**ANNAMALAI UNIVERSITY**

**221- B.Sc. Data Science**

Programme Structure and Scheme of Examination (under CBCS)

(Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Code | Part | Study Components & Course Title | Credit | Hours/Week | Maximum Marks |
| CIA | ESE | Total |
|  |  | SEMESTER – I |  |  |  |  |  |
| 23UTAML11/23UHINL11/23UFREL11 | I | Language– I: பொதுதமிழ்-I: தமிழிலக்கியவரலாறு-1/Hindi-I/French-I | 3 | 6 | 25 | 75 | 100 |
| 23UENGL12 | II | General English – I | 3 | 6 | 25 | 75 | 100 |
| 23UDSCC13 | III | Core – I:Python Programming | 5 | 5 | 25 | 75 | 100 |
| 23UDSCP14 | Core – II: Practical –I:Python Lab | 5 | 4 | 25 | 75 | 100 |
| 23UMAFE15 | Elective - I Mathematical Foundations-I | 2 | 3 | 25 | 75 | 100 |
| 23UTAMB1623UTAMA16 | IV | Skill Enhancement Course – I\*NME- I/Basic Tamil – I /Advanced Tamil – I | 1 | 2 | 25 | 75 | 100 |
| 23UDSCF17 | Foundation Course**:**Problem Solving Technique | 2 | 2 | 25 | 75 | 100 |
|  |  | Total | 23 | 30 |  |  | 700 |
|  |  | SEMESTER – II |  |  |  |  |  |
| 23UTAML21/23UHINL21/23UFREL21 | I | Language– II:பொதுதமிழ் -II: தமிழிலக்கியவரலாறு-2/Hindi-II/French-II | 3 | 6 | 25 | 75 | 100 |
| 23UENGL22 | II | General English – II | 3 | 6 | 25 | 75 | 100 |
| 23UDSCC23 | III | Core – III: Data Structures and Algorithms | 5 | 5 | 25 | 75 | 100 |
| 23UDSCP24 | Core - IV: Practical II:Data Structures and Algorithms using Python Lab | 5 | 5 | 25 | 75 | 100 |
| 23UMAFE25 | Elective – II:Mathematical Foundations-II | 3 | 4 | 25 | 75 | 100 |
| 23UTAMB2623UTAMA26 | IV | Skill Enhancement Course - II \*NME – II /Basic Tamil – II /Advanced Tamil - II | 2 | 2 | 25 | 75 | 100 |
| 23USECG27 | Skill Enhancement Course - III:Internet and its Applications (Common Paper) | 2 | 2 | 25 | 75 | 100 |
| 23UNMSD01 | Language Proficiency for employability: Overview of English Communication\*\* | 2 | - | 25 | 75 | 100 |
|  |  | Total | 25 | 30 |  |  | 800 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Code | Part | Study Components & Course Title | Credit | Hours/Week | Maximum Marks |
| CIA | ESE | Total |
|  |  | SEMESTER – III |  |  |  |  |  |
| 23UTAML31/23UHINL31/23UFREL31 | I | Language– III: பொதுதமிழ்-III: தமிழகவரலாறும், பண்பாடும்/Hindi-III/French-III | 3 | 6 | 25 | 75 | 100 |
| 23UENGL32 | II | General English – III | 3 | 6 | 25 | 75 | 100 |
| 23UDSCC33 | III | Core – V: Data Science | 5 | 5 | 25 | 75 | 100 |
| 23UDSCP34 | Core – VI: Practical –III:Data Science Lab | 5 | 5 | 25 | 75 | 100 |
| 23UDSCE35 | Elective – III:E-COMMERCE | 3 | 4 | 25 | 75 | 100 |
| 23UDSCS36 | IV | Skill Enhancement Course – IV:Organizational Behavior | 1 | 1 | 25 | 75 | 100 |
| 23UDSCS37 | Skill Enhancement Course – V:PHP Programming | 2 | 2 | 25 | 75 | 100 |
|  | Environmental Studies | - | 1 | - | - | - |
|  |  | Total | 22 | 30 |  |  | 700 |
|  |  | SEMESTER – IV |  |  |  |  |  |
| 23UTAML41/23UHINL41/23UFREL41 | I | Language– IV:பொதுதமிழ் -IV: **தமிழும்அறிவியலும்** /Hindi-IV/French-IV | 3 | 6 | 25 | 75 | 100 |
| 23UENGL42 | II | General English – IV | 3 | 6 | 25 | 75 | 100 |
| 23UDSCC43 | III | Core – VII: Object Oriented Programming with Java | 5 | 5 | 25 | 75 | 100 |
| 23UDSCP44 | Core - VIII: Practical IV:Object Oriented Programming with Java Lab | 5 | 4 | 25 | 75 | 100 |
| 23UDSCE45 | Elective – IV:Big Data Technologies | 3 | 4 | 25 | 75 | 100 |
| 23UDSCS46 | IV | Skill Enhancement Course – VI:Software Testing | 2 | 2 | 25 | 75 | 100 |
| 23UDSCS47 | Skill Enhancement Course-VII:Multimedia Systems | 2 | 2 | 25 | 75 | 100 |
| 23UEVSG48 | Environmental Studies | 2 | 1 | 25 | 75 | 100 |
|  |  | Total | 25 | 30 |  |  | 800 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Code | Part | Study Components & Course Title | Credit | Hours/Week | Maximum Marks |
| CIA | ESE | Total |
|  |  | SEMESTER – V |  |  |  |  |  |
| 23UDSCC51 | III | Core – IX: Relational Database Management System | 4 | 5 | 25 | 75 | 100 |
| 23UDSCP52 | Core – X: RDBMS Lab using ORACLE | 4 | 5 | 25 | 75 | 100 |
| 23UDSCC53 | Core – XI: Machine Learning | 4 | 5 | 25 | 75 | 100 |
| 23UDSCD54 | Core – XII: Project with Viva Voce  | 4 | 5 | 25 | 75 | 100 |
| 23UDSCE55-123UDSCE55-223UDSCE55-3 | **Elective – V:**Social Network AnalysisSocial Media ManagementSocial Media Marketing | 3 | 4 | 25 | 75 | 100 |
| 23UDSCE56-123UDSCE56-223UDSCE56-3 | **Elective – VI:**Cloud Computing FundamentalsCloud ServicesInterfacing with Virtualization | 3 | 4 | 25 | 75 | 100 |
| 23UVALG57 | IV | Value Education | 2 | 2 | 25 | 75 | 100 |
| 23UDSCI58 | Summer Internship++ | 2 | - | 25 | 75 | 100 |
|  |  | Total | 26 | 30 |  |  | 800 |
|  |  | SEMESTER – VI |  |  |  |  |  |
| 23UDSCC61 | I | Core – XIII: IoT and Cloud Technologies | 4 | 6 | 25 | 75 | 100 |
| 23UDSCP62 | II | Core – XIV: IoT and Cloud Technologies Lab | 4 | 6 | 25 | 75 | 100 |
| 23UDSCC63 | III | Core – XV: Artificial Intelligence | 4 | 6 | 25 | 75 | 100 |
| 23UDSCE64-123UDSCE64-2 | Elective – VII:Network TechnologiesData Security | 3 | 5 | 25 | 75 | 100 |
| 23UDSCE65-123UDSCE65-2 | IV | Elective – VIII:Data Mining and Warehousing (or)Master Web Designing in Photoshop | 3 | 5 | 25 | 75 | 100 |
| 23UDSCF66 | Professional Competency Skill:Quantitative Aptitude | 2 | 2 | 25 | 75 | 100 |
| 23UDSCX67 | V | Extension Activity | 1 | - | 100 |  | 100 |
|  |  | Total | 21 | 30 |  |  | 700 |
|  |  | Grand Total | 142 |  |  |  | 4500 |
| NME courses offered to other Department |
| Semester – I | 23UDSCN16 | Fundamentals of Information Technology | 2 | 2 | 25 | 75 | 100 |
| Semester - II | 23UDSCN26 | Computer Fundamentals | 2 | 2 | 25 | 75 | 100 |

\* PART-IV: NME / Basic Tamil / Advanced Tamil (Any one)

Students who have not studied Tamil upto12th Standard and have taken any Language other than Tamil in Part-I, must choose Basic Tamil-I in First Semester & Basic Tamil-II in Second Semester.

Students who have studied Tamil upto10th& 12thStandardand have taken any Language other than Tamil in Part-I, must choose Advanced Tamil-I in First Semester and Advanced Tamil-II in Second Semester.

\*\* The course “23UNMSD01: Overview of English Communication” is to be taught by the experts from Naan Mudhalvan Scheme team. However, the faculty members of Department of English should coordinate with the Naan Mudhalvan Scheme team for smooth conduct of this course.

++Students should complete two weeks of internship before the commencement of V semester.

**Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System**

**for all UG courses including Lab Hours**

**First Year – Semester-I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part I | Language – Tamil  | 3 | 6 |
| Part II | English | 3 | 6 |
| Part III | Core Theory, Practical & Elective Courses  | 13 | 14 |
| Part IV | Skill Enhancement Course SEC-1 (NME-I) | 2 | 2 |
| Foundation Course | 2 | 2 |
|  |  | **23** | **30** |

**Semester-II**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part I | Language – Tamil | 3 | 6 |
| Part II |  English | 3 | 6 |
| Part III | Core Theory, Practical & Elective Courses  | 13 | 14 |
| Part IV | Skill Enhancement Course -SEC-2 (NME-II) | 2 | 2 |
| Skill Enhancement Course -SEC-3 (Discipline / Subject Specific) | 2 | 2 |
|  |  | **23** | **30** |

**Second Year – Semester-III**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part I | Language - Tamil | 3 | 6 |
| Part II |  English | 3 | 6 |
| Part III | Core Theory, Practical & Elective Courses | 13 | 14 |
| Part IV | Skill Enhancement Course -SEC-4 (Entrepreneurial Based) | 1 | 1 |
| Skill Enhancement Course -SEC-5 (Discipline / Subject Specific) | 2 | 2 |
|  E.V.S  | - | 1 |
|  |  | **22** | **30** |

**Semester-IV**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part I | Language - Tamil | 3 | 6 |
| Part II |  English | 3 | 6 |
| Part III | Core Theory, Practical & Elective Courses | 13 | 13 |
| Part IV | Skill Enhancement Course -SEC-6 (Discipline / Subject Specific) | 2 | 2 |
| Skill Enhancement Course -SEC-7 (Discipline / Subject Specific) | 2 | 2 |
|  E.V.S  | 2 | 1 |
|  |  | **25** | **30** |

**Third Year**

**Semester-V**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part III | Core Theory, Practical, Project & Elective Courses | 22 | 28 |
| Part IV | Value Education  | 2 | 2 |
| Internship / Industrial Visit / Field Visit | 2 | - |
|  |  | **26** | **30** |

**Semester-VI**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part III | Core Theory, Practical & Elective Courses | 18 | 28 |
| Part IV | Professional Competency Skill | 2 | 2 |
| Part V | Extension Activity | 1 | - |
|  |  | **21** | **30** |

**Consolidated Semester wise and Component wise Credit distribution**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parts**  | **Sem I** | **Sem II** | **Sem III** | **Sem IV** | **Sem V** | **Sem VI** | **Total Credits** |
| **Part I** | 3 | 3 | 3 | 3 | - | - | 12 |
| **Part II** | 3 | 3 | 3 | 3 | - | - | 12 |
| **Part III** | 13 | 13 | 13 | 13 | 22 | 18 | 92 |
| **Part IV**  | 4 | 4 | 3 | 6 | 4 | 2 | 23 |
| **Part V** | - | - | - | - | - | 1 | 1 |
| **Total** | 23 | 23 | 22 | 25 | 26 | 21 | **140** |

**\*Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components Part IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

**CREDIT DISTRIBUTION FOR U.G. PROGRAMME**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Part** | **Course Details** | **No. of Courses** | **Credit per course** | **Total****Credits** |
| **Part I** | Tamil | 4 | 3 | 12 |
| **Part II** | English | 4 | 3 | 12 |
| **Part III** | Core Courses  | 15 | 4/5 | 68 |
| Elective Courses: Generic / Discipline Specific (3 or 2+1 Credits) | 8 | 3 | 24 |
| **Part I, II and III Credits**  | 116 |
| **Part IV** | Skill Enhancement Courses / NME / Language Courses | 7 | 1/2 | 15 |
| Professional Competency Skill Course | 1 | 2 | 2 |
| Environmental Science (EVS) | 1 | 2 | 2 |
| Value Education  | 1 | 2 | 2 |
| Internship | 1 | 2 | 2 |
| **Part IV Credits** | **23** |
| **Part V** | Extension Activity (NSS / NCC / Physical Education) | 1 | 1 | 1 |
| **Total Credits for the UG Programme**  | **140** |

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| --- |
| **Methods of Evaluation** |
| **Internal Evaluation** | Continuous Internal Assessment Test | 25 Marks |
| Assignments |
| Seminars |
| Attendance and Class Participation |
| **External Evaluation** | End Semester Examination | 75 Marks |
|  | Total | 100 Marks |
| **Methods of Assessment** |
| **Recall (K1)** | Simple definitions, MCQ, Recall steps, Concept definitions |
| **Understand/Comprehend (K2)** | MCQ, True/False, Short essays, Concept explanations, Short summary or overview |
| **Application (K3)** | Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain |
| **Analyze(K4)** | Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge |
| **Evaluate(K5)** | Longer essay/Evaluation essay, Critique or justify with pros and cons |
| **Create(K6)** | Check knowledge in specific or off beat situations, Discussion, Debating or Presentations |

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| --- | --- |
| **Programme Outcomes:** | **PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study**PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.**PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.**PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation**PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team**PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.**PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability to embrace moral/ethical values in conducting one’s life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demon starting the ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.**PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling. |
| **Programme Specific Outcomes:** | **PSO1**: To enable students to apply basic microeconomic, macroeconomic and monetary concepts and theories in real life and decision making.**PSO 2**: To sensitize students to various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment.**PSO 3**: To familiarize students to the concepts and theories related to Finance, Investments and Modern Marketing.**PSO 4**: Evaluate various social and economic problems in the society and develop answer to the problems as global citizens.**PSO 5:** Enhance skills of analytical and critical thinking to analyze effectiveness of economic policies. |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO 1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **PSO 1** | Y | Y | Y | Y | Y | Y | Y | Y |
| **PSO 2** | Y | Y | Y | Y | Y | Y | Y | Y |
| **PSO3** | Y | Y | Y | Y | Y | Y | Y | Y |
| **PSO 4** | Y | Y | Y | Y | Y | Y | Y | Y |
| **PSO 5** | Y | Y | Y | Y | Y | Y | Y | Y |

 **3 – Strong, 2- Medium, 1- Low**

**FIRST YEAR –SEMESTER- I**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Title of the Course** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| 23UDSCC13 | Python Programming | **CCI** | 5 | - | - | I | 5 | 25 | 75 | 100 |
| **Learning Objectives** |  |
| **LO1** | To make students understand the concepts of Python programming. |
| **LO2** | To apply the OOPs concept in PYTHON programming. |
| **LO3** | To impart knowledge on demand and supply concepts |
| **LO4** | To make the students learn best practices in PYTHON programming |
| **LO5** | To know the costs and profit maximization |
| **UNIT** | **Contents** | **No. of Hours** |
| I | **Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods. | **15** |
| II | **Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements**.** | **15** |
| III | **Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings:** String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules. | **15** |
| IV | **Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries. | **15** |
| V | **Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files. | **15** |
| **TOTAL HOURS** | **75** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will  |
| CO1 | * Learn the basics of python, Do simple programs on python,

Learn how to use an array. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | * Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | * Work with List, tuples and dictionary, Write program using list, tuples and dictionary.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Usage of File handlings in python, Concept of reading and writing files, Do programs using files. | PO1, PO2, PO3, PO4, PO5, PO6 |

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| **Textbooks** |
| 1 | Reema Thareja, “Python Programming using problem solving approach”, First Edition, 2017, Oxford University Press. |
| 2 | Dr. R. Nageswara Rao, “Core Python Programming”, First Edition, 2017, Dream tech Publishers.  |
| **Reference Books** |
| 1. | VamsiKurama, “Python Programming: A Modern Approach”, Pearson Education. |
| 2. | Mark Lutz, ”Learning Python”, Orielly. |
|  3. | Adam Stewarts, “Python Programming”, Online. |
| 4. | Fabio Nelli, “Python Data Analytics”, APress. |
| 5. | Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication. |
| **Web Resources** |
| 1. | <https://www.programiz.com/python-programming> |
| 2. | <https://www.guru99.com/python-tutorials.html> |
| 3. | <https://www.w3schools.com/python/python_intro.asp> |
| 4. | https://www.geeksforgeeks.org/python-programming-language/ |
| 5. | https://en.wikipedia.org/wiki/Python\_(programming\_language) |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | 2 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightage of course contributed to each PSO** | 15 | 14 | 15 | 15 | 13 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Title of the Course** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCP14** | Python LAB | **CCII** | **-** | **-** | **5** | **I** | **5** | **25** | **75** | **100** |
| **Course Objectives**:1. Be able to design and program Python applications.
2. Be able to create loops and decision statements in Python.
3. Be able to work with functions and pass arguments in Python.
4. Be able to build and package Python modules for reusability.
5. Be able to read and write files in Python.
 |
| LAB EXERCISES | **Required Hours** |
| 1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.
 | **75** |
| **Course Outcomes** |
| On completion of this course, students will |
| CO1 | Demonstrate the understanding of syntax and semantics of |
| CO2 | Identify the problem and solve using PYTHON programming techniques. |
| CO3 | Identify suitable programming constructs for problem solving. |
| CO4 | Analyze various concepts of PYTHON language to solve the problem in an efficient way.  |
| CO5 | Develop a PYTHON program for a given problem and test for its correctness. |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 1 | 3 | 2 | 3 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | 2 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightage of course contributed to each PSO** | 15 | 15 | 13 | 15 | 13 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |
| --- | --- | --- |
| SEMESTER: IELECTIVE: I | **23UMAFE15****MATHEMATICAL FOUNDATIONS – I** | CREDIT: 3HOURS: 4/W |

**UNIT-I: SYMBOLIC LOGIC**

Proposition, Logical operators, conjunction, disjunction, negation, conditional and Bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

**UNIT-II: SET THEORY**

Sets, set operations, Venn diagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets

Functions: Types of Functions, Composition of Functions.

**UNIT-III: BINARY OPERATIONS**

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

**UNIT-IV: DIFFERENTIATION**

Differentiation, Successive differentiation, Leibnitz theorem, Applications of differentiation, Tangent and normal, angle between two curves.

**UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY**

Straight Lines - Pair Straight Lines

**Text Book**

P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai

**Reference Books**

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V. Sundaram & Others, Discrete Mathematical Foundation - A.P. Publication, Sirkali.
3. P. Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.

**COURSE OUTCOMES**

The students after undergoing this course will be able to

CLO1: Understand operators and solve problems using operators

CLO2: Know the concept of set theory, relations and functions

CLO3: Solve problems using permutation and combination

CLO4: Know the concept of limits, differentiation

CLO5: Solve Problems on straight lines and pair straight lines

**Outcome Mapping:**

|  |  |  |
| --- | --- | --- |
|  | POs | PSOs |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 2 | 3 | 3 | 1 | 2 | 3 | 2 | 2 |
| CLO2 | 2 | 2 | 3 | 3 | - | 3 | 3 | 3 | 1 |
| CLO3 | 3 | 2 | 2 | 3 | - | - | 2 | 3 | 2 |
| CLO4 | 2 | 2 | 3 | 3 | 3 | - | 2 | 3 | 2 |
| CLO5 | 3 | 2 | 3 | 3 | 3 | - | 3 | 3 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Title of the Course** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCF17** | Problem Solving Technique | **FC** | 2 | - | - | I | 2 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving. |
| LO2 | Implement different programming constructs and decomposition of problems into functions. |
| LO3 | Use data flow diagram, Pseudo code to implement solutions. |
| LO4 | Define and use of arrays with simple applications |
| LO5 | Understand about operating system and their uses |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction:** History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. **Programming Languages:** Machine language, Assembly language, High-level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers. | **6** |
| II | **Data:** Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC).**Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. **Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming. | **6** |
| III | **Selection Structures:** Relational and Logical Operators -Selecting from Several Alternatives – Applications of Selection Structures.  **Repetition Structures:** Counter Controlled Loops –Nested Loops– Applications of Repetition Structures. | **6** |
| IV | **Data:** Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters. | **6** |
| V | **Data Flow Diagrams:** Definition, DFD symbols and types of DFDs. **Program Modules:** Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. **Files:** File Basics-Creating and reading a sequential file- Modifying Sequential Files. | **6** |
| **TOTAL HOURS** | **30** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will  |  |
| CO1 | * Study the basic knowledge of Computers.

