           | 22MAC41.5<br>22MAC41.6                 | 9 Hours         |
| Trees, Properties<br>Network flows: K | of trees, I<br>ruskal's a  | Rooted a lgorithr | and bina<br>n, Plana | ary trees.<br>Ir graphs, | Spannii<br>Dual of | ng trees<br>planar g | cut sets<br>graphs, I | s, Propert<br>Different | ies of c<br>represe | ut set, all<br>entation o | cut sets, Fundame<br>f a planar graph. | ntal circuits   |
| Caso Study                            | Case stu   | dias an           | Social               | Jotwork /                | Analysis           |                      |                       |                         |                     |                           |  |                 |
|                                       |  |                   |                      |                          |                    |                      |                       | 24 25 4                 |                     | 40.40                     | 4 4 4 5 4 6 5 6 5                      |                 |
| Text Book                             | Text Bo  | ok 1: 1           | 1.4, 12.1            | 1, 12.2, 1               | 2.3, 13.2          | 2, Text I            | 300k 2:               | 3.1, 3.5, 3             | 3.7, 4.1            | , 4.2, 4.3,               | 4.4, 4.5, 4.6, 5.2, 5                  | .6, 5.7.        |

| CIE As          | sessment Pattern (5  | 0 Marks - 1        | 'heory)                                |                |   |  |  |  |  |
|-----------------|--|--------------------|--|----------------|---|--|--|--|--|
|                 |  | Marks Distribution |  |                |   |  |  |  |  |
|                 | <b>RBT Levels</b>  | Test (s)           | Qualitative<br>Assessment (s)          | MCQ's          |   |  |  |  |  |
|                 |  | 25                 | 15                                     | 10             |   |  |  |  |  |
| L1              | Remember   | 5                  | 5                                      | -              |   |  |  |  |  |
| L2              | Understand   | 5                  | 5                                      | -              |   |  |  |  |  |
| L3              | Apply  | 10                 | 5                                      | 10             |   |  |  |  |  |
| 1.4             | Analyze  | 25                 | -                                      | -              |   |  |  |  |  |
| 1.5             | Fyaluate   | 2.5                | _                                      | _              |   |  |  |  |  |
| 16              | Create   | -                  |  | _              |   |  |  |  |  |
| SEE A           | scocemont Pattorn (5   | 0 Marks - 7        | [hoory]                                |                |   |  |  |  |  |
| SEE A:          | ssessment rattern (5   | Evom               | Marke                                  |                |   |  |  |  |  |
|                 | <b>RBT Levels</b>  | Dictrib            | 1 Mar KS                               |                |   |  |  |  |  |
| 11              | Domombor   | DISCIDU            | 10                                     |                |   |  |  |  |  |
|                 | Undorstand   |                    | 10                                     |                |   |  |  |  |  |
|                 | Annly  |                    | 20                                     |                |   |  |  |  |  |
|                 |  |                    | 20<br>F                                |                |   |  |  |  |  |
|                 | Analyze  |                    | 5                                      |                |   |  |  |  |  |
|                 | Evaluate   |                    | 5                                      |                |   |  |  |  |  |
|                 |  |                    | -                                      |                |   |  |  |  |  |
| Sugge           | sted Learning Reso   | urces:             |  |                |   |  |  |  |  |
| 1) Dol          | 900KS:<br>nh D. Crimoldi Diagnot   | a and Camb         | inatorial Mathemati                    | a an annlia    | dintroduction Degreen                             |  |  |  |  |
| I) Kal          | pil F. Gilliaiui, Discieu  | 010 ICDN.          | 111atul 1al Mathemati                  | ics-all applie |   |  |  |  |  |
| 2) Nor          | cation, Filth Eultion, 2   | U19, ISDN:         | 9/89333433055.<br>Nicotion to Engineer | ring and Car   | nnutor Science                                    |  |  |  |  |
| 2 J Nai         | or Dublications Inc. Fi  | rst Edition        | 2016 ISDN. 070 04                      | 0600702E       | ilputer Science,                                  |  |  |  |  |
| Dov             | Dover rubications Inc., FIFSt Edition, 2010, ISBN: 978-0480807935.<br>Deference Deeler |                    |  |                |   |  |  |  |  |
| 1) Ras          | avarai S. Anami and Va   | anakanna S         | Madalli Discrete M                     | athematics .   | A Concept based approach                          |  |  |  |  |
| IJ Das          | wardi jo. Analin and V   | CDN, 07001         | 72710000                               |                | A concept based approach,                         |  |  |  |  |
| 2) Von          | noth II Dogon Digenet  | SDN. 97001         | 73719990.<br>Tag and its Applicati     | ong with Co    | mbinatorias and Cranh                             |  |  |  |  |
| ZJ Ken          | ory McCrow Hill Educ   | e Mathema          | the Edition 2017 IS                    | DIIS WILII CO  | nibiliatorics allu Grapii<br>0401000              |  |  |  |  |
| 2) 0 5          | Malik and MK Son D   | icercto Moth       | iui Euluoli, 2017, 13                  | DN: 970007     | d Applications                                    |  |  |  |  |
| Tho             | mon 2004 ISBN: 979   | 206102128          | selliatical Structures                 | s. Theory an   | u Applications,                                   |  |  |  |  |
| 4) Tho          | mas Koshy Discrete M   | lathematics        | with Annlications 1                    | Flsevier Fir   | st Edition 2005                                   |  |  |  |  |
| ISB             | N· 9788181478870   | iatiiciiatics      | with Applications, i                   |                |   |  |  |  |  |
| Wehl            | inks and Video Lect  | uros (o.Ro         | sources).                              |                |   |  |  |  |  |
| 1)https         | 1/1 / / / / / / / / / / / / / / / / / /  | Kk7w?si=1          | $r_{0}Ve_{2}-rP_{0}4fCH$               |                |   |  |  |  |  |
| 2)https         | //youtu he/Hhvi6vE   | i7fY?si=Ga         | CiIIHBNdV2MArP                         |                |   |  |  |  |  |
| R)https         | //voutu he/7hLvm 4   | 4DNas?si=v         | iYHH fZDZ09Fmd                         | A7             |   |  |  |  |  |
| 4)https         | //voutu be/7hLvm 4   | 4DNas?si=v         | iYHH fZDZQ9Fmd                         | w7             |   |  |  |  |  |
| 5)https         | //voutu.be/67_eeng   | dMVE?si=-7         | 2Pv2xl18oMUwfR                         |                |   |  |  |  |  |
| 6)https         | //voutu.be/fwSiTaC   | s8KM?si=w          | pZcCEG-pNDuIPkS                        |                |   |  |  |  |  |
| 7)https         | ://voutu.be/iHC1ZdL  | dKiw?si=tu         | N-6pLahMWPN4M                          | 1b             |   |  |  |  |  |
| B)https         | ://voutu.be/auvGOCo  | oYdu4?si=3         | ELSvG5g-475AN1                         |                |   |  |  |  |  |
| 9)https         | ://voutu.be/GLHWih   | RB38?si=F          | uoNOAzNR2IIYpU                         | 0              |   |  |  |  |  |
| 10)htt          | ps://voutu.be/hrum   | _<br>NROwTV8?      | si=803hB1BbFD-M                        | ICNXS          |   |  |  |  |  |
| 11) <u>http</u> | s://youtu.be/sWsXB   | Y1908I?si=.        | ALgp]]lzrAafEVDg                       |                |   |  |  |  |  |
| Activi          | ty-Based Learning (  | Suggested          | Activities in Class                    | s)/Practica    | l Based Learning:                                 |  |  |  |  |
| •               | Contents related ac  | tivities (Ac       | tivity-based discus                    | sions)         |   |  |  |  |  |
|                 | For active particular  | rticipation        | of students, instru                    | ct the stud    | ents to prepare Algorithms/Flowcharts/Programming |  |  |  |  |
|                 | Codes  | *                  | · · · ·                                |                | , , , , , , , , , , , , , , , , ,                 |  |  |  |  |
|                 | Organizing Gr  | oup wise di        | scussions on relate                    | ed topics      |   |  |  |  |  |
|                 | Seminars   | -                  |  | -              |   |  |  |  |  |
|                 |  |                    |  |                |   |  |  |  |  |
| L               |  |                    |  |                |   |  |  |  |  |

| OBJECT ORIENTED PROGRAMMING USING JAVA  |  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
|---|--|----------|----------|---------------------|---------------------|-----------|-------------------|----------|-------------|--------------|-------------|-------------|-------------|-----------|--|
| Course Code   | 22CD   | S42      |          |                     |                     |           |                   |          | CIE M       | larks        |             | 50          |             |           |  |
| L:T:P:S   | 3:0:0  | :0       |          |                     |                     |           |                   |          | SEE N       | Jarks        |             | 50          |             |           |  |
| Hrs / Week  | 3  |          |          |                     |                     |           |                   |          | Total Marks |              |             |             | 100         |           |  |
| Credits   | 03   |          |          |                     |                     |           |                   |          | Exan        | n Hours      |             | 03          |             |           |  |
| At the end of the course, the student will be able to:  |  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| 22CDS42.1   | Under  | rstand t | the rea  | l-world             | entities            | using O   | bject Or          | iented F | rogram      | iming con    | cepts.      |             |             |           |  |
| 22CDS42.2   | Identify the importance of inheritance and interface concepts and apply to model relationships |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| 22CDS42.3   | Analy  | se the i | mport    | ance of e           | exceptio            | n handl   | ing and           | string h | andling     | operation    | IS          |             |             |           |  |
| 22CDS42.4   | Apply  | the co   | ncept o  | of Multit           | hreadin             | g in con  | current           | prograr  | nming       |              |             |             |             |           |  |
| 22CDS42.5   | Devel  | op appl  | licatio  | ıs using            | collecti            | ons fran  | nework            | for man  | aging us    | ser define   | d types     |             |             |           |  |
| 22CDS42.6   | Solve  | the rea  | l-worl   | d proble            | ms usin             | g Object  | t Orient          | ed conce | epts and    | l collection | n framewo   | ork in Java | a.          |           |  |
| Mapping of Co   | urse O   | utcom    | es to l  | Program             | n Outco             | omes ai   | nd Prog           | gram Sp  | oecific     | Outcome      | s:          |             |             |           |  |
|   | P01  | P02      | P03      | P04                 | P05                 | P06       | P07               | P08      | P09         | P010         | P011        | P012        | PSO1        | PSO2      |  |
| 22CDS42.1   | 2  | 2        | 2        | 2                   | -                   | -         | -                 | -        | -           | -            | -           | 2           | 3           | 3         |  |
| 22CDS42.2   | 2  | 3        | 3        | 2                   | -                   | -         | -                 | -        | -           | -            | -           | 2           | 3           | 3         |  |
| 22CDS42.3   | 3  | 3        | 3        | 2                   | -                   | -         | -                 | -        | -           | -            | -           | 2           | 3           | 3         |  |
| 22CDS42.4   | 3  | 3        | 3        | 2                   | -                   | -         | -                 | -        | -           | -            | -           | 2           | 3           | 3         |  |
| 22CDS42.5   | 3  | 2        | 3        | 3                   | -                   | -         | -                 | -        | -           | -            | -           | 2           | 3           | 3         |  |
| 2200342.0   | 5  | 5        | 5        | 5                   | _                   | _         | _                 |          | _           | -            | _           | 2           | 5           | 5         |  |
| MODULE-1  | MODULE-1 INTRODUCTION TO JAVA 22CDS42.1 8 Hours  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| The Java Langua   | age, Java  | a Devel  | opmer    | t Kit (JI           | OK); Java           | a Buzzw   | ords, By          | yte Code | , JVM, J    | RE and Jav   | va enviror  | ıment, Da   | ta types, v | variables |  |
| and Arrays, Ope   | erators,   | Contro   | l state  | ment, co            | mmand               | l line Ar | gument            | s, Langu | lage fun    | damental     | s Object (  | Priented F  | Programm    | ing with  |  |
| JAVA: Object Or   | riented o  | concept  | ts, Clas | ses, Obj            | ects and            | d Metho   | ds, Metl          | hod Ove  | rloadin     | g, Constru   | ctor, stat  | ic          |             |           |  |
| members, Impli  | cit this   |          |          |                     | .1                  |           | (1                |          |             |              |             |             |             |           |  |
| Self-study  |  |          | Inve     | stigate<br>dalone : | the con<br>applicat | tion on t | 'Write (<br>IDK19 | Jnce an  | d Run E     | verywhe      | re" with s  | suitable Ja | iva         |           |  |
| Text Book   |  |          | Text     | Book 1:             | Part 10             | hapter    | 1 to 7            |          |             |              |             |             |             |           |  |
| MODULE-2  | INHE   | RITAN    | CE AN    | <b>D</b> INTE       | RFACI               | NG        |                   |          |             |              | 22CDS4      | 2.2         | 8 H         | lours     |  |
| Inheritance, Me   | thod Ov  | verridir | ng, Acc  | ess spe             | cifiers, A          | Abstract  | Classes           | s, Final | member      | rs, The Ob   | ject Class  | s, Interfac | es, Packag  | ge        |  |
| Fundamentals.   | r  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| Text Book   | Text E   | Book 1:  | Part 1   | Chapter             | - 8,9               |           |                   |          |             | 0000         |             | 00000       |             | *         |  |
| MODULE-3  | STRI   | NG MA    | NIPUI    | LATION              | n Evrtno e          | tion Co   | mnorio            | on Coo   | nahina      | ZZCD         | 42.3, 22    | CDS42.4     | 8 H         | lours     |  |
| Fundamentals,   | Types,   | Using    | try, ca  | tch, thro           | ow, thro            | ows, fina | ally, Use         | er Defin | ed Exce     | eptions.     | g, string r | builer, Ex  | ception na  | anunng:   |  |
| Text Book   | Text Book   Text Book 1: Part 2 Chapter 15,16 Part 1 Chapter 10                                |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| MODULE-4  | 4Multi-Threading22CDS42.58 Hours   |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| Thread Concep   | t, Java 🛛  | Гhread   | Mode     | l, The m            | ain met             | thod, Cr  | eating            | Threads  | s, Threa    | d Prioriti   | es, Synch   | ronizatio   | n, join     |           |  |
| Text Book   Text Book 1: Part 1 Chapter 11  |  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| MODULE-5Collection Framework22CDS42.68 Hours  |  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| Collections Overview, Collection Interfaces, Set, List, Map, Queue, Collection Classes, Generics, Type Wrappers,                              |  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| Accessing a collection using an Iterator, Sorting collections, equals() and hashCode contract, overriding equals and hashCode methods in Java |  |          |          |                     |                     |           |                   |          |             |              |             |             |             |           |  |
| Text Book   | Text F   | Book 1:  | Part 1   | Chapter             | • 14. Par           | rt 2 Char | oter 17           |          |             |              |             |             |             |           |  |

| CIE Assessment Pattern (50 Ma | arks – Theory)    |          |                               |       |  |  |  |  |  |
|-------------------------------|-------------------|----------|-------------------------------|-------|--|--|--|--|--|
|                               |                   |          | Marks Distribution            |       |  |  |  |  |  |
|                               | <b>RBT Levels</b> | Test (s) | Qualitative<br>Assessment (s) | MCQ's |  |  |  |  |  |
|                               |                   | 25       | 15                            | 10    |  |  |  |  |  |
| L                             | l Remember        |          | -                             | -     |  |  |  |  |  |
|                               | 2 Understand      | 5        | -                             | -     |  |  |  |  |  |
|                               | 3 Apply           | 10       | 5                             | 5     |  |  |  |  |  |
| L                             | 4 Analyze         | 5        | 5                             | 5     |  |  |  |  |  |
| L                             | 5 Evaluate        | 5        | 5                             | -     |  |  |  |  |  |
| Le                            | 6 Create          | -        | -                             | -     |  |  |  |  |  |

| RI | BT Levels  | Exam Marks<br>Distribution |
|----|------------|----------------------------|
|    |            | (50)                       |
| L1 | Remember   |                            |
| L2 | Understand | 10                         |
| L3 | Apply      | 20                         |
| L4 | Analyze    | 10                         |
| L5 | Evaluate   | 10                         |
| L6 | Create     |                            |

# Suggested Learning Resources:

**Text Books:** 

- 1. Herbert Schildt, "Java: The Complete Reference", 12th Edition, Oracle Press, Tata McGraw Hill, 2017 (Reprint), ISBN-13:978-1260463415
- 2. T. Budd, "Understanding Object-Oriented Programming with Java", Updated Edition, Pearson Education, 2018, ISBN-13: 978-8131708354

### **Reference Books:**

- 1. J. Nino and F.A. Hosch, "An Introduction to programming and OO design using Java", John Wiley & sons, 2019(Reprint), ISBNCode: 978-0470128718.
- 2. Y. Daniel Liang, "Introduction to JAVA Programming", 10th Edition, Pearson Education, ISBN-10:935306578X

3. R. A. Johnson, "Java Programming and Object-Oriented Application Development", Cengage Learning, 2020 (Reprint), ISBN-13:978-0619217464

# Web links and Video Lectures (e-Resources):

1. JDK 19 Documentation - Home (oracle.com)

- 1. Contents related activities (Activity-based discussions)
  - ➢ Hands-on with coding platforms using Java
  - Sroup wise hackathon in Java language

|               | OBJECT ORIENTED PROGRAMMING USING JAVA LAB |   |   |           |             |            |            |             |           |              |           |             |      |        |
|---------------|--|---|---|-----------|-------------|------------|------------|-------------|-----------|--------------|-----------|-------------|------|--------|
| Course Code   | 2  | 22CDL4  | 12  |           |             |            |            |             | CIE N     | <b>Jarks</b> |           | 50          |      |        |
| L:T:P:S       | (  | 0:0:1:0   |   |           |             |            |            |             | SEE I     | Marks        |           | 50          |      |        |
| Hrs / Week    | 2  | 2   |   |           |             |            |            |             | Tota      | l Marks      |           | 100         |      |        |
| Credits       | (  | Exam Hours 03   |   |           |             |            |            |             |           |              |           |             |      |        |
| Course outcom | es: A                                      | t the en  | d of th   | e course  | e, the sti  | udent w    | ill be ab  | le to:      | onto d D  |              |           |             |      |        |
| 22CDL42.1     |  | Apply th  | and examine the real world applications using object oriented Programming concepts. |           |             |            |            |             |           |              |           |             |      |        |
| 22CDL42.2     |  |   |   |           |             |            |            |             |           |              |           |             |      |        |
| 22CDL42.3     |  |   |   |           |             |            |            |             |           |              |           |             |      |        |
| ZZCDL4Z.4     |  | Solve th  | e real  |           |             |            | Diject U   |             | concep    |              |           | ework in ja | ava. |        |
| Mapping of Co |  |   |   | Progra    |             | DO4        |            | bgram s     |           |              | DO11      | DO12        | DCO1 | DCO2   |
| 22001421      | 2  | 2   | 2   | 2         | 1           | 100        | 107        | 100         | 109       |              | -         | 2           | 3    | 3      |
| 22CDL42.1     | 2  | 3   | 2   | 2         | 1           | _          | -          | -           | -         |              |           | 2           | 3    | 3      |
| 22CDL42.2     | 3  | 3   | 3   | 2         | 1           | _          | _          | _           | _         | _            | _         | 2           | 3    | 3      |
| 22CDL42.4     | 3  | 3   | 3   | 2         | 2           | -          | -          | -           | -         | -            | -         | 2           | 3    | 3      |
|               |  |   |   |           |             |            |            |             |           |              |           |             | -    |        |
| Pgm. No.      |  |   |   |           |             | List of    | Progra     | ms          |           |              |           | Hours       |      | COs    |
|               |  |   |   |           |             | Pr         | erequis    | ite Den     | 10        |              |           |             |      |        |
|               |  | • Hel   | lo Wo   | rld prog  | ram on      | Eclipse    | must be    | run         |           |              |           | 2           |      | NA     |
|               |  |   |   |           |             |            | PAR        | T-A         |           |              |           |             |      |        |
| 1             | Desi                                       | Design and Implement a Java program to print the sum of the elements of                   |   |           |             |            |            |             |           |              |           |             |      |        |
|               | the a                                      | ne array with the given below condition. If the array has 6 and 7 in                      |   |           |             |            |            |             |           |              |           |             |      |        |
|               | succ                                       | cceeding orders, ignore 6 and 7 and the numbers between them for the                      |   |           |             |            |            |             |           |              |           |             |      |        |
|               | calcu                                      | ulation of sum.   |   |           |             |            |            |             |           |              |           |             |      |        |
|               | Eg1)                                       | Array l   | Eleme   | nts - 10, | 3,6,1,2,7   | 7,90/P:    |            |             |           |              |           |             |      |        |
|               | 22   |   |   |           |             |            |            |             |           |              |           | 2           | 22C  | DL43.1 |
|               | [i.e.                                      | 10+3+9  | ]   |           |             |            |            |             |           |              |           |             |      |        |
|               | Eg2)                                       | Array   | Eleme   | nts - 7,1 | ,2,3,6      |            |            |             |           |              |           |             |      |        |
|               | 0/P:                                       | 19  | _1  |           | . – .       |            |            |             |           |              |           |             |      |        |
|               | Eg3)                                       | Array I   | Eleme   | nts - 1,6 | ,4,7,9      |            |            |             |           |              |           |             |      |        |
| 2             | 0/P  | 10<br>m and 1   | []  | n ont o L |             | ways the   | + diamla   |             |           | outions      |           |             |      |        |
| 2             | Desi                                       | gn and i  | impiei  | nent a Ja | ava prog    | gram tha   | it displa  | ys a mei    | nu with   | options      |           |             |      |        |
|               |  | 1.<br>ว   | Add   |           |             |            |            |             |           |              |           |             |      |        |
|               | Dage                                       | Z.<br>d on th   | Sub   | one cho   |             | d 2 mun    | ahora or   | nd norfo    | um tha    | volovant     | nonation  | 2           | 220  | 1 12 1 |
|               | After                                      | r porfoi  | e opu   | the one   | sell, lea   | the pro    | aram sl    | hould a     | sk the i  | iser if he   | wants to  | 2           | 220  | DL+3.1 |
|               | cont                                       | inua If   | the us  | or pross  | $e^{1}auon$ | V then t   | he prog    | ram sho     | uld con   | tinue disn   | laving    |             |      |        |
|               | the r                                      | nenu el   | se the  | program   | n should    | d termin   | late.      | 1 4111 5110 | ulu con   | tinue uisp   | laying    |             |      |        |
| 3             | Desi                                       | gn and  | implei  | ment an   | algorith    | nm to ac   | cept an    | array of    | f 5 posit | tive intege  | ers. The  |             |      |        |
|               | algo                                       | orithm must then find the smallest positive integer in the array which cannot 2 22CDL43.1 |   |           |             |            |            |             |           |              |           |             |      |        |
|               | be fo                                      | prmed from the sum of 2 numbers in the array.   |   |           |             |            |            |             |           |              |           |             |      |        |
| 4             | Deve                                       | elop a J  | ava p   | rogram    | Write a     | a progra   | am to c    | heck if     | the pro   | gram has     | received  |             |      |        |
|               | com  | mand li   | ne arg  | guments   | s or not    | . If the j | program    | n has no    | ot receiv | ved the va   | lues then |             |      |        |
|               | prin                                       | t "No Va  | lues",  | else prii | nt all the  | valuesi    | in a singl | le lines s  | eparate   | ed by,(com   | ma). Eg1) |             |      |        |
|               | java                                       | Examp   | le  |           |             |            |            |             |           |              |           | 2           | 22C  | DL43.1 |
|               | 0/P  | : No val  | ues   |           |             |            |            |             |           |              |           |             |      |        |
|               | Eg2)                                       | java E  | xampl   | e Mum     | bai Bai     | ngalore    |            |             |           |              |           |             |      |        |
|               | 0/P:                                       | Mumba   | ii, Ban   | galore    |             |            |            |             |           |              |           |             |      |        |

| 5  | Design and develop a simple Java program to find the longest substring without   |   |           |
|----|--|---|-----------|
|    | repeating characters in a given String. Accept the String through Command Line   | 2 | 22CDL43.2 |
|    | argument.  |   |           |
| 6  | Given a string and a non-empty word string, return a string made of each char just   |   |           |
|    | before and just after every appearance of the word in the string. Ignore cases where   |   |           |
|    | there is no char before or after the word, and a char may be included twice if it is   |   |           |
|    | hetween two words.   |   |           |
|    | •If inputs are "abcXY123XYiik" and "XY" output should be "c13i"  | 2 | 22CDL43.2 |
|    | •If inputs are "XY123XY" and "XY" output should be "13" If inputs are "XY1XY" and  |   |           |
|    | "YV" output should be "11"   |   |           |
|    | Create a Java program for the same   |   |           |
|    |  |   |           |
| 7  | PARI-B   |   |           |
| /  | Design a class that can be used by a health care professional to keep track of a   |   |           |
|    | patient's vital statistics. Here's what the class should do:   |   |           |
|    | Construct a class called Patient   |   |           |
|    | Store a String name for the patient  |   |           |
|    | • Store weight and height for patient as doubles   |   |           |
|    | • Construct a new patient using these values   | 2 | 22CDL43.2 |
|    | write a method called BMI which returns the patient's BMI as a double. BMI can be  |   |           |
|    | calculated as  |   |           |
|    | BMI = (Weight in Pounds / ( Height in inches x Height in inches ) ) x 703  |   |           |
|    | Next, construct a class called "Patients" and create a main method. Create a Patient   |   |           |
|    | object and assign some height and weight to that object. Display the BMI of that   |   |           |
|    | patient.   |   |           |
| 8  | Develop a Java program for a university course registration system. Write a base class   |   |           |
|    | Course with attributes like course ID, course name, and credits. Then, create derived  |   |           |
|    | classes OnlineCourse and OfflineCourse that include additional attributes such as  |   |           |
|    | platform (for online courses) and classroom (for offline courses). Illustrate the use of   | 2 | 22CDL43.2 |
|    | constructors in the base and derived classes to initialize these attributes.   |   |           |
|    |  |   |           |
| 9  | Develop a Program to take care of Number Format Exception if user enters values  |   |           |
|    | other than integer for calculating average marks of 2 students. The name of the  |   |           |
|    | students and marks in 3 subjects are taken from the user while executing the   |   |           |
|    | program.   | 2 |           |
|    | • In the same Program write your own Exception classes to take care of   | Z | ZZCDL43.3 |
|    | Negative values and values out of range (i.e. other than in the range of 0-100)  |   |           |
|    | • Include finally to output the statement "Program terminated".  |   |           |
|    |  |   |           |
| 10 | Create class of SalesPersons as a thread that will display fives sales persons name  |   |           |
|    | Create a class as Days as other Thread that has array of seven days. Call the instance   |   |           |
|    | of Sales Persons in Days and start both the Threads Use Synchronization  | 2 | 22CDL43.3 |
|    | of Salesi ersons in Days and start both the Threads. Ose Synchronization.  |   |           |
| 11 | Create a Student Attendance Management System using a HashMan Collection time  |   |           |
|    | Derform the following operations:  |   |           |
|    | Add the low volve neighbor the value accession device a since low Charles in the value of the va | 2 |           |
|    | Add the key-value pair. Retrieve the value associated with a given key Checkwhether  | Z | 22UDL43.4 |
|    | a particular key/value exist.  |   |           |
|    | replace a value associated with a given key in the HashMap   |   |           |
| 12 | Develop a program to solve the problem given:  | 2 | 22CDL43.4 |

|                     | An array of le          | ngth N    | is prov | vided. Count the  | number                 | of (i, | j) pairs where 1<=i<               | j<=N such              |               |
|---------------------|-------------------------|-----------|---------|-------------------|------------------------|--------|------------------------------------|------------------------|---------------|
|                     | that the diffe          | erence    | of the  | array elements    | on that                | indi   | ces is equal to the s              | sum ofthe              |               |
|                     | square of the           | ir indic  | es.     |                   |                        |        |                                    |                        |               |
|                     | Input : 4, 9, 6, 29, 30 |           |         |                   |                        |        |                                    |                        |               |
|                     | Output: 3               |           |         |                   |                        |        |                                    |                        |               |
|                     | (12)(24)(1              | 5) sati   | sfy the | above condition   | 'n                     |        |                                    |                        |               |
|                     | (1,2), (2,1),(1         | ,5 J 3ati | Siy the |                   |                        |        |                                    |                        |               |
|                     |                         |           |         | Royond Sullah     | r AK I-C<br>uc Virtu   | al I / | h Contont                          |                        |               |
|                     |                         | (To b     | a dana  | during Lab but    | us viitu<br>t not to l | ai La  | in content<br>scluded for CIE or S | FF)                    |               |
|                     |                         | (100      | e uone  | e uuring Lab bu   |                        | Je II  | iciuded for CIE of 5               | eej                    |               |
| 1                   | [https://iow            | , jitd w  | lahe ar | in lovn lovcont   | ions/1.1               | Han    | dling overntions in i              | 10170                  |               |
| 1.                  | [Inteps.//java          |           |         | in /our /life and | 10115/].1              | 1 an   | Life Curele of a thread            | java<br>d              |               |
| Ζ.                  | [https://java           | -11td.vi  | abs.ac  | .in/exp/life-cyc  | le-threa               | a/]:   | Life Cycle of a threa              | 10                     |               |
| CIE Assessmer       | nt Pattern (50          | Marks     | – Lab)  |                   |                        |        |                                    |                        |               |
|                     |                         |           | RBT     | Levels            | Test (                 | s)     | Weekly Assessme                    | ent                    |               |
|                     |                         |           |         |                   | 20                     |        | 30                                 |                        |               |
|                     |                         | L1        | Rer     | nember            | -                      |        | -                                  |                        |               |
|                     |                         | L2        | Unc     | lerstand          | -                      |        | -                                  |                        |               |
|                     |                         | L3        | Арр     | oly               | 10                     | 10 10  |                                    |                        |               |
|                     |                         | L4        | Ana     | alyze             | 5                      |        | 10                                 |                        |               |
|                     |                         | L5        | Eva     | luate             | 5                      |        | 10                                 |                        |               |
|                     |                         | L6        | Cre     | ate               | -                      |        | -                                  |                        |               |
|                     |                         |           |         |                   |                        |        |                                    |                        |               |
| SEE Assessme        | nt Pattern (50          | Marks     | - Lab)  |                   |                        |        |                                    |                        |               |
|                     |                         |           |         |                   |                        | I      | Exam Marks                         |                        |               |
|                     |                         |           |         | <b>RBT</b> Levels |                        | Dis    | tribution (50)                     |                        |               |
|                     |                         |           | L1      | Remember          |                        |        | -                                  |                        |               |
|                     |                         |           | L2      | Understand        |                        |        | -                                  |                        |               |
|                     |                         |           | L3      | Apply             |                        |        | 15                                 |                        |               |
|                     |                         |           | L4      | Analyze           |                        |        | 20                                 |                        |               |
|                     |                         |           | 15      | Fyaluate          |                        |        | 15                                 |                        |               |
|                     |                         |           | 16      | Create            |                        |        | -                                  |                        |               |
|                     |                         |           | LU      | Cleate            |                        |        | -                                  |                        |               |
| Suggested Le        | orning Rosour           | 2005      |         |                   |                        |        |                                    |                        |               |
| Text Books          | ai iiiig Kesoui         | ces.      |         |                   |                        |        |                                    |                        |               |
| 1. Herbe            | ert Schildt. "Iava      | : The C   | omplet  | te Reference", 12 | th Editic              | on. O  | racle Press. Tata Mc               | Graw Hill.2017 (Reprin | nt), ISBN-13  |
| :978-               | 1260463415              |           | ompro   |                   |                        | ,, 0   | 1401011000, 1404110                | aram                   | 10),10211 20  |
| 2. T. Bud           | ld, "Understand         | ing Obj   | ect-Or  | iented Programr   | ning witl              | h Jav  | a", Updated Edition                | , Pearson Education,20 | )18, ISBN-13: |
| 978-8               | 131708354               | 0,        |         | 0                 | U                      | ,      |                                    |                        |               |
| <b>Reference Bo</b> | oks:                    |           |         |                   |                        |        |                                    |                        |               |
| 1 I Nin             | o and EA H              | osch (    | "An Ir  | stroduction to    | nrograr                | nmi    | ng and 00 design                   | a using Java" John     | Wilow &       |