Analyze the programming languages. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | Study the data types and arithmetic operations.Know about the algorithms.Develop program using flow chart and pseudocode. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Determine the various operators.Explain about the structures.Illustrate the concept of Loops | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | Study about Numeric data and character-based data.Analyze about Arrays. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Explain about DFDIllustrate program modules.Creating and reading Files | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | **Stewart Venit,** “Introduction to Programming: Concepts and Design”, Fourth Edition, 2010, Dream Tech Publishers. |
| **Web Resources** |
| 1. | https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm |
| 2. | http://www.nptel.iitm.ac.in/video.php?subjectId=106102067 |
| 3. | <http://utubersity.com/?page_id=876> |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 3** | 3 | 2 | 3 | 3 | 3 | 3 |
| **CO 4** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO 5** | 3 | 3 | 3 | 3 | 3 | 2 |
| **Weightage of course contributed to each PSO** | 15 | 14 | 14 | 15 | 15 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

**FIRST YEAR –SEMESTER- II**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Title of the Course** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCC23** | DATA STRUCTURES AND ALGORITHMS | **CC****III** | **5** | **-** | **-** | **II** | **5** | **25** | **75** | **100** |
| **Learning Objectives** |
| LO1 | Understand the meaning asymptotic time complexity analysis and various data structures |
| LO2 | To enhancing the problem solving skills and thinking skills |
| LO3 | To write efficient algorithms and Programs |
| LO4 | To make the students learn best practices in PYTHON programming |
| LO5 | To understand how to handle the files in Data Structure |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Arrays and ordered Lists** Abstract data types – asymptotic notations – complexity analysis- Linked lists: Singly linked list – doubly linked lists - Circular linked list, General lists- stacks – Queues – Circular Queues – Evaluation of expressions | **15** |
| II | **Trees and Graphs** Trees – Binary Trees – Binary Tree Traversal – Binary Tree Representations – Binary Search Trees - threaded Binary Trees - Application of trees (Sets). Representation of Graphs – Graph implementation – graph Traversals - Minimum Cost Spanning Trees – Shortest Path Problems-Application of graphs | **15** |
| III | **Searching and Sorting** Sorting – Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Selection Sort. Searching – Linear search, Binary search | **15** |
| IV | **Greedy Method and Dynamic programming** Greedy Method: Knapsack problem– Job Sequencing with deadlines – Optimal storage on tapes. General method – Multistage Graph Forward Method– All pairs shortest path – Single source shortest path – Search Techniques for Graphs – DFS – Connected Components – Bi-Connected Components | **15** |
| V | **Backtracking** General Method – 8-Queen‟s – Sum Of Subsets – Graph Colouring – Hamiltonian Cycles – Branch And Bound: General Method – Travelling Sales Person Problem | **15** |
| **TOTAL HOURS** | **75** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will  |  |
| CO1 | To understand the asymptotic notations and analysis of time and space complexityTo understand the concepts of Linked List, Stack and Queue. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | To understand the Concepts of Trees and GraphsPerform traversal operations on Trees and Graphs.To enable the applications of Trees and Graphs. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | To apply searching and sorting techniques | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | To understand the concepts of Greedy Method To apply searching techniques. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Usage of File handlings in python, Concept of reading and writing files, Do programs using files. | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | Seymour Lipshutz(2011),Schaum‟s Outlines - Data Structures with C, Tata McGraw Hill publications. |
| 2 | Ellis Horowitz and SartajSahni (2010), Fundamentals of Computer Algorithms, Galgotia Publications Pvt., Ltd. |
| 3 | Dr. K. Nagesware Rao, Dr. Shaik Akbar, ImmadiMurali Krishna, Problem Solving and Python Programming(2018) |
| **Reference Books** |
| 1. | Gregory L.Heileman(1996), Data Structures, Algorithms and Object-Oriented Programming, McGraw Hill International Edition, Singapore. |
| 2. | A.V.Aho, J.D. Ullman, J.E.Hopcraft(2000). Data Structures and Algorithms, Addison Wesley Publication. |
|  3. | Ellis Horowitz and SartajSahni, Sanguthevar Raja sekaran (2010) ,Fundamentals of Computer Algorithms, Galgotia Publications Pvt.Ltd. |
| **Web Resources** |
| 1. | https://www.tutorialspoint.com/data\_structures\_algorithms/index.htm |
| 2. | <https://www.programiz.com/dsa> |
| 3. | https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/ |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 3** | 3 | 3 | 3 | 3 | 1 | 3 |
| **CO 4** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 5** | 3 | 3 | 3 | 3 | 3 | 2 |
| **Weightage of course contributed to each PSO** | 15 | 15 | 15 | 15 | 13 | 14 |

 **S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Title of the Course** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| 23UDSCP24 | DATASTRUCTURES ANDALGORITHMS USING PYTHON LAB | **CC IV** | 5 | - | 5 | II | 5 | 25 | 75 | 100 |
| **Objectives**To predict the performance of different algorithms in order to guide design decisions, provide theoretical estimation for the required resources of an algorithm to solve a specific computational problem |
| **LIST OF PROGRAMS** | **Required Hour** |
| 1. Perform stack operations2. Perform queue operations3. Perform tree traversal operations4. Search an element in an array using linear search.5. Search an element in an array using binary search6. Sort the given set of elements using Merge Sort.7. Sort the given set of elements using Quick sort.8. Search the Kth smallest element using Selection Sort9. Find the Optimal solution for the given Knapsack Problem using Greedy Method.10. Find all pairs shortest path for the given Graph using Dynamic Programming method11. Find the Single source shortest path for the given Travelling Salesman problem using Dynamic Programming method12. Find all possible solution for an N Queen problem using backtracking method13. Find all possible Hamiltonian Cycle for the given graph using backtracking method | **75** |
| **Course Outcomes** |
| CO | On completion of this course, students will  |
| CO1 | To understand the concepts of Linked List, Stack and Queue. |
| CO2 | Concepts of Trees and Graphs. Perform traversal operations on Trees and Graphs. To enable the applications of Trees and Graphs. |
| CO3 | To apply searching and sorting techniques |
| CO4 | To determine the concepts of Greedy Method To apply searching techniques. |
| CO5 | Usage of File handlings in python, Concept of reading and writing files, Do programs using files. |
| **LearningResources:*** **RecommendedTexts**
	+ - 1. Ellis Horowitz , Sartaj Sahni, Susan Anderson Freed, Second Edition , “Fundamentals of Data in C”, Universities Press
			2. E. Horowitz, S. Sahni and S. Rajasekaran, Second Edition ,“Fundamentals of Computer Algorithms “ Universities Press
* **ReferenceBooks**
	+ - 1. Seymour Lipschutz ,”Data Structures with C”, First Edition, Schaum’s outline series in computers, Tata McGraw Hill.
			2. R.Krishnamoorthy and G.IndiraniKumaravel, Data Structures using C, Tata McGrawHill – 2008.
1. A.K.Sharma, Data Structures using C , Pearson Education India,2011.
2. G. Brassard and P. Bratley, “Fundamentals of Algorithms”, PHI, New Delhi, 1997.
3. A.V. Aho, J.E. Hopcroft, J.D. Ullmann,, “The design and analysis of Computer
4. Algorithms”, Addison Wesley, Boston, 1974
5. Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms, Third edition, MIT Press, 2009
6. Sanjoy Dasgupta, C.Papadimitriou and U.Vazirani , Algorithms , Tata McGraw-Hill, 2008.
 |
| **Course Outcomes** |
| CO | On completion of this course, students will  |
| CO1 | Implement data structures using C |
| CO2 | Implement various types of linked lists and their applications |
| CO3 | Implement Tree Traversals |
| CO4 | Implement various algorithms in C |
| CO5 | Implement different sorting and searching algorithms |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 3** | 3 | 3 | 2 | 2 | 3 | 3 |
| **CO 4** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 5** | 3 | 3 | 3 | 3 | 1 | 2 |
| **Weightage of course contributed to each PSO** | 15 | 15 | 14 | 14 | 13 | 14 |

 **S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |
| --- | --- | --- |
| SEMESTER: IIELECTIVE- II | **23UMAFE25****MATHEMATICAL FOUNDATIONS- II** | CREDIT: 3HOURS: 4/W |

**UNIT-I: MATRICES**

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermitian, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by Cramer’s rule.

**UNIT-II: MATRICES**

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem,

**UNIT-III: INTEGRATION**

Integration Simple problems, integration of rational function involving algebraic expressions of the form $\frac{1}{ax^{2}+bx+c} , \frac{1}{\sqrt{a^{2}+bx+c}} , \frac{px+q}{ax^{2}+bx+c} , \frac{px+q}{\sqrt{a^{2}+bx+c}}$

Integrations using simple substitutions, integrations involving trigonometric functions of the form $\frac{1}{a+bcosx} ,\frac{1}{a^{2}sin^{2}x+ b^{2}cos^{2}x}$ , integration by parts.

**UNIT-IV : INTEGRATION**

Applications of Integration for (i) Area under plane curves, (ii) Volume of solid of revolution.

**UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION**

Planes, straight lines.

**Text Book.**

P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai

**Reference Books**

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V. Sundaram & Others, Discrete Mathematical Foundation - A.P. Publication, Sirkali.
3. Manicavachagompillay& Natarajan. Analytical Geometry part II - Three Dimension S. Viswanathan (printers & publication) Put Ltd., 1991.

**COURSE OUTCOMES**

On successful completion of the course, the students will be able to

CLO1: Understand different types of matrix operators

CLO2: Know the concept of Consistency and Inconsistency of linear equations

CLO3: Solve different forms of Integration

CLO4: Find the Area and volume using integration for real world problems.

CLO5: Know the concept of Planes, straight lines

**Outcome Mapping:**

|  |  |  |
| --- | --- | --- |
|  | POs | PSOs |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 2 | 3 | 3 | 1 | 2 | 3 | 2 | 2 |
| CLO2 | 2 | 2 | 3 | 2 | - | 3 | 3 | 3 | 1 |
| CLO3 | 3 | 3 | 2 | 3 | - | - | 3 | 3 | 2 |
| CLO4 | 3 | 3 | 3 | 3 | 3 | - | 2 | 3 | 2 |
| CLO5 | 3 | 2 | 3 | 2 | 3 | - | 3 | 3 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Title of the Course** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCN16** | Fundamentals of Information Technology | **NME-1** | 2 | - | - | I | 2 | 25 | 75 | 100 |
| **Learning Objectives** |
| **LO1** | Understand basic concepts and terminology of information technology. |
| **LO2** | Have a basic understanding of personal computers and their operation |
| **LO3** | Be able to identify data storage and its usage |
| **LO4** | Get great knowledge of software and its functionalities |
| **LO5** | Understand about operating system and their uses |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction to Computers:**Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer | **6** |
| II | **Basic Computer Organization:**Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers. | **6** |
| III | **Storage Fundamentals:**Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives | **6** |
| IV | **Software:**Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w | **6** |
| V | **Operating System:**Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux. | **6** |
| **TOTAL HOURS** | **30** |

|  |  |
| --- | --- |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will  |  |
| CO1 | * Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | * Develop organizational structure using for the devices present currently under input or output unit.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | * Work with different software, Write program in the software and applications of software.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Usage of Operating system in information technology which really acts as a interpreter between software and hardware. | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | Anoop Mathew, S. Kavitha Murugeshan (2009), “ Fundamental of Information Technology”, Majestic Books. |
| 2 | Alexis Leon, Mathews Leon,” Fundamental of Information Technology”, 2nd Edition. |
| 3 | S. K Bansal, “Fundamental of Information Technology”. |
| **Reference Books** |
| 1. | Bhardwaj Sushil Puneet Kumar, “Fundamental of Information Technology” |
| 2. | GG WILKINSON, “Fundamentals of Information Technology”, Wiley-Blackwell |
|  3. | [A Ravichandran](https://www.bookganga.com/eBooks/Books?AID=5563813659127023211) , “Fundamentals of Information Technology”, Khanna Book Publishing |
| **Web Resources** |
| 1. | <https://testbook.com/learn/computer-fundamentals> |
| 2. | https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html |
| 3. | https://www.javatpoint.com/computer-fundamentals-tutorial |
| 4. | https://www.tutorialspoint.com/computer\_fundamentals/index.htm |
| 5. | https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 3** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 5** | 3 | 3 | 2 | 3 | 3 | 2 |
| **Weightage of course contributed to each PSO** | 15 | 15 | 14 | 15 | 14 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Title of the Course** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| 23UDSCN26 | Computer fundamentals | **NME-II** | 2 | - | - | II | 2 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | Discuss the Introduction about Computer and its Components. |
| LO2 | To Perform the Microsoft Word, Excel, PowerPoint and its operations. |
| LO3 | To get Knowledge about the Internet and Intranet |
| LO4 | Insert heading levels within a web page. |
| LO5 | Insert ordered and unordered lists within a web page. Create a web page. |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction to Computers** - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices –– Types of Operating System. | **6** |
| II | **MS Word**: Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer- watermark – inserting objects (images, other application document) – Table creation – Mail merge. | **6** |
| III | **Ms Excel**: Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet. | **6** |
| IV | **MS PowerPoint**: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined). | **6** |
| V | **Internet**: Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail –.How to send group mail. **E-Commerce**: Digital Signature – Digital Currency – Online shopping and transaction. | **6** |
| **TOTAL HOURS** | **30** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will  |  |
| CO1 | * Understand the basics of Computer and its Generations.

Be able to understand the components of computer. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | To Understand the introduction about MS Word.Be able to perform the Elements of window, Text Formatting, Text Manipulating options in MS Word. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | To Understand the introduction about MS Excel.Be able to inserting and sizing the cellsImplementing formulas and inserting worksheet. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | To Understand the introduction about MS PowerPointBe able to perform the slides manipulation.Implementing Multimedia and templates. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | To Understand the introduction about Internet and Intranet.Be able to access the browsers.To get knowledge about basic components of E-Mail and E-Commerce | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | G. Manjunath, “Computer Basics”, Vasan Publications, 2010. |
| 2 | Pradeep K. Sinha&PritiSinha, “Computer Fundamentals”, 6th Edition, BPB Publications, 2004. |
| **Web Resources** |
| 1. | <https://www.tutorialspoint.com/computer_fundamentals/index.htm> |
| 2. | <https://www.tutorialspoint.com/basics_of_computers/index.htm> |
| 3. | <https://www.tutorialspoint.com/word/index.htm> |
| 4. | <https://www.tutorialspoint.com/excel/index.htm> |
| 5. | <https://www.tutorialspoint.com/powerpoint/index.htm> |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 2 | 2 | 3 | 3 | 2 |
| **CO 3** | 2 | 3 | 3 | 3 | 3 | 3 |
| **CO 4** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO 5** | 3 | 3 | 3 | 3 | 2 | 3 |
| **Weightage of course contributed to each PSO** | 14 | 14 | 13 | 15 | 14 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