1. J. Nino and F.A. Hosch, "An Introduction to programming and OO design using Java", John Wiley & sons,2019(Reprint). ISBNCode: 978-0470128718

2. Y. Daniel Liang, "Introduction to JAVA Programming", 10th Edition, Pearson Education, ISBN-10:**935306578X** R. A. Johnson, "Java Programming and Object-Oriented Application Development", Cengage Learning, 2017, ISBN-13:978-0619217464

| LOGIC DESIGN AND COMPUTER ORGANIZATION         |   |  |          |            |               |            |                        |            |               |            |              |             |           |          |
|--|---|--|----------|------------|---------------|------------|------------------------|------------|---------------|------------|--------------|-------------|-----------|----------|
| Course Code                                    | 220   | DS43   |          |            |               |            |                        | C          | IE Marl       | KS         |              | 50          |           |          |
| L:T:P:S  | 3:0:  | 0:0  |          |            |               |            |                        | S          | EE Mar        | ks         |              | 50          |           |          |
| Hrs / Week                                     | 3   |  |          |            |               |            |                        | Т          | 'otal Ma      | rks        |              | 100         | )         |          |
| Credits  | 03  |  |          |            |               |            |                        | E          | Exam Hours 03 |            |              |             |           |          |
| Course outcom                                  | es:   |  |          |            |               |            |                        |            |               |            |              |             |           |          |
| At the end of th                               | ne cours  | e course, the student will be able to:   |          |            |               |            |                        |            |               |            |              |             |           |          |
| 22CDS43.1                                      | Und   | erstand  | l the w  | orking o   | of logic (    | Gates an   | d simpli               | ify Boolea | an functi     | on using   | Karnaugł     | n maps.     |           |          |
| 22CDS43.2                                      | Imp   | lement   | ation o  | f combi    | national      | logic ci   | rcuits.                |            |               |            |              |             |           |          |
| 22CDS43.3                                      | Ana   | lyze and   | d desig  | gn of circ | cuits usi     | ng latch   | and flip               | oflop's.   |               |            |              |             |           |          |
| 22CDS43.4                                      | Desi  | ign and  | analyz   | ze applic  | ation of      | registe    | rs and co              | ounters.   |               |            |              |             |           |          |
| 22CDS43.5                                      | Ana   | lyze dif   | ferent   | method     | s for cor     | nputer l   | I/O and                | functions  | s of Men      | ory Syste  | em.          |             |           |          |
| 22CDS43.6                                      | Dev   | elop sin   | nple H   | DL prog    | rams.         |            |                        |            |               |            |              |             |           |          |
| Mapping of Co                                  | urse O  | utcom  | es to F  | Program    | n Outco       | omes ai    | nd Prog                | gram Spe   | ecific O      | utcomes    | :            |             |           |          |
|  | P01   | P02  | P03      | P04        | P05           | P06        | P07                    | P08        | P09           | P010       | P011         | P012        | PS01      | PSO2     |
|  |   |  |          |            |               |            |                        |            |               |            |              |             |           |          |
| 22CDS43.1                                      | 2   | 2  | 2        | 2          | -             | -          | -                      | -          | -             | -          | -            | 2           | 2         | 2        |
| 22CDS43.2                                      | 3   | 3  | 3        | 3          | -             | -          | -                      | -          | -             | -          | -            | 2           | 2         | 2        |
| 22CDS43.3                                      | 3   | 3  | 3        | 3          | -             | -          | -                      | _          | -             | -          | -            | 2           | 2         | 2        |
| 22CDS43.4                                      | 3   | 3  | 3        | 3          | -             | -          | -                      | -          | -             | -          | -            | 2           | 2         | 2        |
| 22CDS43.5                                      | 3   | 3  | 3        | 3          | -             | -          | -                      | -          | -             | -          | -            | 2           | 2         | 2        |
| 22CDS43.6                                      | 2   | 2  | 2        | 2          | -             | -          | -                      | -          | -             | -          | -            | 2           | 2         | 2        |
|  |   |  |          |            |               |            |                        |            |               |            |              |             |           |          |
| MODULE-1                                       | Digi  | ital Log   | gic and  | d Comb     | inatior       | nal Logi   | i <mark>c Circu</mark> | its:       |               | 2          | 2CDS43.      | 1           | 8 H       | ours     |
| Introduction to                                | HDL B   | oolean   | Laws     | and The    | eorems,       | Sum-of     | -produc                | ts Metho   | d, Trutł      | 1 Table to | o Karnau     | gh Map, I   | Karnaugh  |          |
| Simplifications,                               | Don't C   | are Cor  | idition  | s, Produ   | ict-of-su     | ims Met    | hod, Pro               | oduct-of-s | sums Si       | nplificati | on, Simpl    | ification b | by Quine- |          |
| Toxt Book                                      | ba, vern  | log imp  | Tovt     | Rook 1     |               |            | I LOGIC (              | Incuits.   |               |            |              |             |           |          |
| MODIII F.2                                     | Con   | hinati   | ional (  | Circuits   | 1.5-1.0       | ,2.1-2.3   |                        |            |               | 2          | 200543       | 2           | 81        | Jours    |
| Number System                                  | Base  | Conve  | rsion    | Rinary     | ∙<br>Additiou | n Rinar    | v Suhtr                | action Bi  | inary M       | ultiplicat | ion and I    | Division    | Insigned  | Rinary   |
| Numbers, Sign-M                                | Magnitu   | ide Nui  | mbers.   | 2's Con    | plemen        | it Repre   | esentatio              | on. 2's Co | mpleme        | ent Arith  | metic. Ari   | thmetic     | onsigneu  | Dillary  |
| Building Blocks                                | 8   |  |          |            | - <b>F</b>    |            |                        | ,          | P             |            | ,            |             |           |          |
| Text Book                                      | Те  | ext Bool   | x 3: 4.1 | - 4.12     |               |            |                        |            |               |            |              |             |           |          |
| MODULE-3                                       | Bas   | ic Com   | puter    | Organi     | ization       | and De     | esign                  |            |               | 22CDS4     | 43.3, 220    | CDS43.4     | 8 H       | lours    |
| Instruction Code                               | es, Con   | Computer Instruction, Timing and Control, Execution and Instruction, Input-Output and Interrupt, Design of |          |            |               |            |                        |            |               |            |              |             |           |          |
| Computer.                                      |   | -  |          |            |               |            |                        |            |               |            |              |             |           |          |
| Text Book                                      | Text  | t Book 2   | 2-2.1-   | 2.6        |               |            |                        |            |               |            | 0.000.40     |             |           | <b>.</b> |
| MODULE-4                                       | Cen   | Central Processor Organization     22CDS43.5     8 Hours   |          |            |               |            |                        |            |               |            |              |             |           |          |
| Processor Bus<br>Manipulation P                | s Organization, Arithmetic Logic Unit (ALU), Instruction Formats, Addressing Modes, Data Transfer and   |  |          |            |               |            |                        |            |               |            |              |             |           |          |
| Data Transfer, D                               | Manipulation, Program Control, Microprocessor Organization. Input-Output Organization: Peripheral Devices, Asynchronous Data Transfer, Direct Memory Access (DMA), Priority Interrupt, Input-Output Processor(IOP). |  |          |            |               |            |                        |            |               |            |              |             |           |          |
| Text Book Text Book 2: 4.1 -4.6                |   |  |          |            |               |            |                        |            |               |            |              |             |           |          |
| MODULE-5Registers and Counters22CDS43.68 Hours |   |  |          |            |               |            |                        | lours      |               |            |              |             |           |          |
| Edge-Triggered                                 | D Flip F  | <sup>r</sup> lop, SR   | Flip Fl  | lop, J K F | lip Flop      | , T Flip I | Flop, Flij             | p Flop wi  | th addit      | ional inpu | ıts, Shift ı | registers,  | Design of |          |
| Binary Counters                                | Binary Counters, counters for other sequences using SR and J K Flip Verilog implementation of Flip-flops. Verilog implementation of Registers and counters  |  |          |            |               |            |                        |            |               |            |              |             |           |          |
| Text Book                                      | Tourie  | Book 1   | 1.01     | <u>812</u> |               |            |                        |            |               |            |              |             |           |          |
| I CAL DOUK                                     | Text  | DOOK   | 0.1 -    | 0.12       |               |            |                        |            |               |            |              |             |           |          |

| <b>CIE Assessment Pattern</b> | n (50 Ma | arks – Theory)    |                    |                               |       |  |  |  |  |
|-------------------------------|----------|-------------------|--------------------|-------------------------------|-------|--|--|--|--|
|                               |          |                   | Marks Distribution |                               |       |  |  |  |  |
|                               |          | <b>RBT Levels</b> | Test (s)           | Qualitative<br>Assessment (s) | MCQ's |  |  |  |  |
|                               |          |                   | 25                 | 15                            | 10    |  |  |  |  |
|                               | L1       | Remember          | 5                  | 5                             | -     |  |  |  |  |
|                               | L2       | Understand        | 10                 | 5                             | 5     |  |  |  |  |
|                               | L3       | Apply             | 5                  | 5                             | 5     |  |  |  |  |
|                               | L4       | Analyze           | 5                  | -                             | -     |  |  |  |  |
|                               | L5       | Evaluate          | -                  | -                             | -     |  |  |  |  |
|                               | L6       | Create            | -                  | -                             | -     |  |  |  |  |

|    | <b>RBT Levels</b> | Exam Marks<br>Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember          | 10                              |
| L2 | Understand        | 20                              |
| L3 | Apply             | 10                              |
| L4 | Analyze           | 10                              |
| L5 | Evaluate          |                                 |
| L6 | Create            |                                 |

### Suggested Learning Resources:

**Text Books:** 

- 1. Donald P Leach and Albert Paul Malvino, Digital Principles and Applications , 8<sup>th</sup>Edition, Tata McGraw Hill,2014, ISBN-13:978-9339203405
- 2. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015, ISBN-13:978-9332518704
- 3. M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013, ISBN :9780134549897

# **Reference Books:**

- 1. Digital Fundamentals, Thomas Floyd, 11th edition, 2014, Pearson Education, ISBN-13:978-9332584600
- 2. An Illustrative Approach to Logic Design, R. D. Sudhakar Samuel, 2010, Pearson Education, ISBN-13: 978-8131732304
- 3. Stephen Brown, Zvonko Vranesic: Fundamentals of Digital Logic Design with VHDL, 2nd Edition, Tata McGrawHill, 2005, ISBN 978-0-07-352953-0
- 4. James W. Bignel, Digital Electronics, Cengage learning, 5th Edition, 2007, ISBN-13:978-8131520710

# Web links and Video Lectures (e-Resources):

- 1. https://onlinecourses.swayam2.ac.in/nou23\_ec05/preview
- 2. https://www.youtube.com/playlist?list=PLxCzCOWd7aiGmXg4NoX6R31AsC5LeCPHe

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning Practical Based learning : Karnaugh Map Simulator, Synthesis of Flip Flops- Simulator Software

| LOGIC DESIGN LAB                    |   |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
|-------------------------------------|---|---|-----------|------------|-----------|-----------|------------------------|--------------|-----------|--------------|--------|------|------|-------------|--|
| Course Code                         |   | 22CDL4  | 43        |            |           |           |                        |              | CIE N     | larks        |        | 50   | 50   |             |  |
| L:T:P:S                             | (   | 0:0:1:0                                       |           |            |           |           |                        |              | SEE N     | <b>Jarks</b> |        | 50   |      |             |  |
| Hrs / Week                          |   | 2 Total Marks                                 |           |            |           |           |                        |              |           |              |        | 100  |      |             |  |
| Credits                             | (   | 01 Exam Hours 03                              |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| Course outcom                       | Course outcomes:  |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| At the end of th                    | ne cou  | rse, the                                      | studer    | it will be | e able to | :         |                        |              |           |              |        |      |      |             |  |
| 22CDL43.1                           | 1   | Analyze                                       | and d     | esign co   | mbinati   | onal log  | gic circui             | its.         |           |              |        |      |      |             |  |
| 22CDL43.2                           | ]   | Realize flip flop and verify the truth table. |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| 22CDL43.3                           | ]   | implem  | entatio   | on of cou  | inters u  | sing flip | flops.                 |              |           |              |        |      |      |             |  |
| 22CDL43.4                           | ]   | mplem   | entatio   | on of log  | ic circui | ts using  | g DLD.                 |              |           |              |        |      |      |             |  |
| Mapping of Co                       | urse (  | Jutcom  | nes to    | Progra     | m Outc    | omes a    | and Pro                | gram S       | pecific   | Outcome      | es:    | 1    | 1    | <del></del> |  |
|                                     | P01   | P02   | P03       | P04        | P05       | P06       | P07                    | P08          | P09       | P010         | P011   | P012 | PS01 | PSO2        |  |
| 22CDL43.1                           | 2   | 2   | 2         | 2          | -         | -         | -                      | -            | -         | -            | -      | 2    | 2    | 2           |  |
| 22CDL43.2                           | 3   | 3   | 3         | 3          | -         | -         | -                      | -            | -         | -            | -      | 2    | 2    | 2           |  |
| 22CDL43.3                           | 3   | 3   | 3         | 3          | -         | -         | -                      | -            | -         | -            | -      | 2    | 2    | 2           |  |
| 22CDL43.4                           | 3   | 3   | 3         | 3          | -         | -         | -                      | -            | -         | -            | -      | Z    | Z    | Z           |  |
| Exp No /                            |   |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| Exp. NO. /<br>Pgm No                |   | List of Programs Hours COs                    |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| - gini itoi                         | DADT A  |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| 1                                   | raki-a<br>Civen a 4 veriable logic expression cimplify it using Entered Veriable Man and    |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| 1                                   | Give  | n a 4-va                                      | iriable   | logic ex   | pressio   | n, simpl  | ng Q.1 m               | ing Ente     | rea var   | аріе мар     | and    | 2    | 220  | DL43.1      |  |
| 2                                   | Perfe   | orm hal                                       | f and fi  | ull adder  | r using c | ombina    | ng o: 1 m<br>ational c | ircuits      | ei it.    |              |        | 2    | 220  | 'DL43 1     |  |
| 3                                   | Perf  | orm hal                                       | f and fi  | ull subtr  | action u  | sing co   | mbinati                | onal circ    | uits.     |              |        | 2    | 220  | DL43.1      |  |
| 4                                   | Real  | ize IK D                                      | ) and T   | Flin-Flo   | ons and   | verifv it | s truth t              | able         | uitoi     |              |        | 2    | 220  | DL43.1      |  |
| 5                                   | Desi  | on and i                                      | imnlen    | inp inc    | g count   | er and I  | ohnson                 | counter      | using 4   | -hit shift   |        |      |      |             |  |
| _                                   | regis   | ster and                                      | demo      | nstrate i  | its work  | ing       | 01113011               | counter      | using i   | bit sint     |        | 2    | 220  | .DL43.2     |  |
| 6                                   | Desi  | gn and i                                      | implen    | nent a m   | od-n (n   | <8) svn   | chronou                | is up or (   | down co   | ounter usi   | ng I-K |      |      |             |  |
|                                     | Flip-   | Flop IC:                                      | s and d   | emonst     | rate its  | working   | ς.                     | - <b>r</b> - |           |              | 87     | 2    | 220  | DL43.2      |  |
|                                     | · •   |   |           |            |           |           | PAR                    | Г-В          |           |              |        |      |      |             |  |
| 7                                   | Simu  | ilate and                                     | d verif   | y the wc   | orking of | f 8:1 mu  | ıltiplexe              | r using V    | /erilog o | code.        |        | 2    | 220  | DL43.2      |  |
| 8                                   | Simu  | ilate and                                     | d verif   | y the wo   | orking of | f half an | d full ad              | lder usin    | ıg Verilo | og code.     |        | 2    | 220  | DL43.2      |  |
| 9                                   | Simu  | ilate and                                     | d verif   | y the wo   | orking of | f half an | ıd full su             | btractor     | using V   | /erilog cod  | le.    | 2    | 220  | DL43.3      |  |
| 10                                  | Simulate and verify the working of the JK,D and T Flip flop using Verilog code. 2 22CDL43.3 |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| 11                                  | 11Simulate and verify the working of Ring and Johnson Counter using Verilog code.222CDL43.4 |   |           |            |           |           | DL43.4                 |              |           |              |        |      |      |             |  |
| 12                                  | 12Simulate and verify mod 8 synchronous up or down counter using Verilog code.222CDL43.4    |   |           |            |           |           | DL43.4                 |              |           |              |        |      |      |             |  |
| PART-C                              |   |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| Beyond Syllabus Virtual Lab Content |   |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
|                                     | (To be done during Lab but not to be included for CIE or SEE)                               |   |           |            |           |           |                        |              |           |              |        |      |      |             |  |
| Combin                              | nationa   | l Multip                                      | oliers [] | nttp://v   | labs.iitk | gp.erne   | et.in/coa              | /exp6/i      | ndex.ht   | ml]          |        |      |      |             |  |
| <ul> <li>Registe</li> </ul>         | rs and  | Counte  | ers[http  | o://vlab   | s.iitkgp. | ernet.in  | /coa/ex                | p5/inde      | x.html    |              |        |      |      |             |  |

### CIE Assessment Pattern (50 Marks - Lab)

|    | DDT Lovale | Test (s) | Weekly Assessment |
|----|------------|----------|-------------------|
|    | NDI Leveis | 20       | 30                |
| L1 | Remember   |          |                   |
| L2 | Understand | 10       | 10                |
| L3 | Apply      | 5        | 10                |
| L4 | Analyze    | 5        | 10                |
| L5 | Evaluate   |          |                   |
| L6 | Create     |          |                   |

# SEE Assessment Pattern (50 Marks - Lab)

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | -                               |
| L2 | Understand | 10                              |
| L3 | Apply      | 20                              |
| L4 | Analyze    | 20                              |
| L5 | Evaluate   | -                               |
| L6 | Create     | -                               |
|    |            |                                 |

# Suggested Learning Resources:

### **Reference Books:**

1) Joseph Cavanagh, "Verilog HDL Design Examples", Publisher: CRC Press, Taylor & Francis group, 2018, ISBN-9781138099951.

2) Dr. Cherry Bhargava and Dr. Rajkumar Sarma, "Hardware Description Language Demystified: Explore Digital System Design using Verilog HDL and VLSI Design Tools", Publisher: BPB Publications, 2020, ISBN- 9789389898040.

3) Charles H Roth and Larry L Kinney, Analog and Digital Electronics, Cengage Learning, 2019, ISBN-13:978-

# 9353502355

|   |  |   |                    |                   |                        | OPER               | ATING              | SYSTEM           | IS              |                 |             |             |                  |          |
|---|--|---|--------------------|-------------------|------------------------|--------------------|--------------------|------------------|-----------------|-----------------|-------------|-------------|------------------|----------|
| Course Code   | 220  | DS44  |                    |                   |                        |                    |                    | CIE M            | larks           |                 |             |             |                  |          |
| L:T:P:S   | 3:0:   | :0:0  |                    |                   |                        |                    |                    | SEE N            | Iarks           |                 | 50          |             |                  |          |
| Hrs / Week  | 3  |   |                    |                   |                        |                    | Tota               | l Marks          |                 | 100             | )           |             |                  |          |
| Credits   | 03   |   |                    |                   |                        |                    | xam Hours 03       |                  |                 |                 |             |             |                  |          |
| Course outcom<br>At the end of th   | Course outcomes:<br>At the end of the course, the student will be able to: |   |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| 22CDS44.1   | Und  | Jnderstand the concept of services provided by and the structure of an operating system.      |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| 22CDS44.2   | Exa  | Examine the various CPU scheduling algorithms.  |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| 22CDS44.3   | Imp  | mplement various operations on deadlock, Analyze various CPU scheduling algorithms.           |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| 22CDS44.4   | Ana  | Analyze the efficiency aspect of using system resources and memory management schemes. Handle |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| 00000445  | ope  | operations for disk scheduling and file operations  |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| 22CDS44.5   | Dev<br>com   | elop va<br>imand:   | arious<br>s        | Linux co          | ommand                 | s that a           | re used            | to mani          | pulate s        | ystem ope       | rations a   | nd file sys | tem              |          |
| 22CDS44.6       Apply the concepts of File system interface to facilitate efficient file operations |  |   |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:                       |  |   |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
|   | P01  | P02   | P03                | P04               | P05                    | P06                | P07                | P08              | P09             | P010            | P011        | P012        | PSO1             | PSO2     |
| 22CDS44.1   | 3  | 3   | 3                  | 3                 | 3                      | -                  | -                  | -                | -               | -               | -           | 2           | 3                | 3        |
| 22CDS44.2   | 3  | 3   | 3                  | 3                 | 3                      | -                  | -                  | -                | -               | -               | -           | 2           | 3                | 3        |
| 22CDS44.3   | 3  | 3   | 3                  | 3                 | 3                      | -                  | -                  | -                | -               | -               | -           | 2           | 3                | 3        |
| 22CDS44.4   | 3  | 3   | 3                  | 3                 | 3                      | -                  | -                  | -                | -               | -               | -           | 2           | 3                | 3        |
| 22CDS44.5   | 3  | 3   | 3                  | 3                 | 3                      | -                  | -                  | -                | -               | -               | -           | 2           | 3                | 3        |
|   |  |   |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| MODULE-1  |  |   | g Syst             | em                |                        |                    | Icorric            | Create           | Wierer          | Swatam C        | ZZCD544     | <b>ł.1</b>  | δΠ               |          |
| Turnes of Orers   | ments, (   | operat  | Due ee             |                   | n and se               | Curity. (          | Jser vie           | w, Syste         | m view,         | System C        | alls: Conc  | ept, Types  | s of System      | I Calls. |
| Types of Opera  | ung sy   | stems.  |                    | ss Man            | agement                | : Proce            |                    | ept, op          | eration         | on proces       | sses, cooj  | perating i  | rocesses,        | mer-     |
| Threads   | mcatio   | n, chu  | cal sec            | tion pro          | biem, se               | парпо              | es,                |                  |                 |                 |             |             |                  |          |
| Tilleaus.   |  |   | Tout               | hoole 1.          | Chanton                | 1 2 1 7            | 1224               | 2526             | 2020            | 210.21          | 2222        |             |                  |          |
| MODULE 2  | CDI  | ICabo   | dulin              | DOOK 1:           | Chapter                | 1, 2.1, 4          | 2.3, 2.4,          | 2.3, 2.0,        | 2.8, 2.9        | , 2.10, 3.1,    | 3.2, 3.3, 3 | 0.4<br>1 2  | 01               | Loura    |
| MODULE-2  |  | J Scne  | auiin              | g<br>ion Non      |                        | ative et           |                    | Cabadu           | lin a Cri       | taria Caba      | ZZCD54      | 4.Z         | 18<br>Multilaual | 1005     |
| Basic Concepts,   | Pre-em<br>ng Mult  | ptive s   | trateg             | ies, Non          | -pre-em                | ptive sti<br>uling | rategies           | , Schedu         | liing Cri       | teria, Sche     | duling alg  | goritnms,   | Multilevel       |          |
| Text Book   |  | evt hor   | $\frac{1}{2}$      | hanter 4          | 1 47 4                 | 3 4 4 <sup>1</sup> | 51 5 2             | 5354             | 5562            | 63646           | 5666        | 7           |                  |          |
| MODULE-3  | Dea  | adlock  | x 1. 0             | lapter            | .1, 1.2, 1             | .5, 1.1, .         | 5.1, 5.2,          | 5.5, 5.1,        | 5.5, 0.2,       | 0.5, 0.1, 0     | 22CDS4      | 4.3         | 81               | lours    |
| System Models   | . Deadl  | ock Cl  | aract              | erizatio          | n. Resoi               | irce All           | locatior           | Graph.           | Deadlo          | ock Preve       | ntion. Av   | oidance.    | Detection        | and      |
| Recovery, Bank  | er's alg   | gorithi   | n                  | crizatio          |                        |                    | ocución            | i urupii,        | Deuli           |                 |             | oraunee,    |                  | unu      |
| Text Book   | Tex  | t book  | 1: Cha             | pter 7            |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| MODULE-4  | Mei  | mory  | Manag              | gement            | ;                      |                    |                    |                  |                 |                 | 22CDS4      | 4.4         | 8 H              | lours    |
| Contiguous Me<br>Replacement, F   | mory A<br>Page rep   | Allocat<br>placem   | ion, Fi<br>ient al | ragmen<br>gorithn | tation, F<br>1, Alloca | Paging,<br>tion of | And Seg<br>frames, | gmenta<br>Thrash | tion. Vi<br>ing | rtual Men       | nory: Dei   | mand Pag    | ging, Page       |          |
| Text Book   | Tex  | t book  | 1: Cha             | pter 8.1          | to 8.6                 |                    |                    |                  |                 |                 |             |             |                  |          |
| MODULE-5  | File-System Interface22CDS44.5<br>22CDS44.68 Hours                         |   |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |
| Concepts, Acce  | ss Met   | hods,   | Direct             | ory an            | d Disk S               | Structu            | re. File           | -System          | Struct          | ure <b>Prot</b> | ection:     | mplemer     | ting File        |          |
| system: File sy   | stem s   | tructu  | re; Fil            | le syste          | m imple                | ementa             | tion; D            | irectory         | implei          | nentation       | ; Allocat   | ion meth    | ods; Free        | space    |
| management.   |  |   | -                  | 5                 |                        |                    | -                  | 5                |                 |                 |             |             |                  | •        |
| Text Book   | Tex  | Text book 1: Chapter 91. To 9.6, 10.1 to 10.5   |                    |                   |                        |                    |                    |                  |                 |                 |             |             |                  |          |

| CIE Assessment Patter | n (50 M | larks – Theory)   |          |                               |       |  |  |  |  |  |
|-----------------------|---------|-------------------|----------|-------------------------------|-------|--|--|--|--|--|
|                       |         |                   |          | Marks Distribution            |       |  |  |  |  |  |
|                       |         | <b>RBT Levels</b> | Test (s) | Qualitative<br>Assessment (s) | MCQ's |  |  |  |  |  |
|                       |         |                   | 25       | 15                            | 10    |  |  |  |  |  |
|                       | L1      | Remember          | 5        | -                             | -     |  |  |  |  |  |
|                       | L2      | Understand        | 10       | -                             | 5     |  |  |  |  |  |
|                       | L3      | Apply             | 5        | 10                            | 5     |  |  |  |  |  |
|                       | L4      | Analyze           | 5        | -                             | -     |  |  |  |  |  |
|                       | L5      | Evaluate          | -        | -                             | -     |  |  |  |  |  |
|                       | L6      | Create            | -        | 5                             | -     |  |  |  |  |  |

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | 10                              |
| L2 | Understand | 20                              |
| L3 | Apply      | 10                              |
| L4 | Analyze    | 10                              |
| L5 | Evaluate   | -                               |
| L6 | Create     | -                               |

# Suggested Learning Resources:

**Text Books:** 

- 1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006, ISBN, 8126509627, 9788126509621
- 2. Silberschatz, Galvin, Greg, "Operating System Concepts", Wiley and Sons, 10th Edition, 2018, ISBN: 978-1-119-32091-3
- 3. William Stallings, "Operating Systems Internals and Design Principles", 9th Edition, Prentice Hall, 2018, ISBN-13 :978-9352866717

### **Reference Books:**

- **4.** Andrew S Tanenbaum, Albert S Woodhull, "Operating systems design and implementation", 3rd edition, ISBN-13:**978-0131429383**
- **5.** UNIX-Concepts Applications, SUMITABHADAS, McGraw Hill, TATA McGraw Hill Edition, 4th edition, 26threprint 2019, ISBN-13:**978-0070635463**
- 6. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", 3rd Edition, Tata McGraw Hill Education, 2017, ISBN 0070611947