**SECOND YEAR –SEMESTER- III**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCC33** | **Data Science** | **CORE -V** | 5 | - | - | III | 5 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | To understand the basic concepts of Data Science |
| LO2 | To understand the principles of algorithms, flowchart and source code |
| LO3 | To acquire a solid foundation in Python. |
| LO4 | To visualize data using plots in python |
| LO5 | To understand and handle database and visualize. |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction to Data Science** Introduction: Data Science - Big Data and Data Science hype – getting past the hype - Datafication - Current landscape of perspectives - Skill sets needed - Statistical Inference - Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA – Applications of Data Science - Data Science in Business - Business Intelligence vs Data Science – Data Analytics Life Cycle - Machine Learning | **15** |
| II | **Introduction to Python** Features of Python - How to Run Python – Identifiers- Reserved Keywords- Variables - Comments in Python - Indentation in Python - Multi-Line Statements- Input, Output and Import Functions- Operators. Data Types and Operations: Numbers -Strings -List -Tuple - Set -Dictionary - Mutable and Immutable Objects - Data Type Conversion. Flow Control: Decision Making-Loops-Nested Loops-Control Statements- Types of Loops-List Comprehensions-Set Comprehensions-Dictionary Comprehensions-Nested Dictionaries. | **15** |
| III | **Functions** Function Definition - Function Calling - Function Arguments - Anonymous Functions (Lambda Functions) - Recursive Functions - Modules and Packages: Built-in Modules - Creating Modules - import Statement- Namespaces and Scope - The dir() function - The reload() function -Packages in Python - Date and Time Modules – Numpy Libraries and Data Manipulation Using Pandas | **15** |
| IV | **File Handling and Object Oriented Programming** Opening a File-Closing a File - Writing to a File - Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python. Regular Expressions. Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes - Destructors in Python - Encapsulation - Data Hiding – Inheritance-Method Overriding – Polymorphism - Exception Handling | **15** |
| V | **Database Programming and Visualizations** Connecting to a Database - Creating Tables - INSERT Operation - UPDATE Operation - DELETE Operation - READ Operation - Transaction Control -Disconnecting from a Database - Exception Handling in Databases - GUI Programming - CGI Programming- Data Visualizations using Matplotlib – histograms, bar charts, pie charts. | **15** |
| **TOTAL HOURS** | **75** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | To explain the basic concepts of data science and its application | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | * To explain the Features of Python
* To demonstrate Control Statements and Looping Statements
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | To understand Python Functions To create and illustrate Numpy Libraries To perform Data Manipulation using Pandas. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | * To understand the File Concepts
* Apply Exception Handling Techniques
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | To Create and manipulate Database To create Data Visualization using Mat plot lib | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | Doing Data Science**,** Straight Talk From The Frontline**, Cathy O'Neil and Rachel** **Schutt, O'Reilly** (2014) |
| 2 | Big Data Analytics, paperback 2nd ed., **Seema Acharya, SubhasiniChellappan, Wiley**  |
| 3 | **Dr. Jeeva Jose (2018) ,**Taming Python By Programming, Khanna Publishers |
| 4 | **Jake Vanderplas,** Python Data Science Handbook: Essential Tools for Working with Data 1st Edition. |
| **Reference Books** |
| 1. | LjubomirPerkovic(2012),Introduction to Computing Using Python: An Application DevelopmentFocus, John Wiley & Sons |
| 2. | John V Guttag(2013), Introduction to Computation and Programming Using Python‟, Revised and expanded Edition, MIT Press. |
| 3 | Kenneth A. Lambert(2012), Fundamentals of Python: First Programs, Cengage Learning |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 2 | 3 | 3 | 3 | 3 | 3 |
| Weightageof coursecontributedtoeachPSO | 14 | 14 | 15 | 15 | 15 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCP34** | **Data Science LAB** | **Core - VI** | - | - | 4 | III | 5 | 25 | 75 | 100 |
| **OBJECTIVES:**To build websites and software, automate tasks, and conduct data analysis.Open Source and Community Development. |
|  | **Required Hours** |
| **LIST OF PROGRAMS**1. Demonstrate the working of “id” and “type” functions.2. Find all prime numbers within a given range.3. Print n terms of Fibonacci series using iteration.4. Demonstrate use of slicing in string.5. Compute the frequency of the words from the input. The output should output after sorting thekey alphanumerically.6. Write a program that accepts a comma separated sequence of words as input and prints thewords in a comma-separated sequence after sorting them alphabetically.7. Demonstrate use of list & related functions.8. Demonstrate use of Dictionary & related functions.9. Demonstrate use of tuple & related functions.10. Implement stack using list.11. Implement queue using list.12. Read and write from a file.13. Copy a file.14. Demonstrate working of classes and objects.15. Demonstrate class method & static method.16. Demonstrate constructors.17. Demonstrate inheritance.18. Demonstrate aggregation/composition.19. Create a small GUI application for insert, update and delete in a table.20. Bar charts, histograms and pie charts | **60** |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 2 | 3 | 3 | 3 | 3 | 3 |
| Weightage of course contributed to each PSO | 14 | 14 | 15 | 15 | 15 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE35** | **E-commerce** | **Elective - III** | 4 | - | - | III | 3 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | Understanding of the foundations and importance of E-commerce |
| LO2 | Understanding of retailing in E-commerce by in terms of branding and pricing strategies and determining the effectiveness of market research. |
| LO3 | Assess the Internet trading relationships including Business to Consumer, Business- to-Business, Intra-organizational. |
| LO4 | Knowing key features of Internet, Intranets and Extranets and how they relate to each other. |
| LO5 | Understanding legal issues and privacy in E-Commerce. |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **E-Commerce:** E-Commerce Framework – E-Commerce and Media Convergence – The anatomy of E-commerce applications - E-Commerce Consumer Applications - E- Commerce Organization Applications. | **6** |
| II | **The Internet:** The Internet Terminology – NSFNET – Architecture and Components– National Research and Education Network – Internet Governance – An overview of Internet Applications. The Business of Internet Commercialization: Telco/Cable/Online companies - National Independent ISPs – Regional level ISPs – Local level ISPs. | **6** |
| III | **E-Commerce and the World Wide Web:** Architectural Framework for E-commerce – WWW as the architecture – Technology behind the web – Security and the web. | **6** |
| IV | **Electronic Payment Systems:** Types of Electronic Payment Systems– Digital token Electronic Payment Systems – Credit Card Based Electronic Payment Systems – Risk and Electronic Payment Systems. Electronic Data Interchange: Legal, Security and Privacy issues. | **6** |
| V | **Advertising and Marketing on the Internet:** E-Commerce Catalogs– Information Filtering – Consumer Data Interface – Emerging tools. Software Agents: Characteristics and Properties of Software Agents – Technology behind Software Agents - Applets, Browsers, and Software Agents. | **6** |
| **TOTAL HOURS** | **30** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | Demonstrate E-Commerce Frameworks. Distinguish E-Commerce and media Convergence. Illustrate E-Commerce Applications. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | Describe the E-Commerce Networks and Research Networks, Analyze the Internet Commercialization | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Evaluate the E-Commerce how incorporate the Internet, Construct the Web Security | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | Distinguish the different payment system.Illustrate the data interchange | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Understanding the Advertising and Marketing on the Internet, Describe Software Agents | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | **Ravi Kalakota& Andrew Whinston,** “*Frontiers of Electronic-Commerce*”, Addison Wesley. |
| **Reference Books** |
| 1. | **EfraimTurvanJ.Lee, David Kug andChung**, “Electronic Commerce”, Pearson Education, Asia. |
| 2. | **Manlyn Greenstein and Miklos**, “Electronic Commerce”, TMH. |
| **Web Resources** |
| 1. | https:/[/www](http://www.the-reference.com/en/expertise/creation-and.../e-commerce).[the-reference.com/en/expertise/creation-and.../e-commerce](http://www.the-reference.com/en/expertise/creation-and.../e-commerce) |
| 2. | 1. <https://en.wikipedia.org/wiki/E-commerce>
 |
| 3.  | 1. https:/[/www](http://www.tutorialspoint.com/e_commerce/index.htm).[tutorialspoint.com/e\_commerce/index.htm](http://www.tutorialspoint.com/e_commerce/index.htm)
 |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 2 | 2 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 2 | 3 | 3 | 2 | 3 |
| Weightage of course contributed to each PSO | 15 | 14 | 14 | 14 | 14 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **O** | **Credits** | **Inst. Hours** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCS36** | **Organizational Behavior** | S EC -4 (NME-1) | Y | - | - | - | 2 | 2 | 25 | 75 | 100 |
| **Learning Objectives** |
| CLO1 | To have extensive knowledge onOB and the scope of OB. |
| CLO2 | To create awareness of Individual Benaviour. |
| CLO3 | To enhance the understanding of Group Behavior |
| CLO4 | To know the basics of Organisaitonal Culture and Organisational Structure |
| CLO5 | To understand Organisational Change, Conflict and Power  |
| **UNIT** | **Details** | **No. of Hours** | **Learning Objectives** |
| I | INTRODUCTION : Concept of Organizational Behavior (OB): Nature, Scope and Role of OB: Disciplines that contribute to OB; Opportunities for OB (Globalization, Indian workforce diversity, customer service, innovation and change, networked organizations, work-life balance, people skills, positive work environment, ethics) | 6 | CLO1 |
| II | INDIVIDUAL BEHAVIOUR: 1. Learning, attitude and Job satisfaction: Concept of learning, conditioning, shaping and reinforcement. Concept of attitude, components, behavior and attitude. Job satisfaction: causation; impact of satisfied employees on workplace. 2. Motivation : Concept; Theories (Hierarchy of needs, X and Y, Two factor, McClelland, Goal setting, Self-efficacy, Equity theory); Job characteristics model; Redesigning jobs, 3. Personality and Values : Concept of personality; Myers-Briggs Type Indicator (MBTI); Big Five model. Relevance of values; Linking personality and values to the workplace (person-job fit, person-organization fit) 4. Perception, Decision Making : Perception and Judgements; Factors; Linking perception to individual decision making:  | 6 | CLO2 |
| III | GROUP BEHAVIOUR : 1. Groups and Work Teams : Concept : Five Stage model of group development; Group norms, cohesiveness ; Group think and shift ; Teams; types of teams; Creating team players from individuals and team based work(TBW) 2. Leadership : Concept; Trait theories; Behavioral theories (Ohio and Michigan studies); Contingency theories (Fiedler, Hersey and Blanchard, Path-Goal);  | 6 | CLO3 |
| IV | ORGANISATIONAL CULTURE AND STRUCTURE : Concept of culture; Impact (functions and liability); Creating and sustaining culture: Concept of structure, Prevalent organizational designs: New design options | 6 | CLO4 |
| V | ORGANISATIONAL CHANGE, CONFLICT AND POWER: Forces of change; Planned change; Resistance; Approaches (Lewin's model, Organisational development);. Concept of conflict, Conflict process; Types, Functional/ Dysfunctional. Introduction to power and politics. | 6 | CLO5 |
|  |  | **30** |  |
|  |
| **Course Outcomes** | On Completion of the course the students will  | **Program Outcomes** |
| **CO1** | To define OrganisationalBehaviour, Understand the opportunity through OB. | PO1, PO2, PO6, PO7 |
| **CO2** | To apply self-awareness, motivation, leadership and learning theories at workplace. | PO2,PO4. PO5, PO6 |
| **CO3** | To analyze the complexities and solutions of group behaviour. | PO1, PO2, PO4, PO5, PO6 |
| **CO4** | To impact and bring positive change in the culture of the organisaiton.  | PO2, PO3, PO4 PO5, PO8 |
| **CO5** | To create a congenial climate in the organization. | PO1, PO2, PO5 PO6, PO8 |
| **Reading List** |
| 1. |  [NeharikaVohra Stephen P. Robbins, Timothy A. Judge](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Neharika+Vohra+Stephen+P.+Robbins%2C+Timothy+A.+Judge&search-alias=stripbooks) , *Organizational Behaviour*, Pearson Education, 18th Edition, 2022. |
| 2. | Fred Luthans, *Organizational Behaviour*, Tata McGraw Hill, 2017. |
| 3. | Ray French, Charlotte Rayner, Gary Rees & Sally Rumbles, *Organizational Behaviour*, John Wiley & Sons, 2011 |
| 4. | [Louis Bevoc](https://www.amazon.in/Louis-Bevoc/e/B071SKMB82/ref%3Ddp_byline_cont_ebooks_1), [Allison Shearsett](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_2?ie=UTF8&field-author=Allison+Shearsett&text=Allison+Shearsett&sort=relevancerank&search-alias=digital-text), [Rachael Collinson](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_3?ie=UTF8&field-author=Rachael+Collinson&text=Rachael+Collinson&sort=relevancerank&search-alias=digital-text), *Organizational Behaviour Reference*, Nutri Niche System LLC (28 April 2017) |
| 5. | Dr. Christopher P. Neck, Jeffery D. Houghton and Emma L. Murray, *Organizational Behaviour: A Skill-Building Approach,* SAGE Publications, Inc; 2nd edition (29 November 2018). |
| **References Books** |
| 1. | Uma Sekaran, Organizational Behavior Text & cases, 2nd edition, Tata McGraw Hill Publishing CO. Ltd |
| 2. | GangadharRao, Narayana, V.S.P Rao, Organizational Behavior 1987, Reprint 2000, Konark Publishers Pvt. Ltd, 1st edition |
| 3. | S.S. Khanka, Organizational Behavior, S. Chand & Co, New Delhi. |
| 4. | J. Jayasankar, Organizational Behavior, Margham Publications, Chennai, 2017. |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 2 | 2 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 2 | 3 | 3 | 2 | 3 |
| Weightage of course contributed to each PSO | 15 | 14 | 14 | 14 | 14 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst. Hours** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCS37** | **PHP PROGRAMMING** | SEC- 5 | Y |  |  |  | 2 | 2 | 25 | 75 | 100 |
| **Course Objective** |
| C1 | To provide the necessary knowledge on basics of PHP. |
| C2 | To design and develop dynamic, database-driven web applications using PHP version. |
| C3 | To get an experience on various web application development techniques. |
| C4 | To learn the necessary concepts for working with the files using PHP. |
| C5 | To get a knowledge on OOPS with PHP. |
| **UNIT** | **Details** | **No. of Hours** | **Course Objectives** |
| I | Introduction to PHP -Basic Knowledge of websites -Introduction of Dynamic Website -Introduction to PHP -Scope of PHP -XAMPP and WAMP Installation | 6 | CO1 |
| II | PHP Programming Basics -Syntax of PHP -Embedding PHP in HTML -Embedding HTML in PHP.Introduction to PHP Variable -Understanding Data Types -Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement.  | 6 | CO2 |
| III | Switch() Statements -Using the while() Loop -Using the for() Loop PHP Functions.PHP Functions -Creating an Array -Modifying Array Elements -Processing Arrays with Loops - Grouping Form Selections with Arrays -Using Array Functions. | 6 | CO3 |
| IV | PHP Advanced Concepts -Reading and Writing Files -Reading Data from a File. | 6 | CO4 |
| V | Managing Sessions and Using Session Variables -Destroying a Session -Storing Data in Cookies -Setting Cookies. | 6 | CO5 |
|  | **Total** | **30** |