# Web links and Video Lectures (e-Resources):

- 1. https://www.geeksforgeeks.org/what-is-an-operating-system/
- 2. https://www.javatpoint.com/operating-system
- 3. https://www.tutorialspoint.com/operating\_system/os\_overview.htm
- 4. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/5\_CPU\_Scheduling.html
- 5. https://www.scaler.com/topics/operating-system/deadlock-in-os/
- 6. https://www.guru99.com/deadlock-in-operating-system.html
- 7. https://onlinecourses.nptel.ac.in/noc21\_cs72/preview
- 8. https://www.udemy.com/course/operating-system-j/

- 1. Contents related activities (Activity-based discussions)
- > For active participation of students, instruct the students to prepare Flowcharts and Handouts
- > Organizing Group wise discussions on issues
- Seminars

| OPERATING SYSTEMS LAB                    |   |  |                    |                    |          |           |           |           |           |            |            |             |        |         |             |  |
|--|---|--|--------------------|--------------------|----------|-----------|-----------|-----------|-----------|------------|------------|-------------|--------|---------|-------------|--|
| Course Code                              |   | 22CDL44 CIE Marks  |                    |                    |          |           |           |           |           |            |            | 50          |        |         |             |  |
| L:T:P:S                                  | (   | 0:0:1:0  |                    |                    |          |           |           |           | SEE N     | Marks      |            | 50          |        |         |             |  |
| Hrs / Week                               | 2   | 2 Total Marks  |                    |                    |          |           |           |           |           |            | 100        |             |        |         |             |  |
| Credits                                  | (   | 01   |                    |                    |          |           |           |           | Exan      | n Hours    |            | 03          |        |         |             |  |
| <b>Course outcom</b><br>At the end of th | <b>comes:</b><br>of the course, the student will be able to:  |  |                    |                    |          |           |           |           |           |            |            |             |        |         |             |  |
| 22CDL44.1                                | ]   | Demons<br>shell en   | strate (<br>vironr | the basio<br>nent. | c knowle | edge of I | Linux co  | mmand     | s and fil | le handlin | gutilities | by usingLi  | nux    |         |             |  |
| 22CDL44.2                                | ]   | Examin   | e the v            | arious p           | rocess s | scheduli  | ing algor | rithms    |           |            |            |             |        |         |             |  |
| 22CDL44.3                                | ]   | Implem   | ent va             | rious op           | eration  | s on dea  | dlock     |           |           |            |            |             |        |         |             |  |
| 22CDL44.4                                |   | Implem   | ent va             | rious Fil          | e Organ  | ization,  | File Allo | ocation S | trategi   | es and Dis | k Schedul  | ing Algorit | hms.   |         |             |  |
| Mapping of Co                            |   |  | nes to             | Progra             |          | comes a   | and Pro   | bgram S   |           |            |            | DO12        | DCO    | 1       | <b>DCO2</b> |  |
| 22001441                                 | 2   | PU2  | PU3                | P04                | P05      | PUO       | P07       | PUo       | P09       | P010       | PUII       | P012        | 2      | )1<br>  | 2           |  |
| 22CDL44.1                                | 3   | 2  | 2                  | 2                  | 3        | -         | -         | -         | -         | -          | -          | 1           | 3      | 2       | 3           |  |
| 22CDL44.3                                | 3   | 2  | 2                  | 2                  | 3        | -         | -         | -         | -         | _          | -          | 1           | 3      |         | 3           |  |
| 22CDL44.4                                | 3   | 2  | 2                  | 2                  | 3        | -         | -         | -         | -         | -          | -          | 1           | 3      | ;       | 3           |  |
|  | r –   |  |                    |                    |          |           |           |           |           |            |            | 1           |        |         |             |  |
| Pgm. No.                                 |   |  |                    |                    | ]        | List of F | Program   | 15        |           |            |            | Hou         | ſS     |         | Cos         |  |
|  | 1   |  |                    |                    |          | Prer      | equisite  | e Progra  | ms        |            |            | 1           |        |         |             |  |
|  |   | <ul> <li>To understand the basics of Unix command and shell programming.</li> <li>To implement various CPU scheduling algorithms.</li> <li>To implement Deadlock Avoidance and Deadlock Detection Algorithms</li> <li>To implement Page Replacement Algorithms</li> <li>To implement various memory allocation methods.</li> <li>To be familiar with File Organization and File Allocation Strategies</li> </ul>                         |                    |                    |          |           |           |           |           |            |            |             | NA     |         |             |  |
|  |   |  |                    |                    |          |           | PAR       | Г-А       |           |            |            | 1           |        |         |             |  |
| 1  | Intro<br>insta<br>Exte<br>unar<br>egre  | Introduction- Linux Architecture- Shell, Kernel, System calls. Linux<br>installation- Steps for installing Linux Operating SystemInternal &<br>External commands in Linux.<br>Internal commands- echo, type, etc.<br>External commands- ls, cp, mv, rm, cat, etc<br>Other commands – tput clear, who, cal, date, bc, man, passwd,<br>uname( with different options).<br>Expressions & search patterns .(dot operator), *, A, +, ?, grep, |                    |                    |          |           |           |           |           |            |            | 2           | 2 22CD |         | CDL44.1     |  |
|  | <ul> <li>egrep, fgrep</li> <li>Working with files &amp; directories.</li> <li>Know the categories of files.</li> <li>Directory related Commands – pwd, mkdir, rmdir, cd, ls</li> <li>Manipulating Absolute paths and Relative paths using cd command.</li> <li>File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc</li> <li>Basic File attributes.</li> <li>Listing seven attributes of a file : ls and its options</li> <li>File Permissions: Absolute and Relative permissions</li> <li>Manipulating File permissions using chmod command</li> </ul> |  |                    |                    |          |           |           |           |           |            |            |             | 22     | CDL44.1 |             |  |

|   | • Mai  | nipulatir             | ng Hai    | rdlink and Softli               | nk usii        | ng ln c        | ommand                  |   |            |
|---|--|-----------------------|-----------|---------------------------------|----------------|----------------|-------------------------|---|------------|
| 3   | Process Mana   |                       |           |                                 |                |                |                         |   |            |
|   | <ul> <li>Process creation, status, Identifying process, ps -f &amp;its options.</li> </ul> |                       |           |                                 |                |                |                         |   |            |
|   | <ul> <li>Running process in background Job control and Proces2termination</li> </ul>       |                       |           |                                 |                |                |                         |   | 22001 44 1 |
|   | • Running process in background, job control, and Procesztermination.                      |                       |           |                                 |                |                |                         | 2 | 22CDL44.1  |
|   | Changing pro   | cess pric             | JIILY,    | scheduning proc                 | ess (0:        | sage 0         | sleep and waltcommanus) |   |            |
| 4   | Design, Devel  |                       |           |                                 |                |                |                         |   |            |
|   | a. FCFS  |                       |           |                                 |                |                |                         | 2 | 22CDL44.2  |
|   | b. Prior   | rity                  |           |                                 |                |                |                         |   |            |
| 5   | Design, Devel  | op and I              | mplei     | mentation of CP                 | U sche         | duling         | by                      |   |            |
|   | a. SJF   |                       |           |                                 |                |                |                         | 2 | 22CDL44.2  |
|   | b. Roun  | ıd Robin              |           |                                 |                |                |                         |   |            |
| 6   | Design, Devel  | op and I              | mplei     | ment Threading                  | and sy         | vnchro         | nized applications      | 2 | 22CDL44.3  |
|   |  |                       |           |                                 | PAR            | T-B            |                         |   |            |
| 7   | Design, Devel  | op and I              | mplei     | ment an Algorith                | nm for         | Dead           | Lock Detection.         | 2 | 22CDL44.3  |
| 8   | Design, Devel  | op and I              | mplei     | ment an Algorith                | nm for         | Deadl          | ock using Banker's      | 2 | 22CDL44.3  |
|   | Algorithm.   |                       |           |                                 | <del>.</del> . |                | 1                       |   |            |
| 9   | Design, Devel  | op and l<br>r virtual | mplei     | ment a Program<br>ory managemen | by usi         | ng pag         | e replacement           | 2 | 22CDL44.3  |
| 10  | Design. Devel  | 2                     | 22CDL44.4 |                                 |                |                |                         |   |            |
| 11  | Design, Devel  | op and I              | mplei     | ment the followi                | ing File       | Alloc          | ation Strategies        |   |            |
|   | a. Sequ  | ential                | -         |                                 |                |                | -                       |   |            |
|   | b. Index   | xed                   |           |                                 | 2              | 22CDL44.4      |                         |   |            |
|   | c. Linke   | ed                    |           |                                 |                |                |                         |   |            |
| 12 Design, Develop and Implement various disk scheduling algorithms |  |                       |           |                                 |                |                |                         | 2 | 22CDL44.4  |
|   |  |                       |           |                                 | PART           | -C             |                         |   |            |
|   |  | ( <b>—</b> 1          |           | Beyond Syllab                   | us Virt        | tual La        | ab Content              |   |            |
|   | • Deadlad  | (To be                | done      | during Lab but                  | t not to       | obein<br>bio// | icluded for CIE or SEE) |   |            |
| CIF Assessmen   | • Deau lock  | Marks –               | Lah)      | inteps://namise                 | o.gitiit       | 10.10/0        | JS-VII tual-laD/        |   |            |
| CIL ASSESSIICI  | it i attern (50 i  |                       | Labj      |                                 | Tes            | t (s)          | Weekly Assessment       |   |            |
|   |  |                       | RBT       | Levels                          | 2              | 0              | 30                      |   |            |
|   |  | L1                    | Ren       | nember                          |                | -              |                         |   |            |
|   |  | L2                    | Und       | lerstand                        |                | -              | -                       |   |            |
|   |  | L3                    | Арр       | oly                             | 1              | .0             | 15                      |   |            |
|   |  | L4                    | Ana       | lyze                            | Į.             | 5              | 10                      |   |            |
|   | <b>L5 Evaluate</b> 5 5   |                       |           |                                 |                |                |                         |   |            |
|   |  | L6                    | Crea      | ate                             |                | -              | -                       |   |            |
|   |  |                       |           |                                 |                |                |                         |   |            |
| SEE Assessmer   | nt Pattern (50   | Marks –               | Lab)      |                                 |                |                |                         |   |            |
|   |  |                       |           | <b>RBT Levels</b>               |                | ]<br>D:        | Exam Marks              |   |            |
|   |  | _                     | 11        | Romomhor                        |                | DIS            | -                       |   |            |
|   |  | _                     | L1<br>L2  | Understand                      |                |                | -                       |   |            |
|   |  | _                     | L2<br>L3  | Annly                           |                |                | 15                      |   |            |
|   |  | _                     | L0<br>L4  | Analyze                         |                |                | 20                      |   |            |
| L5 Evaluate 15  |  |                       |           |                                 |                |                |                         |   |            |
|   |  |                       | L6        | Create                          |                |                | •                       |   |            |
|   |  |                       |           |                                 |                |                |                         |   |            |

# Suggested Learning Resources:

### **Reference Books**

- 1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006, ISBN, 8126509627, 9788126509621
- 2. Silber schatz, Galvin, Greg, "Operating System Concepts", Wiley and Sons, 10th Edition, 2018, ISBN: 978-1-119-32091-3
- 3. William Stallings, "Operating Systems Internals and Design Principles", 9th Edition, Prentice Hall, 2018, ISBN-13: 978-0133805918
- **4.** Andrew S Tanenbaum, Albert S Woodhull, "Operating systems design and implementation", 3rd edition, , ISBN-13:**978-0131429383**
- **5.** UNIX-Concepts Applications, SUMITABHADAS, McGraw Hill, TATA McGraw HillEdition, 4th edition, 26threprint 2019, ISBN-13:**978-0070635463**
- 6. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", 3rd Edition, Tata McGraw HillEducation,2017, ISBN: 0070611947

| Fourse Code         22005451         CIE Marks         50           IT-PPS         24:0:10         SEE Marks         50           Credits         03         03         03           Course outcomes: At the end of the course, the student will be able to:         22005451.1         Implement for Concepts, underlying technologies and migration of M2M to IoT.         22005451.3         Analyze the various features of IoT standard protocols and platforms         22005451.3         Analyze the various features of IoT standard protocols and platforms         22005451.4         Implement programs using Raspherry pi model           22005451.5         Deekoy the M2M fundamentals and data management.         22005451.6         P01         P01         P01.2         PS01         PS02           22005451.6         Design and Develop real world IoT application using system like Raspberry pi.         Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:         P01         P01.2         PS01         PS02           22005451.5         2         3         2         2         -         -         -         -         1         3         2           22005451.5         2         3         2         2         -         -         -         -         1         3         2           22005451.6         3         3<   |                 |  |                |               |            |            | IoT F     | PROGRA    | AMMING        | ſ        |                      |             |               |             |          |
|---|-----------------|--|----------------|---------------|------------|------------|-----------|-----------|---------------|----------|----------------------|-------------|---------------|-------------|----------|
| IFTP'S         20:10         SEE Marks         50           Irrs / Week         24:2         Total Marks         100           Credits         03         Course outcomes: At the end of the course, the student will be able to:         220:54:1.1         100           220:545:1.1         Implement toT concepts, underlying technologies and migration of M2M to IOT.         220:54:1.2         Deploy the M2M fundamentals and data management         220:54:1.3         Implement programs using Raspherry pi mode!         220:54:5.1.5         Understand the interface concepts with networks           220:54:5.1.5         Understand the interface concepts with networks         220:54:5.1.5         Understand the interface concepts with networks         220:54:5.1.6         POI         POI<  | Course Code     | 22CD   | S451           |               |            |            |           |           | CIE Marks 50  |          |                      |             | 0             |             |          |
| IPS / Week         2+2         Total Marks         100           Credits         03         03         03           Course outcomes: At the end of the course, the student will be able to:         22C05451.1         Implement To Toncepts, underlying technologies and migration of M2M to IoT.         22C05451.3         Analyze the various features of IoT standard protocols and platforms         22C05451.3         Analyze the various features of IoT standard protocols and platforms         22C05451.5         Understand the interface concepts with networks           22C05451.5         Understand the interface concepts with networks         22C05451.6         Poil         PO11         PO12         PS01         PS02           22C05451.3         3         2         2         3         -         -         -         2         2         3         3         2           22C05451.1         3         2         2         3         -         -         -         -         2         2         3         3         2         2         3         2         2         3         3         2         2         2         3         2         2         2         3         3         2         2         2         3         3         2         2         2         3  | L:T:P:S         | 2:0:1:0  |                |               |            |            |           |           |               |          | <b>Marks</b>         |             | 50            | )           |          |
| Credits         03         Exam Hours         03           Gourse outcomes: At the end of the course, the student will be able to:         22CD5451.1         Implement IoT concepts underlying technologies and migration of MZM to IoT.         22CD5451.3         Deploy the MZM fundamentals and data management         22CD5451.4         Implement programs using Raspherry pri model         22CD5451.4         Implement programs using Raspherry pri model         22CD5451.4         Implement programs using Raspherry pri model         22CD5451.6         Design and Develop real world IoT application using system like Raspherry pi.           Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:         P01 P01 P01 P03 P04 P05 P06 P07 P08 P09 P01 P01 P01 P012 P501 P502         22CD5451.1         3         3         2         2         3         -         -         -         -         1         3         2         2         3         -         -         -         -         1         3         2         2         3         -         -         -         -         -         2         3         3         2         2         3         -         -         -         -         2         3         3         2         2         3         -         -         -         -         -         2         3         3         2   | Hrs / Week      | 2+2  |                |               |            |            |           |           | Total         | l Marks  |                      | 10          | 00            |             |          |
| Course outcomes: At the end of the course, the student will be able to:         22CD5451.1         Implement for concepts, underlying technologies and migration of M2M to IoT.         22CD5451.2         Deploy the M2M fundamentals and data management.         22CD5451.1         Implement for concepts with networks         22CD5451.1         Deploy the M2M fundamentals and Arg model         22CD5451.1         Implement for concepts with networks         22CD5451.1         POI       PO2       PO3       PO4       PO5       PO       PO1       PO1       PO1       PO2       PO3       PO2         22CD5451.1       3       2       2       3       -       -       -       -       2       2       3         2CD5451.1       3       2       2       2       -       -       -       -       2       2       3       2         2CD5451.1       6       Hours         2CD5451.1       6       Hours         Execution of Internet of Things - Enabling Technologies - IoT Architectures: oneM2/M, Alternative LD       Moule  | Credits         | 03   |                |               |            |            |           |           |               | Exam     | 1 Hours              |             | 03            | 8           |          |
| Implement Inf concepts, underlying technologies and migration of M2M to IoT.           22CD5451.2         Deploy the M2M fundamentals and data management           22CD5451.3         Analyze the various features of IoT standard protocols and platforms           22CD5451.4         Implement programs using Raspberry pi imodel           22CD5451.6         Design and Develop real world IoT application using system like Raspberry pi.           22CD5451.6         Design and Develop real world IoT application using system like Raspberry pi.           22CD5451.6         Design and Develop real world IoT application using system like Raspberry pi.           22CD5451.7         3         3         2         2         3         -         -         -         1         3         2           22CD5451.6         3         3         2         2         3         -         -         -         -         1         3         2           22CD5451.3         2         3         2         2         3         -         -         -         -         2         2         3         2           22CD5451.6         3         3         2         2         2         -         -         -         -         2         2         3         3           22CD5451.6<  | Course outcom   | <b>Itcomes:</b> At the end of the course, the student will be able to:   |                |               |            |            |           |           |               |          |                      |             |               |             |          |
| Image: Product Analyze the various features of IoT standard protocols and platforms           22CD5451.3         Analyze the various features of IoT standard protocols and platforms           22CD5451.5         Understand the interface concepts with networks           22CD5451.6         Design and Develop real world IoT application using system like Raspberry pl.           Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:         PO1   | 22CDS451.1      | Impler   | ment Io        | T conc        | epts, und  | lerlying   | technolo  | gies and  | l migratio    | on of M2 | M to IoT.            |             |               |             |          |
| 22CD5451.3       Analyze the various features of IoT standard protocols and platforms         22CD5451.5       Understand the interface concepts with networks         22CD5451.6       Design and Develop real workl for application using system like Raspberry pi.         Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:         22CD5451.1       3       2       2       3       -       -       -       -       2       3       3         22CD5451.1       3       2       2       2       3       -       -       -       -       2       3       3         22CD5451.1       3       2       2       2       -       -       -       -       2       2       3       2       2       3       2       2       3       2       2       3       2       2       3       2       2       3       2       2       3       2       2       3       2       2       3       2       2       3       3       2       2       2       3       3       2       2       2       3       3       3       2       2       2       3       3       3       3       2       2       2       3  | 22CDS451.2      | Deploy   | y the M        | 2M fur        | damenta    | als and d  | ata man   | agemen    | t             |          |                      |             |               |             |          |
| 22CD5451.4       Implement programs using Raspberry pi model         22CD5451.6       Design and Develop real world IGT application using system like Raspberry pi.         Mapping of Course Outcomes to Program       Outcomes and Program Specific Outcomes:         22CD5451.1       3       3       2       2       3       -       -       -       -       1       3       3         22CD5451.1       3       2       2       2       3       -       -       -       -       1       3       3         22CD5451.3       2       2       2       3       -       -       -       -       1       3       2       2       3       -       -       -       -       2       2       3       3       2       2       2       -       -       -       -       -       2       2       3       3         22CD5451.6       3       3       2       2       2       -       -       -       -       2       2       3       3       3       2       2       2       -       -       -       -       -       2       2       3       3       3       3       3       3       3 <td>22CDS451.3</td> <td>Analyz</td> <td>ze the v</td> <td>arious</td> <td>features</td> <td>of IoT st</td> <td>andard p</td> <td>protocol</td> <td>s and plat</td> <td>forms</td> <td></td> <td></td> <td></td> <td></td> <td></td>   | 22CDS451.3      | Analyz   | ze the v       | arious        | features   | of IoT st  | andard p  | protocol  | s and plat    | forms    |                      |             |               |             |          |
| Image: 2205451.5       Understand the interface concepts with networks         22CD5451.6       Design and Develop real world IoT application using system like Raspberry pi.         Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:         P01       P02       P03       P04       P05       P06       P07       P08       P01       P012       PS01       PS02         2205451.1       3       2       2       3       -       -       -       -       1       3       2         2205451.3       3       2       2       2       -       -       -       -       2       3       3       2         22055451.4       3       2       2       2       -       -       -       -       2       2       3       3       2       2       3       3       2       2       3       3       2       2       3       3       2       3       3       3       2       2       3       3       2       3       3       3       2       2       3       3       3       2       3       3       3       3       3       3       3       3       3       3       3   | 22CDS451.4      | Impler   | ment pi        | rogran        | ns using I | Raspberi   | ry pi moo | del       |               |          |                      |             |               |             |          |
| 22CD5451.6       Design and Develop real world IoT application using system like Raspberry pi.         Mapping of Course Ourcements Program Outcomes and Program Specific Outcomes:         PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         22CD5451.1       3       3       2       2       3       -       -       -       -       2       3       3         22CD5451.3       2       3       2       2       3       -       -       -       -       1       3       2         22CD5451.4       3       2       2       2       3       -       -       -       -       2       2       3       3         22CD5451.6       3       3       2       2       2       -       -       -       -       2       3       3         22CD5451.6       3       3       2       2       2       -       -       -       -       2       2       3       3         22CD5451.6       1       To interface TChallenges       Introduction to IoT       -       -       -   | 22CDS451.5      | Under  | stand t        | he inte       | rface cor  | cepts w    | ith netw  | orks      |               |          |                      |             |               |             |          |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:           POI         PO1         PO1         PO1         PO1         PO1         PO1         PO1         PS01         PS02           22CDS451.1         3         2         2         3         -         -         -         -         2         3         3           22CDS451.1         3         2         2         2         3         -         -         -         -         1         3         2           22CDS451.3         2         3         2         2         2         -         -         -         -         1         3         2           22CDS451.6         3         3         2         2         2         -         -         -         -         2         3         3           22CDS451.6         3         3         2         2         2         -         -         -         -         2         3         3           22CDS451.6         3         3         2         2         -         -         -         -         2         3         3           22CDS451.1         1         Introdu  | 22CDS451.6      | Design   | i and D        | evelop        | real wor   | ld IoT ap  | oplicatio | n using s | system lił    | ke Raspł | perry pi.            |             |               |             |          |
| P01         P02         P03         P04         P05         P06         P07         P08         P09         P010         P011         P012         PS01           22CD5451.1         3         3         2         2         3         -         -         -         -         -         2         3         3         2           22CD5451.2         3         2         2         2         3         -         -         -         -         1         3         2           22CD5451.5         2         3         2         2         2         -         -         -         -         2         2         3         2           22CD5451.5         2         3         2         2         -         -         -         -         -         2         2         3         3         2         2         2         -         -         -         -         -         2         2         3         3         2         2         3         3         3         2         2         -         -         -         -         -         2         2         3         3         3         3   | Mapping of Co   | urse O   | utcom          | es to         | Progra     | m Outc     | omes a    | nd Pro    | gram Sp       | oecific  | Outcome              | es:         |               |             |          |
| 222D5451.1       3       3       2       2       3       -       -       -       -       2       3       3       2         22CD5451.2       3       2       2       3       -       -       -       -       -       1       3       2         22CD5451.3       2       3       2       2       2       -       -       -       -       -       2       2       3         22CD5451.5       2       3       2       2       2       -       -       -       -       -       2       3       3       2       2       3       3       2       2       3       3       2       2       3       3       3       2       2       3   |                 | P01  | P02            | P03           | P04        | P05        | P06       | P07       | P08           | P09      | P010                 | P011        | P012          | <b>PSO1</b> | PSO2     |
| 222D5451.2       3       2       2       2       3       -       -       -       -       1       3       2         22CD5451.3       2       3       2       2       2       3       -       -       -       -       -       1       3       2         22CD5451.5       2       3       2       2       2       -       -       -       -       -       1       3       2         22CD5451.6       3       3       2       2       2       -       -       -       -       -       2       3       3         22CD5451.6       3       3       2       2       2       -       -       -       -       -       2       3       3         3       MODULE-1       Introduction to for       Introduction to for       Introduction to for and biot - IoT Challenges       2       2       3       3         Laboratory Component: (Experiments)       1       1       Introduction to for druino platform and its installation. Familiarization with Arduino set up with "Hello World" Program.       3       Hours         2       MODULE-2       M2M and IoT Technology Fundamentals       22CD5451.2       6 Hours <t< td=""><td>22CDS451.1</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>3</td><td>3</td></t<>  | 22CDS451.1      | 3  | 3              | 2             | 2          | 3          | -         | -         | -             | -        | -                    | -           | 2             | 3           | 3        |
| 222D5451.3       2       3       2       2       3       -       -       -       -       -       2       2       3         22D5451.4       3       2       2       2       2       -       -       -       -       1       3       2         22D5451.5       2       3       2       2       2       -       -       -       -       2       2       3       3         22CD5451.6       3       3       2       2       2       -       -       -       -       -       2       2       3       3         MODULE-1       Introduction to IoT       Introduction to IoT Functional Stack - Fog, Edge and Cloud in IoT, -IoT and Digitization -       -       -       -       2       3       3       3         Laboratory Component: (Experiments)       1       Introduction to Arduino platform and its installation. Familiarization with Arduino set up with "Hello World" Program.       3       Hours       3       Hours         2       To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.       3       To interface Nore Stack Nowledge Management.       22CD5451.2       6       Hours         Devices and gateways, Actuators and its typ  | 22CDS451.2      | 3  | 2              | 2             | 2          | 3          | -         | -         | -             | -        | -                    | -           | 1             | 3           | 2        |
| 222D5451.4       3       2       2       2       2       -       -       -       -       1       3       2         22D5451.5       2       3       2       2       3       -       -       -       -       2       2       3       3         MODULE-1       Introduction to IoT       2       2       3       <   | 22CDS451.3      | 2  | 3              | 2             | 2          | 3          | -         | -         | -             | -        | -                    | -           | 2             | 2           | 3        |
| 222D9451.5       2       3       2       2       3       -       -       -       -       -       2       2       3       3         22CD9451.6       3       3       2       2       2       -       -       -       -       2       3       3         MODULE-1       Introduction to IoT       22CD9451.1       6 Hours       6 Hours       5       3       3       -       -       -       -       2       3       3       3         Convergence of IT and IoT - IoT Challenges       Convergence of IT and IoT - IoT Challenges       -       -       -       -       -       1       0.7       <   | 22CDS451.4      | 3  | 2              | 2             | 2          | 2          | -         | -         | -             | -        | -                    | -           | 1             | 3           | 2        |
| 222DS451.6       3       3       2       2       2       -       -       -       2       3       3         MODULE-1       Introduction to IoT       22CDS451.1       6 Hours         Evolution of Internet of Things - Enabling Technologies - IoT Architectures: oneM2M, Alternative IoT models -       Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT, -IoT and Digitization -         Convergence of IT and IoT - IoT Challenges       Laboratory Component: (Experiments)       .         1       Introduction to Arduino platform and its installation. Familiarization with Arduino set up with "Hello World" Program.       3         2. To interface ED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.       3       Toxinterface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5       MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types. Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       2       10 interface EDigital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         3. To interface Bigital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours   | 22CDS451.5      | 2  | 3              | 2             | 2          | 3          | -         | -         | -             | -        | -                    | -           | 2             | 2           | 3        |
| MODULE-1         Introduction to for         22CDS451.1         6 Hours           Evolution of Internet of Things - Enabling Technologies - IoT Architectures: oneM2M, Alternative IoT models -<br>Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT, -IoT and Digitization -<br>Convergence of IT and IoT - IoT Challenges         -  | 22CDS451.6      | 3  | 3              | 2             | 2          | 2          | -         | -         | -             | -        | -                    | -           | 2             | 3           | 3        |
| Evolution of internet of Things - Enabling Technologies - IoT Architectures: oneM2M, Alternative IoT models -         Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT, -IoT and Digitization -         Convergence of IT and IoT - IoT Challenges         Laboratory Component: (Experiments)         1.       Introduction to Arduino platform and its installation. Familiarization with Arduino set up with "Hello World" Program.         2.       To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.         3.       To interface CS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.         Text Book         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       Iaboratory Component: (Experiments)       1.         1.       To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3.       To interface Buff11 sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetcede.       3.         Text Book       Text Book 1: 3.3, 4.3, 3.8, 4.2, 4.5, 4.7       6 Hours       3.         GLowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Ar   | MODULE-1        |  | 6 (77)         |               | Intr       | oducti     | on to Io  | T         | <b>m</b> 4 14 |          |                      | 22CDS45     | 1.1           | 6 Hou       | Irs      |
| Simplified for Architecture and Core for Functional Stack - Fog, Edge and Cloud in for, -for and Digitization - Convergence of IT and IoT - IoT Challenges         Laboratory Component: (Experiments)       1. Introduction to Arduino platform and its installation. Familiarization with Arduino set up with "Hello World" Program.       3 Hours         2. To interface ED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.       3 Hours         3. To interface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.       6 Hours         Text Book         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       6 Hours         Laboratory Component: (Experiments)       1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         3. To interface Smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours         Text Book       Text Book 1: 3.3,3,4,3,8,4,2,4.5,4.7       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       3 Hours         1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR m   | Evolution of In | iternet  | of Th          | ings -        | Enabli     | ng Tecl    | nnologi   | es – lo   | T Archi       | tecture  | s: oneM <sub>4</sub> | 2M, Alteri  | native lo     | of models   | -        |
| Laboratory Component: (Experiments)       3 Hours         1. Introduction to Arduino platform and its installation. Familiarization with Arduino set up with "Hello World" Program.       3 Hours         2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.       3 Hours         3. To interface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.       6 Hours         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       6 Hours         1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         3. To interface Bigital sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours         1. To interface Bigital sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       6 Hours         3. To interface Smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       6 Hours         3. To interface BMT11 sensor RASPA:2,4.5,4.7       6 Hours         3. Go interface MC Text Book I: 3.3,3.4,3.8,4.2,4.5,4.7       6 Hours         3. Go interface MC Text Book   | Simplified for  | Archite  | LoT            |               | Lore Io    | Funct      | lional S  | таск -    | rog, Eag      | ge and   | Cloud Ir             | 1 101, -10  | I and L       | lgitization | -        |
| 1.       Introduction to Arduino platform and its installation. Familiarization with Arduino set up with "Hello World" Program.       3         2.       To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.       3       3         3.       To interface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.       3       4         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       6       4         Laboratory Component: (Experiments)       1.       1.       1.       1.       1.       10 interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       2.       3       Hours         3.       To interface Buftal sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3       Hours       3         4.       Text Book       Text Book and Platforms       22CDS451.3       6 Hours         6.LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       3       Hours         1.       Demonstrate the connectivit   | Laboratomy Cor  | nnonon   | 101 -          | norim         | antelige   | 5          |           |           |               |          |                      |             |               |             |          |
| 1       Indicator for Program.       3         2.       To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.       3         3.       To interface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.       3         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IOT Technology Fundamentals       22CDS451.2       6       Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.         Laboratory Component: (Experiments)         1.       To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3       Hours         2.       To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3       Hours         Itext Book       Text Book 1: 3.3,34,38,42,4.5,4.7         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6       Hours         Genemotic transport of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3       Hours         Interface UT Protocols and Platforms       22CDS451.3       6 Hours  | 1 Introdu       | ction to   | a Ardu         | uino n        | atform     | and its    | installa  | tion Fr   | miliariz      | ation w  | vith Ardu            | ino sot ur  | a with        |             |          |
| 2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.       3 Hours         3. To interface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.       9         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.         Laboratory Component: (Experiments)         1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         2. To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours         Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7         MODULE-3       IoT Protocols and Platforms         3 Hours         3 Hours         Aboratory Component: (Experiments)         1. To interface Bugital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours         Constructure of the Bugita sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.         10 To pr   | "Hello          | World"   | Progra         | imo pi<br>im. | ationin    | anu no     | mstana    |           | 1111111111112 | ation w  | nui Aiuu             | ino set uj  |               |             |          |
| after every 2 seconds.       3. To interface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       Image: Component: (Experiments)       1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       2. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3. To interface sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       4 Hours         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7       6 Hours         GLowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       6 Hours         Laboratory Component: (Experiments)       1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         1. Demonstrate the connectivity of Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours   | 2. To inter     | rface LE   | ED/Buz         | zzer w        | ith Ardı   | uino/Ra    | spberry   | Pi and    | write a       | progran  | n to turn            | ON LED fo   | or 1 sec      | 3 H         | ours     |
| 3. To interface TCS3200 Color Sensor with Arduino to detect the colors and display them on serial monitor.         Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       6 Hours         Laboratory Component: (Experiments)       1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         2. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7       6 Hours         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       3 Hours         1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       5 Hours  | after ev        | very 2 se  | ,<br>econds    |               |            | ,          | 1 5       |           |               | Ū        |                      |             |               |             |          |
| Image: Text Book       Text Book 1: 1.1,1.3,1.4,2.3,2.5         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       Image: Text Book 1: 1.1,1.3,1.4,2.3,2.5         Laboratory Component: (Experiments)       1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3. Hours         2. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3. To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3. To interface Sensor With Arduino/Raspberry Pi and write a program to turn on alarm some isdetected.       3. To interface Mark Sensor (IR/LDR)       4. Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       3. Hours       3. Hours         1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3. Hours       3. Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3. Hours  | 3. To inter     | face TC  | S3200          | Color         | Sensor     | with Are   | duino to  | detect    | the color     | s and d  | isplay the           | em on seria | al            |             |          |
| Text Book       Text Book T: 1.1, 1.3, 1.4, 1.4, 1.4, 2.3, 2.3         MODULE-2       M2M and IoT Technology Fundamentals       22CDS451.2       6 Hours         Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.       Image: Component: (Experiments)       Image: Component: (Experiments)         1.       To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         2.       To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3 Hours         3.       To interface sense sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       4         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7       5         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       4       4         Laboratory Component: (Experiments)       1.       1.       Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2.       To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours <td>monitor</td> <td>r.</td> <td></td> <td>Toyt</td> <td>Pool 1</td> <td>1112</td> <td>1 1 2 2 2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>  | monitor         | r.   |                | Toyt          | Pool 1     | 1112       | 1 1 2 2 2 |           |               |          |                      |             |               |             |          |
| Interface Information Freeminology Function (Interface)       Interface Interface Interface Management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.         Industry Component: (Experiments)       1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         2. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3 Hours         3. To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7         MODULE-3       IoT Protocols and Platforms       22CDS451.3         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       3 Hours         1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | MODIII F.2      |  | М2             | Man           | HOT TO     | r.1,1.3,   | 1.4,2.3,2 | damen     | tals          |          | 2200                 | \$451.2     |               | 6 Ho        | urc      |
| Image: Service of the service of th | Devices and gat | teways   | Actua          | ators a       | nd its t   | vnes D     | ata mar   | ageme     | nt Conr       | ecting   | Smart Ol             | viects Fve  | ervthing      | as a Servi  |          |
| Iaboratory Component: (Experiments)       1.       To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3.         2.       To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3.       To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3.       To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3.         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7       4.       4.         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       1.       Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2.       To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | (XaaS), M2M an  | id IoT A   | nalvti         | cs, Kn        | owledge    | e Manag    | gement.   | lageme    |               | letting  | Sinart Or            |             | - i y tilling |             |          |
| 1. To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensordetection.       3 Hours         2. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3 Hours         3. To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       3 Hours         Text Book         Text Book       Text Book 1: 3.3, 3.4, 3.8, 4.2, 4.5, 4.7         MODULE-3       IoT Protocols and Platforms       22CDS451.3         6 LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       2000         Laboratory Component: (Experiments)       1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | Laboratory Con  | nponen   | <i>t:</i> (Exp | perim         | ents)      |            | <u>,</u>  |           |               |          |                      |             |               |             |          |
| LED at sensordetection.       2. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3 Hours         3. To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       4 Hours         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7       6 Hours         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       4 Hours       3 Hours         1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | 1. To           | interfac   | e Digit        | al sen        | sor (IR/   | LDR) wi    | ith Ardu  | ino/Ras   | spberry l     | Pi and v | vrite a pro          | ogram to t  | urn ON        |             |          |
| 2. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidityreadings.       3 Hours         3. To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.       4         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7         MODULE-3       IoT Protocols and Platforms       22CDS451.3         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       4         Laboratory Component: (Experiments)       1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       4 Hours  | LEI             | ) at sen   | sordet         | ection        | •          |            |           |           |               |          | -                    | -           |               |             |          |
| and humidityreadings.       3. To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke isdetected.         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       4         Laboratory Component: (Experiments)       1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | 2. To i         | interfac   | e DHT          | 11 sen        | sor with   | Arduin     | o/Rasp    | berry Pi  | and wri       | te a pro | gram to p            | orint temp  | erature       | 3 H         | ours     |
| 3. To interface smoke sensor with Arduino/Raspberry Pl and write a program to turn on alarm when smoke isdetected.         Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | and             | l humid  | ityread        | lings.        |            | A 1 ·      | (D 1      | D.        | · ·           |          |                      | ,           |               |             |          |
| Text Book       Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7         MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       6 Hours         Laboratory Component: (Experiments)       1.       Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2.       To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours   | 3. 10           | interfac   | e smoi         | ke sen:       | sor with   | Arauin     | o/Raspi   | berry Pi  | and wri       | te a pro | igram to t           | urn on ala  | rm            |             |          |
| MODULE-3       IoT Protocols and Platforms       22CDS451.3       6 Hours         6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud       Image: Component: Component: Component: Components of Microsoft Azure,Google cloud         Laboratory Component: (Experiments)       1.       Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2.       To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours   | Text Book       | Text B   | Rook 1.        | 333           | 43842      | 4547       |           |           |               |          |                      |             |               |             |          |
| 6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN Platforms: Components of Microsoft Azure,Google cloud         Laboratory Component: (Experiments)         1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.         Text Book  | MODULE-3        | Text DUUK     Text DUUK 1: 0.0,04,2,4.0,4.7       MODILE-3     Int Protocols and Platforms     22005451.3        |                |               |            |            |           |           |               | urs      |                      |             |               |             |          |
| cloud       Laboratory Component: (Experiments)         1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | 6LowPAN.Wi-fi   | 6 A ow PAN Wi-fi Bluetooth COAP MOTT Zighee Architecture LoPaWAN Platforms: Components of Microsoft Azura Coogle |                |               |            |            |           |           |               |          |                      |             |               |             |          |
| Laboratory Component: (Experiments)       1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | cloud           | ,214000  |                | ,             | - 2 ) -    |            |           |           | 01.01.11      |          |                      |             |               | 000101120   | 0,000810 |
| 1. Demonstrate the connectivity of Arduino/Raspberry Pi with PIR motion sensor with an application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours  | Laboratory Con  | mponei   | nt: (Ex        | perin         | nents)     |            |           |           |               |          |                      |             |               |             |          |
| application to detect obstacle and notify user using LED/LCD.       3 Hours         2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.       3 Hours         Text Book       Text Book 1: 61.623647274757778   | 1. Demons       | strate th  | ne conr        | nectivi       | ty of Arc  | luino/R    | aspberr   | y Pi wit  | h PIR mo      | otion se | nsor with            | an          |               |             |          |
| 2. To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of theobstacle.      Text Book Text Book 1: 61 62 364 72 74 75 77 78  | applicat        | tion to c  | letect o       | obstac        | le and n   | otify use  | er using  | LED/L(    | CD.           |          |                      |             |               | 3 H         | ours     |
| Unstance of theopstacle.           Text Book         Text Book 1: 61 623647274757778  | 2. To inter     | rtace ult  | trasoni        | c sens        | or with    | Arduinc    | )/Raspb   | erry Pi   | and writ      | e a prog | gram to d            | isplay the  |               |             |          |
|   | Text Book       | Tovt P   | OUSLAC         | 1e.           | 2361'      | 7 7 7 1. 7 | 5777      | 8         |               |          |                      |             |               | I           |          |

| MODULE-4  |  |                                    | Io                       | Г Progran    | 22CDS45          | 51.4                   | 6 Hours            |               |                  |  |  |
|---|--|------------------------------------|--------------------------|--------------|------------------|------------------------|--------------------|---------------|------------------|--|--|
| Introduction to Raspberry PI, Rasbian OS, interfacing analog and digital devices, enabling network connective Connecting with web Server, API Connectivity: Open Weather map, API |  |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| ,Connecting with web Server, API Connectivity: Open Weather map API   |  |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| Laboratory Con  | Laboratory Component: (Experiments)  |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| 1. To i   |  |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| ove   | rflow usi  | ngArdui                            | no/Raspb                 | erry PI wit  | h an LED         | Deershermen Ditte dete |                    |               | 3 Hours          |  |  |
| 2. 101  | 2. To interface ADXL335 accelerometer with Arduino/Raspberry Pi to detect the various<br>orientation and displayit on serial monitor   |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| Text Book   | Text Book 1:9.2.9.3.9.4.9.5.10.4.11.3.11.4.11.5.12.3   |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| MODULE-5  | Tene Do  | on 11912,                          | An                       | plications   | of IoT           | 210                    | 22CDS451.5.        |               | 6 Hours          |  |  |
|   |  |                                    | P                        | P            | 01101            |                        | 22CDS451.6         |               | 0 110 110        |  |  |
|   |  |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| Use of Big Data   | a and Vis  | ualizatio                          | on in IoT -              | · Industry 4 | 4.0 concept      | ts , Web Enabled Co    | nstrained Device   | es, Role of I | MachineLearning, |  |  |
| Monitoring an   | nbient ro  | om tem                             | perature                 | using DHT    | 11 Sensor,       | Using an RPi to Co     | ntrol an RGB LEI   | )             |                  |  |  |
| Laboratory Con  | nponent:   | (Exper                             | iments)                  | thuse I EDe  | (Ded Creek       | n and white). The LE   | De chould fellow   | the avale     | 3 Hours          |  |  |
|   | eate an ap   | On Cro                             | n that has '<br>on On Wh | three LEDS   | (Red, Gree)      | n and White J. The LE  | DS Should follow   | the cycle     | 5 110015         |  |  |
| 2. To   | (An On, Keu On, Green On, while Onjtor each nand movement (use Offra Sonic Sensor).<br>2. To interface soil moisture sensor to display the quality of soil moisture values using Arduino |                                    |                          |              |                  |                        |                    |               |                  |  |  |
| Text Book   | Text Bo  | ok 1: 15.                          | 2,15.4,15.               | 5,16.2,16.3  |                  |                        |                    |               |                  |  |  |
| CIE Assessment Pattern(50 Marks - Theory) -   |  |                                    |                          |              |                  |                        |                    |               |                  |  |  |
|   |  | <u> </u>                           |                          | .,           |                  | Marks Di               | stribution         | 1             |                  |  |  |
|   | Mai is Distribution<br>Auglitativa   |                                    |                          |              |                  |                        |                    |               |                  |  |  |
|   |  | RBT Levels Test (s) Assessment Lab |                          |              |                  |                        |                    |               |                  |  |  |
|   |  | 25 05 20                           |                          |              |                  |                        |                    |               |                  |  |  |
|   |  | L1                                 | L1 Remember 5            |              |                  |                        |                    |               |                  |  |  |
|   |  | L2                                 |                          |              |                  |                        |                    |               |                  |  |  |
|   |  | L3                                 | Α                        | pply         | 5                | 3                      | 10                 |               |                  |  |  |
|   |  | L4                                 | An                       | alyze        | 5                | -                      | 10                 | -             |                  |  |  |
|   |  | L5                                 | Eva                      | luate        | 5                | -                      | -                  | -             |                  |  |  |
|   |  | L6                                 | Cr                       | eate         | -                | -                      | -                  |               |                  |  |  |
|   |  |                                    |                          |              |                  |                        | L.                 | -             |                  |  |  |
| SEE Assessmen   | t Pattern  | (50 Ma                             | rks – Th <u>e</u>        | ory)         |                  |                        |                    |               |                  |  |  |
|   |  |                                    |                          | RRTL         | vels             | Exam Marks             |                    |               |                  |  |  |
|   |  |                                    |                          |              |                  | Distribution (50       | )                  |               |                  |  |  |
|   |  |                                    |                          | L1 Reme      | ember            | 10                     |                    |               |                  |  |  |
|   |  |                                    |                          | L2 Unde      | erstand          | 10                     |                    |               |                  |  |  |
|   |  |                                    |                          | L3 Apply     | y                | 10                     |                    |               |                  |  |  |
|   |  |                                    |                          | L4 Analy     | yze              | 10                     |                    |               |                  |  |  |
|   |  |                                    |                          | L5 Evalu     | iate             | 10                     |                    |               |                  |  |  |
|   | · -  |                                    |                          | L6 Creat     | te               |                        |                    |               |                  |  |  |
| Suggested Lea   | rning Re   | sources                            | S:                       |              |                  |                        |                    |               |                  |  |  |
| 1 Maciei  | Kranz "F   | Ruilding                           | the Inter                | met of Thi   | ngsi Imple       | ment New Rusines       | s Models Disrur    | nt Comneti    | tors Transform   |  |  |
| Your b  | ndustrv"   | 1st Edit                           | tion.Wiles               | 7.2021 ISB   | N-13 <b>·978</b> | -1119285663            |                    | . competi     |                  |  |  |
| 2. David  | Hanes , (  | Gonzalo                            | Salgueiro                | , Patrick    | Grossetete       | e, Robert Barton (A    | uthor), Jerome     | Henry," Io'   | T Fundamentals:  |  |  |
| Networ  | rking Tec  | hnologie                           | es, Protoco              | ols, and Use | Cases for t      | the Internet of Thing  | s "1st Edition,Cis | co Press,20   | )21, ISBN-13:    |  |  |
| 978-93  | 3868737  | 743                                |                          |              |                  |                        |                    |               |                  |  |  |

- Colin Dow, "Internet of Things Programming Projects: Build modern IoT solutions with the Raspberry Pi 3 and Python", 1st edition, Packt Publishing, 2018, ISBN :1789131383, 9781789131383
- **4.** David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals:Networking Technologies, Protocols, and Use Cases for the Internet of Things", First Edition, Cisco Press, 2017, ISBN-13:**978-9386873743**

### **REFERENCE BOOKS**

- 1. Qinghao Tang (Author), Fan Du," Internet of Things Security: Principles and Practice", 1st edition, Springer, 2021, ISBN-13:978-9811599415
- 2. Chandrasekar Vuppalapati, "Building Enterprise IoT Applications", 1st Edition, Academic Press, 2019, ISBN-10: 0367173859
- 3. 3. Peter Waher, "Mastering Internet of Things: Design and create your own IoT applications using Raspberry Pi 3", First Edition, Packt Publishing, 2018, ISBN-13:978-1788397483

# Web links and Video Lectures (e-Resources):

- 1. "Raspberrypi", https://www.raspberrypi.org/
- 2. IoTprotocols, https://www.postscapes.com/internet-of-things-protocols/
- 3. IoTPlatforms, https://www.javatpoint.com/iot-tutorial

### Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

• Project based Learning
|   |   |   |           |                 | R PROG     | RAMMI     | NG FO     | R DATA     | SCIENCE     | Ξ         |             |           |             |          |
|---|---|---|-----------|-----------------|------------|-----------|-----------|------------|-------------|-----------|-------------|-----------|-------------|----------|
| Course Code                               | 22CD  | S452  |           |                 |            |           |           | CIE M      | arks        |           | 50          |           |             |          |
| L:T:P:S                                   | 2:0:1   | :0  |           |                 |            |           |           | SEE M      | larks       |           | 50          |           |             |          |
| Hrs / Week                                | 2+2   |   |           |                 |            |           |           | Total      | Marks       |           | 100         |           |             |          |
| Credits                                   | 03  |   |           |                 |            |           |           | Exam       | Hours       |           | 03          |           |             |          |
| <b>Course outcome</b><br>At the end of th | e <b>s:</b><br>e cours  | e, the s  | student   | will be         | able to:   |           |           |            |             |           |             |           |             |          |
| 22CDS452.1                                | Imp   | lement  | t the fur | ndamen          | ital conce | epts of R | R progra  | amming.    |             |           |             |           |             |          |
| 22CDS452.2                                | App   | ly the ı  | use of d  | ata stru        | icture an  | d loop f  | unction   | IS         |             |           |             |           |             |          |
| 22CDS452.3                                | Ana   | lyze th   | e Matri   | x and A         | rrays Co   | ncepts    |           |            |             |           |             |           |             |          |
| 22CDS452.4                                | Exai  | Examine Lists and Data Frames in R.                               |           |                 |            |           |           |            |             |           |             |           |             |          |
| 22CDS452.5                                | Exai  | Examine the built in and user defined functions in R Programming. |           |                 |            |           |           |            |             |           |             |           |             |          |
| 22CDS452.6                                | 52.6 Implement Visualizing and Analyzing Data in R Programming.             |   |           |                 |            |           |           |            |             |           |             |           |             |          |
| Mapping of Cou                            | pping of Course Outcomes to Program Outcomes and Program Specific Outcomes: |   |           |                 |            |           |           |            |             |           |             |           |             |          |
|   | P01   | P02   | P03       | P04             | P05        | P06       | P07       | P08        | P09         | P010      | P011        | P012      | <b>PS01</b> | PSO2     |
| 22CDS452.1                                | 2   | 1   | 2         | 2               | 3          | -         | -         | -          | -           | -         | -           | 2         | 2           | 2        |
| 22CDS452.2                                | 2   | 1   | 2         | -               | -          | -         | -         | -          | -           | -         | -           | 2         | 2           | 2        |
| 22CDS452.3                                | 2   | 1   | 2         | 2               | 3          | -         | -         | -          | -           | -         | -           | 2         | 2           | 2        |
| 22CDS452.4                                | 2   | 1   | 2         |                 | 3          | -         | -         | -          | -           | -         | -           | 2         | 2           | 2        |
| 22CDS452.5                                | 2   | 2 1 2 2 3 2   |           |                 |            |           |           |            |             |           |             | 2         | 2           | 2        |
| 22CDS452.6                                | 2   | 2 1 2 2 2   |           |                 |            |           |           |            |             |           |             |           | 2           | 2        |
|   |   |   |           |                 |            |           |           |            |             |           |             |           |             |          |
| MODULE-1                                  | Introduction to R programming 20CDS452.1,                                   |   |           |                 |            |           |           |            |             |           |             |           | 6 Hour      | 'S       |
| Numonia Anithm                            | otia Aa   | aianm   | ont on    | Vector          | n. D for I | Dogio Mo  | ath Anit  | thmatic I  | Zariahla    | UCDS452   | Z           | na Europa | aciona o    | nd       |
| numeric, Aritini                          | ical ovr  | rossio  | ent, and  | i vectoi        | 5: K 101 1 |           | aui, Ai i | unneuc, v  | v al lable: | s, runcuo | iis, vecto  | is, expre | 5510115 d   | liu      |
| Laboratory Con                            | ntai exp  | nt. (n  | nogran    | nc)             |            |           |           |            |             |           |             |           |             |          |
| 1 Study of                                | data ar   | nalvsis   | using M   | IISJ<br>AS-Fxce | l(Prereo   | uisite)   |           |            |             |           |             |           |             |          |
| 2 Demons                                  | trate Ir  | nstallin  | o R and   | RStudi          | o          | uisitej   |           |            |             |           |             |           | 3 Hou       | irs      |
| 3. Demons                                 | trate w   | orking  | in the    | Console         | e Arithme  | etic Ope  | rators.   |            |             |           |             |           | 0 1100      |          |
| MODULE-2                                  |   |   | Ma        | atrices         | and Arr    | avs       | 1400101   |            |             | 20CDS45   | 2.3         |           | 6 Hou       | rs       |
| Matrices and Arr                          | avs: De   | fining  | a Matri   | x. Sub-s        | setting. M | latrix O  | peratio   | ns. Condi  | tions an    | d Looping | z: if state | ments. lo | oping wi    | ith      |
| for, looping with                         | while,  | vector  | based p   | orogran         | nming.     | ,         | <b>F</b>  | -,         |             | F         | ,           | , -       |             |          |
| Laboratory Co                             | npone   | ent:(pr   | ogran     | ıs)             |            |           |           |            |             |           |             |           |             |          |
| 1. Imp                                    | lement  | ation o   | of vecto  | r and Li        | ist data o | bjects o  | peratio   | ns         |             |           |             |           | _           |          |
| 2. Imp                                    | lement  | ation o   | of vario  | us oper         | ations or  | n matrix  | , array   | and facto  | rs in R     |           |             |           | 3 Hou       | irs      |
| 3. Stud                                   | ly and i  | mplen   | nentatio  | on of va        | rious cor  | ntrol str | uctures   | in R       |             |           |             |           |             |          |
| MODULE-3                                  |   |   | List      | ts and l        | Data Fra   | mes       |           |            |             | 20CDS45   | 2.4         |           | 6 Hou       | rs       |
| Lists and Data Fr                         | and Data Frames: Data Frames, Lists, Special values, The apply family.      |   |           |                 |            |           |           |            |             |           |             |           |             |          |
| Laboratory Con                            | npone   | ent: (p   | rogran    | ns)             |            | _         |           |            | _           |           |             |           |             |          |
| 1. To Creat                               | te Samp   | ole (Du   | mmy) l    | Data in         | R and pe   | rform d   | ata mar   | nipulation | n with R.   |           |             |           | _           |          |
| 2. Implem                                 | entatio   | n and p   | perform   | the vai         | rious ope  | erations  | on data   | a frames   | in R        |           |             |           | 3 Hou       | irs      |
| 3. Data Ma                                | nipulat   | tion wi   | th dply   | r packa         | ge         |           |           |            | · ·         | 20000015  |             |           | <i></i>     |          |
| MODULE-4                                  |   |   |           | Fu              | nctions    |           |           |            |             | 20CDS45   | 2.5         |           | 6 Hou       | rs       |
| Functions: Callin                         | ig funct  | tions, s  | scoping   | , Argun         | nents ma   | tching,   | writing   | functior   | ns: The f   | unction c | ommand      | , Argum   | ents, spe   | cialized |
| function.                                 | 2   |   | . 0       | 0               |            | 0,        |           |            |             |           |             | 5         | •           |          |
|   |   |   |           |                 |            |           |           |            |             |           |             |           |             |          |

| Laboratory Component: (programs) |  |            |              |                |                   |              |                 |               |                       |  |
|----------------------------------|--|------------|--------------|----------------|-------------------|--------------|-----------------|---------------|-----------------------|--|
| 1. Demons                        | trate the  |            | 3 Hours      |                |                   |              |                 |               |                       |  |
| 2. Data Ma                       | nipulatio  | n with     | ı data. tabl | e package      |                   |              |                 |               |                       |  |
| 3. Study ar                      | nd implem  | nentat     | ion of data  | transpos       | e operations      | s in R       | T               |               |                       |  |
| MODULE-5                         | _  | Po         | inters & I   | Data Visua     | alization         |              | 20CDS           | 5452.6        | 6 Hours               |  |
| Pointers: packag                 | es, frames   | s, de b    | ugging, m    | anipulatio     | n of code, co     | ompilation   | of the code.    |               | 1                     |  |
| Laboratory Con                   | mponent  | t: (pro    | ograms)      |                | l - + : D         |              |                 |               |                       |  |
| 1. Imp                           | 3 Hours  |            |              |                |                   |              |                 |               |                       |  |
| CIE Accoccmont                   |  |            |              |                |                   |              |                 |               |                       |  |
| CIL Assessment                   | Assessment Pattern (50 Marks - Theory)<br>Marks Distribution |            |              |                |                   |              |                 |               |                       |  |
|                                  | Oualitative  |            |              |                |                   |              |                 |               |                       |  |
|                                  | RBT Levels Test (s) Assessment Lab                           |            |              |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                | 25                |              | 05              | 20            |                       |  |
|                                  | L  | .1         | Rememb       | er             | 5                 |              | -               | -             |                       |  |
|                                  | L  | .2         | Underst      | and            | 5                 |              | 2               | -             |                       |  |
|                                  | L  | .3         | Apply        |                | 5                 |              | 3               | 10            |                       |  |
|                                  | L  | 4          | Analyze      |                | 5                 |              | -               | 10            |                       |  |
|                                  | L  | <b>.</b> 5 | Evaluate     |                | 5                 |              | -               | -             |                       |  |
|                                  | L  | .6         | 6 Create     |                |                   |              |                 | -             |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
| SEE Assessment                   | t Pattern  | (50 M      | larks – Tł   | neory)         |                   | r –          |                 |               |                       |  |
|                                  |  |            |              | <b>RBT</b> Lev | vels              | Exa          | m Marks         |               |                       |  |
|                                  |  |            | 11           | Domom          | han               | Distri       | 10              | _             |                       |  |
|                                  |  |            | 12           | Underst        | tand              |              | 10              | _             |                       |  |
|                                  |  |            | 13           | Annly          | lanu              |              | 10              | _             |                       |  |
|                                  |  |            | L3<br>L4     | Analyze        | •                 |              | 10              | _             |                       |  |
|                                  |  |            | L5           | Evaluat        | <u>,</u><br>6     |              | 10              | _             |                       |  |
|                                  |  |            | L6           | Create         | •                 |              | -               | _             |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
| Suggested Lear                   | rning Res  | sourc      | es:          |                |                   |              |                 |               |                       |  |
| 1 Jones 0                        | Maillard   | et R :     | and Rohin    | son A (2)      | 014) Introd       | luction to   | Scientific Prov | gramming and  | d Simulation Using R  |  |
| Chapma                           | an & Hall  | /CRC. '    | The R Seri   | es. ISBN-1     | 3: <b>978-146</b> | 6569997      | Scientific 110  | granning and  | a Simulation Using K. |  |
| Gildpin                          |  | uno,       |              |                |                   |              |                 |               |                       |  |
| References                       |  |            |              |                |                   |              |                 |               |                       |  |
| 1. Michael                       | J. Crawley   | y, "Sta    | tistics: An  | Introduct      | ion using R"      | , Second e   | dition, Wiley,2 | 2015, ISBN-13 | : 978-1118941096      |  |
| ISBN-10: 1                       | Video Le   | octure     | s (a-Rase    | urcec).        |                   |              |                 |               |                       |  |
| 1. Wickha                        | m. H. & G  | rolem      | und. G. (2   | 2018). for     | Data Scienc       | ce. O'Reilly | : New York.     | Available for | free at               |  |
| http://r                         | http://r4ds.had.co.nz  |            |              |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
| Activity Based                   | Learning   | g (Sug     | gested A     | ctivities i    | in Class)/ F      | Practical I  | Based learni    | ng            |                       |  |
| Demonstration                    | of simple  | proje      | ects         |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |
|                                  |  |            |              |                |                   |              |                 |               |                       |  |