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| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will  |  |
| 1 | Write PHP scripts to handle HTML forms | PO1,PO4,PO6,PO8. |
| 2 | Write regular expressions including modifiers, operators, and metacharacters. | PO2,PO5,PO7. |
| 3 | Create PHP Program using the concept of array. | PO3,PO6,PO8. |
| 4 | Create PHP programs that use various PHP library functions  | PO2,PO3,PO5,PO8. |
| 5 | Manipulate files and directories. | PO3,PO5,PO6. |
| **Text Book** |
| 1 | Head First PHP & MySQL: A Brain-Friendly Guide- 2009-[Lynn mighley](https://www.amazon.in/Lynn-Beighley/e/B001IGOUMY/ref%3Ddp_byline_cont_book_1)  and [Michael Morrison](https://www.amazon.in/Michael-Morrison/e/B000AQ2H3C/ref%3Ddp_byline_cont_book_2). |
| 2 | The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- [Alan Forbes](https://www.amazon.in/Alan-Forbes/e/B00BBPOUOA/ref%3Ddp_byline_cont_ebooks_1)  |
| **Reference Books** |
| 1. | PHP: The Complete Reference-Steven Holzner. |
| 2. | [DT Editorial Services](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=DT%2BEditorial%2BServices&search-alias=stripbooks) (Author), “*HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)*”, Paperback 2016, 2ndEdition. |
| **Web Resources** |
| 1. | Refer MOOC Courses like NPTEL and SWAYAM |
| 2. | <https://www.w3schools.com/php/default.asp> |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** |
| **CO 1** | S |  |  | S |  | M |  | L |
| **CO 2** |  | M |  |  | S |  | L |  |
| **CO 3** |  |  | M |  |  | L |  | S |
| **CO 4** |  | M | S |  | L |  |  | S |
| **CO 5** |  |  | S |  | L | M |  |  |

**S-Strong M-Medium L-Low**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCC43** | **Object Oriented Programming with Java** | **CC VII** | 5 | - | - | IV | 5 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | Object Oriented Programming with Java. |
| LO2 | Apply the OOPs concept in JAVA programming. |
| LO3 | Become proficient programmers through the java programming language. |
| LO4 | Give insight into real world applications. |
| LO5 | Get the attentions of users in user interface using graphics |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction:** Introduction to Java-Features of Java-Object Oriented Concepts-Software Evolution – Software Development, SDLC Models – SDLC steps – Software Testing – Software Quality – Lexical Issues-Data Types – Variables – Arrays – Operators – Control Statements – Classes – Objects –Constructors – Overloading method – Access control – static and fixed methods – Inner classes –Inheritance-Overriding Methods-Using super-Abstract class. | **15** |
| II | **Packages & Threads:** Packages-Access Protection-Importing Packages-Interfaces-Exception Handling-Throw and Throws- Thread-Synchronization-Messaging- Runnable Interface-Inter thread communication-Deadlock-suspending, resuming and stopping threads-Multithreading | **15** |
| III | **Input/Output & Collection API:** I/O Streams-File Streams-String Objects-String Buffer-Char Array – Java Utilities-Collections interface – Collection classes-Enumeration – Vector –Stack –Hash tables – String class. | **15** |
| IV | **Networking:** Networking –Networking basics – java and the Net – InetAddress- TCP/IP Client Sockets –URL- URL Connection – TCP/IP Server Sockets – Datagrams. | **15** |
| V | **Graphical User Interface in Java:** Working with windows using AWT Classes – Class Hierarchy of Window and Panel –AWT controls – Layout Managers – Menus- Menu bars - Dialog Boxes- File Dialog- Applets-Lifecycle of Applet-Types of Applets-Event handling-Applet tags - JDBC and connecting to Databases – CRUD operations. | **15** |
| **TOTAL HOURS** | **75** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | * Use the syntax and semantics of java programming language and basic concepts of OOP.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | * Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Apply the concepts of Multithreading and Exception handling to Develop efficient and error free codes. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | * Design event driven GUI and web related applications which mimic the real word scenario
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Build the internet-based dynamic applications using the concept of applets | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | **P.Naughton and H.Schildt**(1999), Java 2 (The Complete Reference), Third Edition, Tata MCGraw Hill Edition |
| 2 | **K.K. Aggarwal &Yogesh Sing** (2008), Software Engineering, Revised Third Edition, New Age International Publishers.  |
| **Reference Books** |
| 1. | Cay S. Horstmann, Gary Cornell(2012), Core Java 2 Volume I, Fundamentals- Ninth Edition Addision Wesley  |
| 2. | K.Arnold and J.Gosling, The Java Programming Language- Second Edition, ACM Press/Addison- Wesley Publishing Co. New York |
| **Web Resources** |
| 1. | <https://www.w3schools.com/java/java_oop.asp#:~:text=OOP%20provides%20a%20clear%20structure,code%20and%20shorter%20development%20time> |
| 2. | https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/ |
| 3. | <https://www.javatpoint.com/java-oops-concepts> |
| 4. | <https://www.coursera.org/learn/object-oriented-java> |
| 5. | <https://docs.oracle.com/javase/tutorial/java/concepts/index.html> |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 3 | 3 | 3 | 2 | 3 |
| Weightageof coursecontributedtoeachPSO | 15 | 15 | 14 | 15 | 14 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCP44** | **Object Oriented Programming with Java LAB** | **CC****VIII** | - | - | 5 | IV | 5 | 25 | 75 | 100 |
| **Learning Objectives:**1. Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
2. Read and make elementary modifications to Java programs that solve real-world problems.
3. Be able to create an application using string concept.
4. Be able to create a program using files in application.
5. Be able to create an Applet to create an application.
 |
|  | **Required Hour** |
| **Lab Exercises:**1. Program using Class and Object.2. Program using Constructors.3. Program using Command-Line Arguments.4. Program using Random Class.5. Program using Vectors.6. Program using String Tokenizer Class.7. Program using Interface.8. Program using all forms of Inheritance. 9. Program using String class.10. Program using String Buffer class.11. Program using Exception Handling.12. Implementing Thread based applications 13. Program using Packages.14. Program using Files.**Applets:**15. Working with Colors and Fonts.16. Parameter passing technique.17. Drawing various shapes using Graphical statements.18. Usage of AWT components and Listener in suitable applications. | **60** |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 2 | 3 | 3 | 2 | 3 |
| Weightageof coursecontributedtoeachPSO | 15 | 14 | 14 | 15 | 14 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE45** | **Bigdata technologies** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* To use the Hadoop tools like Hive, and Hbase, which provide interface to relational databases, are also covered as part of this course work.
* To Analyze data with unix tools
 |
| **Course Outcomes:** (forstudents: To know what they are going to learn)**CO1:** Understand the fundamentals of Big cloud and data architectures.**CO2:** Understand HDFS file structure and Mapreduce frameworks, and use them to solve complex problems, which require massive computation power. **CO3:** Understand HDFS file structure and Mapreduce frameworks, and use them to solve complex problems, which require massive computation power. **CO4:**Understand The Hive Shell.**CO5:** Understand and Comparison with traditional databases. |
| **Units** | **Contents** | **Required Hours** |
| **I** | Introduction to Big Data. What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem | **5** |
| **II** | The design of HDFS. HDFS concepts. Command line interface to HDFS. Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file write. | **5** |
| **III** | Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. | **6** |
| **IV** | Classic Mapreduce. Job submission. Job Initialization. Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. MapReduce Types | **6** |
| **V** | The Hive Shell. Hive services. Hive clients. The meta store. Comparison with traditional databases. HiveQl. Hbasics. Concepts. Implementation. Java and Mapreduce clients. Loading data, web queries. | **6** |
| **Learning Resources:*** **Recommended Texts**
1. Tom White, Hadoop, “The Definitive Guide”, 3rd Edition, O’Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch , “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Osborne Media; 1 edition, 2011
* **Reference Books**
1. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
2. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
 |

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| --- |
| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **2** |
| **CO2** | **2** | **3** | **2** | **3** | **2** | **2** |
| **CO3** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO4** | **2** | **2** | **2** | **2** | **2** | **2** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **13** | **12** | **12** | **13** | **12** | **12** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst. Hours** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCS46** | **Software Testing** | SEC-6 | Y | - | - | - | 2 | 2 | 25 | 75 | 100 |
| **Course Objective** |
| **C1** | To study fundamental concepts in software testing |
| **C2** | To discuss various software testing issues and solutions in software unit test, integration and system testing. |
| **C3** | To study the basic concept of Data flow testing and Domain testing. |
| **C4** | To Acquire knowledge on path products and path expressions. |
| **C5** | To learn about Logic based testing and decision tables |
| **UNIT** | **Details** | **No. of Hours** | **Course Objective** |
| **I** | Introduction: Purpose–Productivity and Quality in Software–TestingVsDebugging–Model for Testing–Bugs–Types of Bugs – Testing and Design Style. | 6 | C1 |
| **II** | Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction FlowTesting Techniques. | 6 | C2 |
| **III** | Data Flow Testing Strategies - Domain Testing:Domains and Paths – Domains and Interface Testing. | 6 | C3 |
| **IV** | Linguistic –Metrics – Structural Metric – Path Products and Path Expressions.SyntaxTesting–Formats–Test Cases | 6 | C4 |
| **V** | Logic Based Testing–Decision Tables–Transition Testing–States, State Graph, StateTesting. |  6 | C5 |
|  | **Total** | **30** |  |
| **Course Outcomes** | **Program Outcomes** |
| **CO** | On completion of this course, students will  |  |
| **1** | Students learn to apply software testing knowledge and engineering methods | PO1 |
| **2** | Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation. | PO1, PO2 |
| **3** | Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods. | PO4, PO6 |
| **4** | Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems | PO4, PO5, PO6 |
| **5** | Have an ability to use software testing methods and modern software testing tools for their testing projects. | PO3, PO8 |
| **Text Book** |
| **1** | B.Beizer,“SoftwareTestingTechniques”,IIEdn.,DreamTechIndia,NewDelhi,2003. |
| **2** | K.V.K.Prasad,“SoftwareTestingTools”,DreamTech.India,NewDelhi,2005 |
| **Reference Books** |
| **1.** | I.Burnstein,2003,“PracticalSoftwareTesting”,SpringerInternationalEdn. |
| **2.** | E. Kit, 1995, “Software Testing in the Real World: Improving the Process”,PearsonEducation,Delhi. |
| **3.** | R. Rajani,andP.P.Oak,2004,“SoftwareTesting”,TataMcgrawHill,NewDelhi. |
| **Web Resources** |
| **1.** | <https://www.javatpoint.com/software-testing-tutorial> |
| **2.** | <https://www.guru99.com/software-testing.html> |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** |
| **CO 1** | S |  |  |  |  |  |  |  |
| **CO 2** | M | S |  |  |  |  |  |  |
| **CO 3** |  |  |  | S |  | S |  |  |
| **CO 4** |  |  |  | S | S | M |  |  |
| **CO 5** |  |  | S |  |  |  |  | S |