|   |   |   |                  |                   | PROGR     | RAMMIN                | IG FOR U              | JI AND U             | JX DES    | IGN          |             |            |            |           |
|---|---|---|------------------|-------------------|-----------|-----------------------|-----------------------|----------------------|-----------|--------------|-------------|------------|------------|-----------|
| Course Code                             | 22CD5   | 5453  |                  |                   |           |                       |                       |                      | CIE M     | larks        |             | 50         |            |           |
| L:T:P:S                                 | 2:0:1:  | 0   |                  |                   |           |                       |                       |                      | SEE N     | <b>Jarks</b> |             | 50         |            |           |
| Hrs / Week                              | 2+2   |   |                  |                   |           |                       |                       |                      | Total     | Marks        |             | 10         | 0          |           |
| Credits                                 | 03  |   |                  |                   |           |                       |                       |                      | Exam      | n Hours      |             | 03         |            |           |
| <b>Course outcon</b><br>At the end of t | <b>nes:</b><br>he cours   | se, the s   | studen           | ıt will b         | e able to | ):                    |                       |                      |           |              |             |            |            |           |
| 22CDS453.1                              | Ability   | to unde   | erstand          | l the goa         | ls of use | r interfac            | ce design             | l.                   |           |              |             |            |            |           |
| 22CDS453.2                              | Implen  | nent the  | e desig          | n proces          | ses and   | developr              | ment met              | thodolog             | ies in UI |              |             |            |            |           |
| 22CDS453.3                              | Design  | applica   | tion w           | ith the K         | Inowled   | ge on Me              | enus, Forr            | n Filling,           | Dialog    | ooxes.       |             |            |            |           |
| 22CDS453.4                              | DS453.4 Implement user interaction with interfaces and designing intuitive interactions.                            |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 22CDS453.5                              | Conduc  | cting tes   | sts to e         | valuate           | the usab  | ility and o           | effective             | ness of de           | esigns.   |              |             |            |            |           |
| 22CDS453.6                              | Workin  | ng effect   | tively i         | n multid          | isciplina | ary teams             | s and con             | nmunicat             | ting desi | gn decision  | S.          |            |            |           |
| Mapping of Co                           | ig of Course Outcomes to Program Outcomes and Program Specific Outcomes:  |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
|   | P01   | P02   | P03              | P04               | P05       | P06                   | P07                   | P08                  | P09       | P010         | P011        | P012       | PSO1       | PSO2      |
| 22CDS453.1                              | 3   | 2   | 3                | 2                 | 3         | -                     | -                     | -                    | -         | -            | -           | 2          | 3          | 2         |
| 22CDS453.2                              | 3   | 3     2     3     2     3     -     -     -     -     2     3     2       3     2     3     2     3     -     -     -     -     -     2     3     2 |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 22CDS453.3                              | 3   | 3     2     3     -     -     -     -     2     3     2       3     2     3     -     -     -     -     -     2     3     2                         |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 22CDS453.4                              | 3   | 3     2     3     -     -     -     -     2     3     2       3     2     3     -     -     -     -     -     2     3     2                         |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 22CDS453.5                              | 3   | 3 2 3 2 3 2 3 2   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 22CDS453.6                              | 3   | 3 2 3 2 3 2 3 2   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| MODULE-1                                | USER INTERFACE DESIGN 22CDS453.1 6 Hours  |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| Introduction, G                         | oals of us  | ser inte  | erface o         | design, l         | Motivati  | ions for h            | numan fa              | actors in            | design,   | Object-Act   | tion Interf | ace mode   | l, The Eig | ht Golden |
| rules of Interfac                       | ce desigi   | n.  |                  |                   |           |                       |                       |                      |           |              |             |            | -          |           |
| Laboratory Co                           | mponen  | t:  |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 1. Organi                               | ze the st   | eps to  | get sta          | irted wi          | th UI de  | esigning              | tool Figr             | na.                  |           |              |             |            | 2.11       |           |
| 2. Create                               | a design  | syster  | n with           | linked            | UI com    | onents                | in Figma              | <b>1</b> .           |           |              |             |            | 3 H        | ours      |
| 3. Create                               | a projec  | t in Fig  | ma.<br>Tovt      | Rook 1            | .1112     | 1/22                  | 25                    |                      |           |              |             |            |            |           |
| MODULE-2                                |   |   | ТСЛ              | DOOK 1            | IGN PR    | 0CFSSI                | FS                    |                      |           |              | 2200545     | 32         | 61         | lours     |
| The Three Pill:                         | ars of d  | esion   | Develo           | nment             | metho     | dologies              | and So                | cial imr             | act sta   | tement for   | · early de  | sign revi  | ew Eyne    | ort       |
| Reviews Accen                           | tance Te  | ests and  | l Cont           | rolled P          | sycholo   | gically C             | ) riented             | Experim              | ients     | tement for   | curry uc    | Jigii ievi | ew, Expe   |           |
| Laboratory Con                          | mponen  | t:  |                  |                   | 09011010  | Broand                |                       | p •                  | 1011100   |              |             |            |            |           |
| 1. Create                               | a projec  | t for Ul  | and U            | JX desig          | n using   | wonder                | share M               | lockitt to           | ool.      |              |             |            |            |           |
| 2. Add UX                               | K design  | Widge   | ts.              | C                 | . 0       |                       |                       |                      |           |              |             |            | 3 H        | ours      |
| 3. Create                               | and pre   | view in   | teract           | ions for          | · UX des  | ign.                  |                       |                      |           |              |             |            |            |           |
| Text Book                               | Text B  | ook 1: 3  | 3.3,3.4          | ,3.8,4.2          | ,4.5,4.7  |                       |                       |                      |           |              |             |            |            |           |
| MODULE-3                                | DIR   | ECT M   | ANIP             | ULATIO            | N AND     | VIRTUA                | AL ENVII              | RONME                | NT        |              | 22CDS45     | 3.3        | 6 H        | lours     |
| Direct Manipul                          | lation sy   | vstems  | , Spati<br>throu | al data<br>9h MFN | manage    | ement, \<br>rm Fillir | /isual Tl<br>n and Di | hinking,<br>ialog Bo | Task re   | elated orga  | anization,  | Respons    | se time ai | nd        |
| Laboratory Co                           | mnonen  | t:  | unou             | 511 1.111         | 100,10    |                       | i, una Di             | uiog Do              | Aco.      |              |             |            |            |           |
| 3. Build a                              | 3. Build a navigation menu with components in Figma.  |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 4. Design                               | ning and prototyping forms in Figma. 3 Hours  |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| 5. Create                               | te a dialog box in Figma.   |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| Text Book                               | Text B  | ook 1:  | 6.1, 6.2         | 2.3,6.4,7         | 7.2,7.4,7 | .5,7.7,7.8            | 8                     |                      |           |              |             |            |            |           |
| MODULE-4                                |   |   | ]                | INTER             | ACTION    | N DEVIC               | ES                    |                      |           |              | 22CDS45     | 3.4        | 6 H        | lours     |
| Keyboards and                           | Keyboards and Function Keys, Pointing Devices, Speech Recognition, Image and video displays, User Productivity, Non |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |
| anthropomorp                            | ropomorphic design, Display Design, Color, Preparation of printed manuals.  |   |                  |                   |           |                       |                       |                      |           |              |             |            |            |           |

| Laboratory Component:                    |  |            |                |                 |            |                               |                       |                  |  |
|--|--|------------|----------------|-----------------|------------|-------------------------------|-----------------------|------------------|--|
| 1. Create connections and flows in Figma |  |            |                |                 |            |                               |                       |                  |  |
| 2. Imple                                 | mentatio   | n of In    | teractiv       | e design and    | function   | al layout.                    |                       | 3 Hours          |  |
| 3. Create                                | e a workii   | ng UI/     | UX prot        | otype using p   | prototypi  | ng tools.                     |                       |                  |  |
| Text Book                                | Text Boo   | ok 1:9.2   | 2,9.3,9.4      | ,9.5,10.4,11.3  | ,11.4,11.5 | 5,12.3                        |                       |                  |  |
| MODULE-5                                 |  |            |                | VISUALIZA       | FION       |                               | 22CDS453.5,           | 6 Hours          |  |
| Databasa guar                            | av and ph  | r000.00    | arch In        | formation vi    | cuolizati  | on Advanced filter            | 22CD5453.0            | (unormodia World |  |
| wide web                                 | y and ph   | rase se    | earch, m       | normation vi    | sualizati  | on, Auvanceu Inter            | ing, hypertext and h  | ypermeula, world |  |
| Laboratory Co                            | mnonent  | t.         |                |                 |            |                               |                       |                  |  |
| 1. Data V                                | visualizati  | on des     | ign tool :     | for UI/UX Des   | signers.   |                               |                       | 3 Hours          |  |
| 2. Add lin                               | nks to tex   | t.         | 8              |                 |            |                               |                       |                  |  |
| 3. Web a                                 | nd UI des  | ign usi    | ng Figm        | a and Webflo    | w.         |                               |                       |                  |  |
| Text Book                                | Text Boo   | ok 1: 1    | 5.2,15.4,      | 15.5,16.2,16.   | 3          |                               |                       |                  |  |
| CIE Assessme                             | nt Patter  | n(50 M     | larks – '      | Theory) –       |            |                               |                       |                  |  |
|  | г  |            |                |                 | 1          |                               |                       |                  |  |
|  |  |            |                |                 |            | Marks Distrib                 | ution                 |                  |  |
|  |  |            | RBT Le         | evels           | Test (s)   | Qualitative                   | Lab                   |                  |  |
|  |  |            |                |                 | 25         | Assessmen                     | L 20                  |                  |  |
|  | -  | 11         | Domo           | mbor            | <u> </u>   | 05                            | 20                    |                  |  |
|  | -  | 12         | Inde           | retand          | 5          | - 2                           |                       |                  |  |
|  | _  | L2<br>L3   | Annly          |                 | 5          | 2                             | 10                    |                  |  |
|  | -  | L3<br>L4   | Analy          | 70              | 5          | -                             | 10                    |                  |  |
|  | -  | L5         | Evalu          | ate             | 5          | -                             | -                     |                  |  |
|  | _  | L6         | Creat          | e               | -          | -                             | -                     |                  |  |
|  | L  |            |                | -               |            |                               |                       |                  |  |
| SEE Assessme                             | ent Patter   | n(50 ľ     | Marks –        | Theory)         |            |                               |                       |                  |  |
|  |  |            |                | BBTIO           | volc       | Exam Marks                    |                       |                  |  |
|  |  |            |                | KDT EC          | VCIS       | Distribution (50)             | )                     |                  |  |
|  |  |            |                | L1 Reme         | mber       | 10                            |                       |                  |  |
|  |  |            |                | L2 Under        | rstand     | 10                            |                       |                  |  |
|  |  |            |                | L3 Apply        | ,          | 10                            |                       |                  |  |
|  |  |            |                | L4 Analy        | ze         | 10                            |                       |                  |  |
|  |  |            |                | L5 Evalua       | ate        | 10                            |                       |                  |  |
|  |  |            |                | L6 Create       | e          |                               |                       |                  |  |
| Suggested Le                             | arning R   | esour      | ces:           |                 |            |                               |                       |                  |  |
| Text Books:                              | -  |            |                |                 |            |                               |                       |                  |  |
| 1) Designin                              | g the user   | interf     | ace strat      | egies for effe  | ctive Hun  | nan-Computer Inter            | action, Third Edition | by Ben           |  |
| Shneiderma                               | an, ISBN-1   | 3:978      | -020169        | 94970           |            |                               |                       |                  |  |
| Reference P                              | Books:   |            |                |                 |            |                               |                       |                  |  |
| 1) The Ess                               | sential Gui  | ide to l   | Jser Inte      | erface Design   | - d Editio | n: An Introduction t          | o GUI Design Principl | le s and         |  |
| Techn                                    | iques Pap  | erback     | x – Impo       | rt, 17 April 2( | 007by W0   | ) Galitz., ISBN-13: <b>97</b> | 78-0470053423         |                  |  |
| Web links an                             | d Video I  | Lectur     | es (e-R        | esources):      |            |                               |                       |                  |  |
| 1.                                       | 1. https://onlinecourses.nptel.ac.in/noc21_ar05/preview          |            |                |                 |            |                               |                       |                  |  |
| 2.                                       | 2. https://www.udemy.com/course/ui-ux-web-design-using-adobe-xd/ |            |                |                 |            |                               |                       |                  |  |
| 3.                                       | https:/  | //wwv      | v.cours        | era.org/spec    | cializatio | ons/user-interface            | -design               |                  |  |
| 4.                                       | nttps:/  | //www      | v.figma        | .com/           |            |                               |                       |                  |  |
| Activity-Base                            | ed Learni  | ing (Su    | iggeste        | d Activities    | in Class)  | / Practical Based             | learning              |                  |  |
| 1.Contents                               | related a  | ctivitie   | es (Activ      | ity-based disc  | cussions)  |                               |                       |                  |  |
| ≻ F                                      | for active   | partici    | pation o       | f students, ins | struct the | students to prepare           | Flowcharts and Han    | douts            |  |
|  | )rganizing   | -<br>Grour | -<br>1 wise di | scussions on    | issues Se  | minars                        |                       |                  |  |
| , (                                      | Organizing Group wise discussions on issues, Seminars            |            |                |                 |            |                               |                       |                  |  |

| C# & .NET  |   |  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
|--|---|--|--|-------------------------------------|----------------------------------|-----------------------------|------------------------------|------------------------------|----------------------------------|----------------------------------|-----------------------------|--------------------------|------------------------|------|
| Course Code  | 22CD  | S454   |  |                                     |                                  |                             |                              |                              | CIE Mar                          | 'ks                              |                             | 50                       |                        |      |
| L:T:P:S  | 2:0:1   | :0   |  |                                     |                                  |                             |                              |                              | SEE Mai                          | rks                              |                             | 50                       |                        |      |
| Hrs / Week   | 2+2   |  |  |                                     |                                  |                             |                              |                              | Total M                          | arks                             |                             | 100                      |                        |      |
| Credits  | 03  |  |  |                                     |                                  |                             |                              |                              | Exam H                           | ours                             |                             | 03                       |                        |      |
| <b>Course outcomes</b> At the end of the e                                       | :<br>course,  | the stu  | dent wil                               | l be able                           | e to:                            |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| 22CDS454.1   | Und   | erstand  | the tech                               | inologie                            | es of the                        | .NET fr                     | amewo                        | rk                           |                                  |                                  |                             |                          |                        |      |
| 22CDS454.2   | Und   | erstand  | the basi                               | c and o                             | bject or                         | iented o                    | concept                      | s in C#.                     |                                  |                                  |                             |                          |                        |      |
| 22CDS454.3   | Model the real world entities as classes and objects using C# object oriented Programming concepts. |  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| 22CDS454.4   | 4 Apply exception handling and gain efficient testing, debugging skillsC#.                          |  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| 22CDS454.5   | 2CDS454.5 Applying interfaces and Events in C# programming.   |  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| 22CDS454.6   | 2CDS454.6Develop Windows applications based on C# programming libraries and .NET Framework.         |  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| Mapping of Cour  | rse Outcomes to Program Outcomes and Program Specific Outcomes:                                     |  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
|  | P01   | P02  | PO3                                    | P04                                 | P05                              | P06                         | P07                          | P08                          | P09                              | P010                             | P011                        | P012                     | PSO1                   | PSO2 |
| 22CDS454.1   | 2   | 2  | 2                                      | 2                                   | 2                                | -                           | -                            | -                            | -                                | -                                | -                           | 2                        | 2                      | 2    |
| 22CDS454.2   | 2   | 2  | 2                                      | 2                                   | 2                                | -                           | -                            | -                            | -                                | -                                | -                           | 2                        | 2                      | 2    |
| 22CDS454.3   | 2   | 2  | 2                                      | 2                                   | 2                                | -                           | -                            | -                            | -                                | -                                | -                           | 2                        | 2                      | 2    |
| 22CDS454.4   | 2   | 2  | 2                                      | 2                                   | 2                                | -                           | -                            | -                            | -                                | -                                | -                           | 2                        | 2                      | 2    |
| 22CDS454.5   | 2   | 2  | 2                                      | 2                                   | 2                                | -                           | -                            | -                            | -                                | -                                | -                           | 2                        | 2                      | 2    |
| 22CDS454.6   | 2   | 2  | 2                                      | 2                                   | 2                                | -                           | -                            | -                            | -                                | -                                | -                           | 2                        | 2                      | 2    |
| MODULE-1   |   | <b>INTRODUCTION TO .NET</b> 22CDS454.1 6 Hours   |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| The C# Environm<br>Overview,Compo<br>Language<br>Oriented Program                | ent : N<br>nentso<br>nming (  | ET Fran<br>f.NET,Co<br>("MS<br>concept:  | nework<br>ommonI<br>IL" oi<br>s: Encap | An<br>Languag<br>' "IL"<br>sulation | geSpecif<br>),The Co<br>n, Polyn | ication(<br>ommon<br>orphis | (CLS),C<br>Type S<br>m, Inhe | ommon<br>ystem((<br>ritance, | Languag<br>CTS), .NE<br>The .Net | eRuntim<br>ET Frame<br>t Languaş | e(CLR),M<br>work Ba<br>ges. | licrosoft I<br>se Classe | ntermedi<br>s, Object- | ate  |
| <ol> <li>Download and</li> <li>Creating First</li> <li>Write a C# Sha</li> </ol> | install<br>Console  | first vis<br>e applica<br>gram to  | sual stud<br>ation.<br>swap tv         | lio.<br>vo num                      | bers.                            |                             |                              |                              |                                  |                                  |                             |                          | 3 Но                   | ours |
| Text Book  |   |  | Text B                                 | ook 1: 1                            | .2,1.3,1                         | .4.1,2.1,                   | Text B                       | ook 2:7.                     | 2                                |                                  |                             |                          |                        |      |
| MODULE-2   |   |  | A                                      | N OVE                               | RVIEW                            | OF C#                       |                              |                              |                                  | 22CDS                            | 454.2, 22                   | 2CDS454.3                | 3 6 Ho                 | urs  |
| C# Program –Exec<br>Keywords, Identifi   | ution, S<br>ers, Lit  | on, Sample Programs, Command Line Arguments, Programming Examples, Literals, Variables and Data Types:<br>s, Literals, Variables, Data Types, Boxing and Unboxing. operators, branching and looping. |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| List of Programs   | :   | -  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| 1) Develop C# prog<br>2) Demonstrate bo<br>3) Develop C# cons                    | gram to<br>xing an<br>sole apj  | ram to show command line arguments.3 Hourssing and unboxing.application with looping and branching logics.3 Hours  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |
| Text Book  | <b>Text Book</b> Text Book 1: chapter 2.2,3.1- 3.8,4.1-4.3,5.1-5.9 & 11.11                          |  |  |                                     |                                  |                             |                              |                              |                                  |                                  |                             |                          |                        |      |

| MODULE-3   |  | STRUCTURES AND ENUMERATIONS 22CDS454.3 6 Hou  |   |  |  |                                |                                  |  |  |  |  |  |  |
|--|--|---|---|--|--|--------------------------------|----------------------------------|--|--|--|--|--|--|
| Structures-Defini<br>Guidelines to use<br>Classes and Objec  | ng a Structu<br>Structures<br>ts: Classes,                             | ire, Assigning Values to<br>; Enumerations-Enum<br>Constructors & Destru  | ) Members ,<br>erator Initi<br>ctors, Nesti | Structures with Method<br>alization, Enumerator I<br>ing of Classes, Members | s, Nested Struc<br>3ase Types, En<br>, Properties. | tures, Classes<br>umerator Typ | Vs Structures,<br>be Conversion. |  |  |  |  |  |  |
| List of Programs<br>1) Develop c# appl<br>data by using<br>b)Constructor<br>2) Develop static cl<br>3) C# program to i | :<br>ication usir<br>a)Ordinary<br>rs.<br>lasses and s<br>illustrate N | ng classes and object to<br>method.<br>show how to display cu<br>esting of structures.  | display stu<br>rrent salary                 | dent<br>7 and upraised salary us   | ing static meth                                    | ods                            | 3 Hours                          |  |  |  |  |  |  |
| Text Book  | Text Book  | ext Book 1: 6.1-6.2,6.4-6.5,10.2,12.10-12.13  |   |  |  |                                |                                  |  |  |  |  |  |  |
| MODULE-4   |  | EXCEPTION   | HANDLIN                                     | G  | 22CDS4   | 54.4                           | 6 Hours                          |  |  |  |  |  |  |
| Exceptions – An C<br>Handler, Using 'Fi  | )verview, E<br>inally', Nest   | ew, Exception Handling Syntax, Multiple Catch Statements, The Exception Hierarchy, General Catch<br>', Nested Try Blocks, User Defined Exceptions, Checked and Unchecked. |   |  |  |                                |                                  |  |  |  |  |  |  |
| List of Programs<br>1. Demonstrate<br>2. Demonstrate<br>3. Demonstrate   | :<br>c# progran<br>user Define<br>Checked an                           | program to handle error using try catch.<br>Pr Defined exception in c#. <b>3 Hours</b><br>Pr Cked and unchecked in C#.  |   |  |  |                                |                                  |  |  |  |  |  |  |
| Text Book  | Text Book  | 1: 13.1-13.13   |   |  |  |                                |                                  |  |  |  |  |  |  |
| MODULE-5   |  | INTERFACES A  | ND DELEGA                                   | ATES   | 22CDS4<br>22CDS4                                   | 54.5,<br>54.6                  | 6 Hours                          |  |  |  |  |  |  |
| Defining Interface<br>Interfaces, Delega   | es, Extendin<br>ates, Multica  | g Interfaces, Implemen<br>ast Delegates,. Develop   | ting Interfa<br>ing Windov                  | ces, Explicit Interface In<br>vs Applications                                | nplementation,                                     | Abstract Clas                  | ses and                          |  |  |  |  |  |  |
| List of Programs   | :  |   |   |  |  |                                |                                  |  |  |  |  |  |  |
| 1. Demonstrate   | usage of de  | legates.  |   |  |  |                                | 3 Hours                          |  |  |  |  |  |  |
| 2. Demonstrate   | interface co<br>all Window   | oncept c  |   |  |  |                                |                                  |  |  |  |  |  |  |
| Text Book  | Text Book  | 2: 6.2-6.4  |   |  |  |                                |                                  |  |  |  |  |  |  |
| CIE Assessment P   | attern(50  | rn(50 Marks – Theory) –   |   |  |  |                                |                                  |  |  |  |  |  |  |
|  |  | Marks Distribution  |   |  |  |                                |                                  |  |  |  |  |  |  |
|  |  | <b>RBT Levels</b>   | Test (s)                                    | Qualitative<br>Assessment  | Lab  |                                |                                  |  |  |  |  |  |  |
|  |  |   | 25  | 05   | 20   |                                |                                  |  |  |  |  |  |  |
|  | L1   | Remember  | 5   | -  | -  |                                |                                  |  |  |  |  |  |  |
|  | L2   | Understand  | 5   | 2  | -  |                                |                                  |  |  |  |  |  |  |
|  |  | Apply   | 5   | 3  | 10   |                                |                                  |  |  |  |  |  |  |
|  |  | Analyze<br>Evaluato   | 5   | -  | 10   |                                |                                  |  |  |  |  |  |  |
|  | L5<br>L6   |   | -   | -  |  |                                |                                  |  |  |  |  |  |  |
|  | 10   | Greate  |   |  | <u> </u>   |                                |                                  |  |  |  |  |  |  |

| SEE Assessment Pattern(50 Marks - Theory)  |                       |                         |                            |  |  |  |  |  |  |  |  |  |
|--|-----------------------|-------------------------|----------------------------|--|--|--|--|--|--|--|--|--|
|  | DDT Lovele            | Exam Marks              | 7                          |  |  |  |  |  |  |  |  |  |
|  | <b>RBI</b> Levels     | Distribution (50)       |                            |  |  |  |  |  |  |  |  |  |
| L1   | Remember              | 10                      |                            |  |  |  |  |  |  |  |  |  |
| L2   | Understand            | 20                      |                            |  |  |  |  |  |  |  |  |  |
| L3   | Apply                 | 10                      |                            |  |  |  |  |  |  |  |  |  |
| L4   | Analyze               | 10                      |                            |  |  |  |  |  |  |  |  |  |
| L5   | Evaluate              | -                       |                            |  |  |  |  |  |  |  |  |  |
| L6   | L6 Create -           |                         |                            |  |  |  |  |  |  |  |  |  |
|  |                       |                         |                            |  |  |  |  |  |  |  |  |  |
| Suggested Learning Resources:  |                       |                         |                            |  |  |  |  |  |  |  |  |  |
| Text Books:  |                       |                         |                            |  |  |  |  |  |  |  |  |  |
| <ol> <li>HerbertSchildt, "TheCompleteRefere</li> </ol>   | nce:C#4.0",TataM      | IcGrawHill,2012.ISBN    | -13: <b>978-0071741163</b> |  |  |  |  |  |  |  |  |  |
| 2. Mark J. Price," C# 8.0 and .NET Cor   | e 3.0" – Modern       | Cross-Platform Deve     | lopment, Fourth            |  |  |  |  |  |  |  |  |  |
| Edition, Expert Insight, 2019, ISBN-1  | 3: <b>978-1788478</b> | 120                     |                            |  |  |  |  |  |  |  |  |  |
| Reference Books:   |                       |                         |                            |  |  |  |  |  |  |  |  |  |
| 1. Andrew Troelsen, "ProC#2010andth  | e.NET 4Platform       | Fifth edition, A Press, | 2010, ISBN: 9781430225492  |  |  |  |  |  |  |  |  |  |
| 2. Ian Griffiths, Matthew Adams,Jess   | seLiberty,"Progra     | mmingC#4.0",Sixth I     | Edition,O"Reilly,          |  |  |  |  |  |  |  |  |  |
| 2010, ISBN: 978-0-596-15983-2  |                       |                         |                            |  |  |  |  |  |  |  |  |  |
|  |                       |                         |                            |  |  |  |  |  |  |  |  |  |
| Web links and Video Lectures (e-Resource   | es):                  |                         |                            |  |  |  |  |  |  |  |  |  |
|  | • • • • •             |                         |                            |  |  |  |  |  |  |  |  |  |
| 1. https://ict.iitk.ac.in/courses/introduct  | lon-to-c-sharp/       |                         |                            |  |  |  |  |  |  |  |  |  |
| 2. https://dollet.http://dollet.https://dollet.httt | anguages/csnarp       |                         |                            |  |  |  |  |  |  |  |  |  |
| beginnershttps://www.dueniy.com/course/c-ne  | vatch?v=SXmVvn        | 16L8dw&list=PLAC32      | 5451207E3105               |  |  |  |  |  |  |  |  |  |
| beginnersneeps.//www.youtube.com/v   | vaten. v=5/mirvyn     | 101000000013t-1111032   | 515120715105               |  |  |  |  |  |  |  |  |  |
| Activity-Based Learning (Suggested Activi  | ties in Class)/ P     | ractical Based lear     | ning                       |  |  |  |  |  |  |  |  |  |
| Demonstration of visual studio   |                       |                         |                            |  |  |  |  |  |  |  |  |  |
| Video demonstration of window application Contents   |                       |                         |                            |  |  |  |  |  |  |  |  |  |
| related activities (Activity-based discus  | ssions)               |                         |                            |  |  |  |  |  |  |  |  |  |
| <ul> <li>For active participation of studen</li> </ul>   | ts, instruct the stu  | idents to work in batc  | hes                        |  |  |  |  |  |  |  |  |  |
| <ul> <li>Organizing Group wise discussions on programs</li> </ul>  |                       |                         |                            |  |  |  |  |  |  |  |  |  |

Seminars

|   | DATA VISUALIZATION USING TABLEAU   |            |          |              |                    |           |           |         |       |       |     |     |      |         |
|---|--|------------|----------|--------------|--------------------|-----------|-----------|---------|-------|-------|-----|-----|------|---------|
| Course Code   |  | 22CDS4     | -61      |              |                    |           |           |         | CIE M | larks |     | 50  |      |         |
| L:T:P:S   |  | 0:0:1:0    |          |              |                    |           |           |         | SEE N | larks |     | 50  |      |         |
| Hrs / Week  |  | 2          |          |              |                    |           |           |         | Total | Marks |     | 100 |      |         |
| Credits   |  | 01         |          |              |                    |           |           |         | Exam  | Hours |     | 03  |      |         |
| <b>Course outco</b><br>At the end of  | At the end of the course, the student will be able to:   |            |          |              |                    |           |           |         |       |       |     |     |      |         |
| 22CDS461.1  |  | Implem     | ent the  | main co      | oncepts            | of data v | visualiza | tion    |       |       |     |     |      |         |
| 22CDS461.2     Apply the main chart types and their recommended usage         |  |            |          |              |                    |           |           |         |       |       |     |     |      |         |
| 22CDS461.3     Deploy the most important visual best practices                |  |            |          |              |                    |           |           |         |       |       |     |     |      |         |
| 22CDS461.4 Create charts and dashboards using Tableau                         |  |            |          |              |                    |           |           |         |       |       |     |     |      |         |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: |  |            |          |              |                    |           |           |         |       |       |     |     |      |         |
|   | P01         P02         P03         P04         P05         P06         P07         P08         P09         P010         P011         P012         PS01         PS02           22CDS4611         2 |            |          |              |                    |           |           |         |       |       |     |     | PSO2 |         |
| 22CDS461.1  | 2  | 2          | 2        | 2            | 2                  | -         | -         | -       | -     | -     | -   | 2   | 3    | 3       |
| 22CDS461.2  | 2  | 2          | 2        | 2            | 2                  | -         | -         | -       | -     | -     | -   | 2   | 3    | 3       |
| 22CDS461.3  | 2  | 2          | 2        | 2            | 2                  | -         | -         | -       | -     | -     | -   | 2   | 3    | 3       |
| 22CDS461.4  | Z  | Z          | Z        | Z            | Z                  | -         | -         | -       | -     | -     | -   | Z   | 3    | 3       |
| Pgm. No.  | gm. No. List of Programs Hours COs   |            |          |              |                    |           |           |         |       |       | COs |     |      |         |
| Prerequisite Demo   |  |            |          |              |                    |           |           |         |       |       |     |     |      |         |
| Data Visualization , Analyzing Charts to derive insights                      |  |            |          |              |                    |           |           |         |       |       |     |     |      |         |
|   |  |            |          |              |                    |           | PAR       | T-A     |       |       |     |     |      |         |
| 1   | Intr   | oductior   | n to dat | ta visual    | ization            |           |           |         |       |       |     | 2   | 22C  | DS461.1 |
| 2   | Firs   | t steps ir | ı Table  | eau          |                    |           |           |         |       |       |     | 2   | 22C  | DS461.1 |
| 3   | Des  | ign requ   | ired m   | odules       |                    |           |           |         |       |       |     | 2   | 22C  | DS461.2 |
| 4   | Crea   | ating cor  | e char   | t visuals    | in Table           | eau       |           |         |       |       |     | 2   | 22C  | DS461.2 |
| 5   | Visu   | ial best p | oractic  | es           |                    |           |           |         |       |       |     | 2   | 22C  | DS4613  |
| 6   | Filte  | ering and  | l sortir | ng data i    | n Tablea           | au        |           |         |       |       |     | 2   | 22C  | DS461.3 |
|   | _  |            | ,        |              |                    |           | PAR       | T-B     |       |       |     |     |      |         |
| 7   | For  | matting    | charts   | and visu     | ials in Ta         | ableau    |           |         |       |       |     | 2   | 220  | JS461.3 |
| 9   | Wo   | ractive c  | th mult  | tiple cha    | ons<br>irts in a o | dashboa   | rd        |         |       |       |     | 2   | 220  | JS461.3 |
| 10  | Woi  | rking wit  | th geos  | n<br>atial d | ata and            | maps      |           |         |       |       |     | 2   | 220  | 05461.2 |
| 11  | Intr   | o to data  | storv    | telling &    | Creatin            | g data si | tories in | Tableau | l     |       |     | 2   | 220  | DS461.4 |
| 12  | Pers   | sonal pro  | oject    | 0            |                    | 0         |           |         |       |       |     | 2   | 220  | DS461 4 |
|   | PART-C   |            |          |              |                    |           |           |         |       |       |     |     |      |         |
|   | Beyond Syllabus Virtual Lab Content<br>(To be done during Lab but not to be included for CIE or SEE)<br>1. https://www.iiitmk.ac.in/DAVirtalLab/Register.php   |            |          |              |                    |           |           |         |       |       |     |     |      |         |

## CIE Assessment Pattern (50 Marks - Lab)

|    | DDT Lovele        | Test (s) | Weekly Assessment |
|----|-------------------|----------|-------------------|
|    | <b>KBI</b> Levels | 20       | 30                |
| L1 | Remember          | -        | -                 |
| L2 | Understand        | 5        | 10                |
| L3 | Apply             | 5        | 10                |
| L4 | Analyze           | 5        | 5                 |
| L5 | Evaluate          | 5        | 5                 |
| L6 | Create            | -        | -                 |

## SEE Assessment Pattern (50 Marks - Lab)

|    | <b>RBT Levels</b> | Exam Marks<br>Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember          | 10                              |
| L2 | Understand        | 10                              |
| L3 | Apply             | 10                              |
| L4 | Analyze           | 20                              |
| L5 | Evaluate          | -                               |
| L6 | Create            | -                               |

# Suggested Learning Resources:

## **Reference Books**

1. "Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few **Website:** Perceptual Edge, ISBN-13:978-1600330193

2. "Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky". **Website:** O'Reilly

Media, SBN :1449390684, 781449390686

#### References

1. https://www.tableau.com/learn/training

|                                      |   |   |                  |           | Е         | THICAL    | . <b>НАСКІ</b> | NG PRA    | CTICES   |             |            |            |           |            |  |
|--------------------------------------|---|---|------------------|-----------|-----------|-----------|----------------|-----------|----------|-------------|------------|------------|-----------|------------|--|
| Course Code                          |   | 22CDS4  | 62               |           |           |           |                |           | CIE M    | larks       |            | 50         |           |            |  |
| L:T:P:S                              | (   | 0:0:1:0   |                  |           |           |           |                |           | SEE N    | larks       |            | 50         |           |            |  |
| Hrs / Week                           | :   | 2   |                  |           |           |           |                |           | Total    | Marks       |            | 100        | )         |            |  |
| Credits                              | (   | 01  |                  |           |           |           |                |           | Exam     | Hours       |            | 03         |           |            |  |
| <b>Course outco</b><br>At the end of | mes:<br>the co  | ourse, th   | e stud           | ent will  | be able t | to:       |                |           |          |             |            |            |           |            |  |
| 22CDS462.1                           | 1   | Underst   | and th           | e basics  | of comp   | outer ba  | sed vuln       | erabiliti | es.      |             |            |            |           |            |  |
| 22CDS462.2                           |   | Analyze   | the di           | fferent f | oot prin  | ting, rec | onnaiss        | ance and  | scanni   | ng method   | s.         |            |           |            |  |
| 22CDS462.3                           | ]   | Apply the various hacking options available in Web and wireless applications and network protection |                  |           |           |           |                |           |          |             | tions and  | explore th | e options | for        |  |
| 22CDS462.4                           | ]   | Evaluate the enumeration and vulnerability analysis methods.  |                  |           |           |           |                |           |          |             |            |            |           |            |  |
| Mapping of C                         | Course  | e Outco   | mes t            | o Progr   | am Ou     | tcomes    | and Pr         | ogram S   | Specific | Outcom      | es:        |            |           |            |  |
|                                      | P01         P02         P03         P04         P05         P06         P07         P08         P09         P010         P011 |   |                  |           |           |           |                |           |          | P012        | PSO1       | PSO2       |           |            |  |
| 22CDS462.1                           | 2   | 2   | 2                | 2         | 2         | -         | -              | -         | -        | -           | -          | 2          | 3         | 3          |  |
| 22CDS462.2                           | 2   | 2   | 2                | 2         | 2         | -         | -              | -         | -        | -           | -          | 2          | 3         | 3          |  |
| 22CDS462.3                           | 2   | 2   | 2                | 2         | 2         | -         | -              | -         | -        | -           | -          | 2          | 3         | 3          |  |
| 22003402.4                           | 2   | 2   | 2                | 2         | 2         | _         | _              |           |          | _           | _          | 2          | 5         | 5          |  |
| Pgm. No.                             |   |   |                  |           |           | List of I | Program        | ns        |          |             |            | Hours      | ;         | COs        |  |
|                                      | 1   |   |                  |           |           | Prei      | equisit        | e Progra  | ams      |             |            |            |           |            |  |
|                                      |   |   |                  | Introdu   | action t  | o Linux   | progra         | mming     |          |             |            | 2          |           | NA         |  |
|                                      | 1   |   |                  |           |           |           | PAR            | RT-A      |          |             |            | 1          |           |            |  |
| 1                                    |   |   |                  |           |           |           |                |           |          |             |            |            |           |            |  |
|                                      | Insta   | all Kali c  | or Back          | track Li  | nux / M   | eta splo  | itable/ V      | Nindows   | XP       |             |            | 2 22CD5462 |           |            |  |
| 2                                    | Prac  | tice the  | basics           | of reco   | nnaissar  | ice.      |                |           |          |             |            | 2          | 22C       | DS462.2    |  |
| 3                                    | . Usi<br>list.  | ng FOCA   | A / Sea          | rch Digg  | ity tools | s, extrac | t metada       | ata and e | xpandir  | ng the targ | et         | 2          | 22C       | 22CDS462.2 |  |
| 4                                    | Aggr<br>Pate  | regates i<br>rva's M  | inform<br>altego | ation fro | om publ   | ic databa | ases usi       | ng online | free to  | ols like    |            | 2          | 22C       | DS462.2    |  |
| 5                                    | Info  | rmation   | gathe            | ring usir | ng tools  | like Rob  | tex.           |           |          |             |            | 2          | 22C       | DS462.2    |  |
| 6                                    | Scan  | the tar   | get usi          | ng tools  | like Nes  | ssus.     |                |           |          |             |            | 2          | 22C       | DS462.2    |  |
|                                      |   |   |                  |           |           |           | PAF            | RT-B      |          |             |            |            |           |            |  |
| 7                                    | View  | v and ca  | pture i          | network   | traffic ı | ısing Wi  | reshark        |           |          |             |            | 2          | 22C       | DS462.3    |  |
| 8                                    | Automate dig for vulnerabilities and match exploits using Armitage  |   |                  |           |           |           |                |           |          |             | 2          | 22C        | DS462.3   |            |  |
| 9                                    | Web Server, SQL Injection, Cross Site<br>Scripting  |   |                  |           |           |           |                |           |          |             | 2 22CDS462 |            | DS462.3   |            |  |
| 10                                   | Expl  | Exploit Writing, Buffer Overflow  |                  |           |           |           |                |           |          |             | 2 22CDS462 |            | DS462.3   |            |  |
| 11                                   | Incic   | dent Hai  | ndling           | & Respo   | onse      |           |                |           |          |             |            | 2 22CDS462 |           | DS462.4    |  |
| 12                                   | Bluetooth Hacking, Mobiles Phone<br>Hacking.  |   |                  |           |           |           |                |           |          | 2           | 22C        | DS462.4    |           |            |  |

## PART-C Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)

## 1. https://www.hackthebox.com/hacker/hacking-labs

## CIE Assessment Pattern (50 Marks - Lab)

|    | DDT Lovele        | Test (s) | Weekly Assessment |
|----|-------------------|----------|-------------------|
|    | <b>KBI</b> Levels | 20       | 30                |
| L1 | Remember          | -        | -                 |
| L2 | Understand        | 5        | 10                |
| L3 | Apply             | 5        | 10                |
| L4 | Analyze           | 5        | 5                 |
| L5 | Evaluate          | 5        | 5                 |
| L6 | Create            | -        | -                 |

#### SEE Assessment Pattern (50 Marks - Lab)

|    | RBT Levels | Exam Marks<br>Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember   | -                               |
| L2 | Understand | 10                              |
| L3 | Apply      | 10                              |
| L4 | Analyze    | 20                              |
| L5 | Evaluate   | 10                              |
| L6 | Create     | -                               |

#### Suggested Learning Resources:

#### References

- 1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010, ISBN, 1133169031, 9781133169031
- 2. The Basics of Hacking and Penetration Testing Patrick Engebretson, SYNGRESS, Elsevier, 2013, SBN: 9780124116443
- 3. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, Dafydd Stuttard and Marcus Pinto, 2011, ISBN-13:978-1118026472
- 4. Black Hat Python: Python Programming for Hackers and Pentesters, Justin Seitz, 2014, ISBN-13: 978-1593275907

|               |                |                              |                              | C                              | LOUD-E                         | BASED C                       | OLLAB     | ORATIV               | E WOR               | KSPACE                    |               |            |            |         |
|---------------|----------------|------------------------------|------------------------------|--------------------------------|--------------------------------|-------------------------------|-----------|----------------------|---------------------|---------------------------|---------------|------------|------------|---------|
| Course Code   |                | 22CDS4                       | 63                           |                                |                                |                               |           |                      | CIE M               | larks                     |               | 50         |            |         |
| L:T:P:S       |                | 0:0:1:0                      |                              |                                |                                |                               |           |                      | SEE N               | Marks                     |               | 50         |            |         |
| Hrs / Week    |                | 2                            |                              |                                |                                |                               |           |                      | Tota                | l Marks                   |               | 100        |            |         |
| Credits       |                | 01                           |                              |                                |                                |                               |           |                      | Exan                | n Hours                   |               | 03         |            |         |
| At the end of | mes:<br>the co | ourse, th                    | e stud                       | ent will                       | be able t                      | to:                           |           |                      |                     |                           |               |            |            |         |
| 22CDS463.1    |                | Demons                       | trate t                      | he acces                       | ss and se                      | etting of                     | google a  | ccount o             | reation             | and mana                  | igement       |            |            |         |
| 22CDS463.2    |                | Demons                       | trate t                      | he colla                       | boratior                       | n tools si                    | uch as Cl | assroom              | n, Docs,            | Sheets, Sli               | des, Form     | s and Driv | e          |         |
| 22CDS463.3    |                | Create a<br>Host OS          | Virtua<br>using              | al Machi<br>the PIN            | ne using<br>G comm             | gOracle<br>and                | Virtual H | Box and t            | test the            | communio                  | cation betw   | ween the g | uest OS a  | nd      |
| 22CDS463.4    |                | Build an                     | applic                       | cation in                      | various                        | cloud p                       | latforms  | s and int            | egrate i            | t with a lo               | cal IDE to I  | launch tha | t applicat | ion     |
| Mapping of C  | ours           | e Outco                      | mes t                        | o Progi                        | am Ou                          | tcomes                        | and Pr    | ogram S              | Specific            | c Outcom                  | es:           |            |            |         |
|               | P01            | P02                          | P03                          | P04                            | P05                            | P06                           | P07       | P08                  | P09                 | P010                      | P011          | P012       | PSO1       | PSO2    |
| 22CDS463.1    | 2              | 2                            | 2                            | 2                              | 2                              | -                             | -         | -                    | -                   | -                         | -             | 2          | 3          | 3       |
| 22CDS463.2    | 2              | 2                            | 2                            | 2                              | 2                              | -                             | -         | -                    | -                   | -                         | -             | 2          | 3          | 3       |
| 22CDS463.3    | 2              | 2                            | 2                            | 2                              | 2                              | -                             | -         | -                    | -                   | -                         | -             | 2          | 3          | 3       |
| 22CDS463.4    | Z              | Z                            | Z                            | Z                              | Z                              | -                             | -         | -                    | -                   | -                         | -             | Z          | 3          | 3       |
| Pgm. No.      |                |                              |                              |                                |                                | List of I                     | Progran   | 15                   |                     |                           |               | Hours      |            | COs     |
|               |                |                              |                              |                                |                                | Pr                            | ereauis   | ite Dem              | 05                  |                           |               |            |            |         |
|               |                | 1 Clo                        | ud Sto                       | rago                           |                                |                               |           |                      | 00                  |                           |               |            |            |         |
|               |                | 1. Clo<br>2. Var             | ious C                       | Cloud Co                       | ollabora                       | tive too                      | ols       |                      |                     |                           |               | 2          |            | NA      |
|               |                |                              |                              |                                |                                |                               | PAR       | T-A                  |                     |                           |               | r          |            |         |
| 1             |                | a) Cre<br>Sett<br>b) Der     | ate a '<br>ting us<br>nonstr | Test do<br>ing Goo<br>ating th | main fo<br>gle Worl<br>e Basic | r demoi<br>kspace.<br>and Ady | nstrating | g Sign-U<br>lendar s | p, Sign•<br>ettings | -in and Pi<br>that's incl | ofile<br>udes | 2          | 220        | DS463.1 |
| 2             | Dam            | the                          | integr                       | ating, Sh                      | haring an                      | nd Upda                       | ting Usi  | ng Googl             | e Calen             | dar.                      | uueb          |            |            |         |
| 2             | Den            | ionstrat                     | ing the                      | d with G                       | ng leatu<br>Soogle D           | re using                      | Google    | DOCS                 |                     |                           |               |            |            |         |
|               | l l            | 0  0  0  0  0  0  0  0  0  0 | on and                       | Create a                       | a new do                       |                               |           |                      |                     |                           |               |            |            |         |
|               |                | ) Coll                       | labora                       | tion Doc                       | s in the                       | Cloud                         |           |                      |                     |                           |               |            |            |         |
|               | Ċ              | l) Ver                       | sion hi                      | istorv G                       | oogle Do                       | CS CS                         |           |                      |                     |                           |               | 2          | 220        | DS463.2 |
|               | e              | ) Sim                        | ple Ed                       | iting Op                       | tions                          |                               |           |                      |                     |                           |               |            |            |         |
|               | f              | ) Goo                        | gle Do                       | ocs Addo                       | ons                            |                               |           |                      |                     |                           |               |            |            |         |
|               | g              | g) Adv                       | vanced                       | Editing                        | Option -                       | -Word C                       | ount Tra  | acker                |                     |                           |               |            |            |         |
|               | h              | ı) Doc                       | cument                       | t Forma                        | tter and                       | Transla                       | tion Assi | istant               |                     |                           |               |            |            |         |
| 3             | Dem            | nonstrat                     | ing the                      | e followi                      | ng featu                       | re using                      | Google    | Sheets               |                     |                           |               |            |            |         |
|               |                | a) Get                       | starte                       | d with G                       | loogle D                       | ocs                           |           |                      |                     |                           |               |            |            |         |
|               |                | b) Ope                       | en and                       | Create a                       | a new Sh                       | leet                          |           |                      |                     |                           |               | 2          | 220        | DS4632  |
|               |                | c) Bas                       | ic Edit                      | ing Opti                       | on in Go                       | ogle She                      | eets      |                      |                     |                           |               | -          | 220        | 0010012 |
|               |                | d) Bas                       | ic Forr                      | nulas in                       | Google                         | Sheets                        |           |                      |                     |                           |               |            |            |         |
|               |                | ej Adv                       | vanced                       | Editing                        | Option                         |                               |           |                      |                     |                           |               |            |            |         |
| 4             | Den            | nonstrat                     | ting the                     | e follow                       | ing featı<br>'                 | ire using                     | g Google  | Slides               |                     |                           |               |            |            |         |
|               |                | a) Cre                       | ate Go                       | ogle Slic                      | les                            |                               |           | C h h                | 0                   | _                         |               |            |            |         |
|               |                | b) Add                       | ling Co                      | ntent to<br>Rutton             | Slides a                       | and Inse                      | rt More   | Content              | Options             | 5                         |               |            |            |         |
|               |                | d) Slid                      | es Sha                       | re and c                       | s and Of<br>collabors          | ate                           |           |                      |                     |                           |               | 2          | 220        | DS463 2 |
|               |                | e) For                       | mat Oi                       | ptions S                       | lides                          |                               |           |                      |                     |                           |               | _          | 220        |         |
|               |                | f) Slid                      | les Vie                      | w Optio                        | ns and S                       | lide Tra                      | nsitions  |                      |                     |                           |               |            |            |         |
|               |                |                              |                              |                                |                                |                               |           |                      |                     |                           |               |            |            |         |
|               |                |                              |                              |                                |                                |                               |           |                      |                     |                           |               |            |            |         |

| 5            | Demons                                 | trating the fo   | ollowing feature using  | g Google form                     |                               |               |            |
|--------------|--|--|---|-----------------------------------|-------------------------------|---------------|------------|
|              | a)<br>b)<br>c)<br>d)<br>e)<br>f)<br>g) | Sections, Pro<br>Questions<br>Go to section<br>Upload Files<br>Designs for<br>Adding Imag<br>Getting Resp<br>Google Form | eviewing, Linear Scale<br>n based on Answer<br>s into a Google Form<br>your Forms<br>ges and Videos & Impo<br>ponses<br>ns Addons | e, Multiple Cho<br>orting Questio | oice Grid, DOB, Moving<br>DNS | 2             | 22CDS463.2 |
| 6            | Demons                                 | trating the fo   | ollowing feature using  | g Google Site                     |                               |               |            |
|              | a)                                     | Create Upda  | te Layout of Page   |                                   |                               |               |            |
|              | c)                                     | Add Pages to   | Sites Theme and Styl  | le                                |                               |               |            |
|              | d)                                     | Google Sites   | Navigation  |                                   |                               | 2             | 22CDS463.2 |
|              | e)                                     | Edit and Up  | date  |                                   |                               |               |            |
|              | f)                                     | Announcem  | ent banner  |                                   |                               |               |            |
|              | g)                                     | Site Sharing   | and Collaboration   |                                   |                               |               |            |
|              | nj                                     | Google Sites   | Launch  | PART-R                            |                               |               |            |
| 7            | Demons                                 | trating the fo   | ollowing feature using  | g Google Drive                    | 2                             |               |            |
|              | a)                                     | Organise vo  | ur Google Drive   | ,,                                | -                             |               |            |
|              | b)                                     | Managing W   | orkspaces   |                                   |                               |               |            |
|              | c)                                     | Uploading F  | iles and Folders  |                                   |                               |               |            |
|              | d)                                     | Search and (   | Cloud Search  |                                   |                               | 2             | 22CDS463.3 |
|              | e)                                     | Google Drive   | e for Desktop   |                                   |                               |               |            |
|              | f)                                     | Collaboratio   | on with Google Drive  |                                   |                               |               |            |
|              | g)                                     | Shared Driv  | es  |                                   |                               |               |            |
| 8            | Install 0                              | racle Virtual  | box and create two V  | 'Ms on your la                    | aptop/Desktop.                | 2             | 22CDS463.3 |
| 9            | Use vers                               | ion control s  | systems to create a ce  | ntral reposito                    | ory and local repository.     | 2             | 22CDS463.3 |
| 10           | Use vers<br>checkou                    | sion control<br>t, reset, and  | systems command delete repositories.  | to clone, co                      | mmit, push, fetch, pull,      | 2             | 22CDS463.3 |
| 11           | Develop                                | a Hello Wor  | ld application using G  | oogle AppEn                       | gine in Eclipse.              | 2             | 22CDS463.4 |
| 12           | Create a                               | hello world  | app and other simpl   | e web applica                     | ations using python / java.   | 2             | 220054634  |
|              | Use GAE                                | launcher to  | launch the web applie   | cations.                          |                               | 2             | 22005405.4 |
|              |  |  |   | PART-C                            |                               |               |            |
|              |  | (To bo   | Beyond Syllab   | us Virtual La<br>t not to ho in   | b Content                     |               |            |
| 1 https://   | //www.r                                | un edu/wh  | o-we-are/administr  | ative-offices                     | /information-technology       | /virtual-la   | hs         |
| I. https://  | .,,,                                   | walcuu, wii  |   |                                   | , mormation teemology         | , vii tuur iu |            |
| CIE Assessme | ent Patter                             | rn (50 Mark  | s – Lab)  |                                   |                               |               |            |
|              |  |  | RRT Lovale  | Test (s)                          | Weekly Assessment             |               |            |
|              |  |  | KDT Levels  | 20                                | 30                            |               |            |
|              |  | L1   | Remember  | -                                 | -                             |               |            |
|              |  | L2   | Understand  | 5                                 | 5                             |               |            |
|              |  | L3   | Apply   | 5                                 | 10                            |               |            |
|              |  | L4   | Analyze   | 5                                 | 10                            |               |            |
|              |  | L5   | Evaluate  | 5                                 | 5                             |               |            |
|              |  | LO   | create  | -                                 | -                             |               |            |
|              |  |  |   |                                   |                               |               |            |

## SEE Assessment Pattern (50 Marks - Lab)

|    | <b>RBT Levels</b> | Exam Marks<br>Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember          | -                               |
| L2 | Understand        | 10                              |
| L3 | Apply             | 10                              |
| L4 | Analyze           | 20                              |
| L5 | Evaluate          | 10                              |
| L6 | Create            | -                               |
|    |                   |                                 |

# Suggested Learning Resources:

## **Reference Books:**

- 1. Thuan, P. D. (2022). Employment of Google Tools in English Language Education: A Review. *British Journal of Multidisciplinary and Advanced Studies*, *3*(2), 70-77, DOI:<u>10.37745/bjmas.2022.0073</u>
- 2. Sunyaev, A., & Schneider, S. (2013). Cloud services certification. *Communications of the ACM*, *56*(2), 33-36, https://doi.org/10.1145/2408776.2408789

|  |                      |                   |                  |            |            | FIL        | E STRU(    | CTURES      |            |              |            |       |      |           |
|--|----------------------|-------------------|------------------|------------|------------|------------|------------|-------------|------------|--------------|------------|-------|------|-----------|
| Course Code                              |                      | 22CDS4            | -64              |            |            |            |            |             | CIE M      | larks        |            | 50    |      |           |
| L:T:P:S                                  |                      | 0:0:1:0           |                  |            |            |            |            |             | SEE N      | <b>larks</b> |            | 50    |      |           |
| Hrs / Week                               |                      | 2                 |                  |            |            |            |            |             | Total      | Marks        |            | 100   | 1    |           |
| Credits                                  |                      | 01                |                  |            |            |            |            |             | Exam       | n Hours      |            | 03    |      |           |
| <b>Course outcom</b><br>At the end of th | <b>es:</b><br>ne cou | rse, the          | studer           | nt will be | e able to  | :          |            |             |            |              |            |       |      |           |
| 22CDS464.1                               |                      | Impleme           | ent op           | erations   | related    | to files   |            |             |            |              |            |       |      |           |
| 22CDS464.2                               |                      | Apply th          | ie cono          | cepts of   | file syste | em to pr   | oduce t    | he given    | applica    | tion         |            |       |      |           |
| 22CDS464.3                               |                      | Evaluate          | e perfo          | ormance    | of vario   | ous file s | ystems     | on given    | parame     | eters.       |            |       |      |           |
| 22CDS464.4                               |                      | Demons            | tratio           | n on mir   | imizing    | seek tir   | ne         |             |            |              |            |       |      |           |
| Mapping of Co                            | urse                 | Outcom            | ies to           | Progra     | m Outc     | omes a     | nd Pro     | gram Sj     | pecific    | Outcome      | s:         |       |      |           |
|  | P01                  | P02               | P03              | P04        | P05        | P06        | P07        | P08         | P09        | P010         | P011       | P012  | PSO1 | PSO2      |
| 22CDS464.1                               | 2                    | 3                 | 2                | 2          | 2          | -          | -          | -           | -          | -            | -          | 2     | 3    | -         |
| 22CDS464.2                               | 2                    | 3                 | 2                | 2          | 2          | -          | -          | -           | -          | -            | -          | 2     | 3    | -         |
| 22CDS464.3                               | 2                    | 3                 | 2                | 2          | 2          | -          | -          | -           | -          | -            | -          | 2     | 2    | -         |
| 22CDS464.4                               | 2                    | 3                 | 2                | 2          | 2          | -          | -          | -           | -          | -            | -          | 2     | 3    | -         |
|  | r                    |                   |                  |            |            |            |            |             |            |              |            |       |      |           |
| Pgm. No.                                 |                      |                   |                  |            | ]          | List of F  | Program    | ns          |            |              |            | Hours |      | COs       |
|  |                      |                   |                  |            |            | Prere      | quisite    | Progra      | ms         |              |            |       |      |           |
|  |                      | 1 Doc             | ia Filo          | handlin    | gonorat    | ionlog     | fonon f    | aloso ota   | )          |              |            |       |      |           |
|  |                      | 1. Dasi<br>2 File | a locat          | ion        | goperat    | lon(eg:    | iopen, i   | ciose etc   | .)         |              |            |       |      |           |
|  |                      | 3. File           | e creat          | ion and    | opening    | g modes    |            |             |            |              |            | 2     |      | NA        |
|  |                      |                   |                  |            |            |            | PART       | Г-А         |            |              |            |       |      |           |
| 1  | Writ                 | e a prog          | gram t           | to read s  | eries of   | names,     | one pe     | r line, fr  | om stan    | dard inpu    | t and      |       | 22CD | S464.1    |
|  | writ                 | e these           | name             | s spelle   | d in rev   | verse or   | der to     | the stan    | dard ou    | itput usin   | g I/0      | 2     |      |           |
|  | redi                 | rection a         | and pi           | pes        |            |            |            |             |            |              |            |       |      |           |
| 2  | Writ                 | e a prog          | gram t           | o read se  | eries of   | names,     | one per    | line, usi   | ng an in   | put filespe  | ecified by |       | 22CD | 5464.1    |
|  | the                  | user ins          | stead of         | of the st  | andard     | input a    | ind usin   | ig an ou    | tput file  | 9            |            | 2     |      |           |
|  | spec                 | ified by          | the us           | er inste   | ad of the  | e standa   | rd outp    | ut.         |            |              |            |       |      |           |
| 3  | Writ                 | e a prog          | gram to          | o read ai  | nd write   | e studen   | t objects  | s with fix  | ed-leng    | gth records  | sand       | 2     | 22CD | 5464.1    |
| A.                                       | Writ                 | leius del         | minite<br>Tram t | u by [.    | impiem     | ent paci   | k ( ), unp | Dack ( )    | rod-long   | th records   | and        | Z     | 2200 | \$4.6.4.1 |
| т  | the f                | ields de          | limite           | d by " ".  | Implem     | ent mod    | lify ( ) a | nd searc    | h ( ) me   | thods.       | sanu       | 2     | 2200 | JTUT.1    |
| 5  | Writ                 | e a prog          | gram t           | o read a   | nd write   | studen     | t objects  | s with Va   | riable -   | Length       |            |       | 22CD | S464.1    |
|  | reco                 | rds usin          | ,<br>ig any      | suitable   | record     | structur   | e. Imple   | ement pa    | ick ( ), u | npack ()     |            | 2     |      |           |
| 6  | Writ                 | e a prog          | gram to          | o read ai  | nd write   | e studen   | t objects  | s with Va   | riable -   | Length       |            |       | 22CD | S464.1    |
|  | reco                 | rds usin          | ig any           | suitable   | record     | structur   | e. Imple   | ement m     | odify ( )  | and searc    | h()        | 2     |      |           |
|  | met                  | nods              |                  |            |            |            |            |             |            |              |            |       |      |           |
|  | r —                  |                   |                  |            |            |            | PART       | Г-В         |            |              |            |       |      |           |
| 7  | Writ                 | e a prog          | gram to          | o write s  | tudent     | objects    | with Var   | riable - L  | ength r    | ecords usi   | ng         | -     | 22CD | 5464.1    |
|  | any                  | suitable          | recor            | a structı  | ire and    | to read    | from thi   | s file a st | udent r    | ecord usin   | IGKKN.     | 2     |      |           |
| 8  | Writ                 | te a prog         | gram t           | o imnler   | nent sin   | nple ind   | ex on nr   | rimarv k    | ev for a   | file of stuc | lent       |       | 22CD | S464.1    |
| _  | obje                 | cts. Imp          | lemen            | tadd ()    | , search   | ( ), dele  | te ( ) us  | ing the in  | ndex.      |              | -          | 2     |      |           |