**S-Strong M-Medium L-Low**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst. Hours** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCS47** | **Multimedia Systems** | SEC-7 | Y | - | - | - | 2 | 2 | 25 | 75 | 100 |
| **Course Objective** |
| **C1** | Understand the definition of Multimedia |
| **C2** | To study about the Image File Formats,SoundsAudio File Formats |
| **C3** | Understand the concepts of Animation and DigitalVideoContainers |
| **C4** | To study about the Stage of Multimedia Project |
| **C5** | Understand the concept of OwnershipofContentCreatedforProjectAcquiringTalent |

|  |  |  |  |
| --- | --- | --- | --- |
| **UNIT** | **Details** | **No. of Hours** | **Course Objective** |
| I | Multimedia Definition-Use Of Multimedia-Delivering Multimedia- Text: About Fonts and Faces - Using Text in Multimedia -Computers and Text Font Editing and Design Tools-Hypermedia and Hypertext. | 12 | C1 |
| II | Images: Plan Approach - Organize Tools - Configure Computer Workspace -Making Still Images - Color - Image File Formats. Sound: The Power of Sound -DigitalAudio-MidiAudio-Midivs.DigitalAudio-MultimediaSystemSoundsAudio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project | 12 | C2 |
| III | Animation: The Power of Motion-Principles of Animation-Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays-Digital Video Containers-Obtaining Video Clips -Shooting and Editing Video | 12 | C3 |
| IV | Making Multimedia: The Stage of Multimedia Project - The Intangible Needs -The Hardware Needs - The Software Needs - An Authoring Systems Needs-Multimedia Production Team. | 12 | C4 |
| V | Planning and Costing: The Process of Making Multimedia-Scheduling-Estimating - RFPs and Bid Proposals. Designing and Producing - Content andTalent:AcquiringContent-OwnershipofContentCreatedforProject-AcquiringTalent | 12 | C5 |
|  | **Total** | **60** |  |

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| **Course Outcomes** | **Programme Outcomes** |
| **CO** | On completion of this course, students will  |  |
| **1** | understand the concepts, importance, application and the process of developing multimedia | PO1 |
| **2** | to have basic knowledge and understanding about image related processings | PO1, PO2 |
| **3** |  To understand the framework of frames and bit images to animations | PO4, PO6 |
| **4** | Speaks about the multimedia projects and stages of requirement in phases of project. | PO4, PO5, PO6 |
| **5** | Understanding the concept of cost involved in multimedia planning, designing, and producing | PO3, PO8 |
| **Text Book** |
| **1** | TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw-Hill,2001. |
| **Reference Books** |
| **1.** | RalfSteinmetz&KlaraNahrstedt"MultimediaComputing,Communication&Applications",PearsonEducation,2012. |
| **Web Resources** |
| **1.** | <https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/> |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** |
| **CO 1** | S |  |  |  |  |  |  |  |
| **CO 2** | M | S |  |  |  |  |  |  |
| **CO 3** |  |  |  | S |  | S |  |  |
| **CO 4** |  |  |  | S | S | M |  |  |
| **CO 5** |  |  | S |  |  |  |  | S |

**S-Strong M-Medium L-Low**

**THIRD YEAR –SEMESTER- V**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCC51** | **Relational Database Management System** | **CC IX** | 5 | - | - | V | 4 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | To understand the different issues involved in the design and implementation of a database system. |
| LO2 | To study the physical and logical database designs, database modeling, relational, hierarchical, and network models |
| LO3 | To understand and use data manipulation language to query, update, and manage a database |
| LO4 | To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, |
| LO5 | To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS. |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction:** Database System-Characteristics of Database Management Systems- Architecture of Database Management Systems-Database Models-System Development Life Cycle-Entity Relationship Model. | **18** |
| II | **Relational Database Model:** Structure of Relational Model-Types of keys. Relational Algebra: Unary operations-Set operations-Join operations. Normalization: Functional Dependency- First Normal form-Second Normal Form-Third Normal form- Boyce-Codd Normal Form-Fourth Normal Form. | **18** |
| III | **SQL:** Introduction. Data Definition Language: Create, alter, drop, rename and truncate statements. Data Manipulation Language: Insert, Update and Delete Statements. Data Retrieval Language: Select statement. Transaction Control Language: Commit, Rollback and Savepoint statements. Single row functions using dual: Date, Numeric and Character functions. Group/Aggregate functions: count, max, min, avg and sum functions. Set Functions: Union, union all, intersect and minus. Subquery: Scalar, Multiple and Correlated subquery. Joins: Inner and Outer joins.Defining Constraints: Primary Key, Foreign Key, Unique, Check, Not Null. | **18** |
| IV | **PL/SQL:** Introduction-PL/SQL Basic-Character Set- PL/SQL Structure-SQL Cursor-Subprograms-Functions-Procedures. | **18** |
| V | **Exception Handling:** Introduction-Predefined Exception-User Defined Exception-Triggers-Implicit and Explicit Cursors-Loops in Explicit Cursor. | **18** |
| **TOTAL HOURS** | **90** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | To demonstrate the characteristics of Database Management Systems. To study about the concepts and models of database. * To impart the concepts of System Development Life Cycle and E-R Model.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | To classify the keys and the concepts of Relational Algebra. To impart the applications of various Normal Forms Classification of Dependency. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | Representation of PL-SQL Structure. To impart the knowledge of Sub Programs, Functions and Procedures. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Implicit and Explicit Cursors. | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | **Pranab Kumar Das Gupta and P. Radha Krishnan,** “Database Management System Oracle SQL and PL/SQL”, Second Edition, 2013, PHI Learning Private Limited. |
| **Reference Books** |
| 1 | **RamezElmasri and Shamkant B. Navathe**, “*Fundamentals of Database Systems*”, Seventh Edition, Pearson Publications. |
| 2 | **Abraham Silberschatz, Henry Korth, S. Sudarshan**, “*Database System Concepts*”, Seventh Edition, TMH.  |
|  | **Web Resources** |
| 1 | <http://www.amazon.in/DATABASE-MANAGEMENT-SYSTEM-ORACLE-SQLebook/dp/B00LPGBWZ0#reader_B00LPGBWZ0> |
|  |  |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO 2 | 3 | 3 | 3 | 2 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 3 | 3 | 3 | 3 | 3 |
| Weightageof coursecontributedtoeachPSO | 14 | 15 | 15 | 14 | 15 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCP52** | **RDBMS Lab using ORACLE** | **CC** **X** | - | - | 5 | V | 4 | 25 | 75 | 100 |
| **Learning Objectives**:1. To explain basic database concepts, applications, data models, schemas and instances.
2. To demonstrate the use of constraints and relational algebra operations
3. Describe the basics of SQL and construct queries using SQL.
4. To emphasize the importance of normalization in databases
5. To facilitate students in Database design
 |
| **LAB EXERCISES:****SQL:**1. DDL commands.
2. Specifying constraints-Primary Key, Foreign Key, Unique, Check, Not Null.
3. DML commands.
4. Set Operations.
5. Joins.
6. Sub-queries.

**PL/SQL:**1. Control Constructs.
2. Exception Handlers.
3. Implicit Cursor.
4. Explicit Cursor.
5. Procedures.
6. Functions.
7. Triggers.
8. TCL Commands usage (Commit, Rollback, Savepoint)
 |

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| **Course Outcomes** |
| CO | On completion of this course, students will |
| CO1 | To demonstrate the characteristics of Database Management Systems. To study about the concepts and models of database. To impart the concepts of System Development Life Cycle and E-R Model. |
| CO2 | To classify the keys and the concepts of Relational Algebra. To impart the applications of various Normal Forms Classification of Dependency. |
| CO3 | To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure. |
| CO4 | Representation of PL-SQL Structure. To impart the knowledge of Sub Programs, Functions and Procedures. |
| CO5 | Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Implicit and Explicit Cursors. |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO 2 | 3 | 3 | 3 | 2 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 3 | 3 | 3 | 3 | 3 |
| Weightage of course contributed to each PSO | 14 | 15 | 15 | 14 | 15 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCC53** | **MACHINE LEARNING** | **CCXI** | 5 | - | - | V | 4 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | To Learn about Machine Intelligence and Machine Learning applications |
| LO2 | To implement and apply machine learning algorithms to real-world applications |
| LO3 | To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems |
| LO4 | To create instant based learning |
| LO5 | To apply advanced learning |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction Machine Learning** - Difference between AI, Machine Learning and Big data. Supervised and unsupervised learning, parametric vs non-parametric models, parametric models for classification and regression- Linear Regression, Logistic Regression, Naïve Bayes classifier, simple non-parametric classifier-K-nearest neighbour, support vector machines | **15** |
| II | **Neural networks and genetic algorithms** Neural Network Representation – Problems – Perceptions – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning. | **15** |
| III | **Bayesian and computational learning** Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model. | **15** |
| IV | **Instant based learning** K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning. | **15** |
| V | **Advanced learning** Recommendation systems – opinion mining, sentiment analysis. Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning. | **15** |
| **TOTAL HOURS** | **75** |

|  |  |
| --- | --- |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | * Appreciate the importance of visualization in the data analytics solution
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | Apply structured thinking to unstructured problems | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Understand a very broad collection of machine learning algorithms and problems | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theor | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Develop an appreciation for what is involved in learning from data.  | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013. |
| 2 | Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning" 2015, MIT Press |
| **Reference Books** |
| 1. | EthemAlpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004. |
| 2 | Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009. |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 3 | 2 | 3 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO 5 | 3 | 3 | 3 | 3 | 3 | 2 |
| Weightage of course contributed to eachPSO | 15 | 15 | 14 | 15 | 14 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCD54** | **PROJECT WITH VIVA-VOCE** |  | 5 | - | - | - | 4 | 25 | 75 | 100 |