| 9                | Write a program to            | read tw  | o lists of names  | and then ma        | tch the names in the t | NO         |           | 22CDS464.1   |
|------------------|-------------------------------|----------|-------------------|--------------------|------------------------|------------|-----------|--------------|
|                  | lists using Conseque          | ential M | latch based on a  | a single loop      | . Output the namescon  | nmon       | 2         |              |
|                  | to both the lists.            |          |                   |                    | -                      |            |           |              |
| 10               | Write a program to            | read k   | Lists of names    | and merge t        | hem using k-way mer    | ge         |           | 22CDS464.1   |
|                  | algorithm with k = 8          | 3.       |                   | _                  |                        | _          | 2         |              |
| 11               | Write a program to            | store ar | nd retrieve stud  | ent data fror      | n file using hashing.  |            | 2         | 22CDS464.1   |
| 12               | Write a program to            | store ar | nd retrieve stud  | ent data fror      | n file using extended  |            | 2         | 22CDS464.1   |
|                  | hashing.                      |          |                   |                    |                        |            | Z         |              |
|                  | •                             |          |                   | PART-C             |                        |            |           |              |
|                  |                               | Bey      | yond Syllabus V   | Virtual Lab        | Content                |            |           |              |
| 1. https:/       | /mitcommlab.mit.ed            | lu/be/c  | :ommkit/file-st   | tructure/          |                        |            |           |              |
| 2. https:/       | /visualgo.net/en              |          |                   |                    |                        |            |           |              |
|                  | + Dettern (FO Meriles         | L ab)    |                   |                    |                        |            |           |              |
| CIE Assessmen    | t Pattern (50 Marks           | – Labj   |                   |                    |                        |            |           |              |
|                  |                               |          |                   | Tect (c)           | Wookly Accessmo        | nt         |           |              |
|                  |                               | RBT      | Levels            | 20                 | 20                     | IL         |           |              |
|                  | 11                            | Rem      |                   |                    |                        |            |           |              |
|                  | 12                            | IInd     | erstand           |                    |                        |            |           |              |
|                  | 12                            | Ann      | lv                | 5                  | 10                     |            |           |              |
|                  | 1.4                           | Ana      | lyze              | 5                  | 5                      |            |           |              |
|                  | 15                            | Eval     | uate              | 5                  | 5                      |            |           |              |
|                  | <u>16</u>                     | Crea     | ite               | -                  | -                      |            |           |              |
|                  |                               |          |                   |                    |                        |            |           |              |
| SEE Assessmen    | it Pattern (50 Marks          | – Lab)   |                   |                    |                        |            |           |              |
|                  |                               |          |                   |                    |                        |            |           |              |
|                  |                               |          | <b>RBT Levels</b> |                    | Exam Marks             |            |           |              |
|                  |                               |          | <b>D</b>          | Di                 | stribution (50)        |            |           |              |
|                  |                               | L1       | Remember          |                    | -                      |            |           |              |
|                  |                               | L2       | Understand        |                    | 10                     |            |           |              |
|                  |                               | L3       | Apply             |                    | 10                     |            |           |              |
|                  |                               | L4       | Analyze           |                    | 20                     |            |           |              |
|                  |                               | L5       | Evaluate          |                    | 10                     |            |           |              |
|                  |                               | LO       | Create            |                    | -                      |            |           |              |
| Suggested Lea    | rning Resources:              |          |                   |                    |                        |            |           |              |
| 1) File Structur | JKS:<br>Jas: An Object-Orient | ed Ann   | roach with C+-    | +• United St       | ates Editionby Micha   | al I Falb  | (Author)  | Bill7oellick |
| (Author) Grag    | Riccardi (Author) IS          | RN · 9   | 788177583731      | +. Oniteu Sta<br>I | ates Euronoy Micha     | ei j. pulk | (Autioi), | DHIZUEHICK   |
| (integ           | Recardi (Autior), 13          |          | ,001/,003/31      | L                  |                        |            |           |              |

|                          |               |               | S          | OCIAL C    | ONNEC       | Γ AND R   | ESPONS               | SIBILITY   |                   |              |                   |         |
|--------------------------|---------------|---------------|------------|------------|-------------|-----------|----------------------|------------|-------------------|--------------|-------------------|---------|
| Course Code              | 22SCF         | 47            |            |            |             |           |                      | CIE        | Marks             | 50           |                   |         |
| L:T:P:S                  | 0:0:1:        | 0             |            |            |             |           |                      | SEE        | Marks             |              |                   |         |
| Hrs / Week               | 02            |               |            |            |             |           |                      | Tota       | al Marks          | 50           |                   |         |
| Credits                  | 01            |               |            |            |             |           |                      | Exa        | m Hours           | 02           |                   |         |
| Course outcom            | es: At the e  | nd of th      | e cours    | e, the stu | ıdent wi    | ll be abl | e to:                |            |                   |              |                   |         |
| 22SCK47.1                | Comm          | unicate a     | and con    | nect to    | the surro   | ounding   |                      |            |                   |              |                   |         |
| 22SCK472                 | Under         | stand th      | e needs    | and pro    | oblems o    | f the cor | nmunity              | and invo   | olve them i       | n problem    | -solving          |         |
| 22SCK47.3                | Develo        | p amon        | g thems    | selves a   | sense of    | social &  | civic res            | ponsibil   | ity and util      | lize their k | nowledge in       | finding |
|                          | practio       | al soluti     | ions to i  | ndividu    | al and co   | ommuni    | ty proble            | ems        |                   |              |                   |         |
| 22SCK47.4                | Develo        | op compo      | etence 1   | required   | l for groı  | ıp-living | ; and sha            | ring of r  | esponsibili       | ities & gain | ı skills          |         |
|                          | in mot        | oilizing c    | ommur      | ity part   | icipation   | ı to acqu | ire leade            | ership qu  | alities and       | democrat     | ic attitudes      |         |
| Mapping of Co            | urse Outc     | omes to       | Progr      | am Out     | comes       | and Pro   | ogram S              | pecific    | Outcomes          | S:           |                   |         |
|                          | P01           | P02           | P03        | P04        | P05         | P06       | P07                  | P08        | P09               | P010         | P011              | P012    |
| 22SCK47.1                | -             | -             | -          | -          | -           | 3         | 2                    | -          | 2                 | 3            | -                 | 1       |
| 22SCK472                 | -             | -             | -          | -          | -           | 3         | 2                    | -          | 2                 | 3            | -                 | 1       |
| 22SCK47.3                | -             | -             | -          | -          | -           | 3         | 2                    | -          | 2                 | 3            | -                 | 1       |
| 22SCK47.4                | -             | -             | -          | -          | -           | 3         | 2                    | -          | 2                 | 3            | -                 | 1       |
|                          |               |               |            |            |             |           |                      |            |                   |              |                   |         |
| MODULE-1                 | PLAN          | <b>FATION</b> | AND A      | DOPTIC     | ON OF A     | TREE      |                      |            | 22                | SCK47.1,     | 3 H               | ours    |
|                          |               |               |            |            |             |           |                      |            | 22                | SCK47.2      |                   |         |
| Plantation of a          | tree that v   | vill be ad    | lopted f   | for three  | e years b   | y a grou  | p of B.Te            | ech stude  | ents. (ONE        | STUDENT      | ONE TREE)         | They    |
| will also make           | an excerpt    | either a      | s a doci   | umentai    | y or a pl   | noto blo  | g descrii<br>dy repo | oing the j | plant's orig      | gin, its usa | ge in daily li    | te, its |
|                          | HFRI          | CACF W        |            |            | FTS CO      | RNFR      | uy, repo             | It, Outco  | nies.<br><b>2</b> | 256647 2     | 21                | Hours   |
| MODOLL-2                 | IILINI        |               |            |            | 11500       | MILIN     |                      |            | 2                 | 23CR47.2     | ι, 51<br><b>λ</b> | iours   |
| Heritage tour            | knowing tl    | ne histor     | w and c    | ulture c   | f the city  | v conne   | cting to             | neonle a   | round thro        | nugh their   | ,<br>history kno  | wing    |
| the city and its         | craftsman     | photo b       | log and    | docume     | entary of   | n evoluti | on and p             | people a   | f various c       | raft forms   | - Objectives,     | Visit,  |
| case study, rep          | ort, outcor   | nes.          | U          |            | 5           |           |                      |            |                   |              |                   | ŗ       |
| MODULE-3                 | 0             | ORGANI        | C FARM     | ING AN     | D WAST      | E MANA    | AGEMEN               | IT         | 22                | SCK47.4,     | 31                | Hours   |
|                          |               |               |            |            |             |           |                      |            | 22                | SCK47.4      |                   |         |
| Usefulness of            | organic far   | ming, w       | et wast    | e manag    | gement i    | n neigh   | bouring              | villages,  | and imple         | ementatior   | in the cam        | pus –   |
| Objectives, Vis          | it, case stud | y, repor      | t, outco   | mes.       |             |           |                      |            |                   | 0001748      |                   |         |
| MODULE-4                 | WAIE          | K CONS        | ERVAI      | ION        |             |           |                      |            |                   | 25CK47.3     | i, 31             | Hours   |
| <u>Un avuin a th a m</u> |               | tions in t    | h o our    |            |             |           | -l                   | ation in t |                   | 23UN47.4     | t have a what     | ablaa   |
| Knowing the p            | resent prac   | tices in t    | ne surr    | ounding    | g villages  | and im    | olementa             | ation in t | ne campus         | s, documen   | tary or phot      | obiog   |
| presenting the           |               | actices –     | Objecti    | ves, vis   | it, case si | ludy, rep | ort, out             | comes.     |                   |              |                   | T       |
| MODULE-5                 | FUUD          | WALK          |            |            |             |           |                      |            | 22                | SCK47.1      | 31                | Hours   |
| City's culinary          | practicos f   | adlara        | and in     | digonou    | c matari    | als of th | rogion               | usod in a  | 22                | bioctivos    | Visit caso st     | udu     |
|                          | practices, r  |               | , anu m    | uigenou    | S materi    |           | e region             | useu III c | ooking – C        | bjectives,   | visit, tase st    | uuy,    |
|                          | es.           | . (50 )       | ( <b>)</b> | A          |             | <u>ر۲</u> |                      |            |                   |              |                   |         |
| CIE Assessme             | nt Patter     | n (50 M       | arks –     | ACTIVI     | ty base     | a) -      |                      |            |                   | 0 C 1        | ,                 |         |
| • Each m                 | iodule is e   | valuate       | ed as gi   | ven be     | low and     | 100 m     | arks in              | scaled c   | lown to 5         | u as final   | marks.            |         |
|                          |               |               |            | nnonei     | t for ea    | nch mor   | hile                 |            | Marks             |              |                   |         |
|                          |               | Field V       | /isit Pla  | n Disci    | ission      |           | luic                 |            | 10                |              |                   |         |
|                          |               | Comm          | enceme     | nt of act  | ivities a   | nd its pr | ogress               |            | 20                |              |                   |         |
|                          |               | Case st       | udv-ba     | sed Asse   | essment     | Individu  | al                   |            | 20                |              |                   |         |
|                          |               | perform       | mance v    | with rep   | ort         |           |                      |            | 20                |              |                   |         |
|                          |               | Module        | ewisest    | udy&its    | consolid    | ation5*   | 5 =25                |            | 25                |              |                   |         |
|                          |               | Video l       | based s    | eminar f   | or 10 mi    | inutes by | y                    |            | 25                |              |                   |         |
|                          |               | each st       | udent a    | it the en  | d of sem    | ester wi  | th                   |            |                   |              |                   |         |
|                          |               | report.       | Activit    | ties1 to   | 5, 5*5 =2   | 25        |                      |            |                   |              |                   |         |
|                          |               |               |            |            |             |           | То                   | tal        | 100               |              |                   |         |

- Implementation strategies of the project (NSS work).
- Individual student has to submit a final report which should be signed by NSS Officer, the HOD and Principal.
- Finally, the consolidated marks sheet and the reports should be available in the department. .

## Activity-Based Learning / Practical Based learning

- Platform to connect to others and share the stories with others:
  - Jamming session
    - $\circ$  Open mic
    - $\circ$  Poetry
- Share the experience of Social Connect.
- Exhibit the talent like playing instruments, singing, one-actplay, art-painting, and fine art.

## Pedagogy:

- The students will be divided into groups. Each group will be handled by faculty mentor.
- A total of 40 50 hrs engagement in the semester
- Faculty mentor will design the activities (particularly Jamming sessions, open micand poetry)
- The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.
- The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semesterlong activities conducted by faculty mentors.
- Students should present the progress of the activities as per the schedule in the prescribed practical session in the field.
- There should be positive progress in the vertical order for the benefit of society in general though activities.

## **Plan of Action:**

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty mentor for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1<sup>st</sup>to 5<sup>th</sup>, compiled report should be submitted as per the instructions and scheme.
- Practice Session Description:
  - Lecture session in field to start activities
    - Students Presentation on Ideas
  - Commencement of activity and its progress
  - Execution of Activity
  - Case study-based Assessment, Individual performance
  - Sector/ Team wise study and its consolidation
  - Video based seminar for 10 minutes by each student at the end of semester with Report.

| 0.11 |            |            | ·                                      |                         | <b>D</b>   | h 1           |
|------|------------|------------|--|-------------------------|------------|---------------|
| SN   | Topic      | Group size | Location                               | Activity execution      | Reporting  | Evaluation of |
| 0    |            |            |  |                         |            | the Topic     |
|      |            |            |  |                         |            |               |
| 1.   | Plantation | May be     | Farmers land/ parks                    | Site selection          | Report     | Evaluatio     |
|      | and        | individua  | /Villages                              | / Proper                | should be  | n as per      |
|      | adoption   | l or team  | /roadside/community area               | consultation/Continuous | submitted  | the           |
|      | of a tree  | (3-5)      | /College campus                        | monitoring/Information  | by         | rubrics of    |
|      |            |            |  | board                   | individual | scheme        |
|      |            |            |  |                         | to the     | and           |
|      |            |            |  |                         | concerned  | syllabus      |
|      |            |            |  |                         | evaluation | 5             |
|      |            |            |  |                         | authority  |               |
| 2.   | Heritage   | May be     | Temples / monumental                   | Site selection          | Report     | Evaluatio     |
|      | walk and   | individua  | places / Villages / City               | /Proper                 | should be  | n as per      |
|      | crafts     | l or team  | Areas / Grama                          | consultation/Continuous | submitted  | the           |
|      | corner     | (3-5)      | panchayat/public                       | monitoring/Information  | bv         | rubrics of    |
|      |            |            | associations/Government                | board                   | individual | scheme        |
|      |            |            | Schemes officers/campus                |                         | to the     | and           |
|      |            |            | ······································ |                         | concerne   | svllabus      |
|      |            |            |  |                         | d          |               |
|      |            |            |  |                         | evaluation |               |

|    |  |   |   |  | authority  |   |
|----|--|---|---|--|--|---|
| 3. | Organic<br>farming and<br>waste<br>management        | May be<br>individua<br>l or team<br>(3-5) | Farmers<br>land/parks/Villages visits<br>/roadside/community area<br>/ College campus                   | Group selection /proper<br>consultation<br>/ Continuous monitoring<br>/Information board | Report<br>should be<br>submitted<br>by<br>individual<br>to the<br>concerne<br>d<br>Evaluation<br>authority | Evaluatio<br>n as per<br>the<br>rubrics of<br>scheme<br>and<br>syllabus |
| 4. | Water<br>conservation:<br>Conservation<br>techniques | May be<br>individua<br>l or team<br>(3-5) | Villages/City<br>Areas/Grama<br>panchayat/public<br>associations/Government<br>Schemes officers /campus | Site selection /proper<br>consultation/Continuous<br>monitoring/Informatio<br>n board    | Report<br>should be<br>submitted<br>by<br>individual<br>to the<br>concerne<br>d<br>Evaluation<br>authority | Evaluatio<br>n as per<br>the<br>rubrics of<br>scheme<br>and<br>syllabus |
| 5. | Food walk:<br>Practices in<br>society                | May be<br>individua<br>l or team<br>(3-5) | Villages/CityAreas/Gram<br>a<br>panchayat/public<br>associations/Government<br>Schemes officers/campus  | Group selection /proper<br>consultation<br>/ Continuous monitoring<br>/Information board | Report<br>should be<br>submitted<br>by<br>individual<br>to the<br>concerne<br>d<br>Evaluation<br>authority | Evaluatio<br>n as per<br>the<br>rubrics of<br>scheme<br>and<br>syllabus |
|    |  |   |   |  | authority  |   |

|  |                |  |          |         |          | MINI     | PROJE     | CT – I    |           |                 |          |    |     |     |
|--|----------------|--|----------|---------|----------|----------|-----------|-----------|-----------|-----------------|----------|----|-----|-----|
| Course Code                              | 22C            | DS48   |          |         |          |          |           |           | CII       | E Marks         |          | 50 | 0   |     |
| L:T:P:S                                  | 0:0:           | 1:0  |          |         |          |          |           |           | SE        | E Marks         |          | 50 | 0   |     |
| Hrs / Week                               | 2              |  |          |         |          |          |           |           | То        | Total Marks 100 |          |    | 00  |     |
| Credits                                  | 01             |  |          |         |          |          |           |           | Exa       | am Houi         | 'S       | 03 | 3   |     |
| <b>Course outcom</b><br>At the end of th | ies:<br>he cou | rse, the student will be able to:                                |          |         |          |          |           |           |           |                 |          |    |     |     |
| 22CDS48.1                                | Арр            | oly the  | knowl    | edge of | approp   | oriate d | omains    | of the S  | Solve rea | al world j      | problems | S  |     |     |
| 22CDS48.2                                | Des            | sign modules for solving the problems identified                 |          |         |          |          |           |           |           |                 |          |    |     |     |
| 22CDS48.3                                | Imp            | mplement modules with a suitable software framework              |          |         |          |          |           |           |           |                 |          |    |     |     |
| 22CDS48.4                                | Ana            | alyze re   | eal woi  | ld prot | olems tł | nrough   | survey    | of existi | ng prob   | lems            |          |    |     |     |
| 22CDS48.5                                | Арр            | oly ethi   | ical pra | actices | and inv  | olve in  | a team    | to exect  | ute a tas | k               |          |    |     |     |
| 22CDS48.6                                | Cor            | nmunio   | cate th  | e work  | throug   | h repor  | rt writin | ng and r  | nanager   | nent pra        | cti      |    |     |     |
| Mapping of Co                            | urse (         | urse Outcomes to Program Outcomes and Program Specific Outcomes: |          |         |          |          |           |           |           |                 |          |    |     |     |
|  | P01            | PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 F        |          |         |          |          |           |           | PSO2      |                 |          |    |     |     |
| 22CDS48.1                                | 3              | 3 3 3 2 3 1 3  |          |         |          |          |           |           | 3         |                 |          |    |     |     |
| 22CDS48.2                                | 3              | 3  | 3        | 2       | 3        | 1        | -         | -         | -         | -               | -        | -  | 3   | 3   |
| 22CDS48.3                                | 3              | 3  | 3        | 2       | 3        | 1        | -         | -         | -         | -               | -        | -  | 3   | 3   |
| 22CDS48.4                                | 3              | 3  | 3        | 2       | 3        | 1        | -         | -         | -         | -               | -        | -  | 3   | 3   |
| 1 776.0548.5                             | -              | -  | -        | -       | -        | -        |           |           |           | -               | -        | -  | 1 3 | 1 3 |

The student shall be capable of identifying a problem related to the field of Computer Science and carry out a mini project on the problem defined. Each student is expected to dothe mini project individually. The work progress towards the project will be reviewed by apanel of experts during the course of the semester. At the completion of a project the student will submit a project report, which will be evaluated by duly appointed examiner(s).

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#### Scope of the Mini project areas, but are not limited to :

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- 1) Data Structure driven applications
- 2) DBMS

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22CDS48.6

- 3) Web Design Technologies
- 4) Data Analytics

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- 5) Java Based Projects
- 6) Digital Design Hardware
- 7) Operating Systems

## CIE Assessment Pattern (50 Marks - Lab)

|    | DDT Lovele | Test (s) | Weekly Assessment |
|----|------------|----------|-------------------|
|    | KDI LEVEIS | 20       | 30                |
| L1 | Remember   | -        | -                 |
| L2 | Understand | 5        | 10                |
| L3 | Apply      | 5        | 10                |
| L4 | Analyze    | 5        | 5                 |
| L5 | Evaluate   | 5        | 5                 |
| L6 | Create     | -        | -                 |
|    |            |          |                   |

| SEE Assessment Pattern (50 Ma | rks – La | ab)               |                                 |   |
|-------------------------------|----------|-------------------|---------------------------------|---|
|                               |          | <b>RBT Levels</b> | Exam Marks<br>Distribution (50) |   |
|                               | L1       | Remember          | -                               | 1 |
|                               | L2       | Understand        | -                               | 1 |
|                               | L3       | Apply             | 15                              | 7 |
|                               | L4       | Analyze           | 15                              | 7 |
|                               | L5       | Evaluate          | 10                              | 7 |
|                               | L6       | Create            | 10                              | 7 |

| NATIONAL SERVICE SCHEME (NSS) |   |  |   |  |                                    |  |                                   |                                |          |  |                    |       |
|-------------------------------|---|--|---|--|------------------------------------|--|-----------------------------------|--------------------------------|----------|--|--------------------|-------|
| Course Code                   | 22NSS3  | 0, 22NS  | S40, 22NSS  | 550, 22NS  | \$60                               |  | CIE Ma<br>(each S                 | rks<br>Semeste                 | r)       | 50   |                    |       |
| L:T:P:S                       | 0:0:0:0   |  |   |  |                                    |  | SEE Ma                            | rks                            |          |  |                    |       |
| Hrs / Week                    | 2   |  |   |  |                                    |  | Total M                           | larks                          |          | 50 x 4 = 200                                     |                    |       |
| Credits                       | 00  |  |   |  | 02                                 |  |                                   |                                |          |  |                    |       |
| Course outcomes:              |   |  |   |  |                                    |  |                                   |                                |          |  |                    |       |
| At the end of the             | course, th  | ourse, the student will be able to:  |   |  |                                    |  |                                   |                                |          |  |                    |       |
| 22NSSX0.1                     | Underst   | Understand the importance of his / her responsibilities towards society.   |   |  |                                    |  |                                   |                                |          |  |                    |       |
| 22NSSX0.2                     | Analyse   | the envi   | ironmental  | and societ   | al problen                         | ns/issue                                 | s and will                        | be able                        | to desig | solutions  | for thesai         | ne.   |
| 22NSSX0.3                     | Evaluate<br>develop   | Evaluate the existing system and to propose practical solutions for the same for sustainable development. Implement government or self-driven projects effectively in the field. |   |  |                                    |  |                                   |                                |          |  |                    |       |
| 22NSSX0.4                     | Develop<br>harmony  | capacit<br>y ingene  | y to meet e<br>eral.  | emergencie   | es and nat                         | tural dis                                | asters &                          | practice                       | nationa  | al integratio                                    | on and soo         | cial  |
| Mapping of Cour               | rse Outco   | mes to   | Program (   | Outcomes   | 5:                                 |  |                                   |                                |          |  |                    |       |
|                               | P01   | P02  | P03   | P04  | P05                                | P06                                      | P07                               | P08                            | P09      | P010   | P011               | P012  |
| 22NSSX0.1                     | -   | -  | -   | -  | -                                  | 3  | -                                 | -                              | 2        | -  | -                  | 1     |
| 22NSSX0.2                     | -   | -  | -   | -  | -                                  | 3  | 3                                 | -                              | 2        | -  | -                  | 1     |
| 22NSSX0.3                     | -   | -  | -   | -  | -                                  | 3  | 3                                 | -                              | 2        | -  | -                  | 1     |
| 22NSSX0.4                     | -   | -  | -   | -  | -                                  | 3  | 3                                 | -                              | 2        | -  | -                  | 1     |
|                               |   |  |   |  |                                    |  |                                   |                                |          |  |                    |       |
| Course Code                   |   |  |   | CON  | TENT                               |  |                                   |                                |          | COs  | Н                  | OURS  |
| 3RD<br>22NSS30                | 1. On<br>Co<br>2. W<br>3. Se  | rganic fa<br>onnectiv<br>aste ma<br>etting of<br>ontribut  | arming, Ind<br>vity for mar<br>inagement-<br>f the inform<br>ion in socia | dian Agric<br>keting<br>Public, Pr<br>nation imp<br>I and ecor | ivate and<br>parting cl            | Past, Pre<br>Govtorg<br>ub for w<br>ues. | sent and<br>ganizatio<br>vomen le | Future<br>n, 5R's.<br>ading to | )        | 22NSS30.1<br>22NSS30.2<br>22NSS30.3<br>22NSS30.4 | .,<br>31<br>,<br>4 | ) HRS |
| 4TH<br>22NSS40                | contribution in social and economic issues.       2203330.4         4. Water conservation techniques -Role of different stakeholders-<br>Implementation.       22NSS40.1,         5. Preparing an actionable business proposal for enhancing the village<br>income and approach for implementation.       22NSS40.2,       30 HRS         6. Helping local schools to achieve good results and enhance their       22NSS40.4       30 HRS   |  |   |  |                                    |  |                                   |                                |          |  | ) HRS              |       |
| 5TH<br>22NSS50                | <ul> <li>7. Developing Sustainable Water management system for rural areas and implementation approaches.</li> <li>8. Contribution to any national level initiative of Government of India.</li> <li>22NSS50.1,</li> <li>22NSS50.2,</li> <li>30 HRS</li> <li>Foreg. Digital India, Skill India, Swachh Bharat, Atma nirbhar Bharath, 22NSS50.3, Make in India, Mudra scheme, Skill development programsetc.</li> <li>9. Spreading public awareness under rural out reach programs. (minimum5programs).</li> </ul> |  |   |  |                                    |  |                                   |                                |          |  | ) HRS              |       |
| 6TH<br>22NSS60                | 10. Or<br>se<br>11. Go<br>in  | ganize l<br>minars.<br>vt. schoo<br>frastruc   | National int<br>(MinimumT<br>ol Rejuvena<br>ture.                         | egration a<br>WO progr<br>tion and h                           | nd social l<br>ams).<br>elping the | harmony<br>em to ach                     | v events/v<br>vieve good          | worksho<br>1                   | pps/     | 22NSS60.1<br>22NSS60.2<br>22NSS60.3<br>22NSS60.4 | ,<br>, 30          | 0 HRS |

## CIE Assessment Pattern (50 Marks - Activity based) -

| CIE component for every semester          | Marks |
|---|-------|
| Presentation -1                           | 10    |
| Selectionoftopic,PHASE-1                  |       |
| Commencement of activit and its progress- | 10    |
|   |       |
| Case study-based Assessment Individual    | 10    |
| performance                               |       |
| Sector wise study and its consolidation   | 10    |
| Videobasedseminarfor10minutesbyeach       | 10    |
| Student at the end of semester with       |       |
| Report.                                   |       |
| Total marks for the course in each        | 50    |
| semester                                  |       |

- Implementation strategies of the project(NSS work).
- The last report should be signed by NSS Officer, the HOD and principal.
- Atlast report should be evaluated by the NSS officer of the institute.
- Finally, the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.

# Suggested Learning Resources:

#### **Reference Books:**

- 1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
- 2. Government of Karnataka, NSS cell, activities reports and its manual.
- 3. Government of India, NSS cell, Activities reports and its manual.

## Pre-requisites to take this Course:

- 1. Students should have a service-oriented mindset and social concern.
- 2. Studentsshouldhavededicationtoworkatanyremoteplace,anytimewithavailable resources and proper time management for the other works.
- 3. Students should be ready to sacrifice some of the time and wishes to achieve service-oriented targets on time.

## Pedagogy:

- In every semester from 3rd semester to 6th semester, each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last, in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.
- State the need for NSS activities and its present relevance in the society and provide real-life examples.
- Support and guide the students for self-planned activities.
- NSS coordinator will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encouragethestudentsforgroupworktoimprovetheircreativeandanalyticalskills.

## **Plan of Action:**

- Student/s in individual or in a group should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.
- At the end of every semester, activity report should be submitted for evaluation.
- Practice Session Description:
  - o Lecture session by NSS Officer
  - Students Presentation on Topics
  - Presentation 1, Selection of topic, PHASE 1
  - Commencement of activity and its progress PHASE 2
  - o Execution of Activity
  - o Case study-based Assessment, Individual performance
  - $\circ\quad$  Sector/ Team wise study and its consolidation
  - Video based seminar for 10minutes by each student at the end of semester with Report.

| SINo | Topic  | Group<br>size                             | Location  |  | Reporting   | Evaluation<br>of the Topic  |
|------|--|---|---|--|---|---|
| 1.   | Organic farming,<br>Indian<br>Agriculture (Past,<br>Present and<br>Future)<br>Connectivity for<br>marketing.                       | May<br>be<br>indivi<br>dual<br>or<br>team | Farmers<br>land/Villages/roadside<br>/Community area/<br>College campus                                 | Site<br>selection/proper<br>consultation/Conti<br>nuous<br>monitoring/Infor<br>mation board  | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>asper the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer  |
| 2.   | Waste<br>management–<br>Public, Private<br>and<br>Govtorganization,<br>5 R's.  | May<br>be<br>indivi<br>dual<br>or<br>team | Villages/CityAreas/Grama<br>panchayat/public<br>associations/Government<br>Schemes officers/<br>campus  | Site<br>selection/proper<br>consultation/Conti<br>nuous<br>monitoring/Infor<br>mation board  | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer |
| 3.   | Setting of the<br>information<br>imparting club<br>for women<br>leading to<br>contribution in<br>social<br>And economic<br>issues. | May<br>be<br>indivi<br>dual<br>or<br>team | Women empowerment<br>groups/ Consulting NGOs &<br>Govt Teams /College campus                            | Group<br>selection/proper<br>consultation/Conti<br>nuous<br>monitoring/Infor<br>mation board | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer |
| 4.   | Water<br>conservation<br>techniques –<br>Role of different<br>stake holders–<br>Implementation.                                    | May<br>be<br>indivi<br>dual<br>or<br>team | Villages/City Areas/Grama<br>panchayat/public<br>associations/Government<br>Schemes officers/<br>campus | Site selection<br>/proper<br>consultation/Conti<br>nuous<br>monitoring/Infor<br>mation board | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer |
| 5.   | Preparing an<br>actionable<br>business<br>proposal for<br>enhancing the<br>village income<br>and approach for<br>implementation.   | May<br>be<br>indivi<br>dual<br>or<br>team | Villages/CityAreas/Grama<br>panchayat/public<br>associations/Government<br>Schemes officers/<br>campus  | Group<br>selection/proper<br>consultation/Conti<br>nuous<br>monitoring/Infor<br>mation board | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer |

| 6.  | Helping loca<br>schools to<br>achieve good<br>results and<br>enhance their<br>enrolment in<br>Higher/<br>technical/vocati<br>onal education.   | May<br>be<br>indivi<br>dual<br>or<br>team | Local government /private/<br>aided schools/Government<br>Schemes officers                              | School<br>selection/proper<br>consultation/<br>Continuous<br>monitoring/Infor<br>mation board   | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer |
|-----|--|---|---|---|---|---|
| 7.  | Developing<br>Sustainable<br>Water<br>management<br>system for rural<br>areas and<br>implementation<br>approaches.   | May<br>be<br>indivi<br>dual<br>or<br>team | Villages/CityAreas/Grama<br>panchayat/public<br>associations/ Government<br>Schemes officers/<br>campus | Site<br>selection/proper<br>consultation/<br>Continuous<br>monitoring/Infor<br>mation board     | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubric sof<br>scheme<br>and<br>syllabus by<br>NSS officer |
| 8.  | Contribution to<br>any national level<br>initiative of<br>Government of<br>India. For eg.<br>Digital India, Skill<br>India,<br>SwachhBharat,<br>AtmanirbharBha<br>rath, Make in<br>India, Mudra<br>scheme, Skill<br>development<br>programs etc. | May<br>be<br>indivi<br>dual<br>or<br>team | Villages/CityAreas/Grama<br>panchayat/public<br>associations/ Government<br>Schemes officers/<br>campus | Group<br>selection/proper<br>consultation/<br>Continuous<br>monitoring<br>/Information<br>board | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>asper the<br>rubrics<br>of scheme<br>and<br>syllabus by<br>NSS officer  |
| 9.  | Spreading public<br>awareness under<br>rural outreach<br>programs.<br>(minimum5prog<br>rams)   | May<br>be<br>indivi<br>dual<br>or<br>team | Villages/CityAreas/Grama<br>panchayat/public<br>associations/ Government<br>Schemes officers/<br>campus | Group<br>selection/proper<br>consultation/<br>Continuous<br>monitoring<br>/Information<br>board | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer |
| 10. | Organize<br>National<br>integration and<br>social harmony<br>events<br>/workshops<br>/seminars.<br>(Minimum 02<br>programs).   | May<br>be<br>indivi<br>dual<br>or<br>team | Villages/CityAreas/Grama<br>panchayat/public<br>associations/Government<br>Schemes officers/<br>campus  | Place<br>selection/proper<br>consultation/Conti<br>nuous monitoring<br>/Information<br>board    | Report should<br>be submitted by<br>individual to the<br>concerned<br>evaluation<br>authority | Evaluation<br>as per the<br>rubrics of<br>scheme<br>and<br>syllabus by<br>NSS officer |

| PHYSICAL EDUCATION (PE) (SPORTS AND ATHLETICS)         |   |   |  |                          |                            |            |            |           |                             |                   |        |      |  |  |
|--|---|---|--|--------------------------|----------------------------|------------|------------|-----------|-----------------------------|-------------------|--------|------|--|--|
| Course Code  | 22PED3  | 80, 22PED   | 40   |                          |                            |            | CIE Ma     | rks       |                             | 50                | 50     |      |  |  |
|  |   |   |  |                          |                            |            | (each s    | emeste    | r)                          |                   |        |      |  |  |
| L:T:P:S  | 0:0:0:0   |   |  |                          |                            |            | SEE Ma     | irks      |                             |                   | 0 400  |      |  |  |
| Hrs / Week   | 2   |   |  |                          |                            |            | Total N    | larks     |                             | 50 x              | 2=100  |      |  |  |
| Credits  | 00  |   |  |                          |                            |            | Exam       | lours     |                             | 02                |        |      |  |  |
| At the end of the course, the student will be able to: |   |   |  |                          |                            |            |            |           |                             |                   |        |      |  |  |
| 22PEDX0.1  | Underst   | and the fu  | ndamenta   | l concepts               | s and skill                | s of Phys  | ical Educ  | ation, He | alth, Nutrition and Fitness |                   |        |      |  |  |
| 22PEDX0.2  | Create c<br>maintair  | onsciousn<br>ning a hea   | ess amon<br>lthy lifesty   | g the stude<br>rle       | ents on He                 | ealth, Fit | ness and ` | Wellness  | s in develo                 | oping and         |        |      |  |  |
| 22PEDX0.3  | Perform<br>regional   | in the sel<br>/state / n  | ected spor<br>ational / in   | ts or athle<br>ternation | etics of stu<br>al levels. | ident's c  | hoice and  | particip  | ate in the                  | competiti         | on at  |      |  |  |
| 22PEDX0.4  | Underst   | and the ro  | les and re   | sponsibili               | ties of org                | ganizatio  | n and adr  | ninistrat | tion of spo                 | orts and ga       | mes    |      |  |  |
| Mapping of (   | Course Outco  | omes to P   | rogram (   | Dutcome                  | s:                         |            | r          |           |                             | 1                 |        |      |  |  |
|  | P01   | P02   | P03  | P04                      | P05                        | P06        | P07        | P08       | P09                         | P010              | P011   | P012 |  |  |
| 22PEDX0.1  | -   | -   | -  | -                        | -                          | 2          | -          | 3         | 3                           | -                 | -      | 2    |  |  |
| 22PEDX0.2  | -   | -   | -  | -                        | -                          | 2          | -          | 3         | 3                           | -                 | -      | 2    |  |  |
| 22PEDX0.3  | -   | -   | -  | -                        | -                          | 2          | -          | 3         | 3                           | -                 | -      | 2    |  |  |
| 221 LDX0.4   |   | _   | _  | _                        | -                          | 2          | _          | 5         | J                           | -                 |        | L    |  |  |
| Semester   |   | CONTENT   |  |                          |                            |            |            |           |                             |                   |        | JRS  |  |  |
|  | Module 1:   |   |  |                          |                            |            |            |           |                             |                   |        |      |  |  |
|  | A. Li:<br>B. Fi<br>C. Fo<br>D. He<br>E. Pr  | festyle,<br>tness<br>ood & Nutr<br>ealth & We<br>re-Fitness   | rition<br>ellness<br>test.   | 22PE<br>22PI             | 22PED30.1,<br>22PED30.2    |            | 5 HRS      |           |                             |                   |        |      |  |  |
| 3RD<br>22PED30   | Module 2:<br>A. W<br>B. St<br>C. Sp<br>D. Ag<br>E. Fl<br>F. Ca  | <b>General I</b><br>arming up<br>rength – P<br>beed – 30 I<br>gility – Shu<br>exibility –<br>ardiovascu | F <b>itness &amp;</b><br>o (Free Har<br>Jush-up / I<br>Mtr Dash<br>uttle Run<br>Sit and Re<br>ilar Endur | 22PE<br>22PI             | 22PED30.2,<br>22PED30.3    |            | 15 HRS     |           |                             |                   |        |      |  |  |
|  | Module 3: Recreational Activities       A. Postural deformities.       B. Stress management.       C. Aerobics.       D. Traditional Games  |   |  |                          |                            |            |            |           |                             | ED30.3,<br>ED30.4 | 10 HRS |      |  |  |
|  | Module 1:I  | Ethics and<br>hics in Spo   | d Moral V  | alues                    |                            |            |            |           | 22PE<br>22PE                | ED40.1,<br>ED40.2 | 5 H    | RS   |  |  |
| 4TH<br>22PED40   | <ul> <li>B. Moral Values in Sports and Games</li> <li>Module 2: Specific Games (Anyone to be selected by the student)</li> <li>A. Volleyball – Attack, Block, Service, Upper Hand Pass and Lower hand Pass.</li> <li>B. Throwball – Service, Receive, Spin attack, Net Drop &amp; Jump throw.</li> <li>C. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus.</li> <li>D. Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.</li> <li>E. Table Tennis – Service (Fore Hand &amp; Back Hand), Receive (Fore Hand&amp; Back Hand), Smash.</li> <li>F. Athletics (Track / Field Events) – Any event as per availability of</li> </ul> |   |  |                          |                            |            |            |           |                             | 22PED40.3         |        | IRS  |  |  |

Module 3: Role of Organization and administration

5 HRS

22PED40.4

#### CIE Assessment Pattern (50 Marks - Practical) -

CIE to be evaluated every semester end based on practical demonstration of Sports and Athletics activities learnt in the semester.

| CIE  | Marks |
|--|-------|
| Participation of student in all the modules  | 10    |
| Quizzes – 2, each of 7.5 marks   | 15    |
| Final presentation / exhibition / Participationin<br>competitions/ practical on specific tasks<br>assigned to the students | 25    |
| Total  | 50    |

## Suggested Learning Resources:

#### **Reference Books:**

- 1. Saha, A.K.Sarir SiksherRitiniti, Rana Publishing House, Kalyani.
- 2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
- 3. Petipus, et. al., Athlete's Guide to Career Planning, Human Kinetics.
- 4. Dharma, P.N.Fundamentals of Trackand Field, Khel SahityaKendra, NewDelhi.
- 5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, NewDelhi.
- 6. VivekThani, Coaching Cricket, Khel Sahitya Kendra, NewDelhi.
- 7. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
- 8. Bandopadhyay, K.SarirSikshaParichay, Classic Publishers, Kolkata
- 9. NaveenJain, Play and Learn Basketball, Khel Sahitya Kendra, NewDelhi.
- 10. DubeyH.C., Basketball, Discovery Publishing House, NewDelhi.
- 11. RachanaJain, Teach Yourself Basketball, Sports Publication.
- 12. JackNagle, Power Pattern Offences for Winning basketball, Parker PublishingCo., NewYork.
- 13. RenuJain, Play and Learn Basketball, Khe lSahitya Kendra, NewDelhi.
- 14. SallyKus, Coaching Volleyball Successfully, Human Kinetics.

| YOGA   |  |           |            |                 |       |     |                   |                |                              |                             |      |        |
|--|--|-----------|------------|-----------------|-------|-----|-------------------|----------------|------------------------------|-----------------------------|------|--------|
| Course Code  | 22YOG3   | 80, 22YOG | 640, 22YO  | G50, 22Y        | OG60  |     | CIE Ma<br>(each S | rks<br>Semeste | r)                           | 50                          | 50   |        |
| L:T:P:S  | 0:0:0:0  |           |            |                 |       |     | SEE Ma            | rks            |                              |                             |      |        |
| Hrs / Week   | 2 Total Marks  |           |            |                 |       |     |                   |                |                              | 50 x 4 = 2                  |      |        |
| Credits  | 00Exam Hours02   |           |            |                 |       |     |                   |                |                              |                             |      |        |
| Course outcomes:<br>At the end of the course, the student will be able to: |  |           |            |                 |       |     |                   |                |                              |                             |      |        |
| 22YOGX0.1  | Use Yogasana practices in an effective manner  |           |            |                 |       |     |                   |                |                              |                             |      |        |
| 22YOGX0.2  | Become familiar with an authentic foundation of Yogic practices  |           |            |                 |       |     |                   |                |                              |                             |      |        |
| 22YOGX0.3  | Practice different Yogic methods such as Surya namaskara, Pranayama and some of the Shat Kriyas  |           |            |                 |       |     |                   |                |                              |                             |      |        |
| 22YOGX0.4  | Use the t  | eachings  | of Patanja | li in daily     | life. |     |                   |                |                              |                             |      |        |
| Mapping of Cou   | rse Outco  | mes to P  | rogram (   | Dutcome         | S:    |     |                   |                |                              |                             |      |        |
|  | P01  | PO2       | P03        | P04             | P05   | P06 | P07               | P08            | P09                          | P010                        | P011 | P012   |
| 22YOGX0.1  | -  | -         | -          | -               | -     | 3   | -                 | -              | -                            | -                           | -    | 1      |
| 22Y0GX0.2  | -  | -         | -          | -               | -     | 3   | -                 | -              | -                            | -                           | -    | 1      |
| 22Y0GX0.3  | -  | -         | -          | -               | -     | 3   | -                 | -              | -                            | -                           | -    | 1      |
| 22Y0GX0.4  | -  | -         | -          | -               | -     | 3   | -                 | -              | -                            | -                           | -    |        |
| Semester /   |  |           |            |                 |       |     |                   |                |                              |                             |      |        |
| <b>Course Code</b>   |  |           |            | CON             | IENI  |     |                   |                |                              | LUS                         | н    | UUKS   |
| 3rd<br>22YOG30   | <ul> <li>history and development. Yoga, its meaning, definitions.Different schools of yoga, importance of prayer</li> <li>Brief introduction of yogic practices for common man: Yogicpractices for common man to promote positive health</li> <li>Rules and regulations: Rules to be followed during yogic practices by practitioner</li> <li>Misconceptions of yoga: Yoga its misconceptions, Difference betweenyogic and non-yogic practices.</li> <li>Surya namaskara:</li> <li>Surya namaskar prayer and its meaning, Need, importance and bene Surya namaskar 12 count, 2rounds</li> <li>Different types of Asanas:</li> <li>Sitting: Padmasana, Vajrasana, Sukhasana</li> <li>Prone line: Bhujangasana, Shalabhasana</li> <li>Curping in a Urikshana, Trikonasana, Ardhakati Chakrasana</li> <li>Prone line: Bhujangasana, Shalabhasana</li> </ul> |           |            |                 |       |     |                   |                | 32 Hrs/<br>mester<br>rs/week |                             |      |        |
| 4TH<br>22YOG40   | Suryanamaskara: Suryanamaskar 12 count,4rounds22Y0G40.1,Brief introduction and importance of:<br>Kapalabhati: Revision of Kapalabhati -40strokes/min3rounds22Y0G40.2,Different types of Asanas:<br>1. Sitting: Paschimottanasana, ArdhaUshtrasana, Vakrasana,<br>AakarnaDhanurasana22Y0G40.3,2. Standing: ParshvaChakrasana, UrdhvaHastothanasana,<br>Hastapadasana22Y0G40.4Total 32 H:<br>Semeste<br>2 Hrs/we3. Prone line: Dhanurasana<br>4. Supine line: Karna Peedasana, Sarvangasana, Chakraasana<br>Pranayama: Chandra Bhedana, Nadishodhana, Surya BhedanaHastapadasana   |           |            |                 |       |     |                   |                |                              | 32 Hrs/<br>mester<br>s/week |      |        |
| 22YOG50  | Brief in   | troductio | on and im  | <b>portance</b> | of:   |     | , ounus           |                |                              |                             | Sei  | mester |

|  | Different typ<br>1. Sitting:<br>Yogamu<br>2. Standin | <b>es of Asanas</b> :<br>Yogamudra in Padmasana, Vibhakta P<br>ıdra in Vajrasana<br>g: Parivritta Trikonasana, Utkatasana, | aschimottanasana,<br>Parshvakonasana | 22YOG50.1,<br>22YOG50.2,<br>22YOG50.3,<br>22YOG50.4 | 2 Hrs/week    |  |  |  |
|--|--|--|--------------------------------------|---|---------------|--|--|--|
|  | 3. Prone li<br>Rajakar                               | ne: Padangushtha Dhanurasana, Poor   | na Bhujangasana /                    |   |               |  |  |  |
|  | 4. Supine l  | line: Navasana/Noukasana, Pavanamu   | ıktasana, Sarvangasan                |   |               |  |  |  |
|  | Patanjali'sAs  | htangaYoga: Pratyahara, Dharana  | -                                    |   |               |  |  |  |
|  | Pranayama:   | Ujjayı, Sheetali, Sheektari  |                                      |   |               |  |  |  |
|  | Kapalabhati:   | Revision of Kapalabhati –80 strokes/   | min3rounds                           |   |               |  |  |  |
|  | Brief introdu  | iction and importance of:  |                                      |   |               |  |  |  |
|  | Different typ  | es of Asanas:<br>Bakasana, Hanumanasana, Ekanada P   | aiakanotasana                        | 22Y0G60.1,<br>22Y0G60.2                             |               |  |  |  |
|  | 2. Standin   | g: Parivritta Trikonasana, Utkatasana,   | Parshvakonasana                      | 22YOG60.3,  |               |  |  |  |
| (TH  | 3. Supine l  | ine: Setubandhasana, Shavasanaa (Re  | laxation posture)                    | 22YOG60.4   | Total 32 Hrs/ |  |  |  |
| 22Y0G60  | Patanjali'sAs  | <b>shtangaYoga</b> : Dhyana (Meditation), Sa   | amadhi                               |   | Semester      |  |  |  |
|  | Pranayama:   | Bhastrika, Bhramari, Ujjai   |                                      |   | 2 Hrs/week    |  |  |  |
|  | Shat Kriyas:J  | alaneti and sutraneti, Sheetkarma Kap  | oalabhati                            |   |               |  |  |  |
|  |  |  |                                      |   |               |  |  |  |
|  |  |  |                                      |   |               |  |  |  |
|  |  |  |                                      | L   |               |  |  |  |
| CIE Assessmer  | t Pattern (50 M                                      | arks – Practical) –  |                                      |   |               |  |  |  |
| CIE to be ev   | valuated every se                                    | mester based on practical demonstra  | tion of Yogasana lear                | nt in the semester                                  | and           |  |  |  |
| internar tes   | is (objective type                                   |  | Marks                                | 1   |               |  |  |  |
|  |  | Avg of Test 1 and Test 2   | 25                                   |   |               |  |  |  |
|  |  | Demonstration of Yogasana  | 25                                   |   |               |  |  |  |
|  |  | Total  | 50                                   |   |               |  |  |  |
| Suggested Lea  | rning Resource                                       | 25:  |                                      |   |               |  |  |  |
| 1. Swami   | Kuvulyananda:  | Asma (Kavalyadhama, Lonavala)  |                                      |   |               |  |  |  |
| 2. Tiwari, O P: Asana Why and How  |  |  |                                      |   |               |  |  |  |
| 3. Ajitkumar: Yoga Pravesha (Kannada)  |  |  |                                      |   |               |  |  |  |
| 4. Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha(Bihar School of yoga, Munger)<br>5. Swami Satyananda Saraswati: Surya Namaskar(Bihar School of yoga, Munger) |  |  |                                      |   |               |  |  |  |
| 6. Nagendra H R: The art and science of Pranayama  |  |  |                                      |   |               |  |  |  |
| 7. Tiruka: Shatkriyegalu (Kannada)   |  |  |                                      |   |               |  |  |  |
| 8. Iyenga  | r B K S: Yoga Pra<br>r B K S: Light on               | idipika (Kannada)<br>Yoga (English)  |                                      |   |               |  |  |  |
| Web links and  | Video Lectures                                       | e-Resources):  |                                      |   |               |  |  |  |
| 1. https:/   | /youtu.be/KB-TY                                      | /lgd1wE  |                                      |   |               |  |  |  |
| 2. https:/   | /voutu.be/aa-TG                                      | 0Wg1Ls   |                                      |   |               |  |  |  |

|  | BASIC APPLIED MATHEMATICS-II<br>(Common to all Branches) |                  |   |                  |                        |           |   |          |               |         |                  |            |                                   |             |
|--|--|------------------|---|------------------|------------------------|-----------|---|----------|---------------|---------|------------------|------------|-----------------------------------|-------------|
| Course   | e Code   | 22DM/            | AT41  |                  |                        | (comi     | 1011 10 1                                     |          | CIE Marks 100 |         |                  |            |                                   |             |
| L:T:P:S  | <u>s couc</u>  | 0:0:0:0:0        | )   |                  |                        |           |   |          | SEE           | Mark    | 3                |            |                                   |             |
| Hrs. /   | y<br>Week  | 3                |   |                  |                        |           |   |          | Total Marks   |         |                  |            |                                   | 100         |
| Credit   | s  | 00               |   |                  |                        |           |   |          | Fyam Hours    |         |                  |            |                                   |             |
| Course   | e outcomes   |                  |   |                  |                        |           |   |          | Linu          |         | uib              |            |                                   |             |
| At the   | end of the co  | ourse, th        | e stude   | ent will         | be able to             | :         |   |          |               |         |                  |            |                                   |             |
| 22DN   | MAT41.1  | Gain kr          | nowled  | ge of ba         | isic opera             | tions of  | vectors                                       | 5        |               |         |                  |            |                                   |             |
| 22DN   | MAT41.2  | Use cui          | rl and d  | livergei         | nce of a ve            | ector fur | nction in                                     | n three  | e dime        | ensio   | ns               |            |                                   |             |
| 22DN   | MAT41.3  | Develo           | p the a   | bility to        | solve hig              | her ord   | er Line                                       | ar diffe | erenti        | ial equ | uations          |            |                                   |             |
| 22DN   | MAT41.4  | Know t<br>bounda | Know the basic concepts of Laplace transform to solve the Periodic functions and also solve initial and poundary value problems using Laplace transform method. |                  |                        |           |   |          |               |         |                  |            |                                   |             |
| Маррі  | ing of Cour  | se Outc          | omest   | to Prog          | gram Out               | tcomes    | :   |          |               |         |                  |            |                                   |             |
|  | 0  | P01              | P02   | PO3              | P04                    | P05       | P06   | PO       | 7             | P08     | P09              | P010       | P011                              | P012        |
| 22DI   | MAT41.1  | 3                | 3   | -                | -                      | -         | -   | -        |               | -       | -                | -          |                                   | -           |
| 22DI   | MAT41.2  | 3                | 3   | -                | -                      | -         | -   | -        |               | -       | -                | -          | -                                 | -           |
| 22DI   | MAT41.3  | 3                | 3   | -                | -                      | -         | -   | -        |               | -       | -                | -          | -                                 | -           |
| 22DI   | MAT41.4  | 3                | 3   | -                | -                      | -         | -   | -        |               | -       | -                | -          | -                                 | -           |
|  |  | 1                |   |                  |                        | 1         |   |          | I             |         |                  |            |                                   | 1           |
| MO   | DULE-1   | VECTO            | ORS   |                  |                        |           |   |          |               |         |                  |            | 22DMAT41.1                        | 8 Hours     |
| Definit  | ion of scala   | r and vec        | tor, Ve   | ctor ad          | dition, Su             | btractio  | n   |          |               |         |                  |            |                                   | •           |
| and Multiplication-Dot product, Cross product, Scalar triple product. Orthogonal, Co-planar and Angle between vectors-Problems.  |  |                  |   |                  |                        |           |   |          |               |         |                  |            |                                   |             |
| Text Bo  | ook  | Text Bo          | Fext Book 1: 3.1, 3.5, 3.6, 3.9, Text Book 2: 7.1, 9.2, 9.3, 9.4.   |                  |                        |           |   |          |               |         |                  |            |                                   |             |
| MODU   | JLE-2  | VECTO            | VECTOR DIFFERENTIATION 22DMAT41.2 8 Hours   |                  |                        |           |   |          |               |         |                  |            |                                   |             |
| Vector differential operator-Gradient of a scalar function, Divergence of a vector function, Curl of a vector function-Problems. |  |                  |   |                  |                        |           |   |          |               |         |                  |            |                                   |             |
| Soleno   | idal and irro  | otational        | vector  | fields-l         | Problems.              |           | _   |          |               |         |                  |            |                                   |             |
| Text Bo  | ook  | Text B           | ook 1:  | 8.5, 8.6         | , 8.7, Tex             | t Book 2  | 2: 9.7, 9                                     | 9.8, 9.9 | ).            |         |                  |            |                                   |             |
| MODU   | JLE-3  | LINEA            | R DIFF  | FEREN            | FIAL EQU               | JATION    | IS WIT  | H CON    | ISTA          | NT C    | OEFFI            | CIENTS     | 22DMAT41.3                        | 8 Hours     |
| Solutio  | on of initial $s(ax + b)$                                | and bou          | ndary   | value p          | oroblems,              | Invers    | e differ                                      | ential   | opera         | ator t  | echniq           | ues for tl | ne functions-e <sup>ax</sup> , si | n(ax + b)   |
|  | $\frac{3(ax + b)}{1}$                                    |                  | 1.1   | 100.1            |                        | 12.0      |   |          |               |         |                  |            |                                   |             |
| Text Bo  |  | I ext B          | 00K 1:  | 13.3, 1          | 3.4, 13.5,             | 13.6,     |   |          |               |         |                  |            | 22DMAT41 4                        | 0.11        |
| MODU   | JLE-4  |                  | CE IR   | ANSFC            |                        |           | . D   | D.       |               |         | <u>f</u> I and a |            |                                   | 8 Hours     |
| proof  | Periodic fu  | nctions (        | withou  | t proof          | hentary h<br>J-problen | unctions  | S-Proble                                      | ems. P   | roper         | ties o  | і саріа          | ce transic | orms (Snitting prope              | rty-without |
| Text B   | nok  | Text B           | $\frac{1}{1}$   | $\frac{1}{2132}$ | 14215                  | Text Bo   | $nok 2 \cdot 6$                               | 51       |               |         |                  |            |                                   |             |
| MODU   | JLE-5  | INVER            | SE LAI  | PLACE            | TRANSF                 | ORM       | <u>, , , , , , , , , , , , , , , , , , , </u> |          |               |         |                  |            | 22DMAT41.4                        | 8 Hours     |
| Inverse  | e Laplace Tr   | ansform          | by par  | tial frac        | ctions-Pro             | blems.    | Solution                                      | n of lin | ear d         | liffere | ntial eq         | uations u  | sing                              |             |
| Laplac   | e Transform  | s-Proble         | ems.  | 24.4.2           |                        | · D 1     | 2 ( 1   |          |               |         |                  | -          | -                                 |             |
| Text Bo  | 00K  | I ext B          | 00K I:  | 21.12,           | 21.15, Ie              | Xt BOOK   | 2:6.4.  |          |               |         |                  |            |                                   |             |
| CIE As   | sessment P   | attern (         | 50 X 2  | =100 M           | larks – T              | heory)    |   |          | 1             |         |                  |            |                                   |             |
|  |  |                  |   | <u> </u>         | Marks Dis              | stributi  | on  |          |               |         |                  |            |                                   |             |
| RBT Levels   |  | Te               | st (s)  | Qualit           | tative                 | M         | CQ's  |          |               |         |                  |            |                                   |             |
|  |  |                  |   | Assessn          | nent (s)<br>-          |           |   |          |               |         |                  |            |                                   |             |
|  |  |                  |   | 25               | 1                      | 5         | ]   | 10       |               |         |                  |            |                                   |             |
|  | Kemembe  | er               |   | 5                |                        |           |   | -        | -             |         |                  |            |                                   |             |
| L2 Understand  |  |                  |   | 5                | -                      | )<br>-    |   | -        | -             |         |                  |            |                                   |             |
|  | Apply 10 5   |                  |   |                  |                        | 1         | LU  |          |               |         |                  |            |                                   |             |
|  | Analyze  |                  |   |                  |                        |           |   |          |               |         |                  |            |                                   |             |
|  | Evaluate   |                  |   | 2.5              |                        |           |   | -        |               |         |                  |            |                                   |             |
| LO   | Create   |                  |   |                  |                        |           |   |          |               |         |                  |            |                                   |             |

## Suggested Learning Resources:

#### **Text Books:**

- 1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.
- 2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, Reprint 2016, ISBN: 9788126554232.

#### **Reference Books:**

- 1) Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.
- 2) B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.
- 3) H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.
- 4) N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

## Web links and Video Lectures (e-Resources):

1)https://youtu.be/SaNDPSk1UVM?si=FRxMnRi1btCUIscK

2)https://youtu.be/HxrLu-qRJKc?si=pKc9XOCllBx-H4Wp

3)https://youtu.be/ma1QmE1SH3I?si=Hoo3\_cjiIds203os

4)https://youtu.be/TKBXey91Gc4?si=JjZfQvJxdxN8I6YQ

5)https://youtu.be/1THkFmuIPXM?si=pc9VvmZ-9cQe\_Wr\_

6)https://youtu.be/m7jH0jfRf2I?si=00EWttfQhieJ9wih

7)https://youtu.be/qFnoRfZknBY?si=BeMrhMF3LML4hBGa

8)https://youtu.be/n9XP6pljtw8?si=3gU-XKgt5JIZe9LE

## Activity-Based Learning (Suggested Activities in Class)/Practical Based Learning:

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming Codes
  - Organizing Group wise discussions on related topics
  - Seminars

#### **APPENDIX A**

#### List of Assessment Patterns

| SLNO | Assessments   |
|------|---|
| 1    | Continuous Internal Evaluation                                  |
| 2    | Assignments   |
| 3    | Online/Offline Quizzes  |
| 4    | Mini Projects/ Projects   |
| 5    | Group Discussions   |
| 6    | Case studies  |
| 7    | Practical Activities/Problem Solving Exercises                  |
| 8    | Practical Orientation on design thinking, Creative & Innovation |
| 9    | Participatory & Industry-Integrated Activities                  |
| 10   | Class Presentations   |

#### **APPENDIX B**

#### **Outcome Based Education**

**Outcome-based education** (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead classes, opportunities, and assessments should all help students achieve the specified outcomes.

There are three educational Outcomes as defined by the National Board of Accreditation:

**Program Educational Objectives:** The Educational objectives of an engineering degree program are the statements that describe the expected achievements of graduate in their career and also in particular what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

**Program Outcomes:** What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

**Course Outcome:** The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

## **Mapping of Outcomes**

COURSE OUTCOME PROGGRAM OUTCOME PROGRAM EDUCATIONAL OBJECTIVES DEPARTMENTAL MISSION DEPARTMENTAL VISION

#### **APPENDIX C**

## The Graduate Attributes of NBA

| Engineering<br>knowledge                         | Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
|--|--|
| Problem analysis                                 | Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| Design/development<br>of solutions               | Design solutions for complex engineering problems and design system components or processes<br>that meet the specified needs with appropriate consideration for the public health and safety, and<br>the cultural, societal, and environmental considerations.   |
| Conduct<br>investigations of<br>complex problems | The problems that cannot be solved by straight forward application of knowledge, theories and techniques applicable to the engineering discipline that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions that require consideration of appropriate constraints/requirements not explicitly given in the problem statement (like: cost, power requirement, durability, product life, etc.) which need to be defined (modeled) within appropriate mathematical framework that often require use of modern computational concepts and tools. |
| Modern tool usage                                | Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.   |
| The engineer and society                         | Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.   |
| Environment and sustainability                   | Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.  |
| Ethics   | Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.   |
| Individual and team<br>work                      | Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.  |
| Communication                                    | Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.   |
| Project management<br>and finance                | Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.  |
| Life-long learning                               | Recognize the need for, and have the preparation and ability to engage in independent and life-<br>long learning in the broadest context of technological change.  |

#### **APPENDIX D**

#### **BLOOM'S TAXONOMY**

**Bloom's taxonomy** is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.




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