**(Refer to the regulations)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE55-1** | **SOCIAL NETWORK ANALYSIS** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Analyze and mining communities in web social networks
* Visualize social networks.
 |
| **Course Outcomes:** (for students: To know what they are going to learn)**CO1:**Understanding the concept of  Network Mining, Graph Models**CO2:**Learning about  Social-Network Graph.**CO3:** Evaluating Social-Network Graph as well as properties**CO4:**Learning the Information Diffusion in Social Network**CO5:** Analyzing Social Networks Applications and Research Trends. |
| **Units** | **Contents** | **Required Hours** |
| **I** | **Introduction to Social Network Mining, Graph Models and Node Metrics:** Introduction to social network mining- Social Networks as Graphs.-Random graph models/ graph generators (preferential attachment, small world). | **6** |
| **II** | **Social-Network Graph Analysis:**  Social network exploration/ processing: graph kernels, graph classification, clustering of social | **5** |
| **III** | **Social-Network Graph Analysis and Properties :** Social network exploration/ processing and properties: Finding overlapping communities, similarity between graph nodes, counting triangles in graphs. | **5** |
| **IV** | **Information Diffusion in Social Network:** Information diffusion in graphs: Cascading behavior, spreading, epidemics, heterogeneous social network mining, influence maximization, outbreak detection | **6** |
| **V** | **Dynamic Social Networks, Applications and Research Trends :** Dynamic social networks, Link prediction, Social learning on networks.- Special issues in Information and Biological networks. | **6** |
| **Learning Resources:*** **Recommended Texts**
1. Peter Mika, ―Social Networks and the Semantic Web‖, First Edition, Springer 2007
2. Borko Furht, ―Handbook of Social Network Technologies and Applications‖, 1st Edition,2014
* **Reference Books**
1. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, ―Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling‖, IGI Global Snippet, 2009.
2. John G. Breslin, Alexander Passant and Stefan Decker, ―The Social Semantic Web‖, Springer, 2009.
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **3** | **2** | **2** |
| **CO2** | **3** | **3** | **3** | **3** | **3** | **2** |
| **CO3** | **2** | **2** | **2** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **3** | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **2** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **14** | **12** | **13** | **14** | **14** | **13** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE55-2** | **SOCIAL MEDIA MANAGEMENT** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Develop  social media marketing strategies
* Predict and test human behavior in social web and related communities
 |
| **Course Outcomes:** (for students: To know what they are going to learn)**CO1:** Understanding the concept of  Social media basic management.**CO2:** Learning about  Social media strategy development ideas**CO3:** Evaluating the advertisements via Social Media**CO4:** Learning the community management.**CO5:** Analyzing n and reporting Social media. |
| **Units** | **Contents** | **Required Hours** |
| **I** | **Introduction to Social Media Management:** Overview of Social Media Platforms- Evolution of Social Media- Importance of Social Media for Businesses- Key Concepts: Engagement, Reach, Impressions | **6** |
| **II** | **Social Media Strategy Development:**Target Audience IdentificationSetting SMART Goals for Social Media- Content Planning and Creation- Social Media Calendar Management- Analytics and Measurement Tools. | **5** |
| **III** | **Social Media Advertising:** Paid vs. Organic Social Media- Advertising on Facebook, Instagram, Twitter, LinkedIn, etc.- Budgeting and Bidding Strategies- Ad Copywriting and Visual Design- Performance Metrics and ROI Analysis. | **5** |
| **IV** | **Community Management and Customer Service:** Building and Managing Online Communities- Crisis Management on Social Media -Responding to Customer Feedback- Monitoring and Moderation - Tools for Community Engagement. | **6** |
| **V** | **Social Media Analytics and Reporting:** Data Analysis for Social Media- Key Performance Indicators (KPIs)- Creating Comprehensive Social Media Reports- Adjusting Strategies Based on Analytics- Emerging Trends in Social Media. | **6** |
| **Learning Resources:*** **Recommended Texts**
1. Dave Evans, "Social Media Marketing: An Hour a Day" Wiley Publisher, 2020.
2. Borko Furht, ―Handbook of Social Network Technologies and Applications‖, 1st Edition,2014
* **Reference Books**
1. Guy Kawasaki and Peg Fitzpatrick, "The Art of Social Media: Power Tips for Power Users”, Publisher: Portfolio, Year: 2014.
2. Dion Goh and Schubert Foo, ―Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively‖, IGI Global Snippet, 2008.
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **2** |
| **CO2** | **2** | **3** | **2** | **3** | **2** | **2** |
| **CO3** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO4** | **2** | **2** | **2** | **2** | **2** | **2** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **13** | **12** | **12** | **13** | **12** | **12** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE55-3** | **SOCIAL MEDIA MARKETING** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Understand what social media is, the various channels through which it operates, and its role in marketing strategy.
* Develop social media marketing goals, objectives and content.
 |
| **Course Outcomes:** (for students: To know what they are going to learn)**CO1:** Preparing Facebook Ads and Instagram Ads and understand how to effectively brand their Social Media Pages.**CO2:** Establish a Video Marketing Strategy and learn YouTube Advertising.**CO3:** Demonstrate how to effectively brand their Twitter profile and use Twitter Ads.**CO4:** Understand how Consumer Generated Content and New Technologies are changing the Future of Social Media Marketing. **CO5:** Designing and developing an effective Blog.. |
| **Units** | **Contents** | **Required Hours** |
| **I** | Introduction - Introduction to Social Media, What is Social Media? - How Social Media developed, Managing Information – Aggregators, Google Alerts, Blogs. Getting your company ready for Social Media Content Management – Touch point analysis, Scheduling, Creating content, Managing content programs, Planning Worksheets. | **6** |
| **II** | Blogs – Blogger, Tumblr, Wordpress, Influencers Who are they? How to find them How to use them to benefit your brand. | **5** |
| **III** | YouTube Long - form video platforms, Setting up a channel, Managing content - Video Flow - Google Pages for YouTube Channel - Verify Channel Webmaster Tool – Adding Asset - Associated Website Linking - Custom Channel URL - Channel ART - Channel Links - Channel Keywords - Branding Watermark - Featured Contents on Channel - Channel Main Trailer | **7** |
| **IV** | Twitter - Set-up and usage Tips. LinkedIn - Tips and Guides Review of profiles. Pinterest - Visual social media and bookmarking, Set-up and management | **5** |
| **V** | Collaborative Marketing & Crowd sourcing - Consumer-generated content (Encouraged Organic), New Technologies – Chat Bots/Messenger Bots and Artificial Intelligence. | **5** |
| **Learning Resources:*** **Recommended Texts**
1. Social Marketing in India 1st Edition (Sameer Deshpande, Philip Kotler, Nancy R. Lee)
2. Marketing with Social Media (Linda Coles)
* **Reference Books**
1. Social Media Marketing 1st Edition (Michael R. Solomon, Tracy Tuten)
2. The Art of Social Media: Power Tips for Power Users (Guy Kawasaki, Peg Fitzpatrick
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **2** |
| **CO2** | **2** | **3** | **2** | **3** | **2** | **2** |
| **CO3** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO4** | **2** | **2** | **2** | **2** | **2** | **2** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **13** | **12** | **12** | **13** | **12** | **12** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE56-1** | **CLOUD COMPUTING****FUNDAMENTALS** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Analyze and mining communities in web social networks
* Visualize social networks.
 |
| **Course Outcomes:** (for students: To know what they are going to learn)**CO1:**Understanding the concept of  Network Mining, Graph Models**CO2:**Learning about  Social-Network Graph.**CO3:** Evaluating Social-Network Graph as well as properties**CO4:**Learning the Information Diffusion in Social Network**CO5:** Analyzing Social Networks Applications and Research Trends. |
| **Units** | **Contents** | **Required Hours** |
| **I** | **Cloud Computing Overview Origins of Cloud computing** – Cloud components - Essential characteristics – On-demand self service, Broad network access, Location independent  | **5** |
| **II** | **Resource pooling:** Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing. | **6** |
| **III** | **Cloud Insights** Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development | **5** |
| **IV** | **Cloud Architecture- Layers:** Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service ( PaaS ), features of PaaS and benefits, Infrastructure as a Service ( IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. | **7** |
| **V** | **Cloud deployment model:** Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing. | **5** |
| **Learning Resources:*** **Recommended Texts**
1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
* **Reference Books**
1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010 Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg,
2. Andrzej Goscinski, John Wiley & Sons, Inc. 2011
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **2** |
| **CO2** | **2** | **3** | **2** | **3** | **2** | **2** |
| **CO3** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO4** | **2** | **2** | **2** | **2** | **2** | **2** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **13** | **12** | **12** | **13** | **12** | **12** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE56-2** | **CLOUD SERVICES** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Express the Cloud service called platform as a service
* Analyze the Amazon & Google Web Services.
 |
| **Course Outcomes:** (for students: To know what they are going to learn)**CO1:**Illustrate and apply Cloud Computing and categories the different Cloud services and deployment models**CO2:**Identify and analyse  the key components of Amazon web Service**CO3:** Explore platform as a service in cloud computing**CO4:**Analyze the components of open stack & Google Cloud platform and understand Cloud Computing**CO5:** Apply the cloud concepts in real time in order to handle the storage |
| **Units** | **Contents** | **Required Hours** |
| **I** | **Platform as a Service:** Defining Services – Using PaaS Application Frameworks – Using Google web services: Exploring Google Applications - Using Amazon Web Services - Using Microsoft Cloud Services, Defining the Windows Azure Platform. | **6** |
| **II** | **Cloud Infrastructures:** Administrating the cloud – Understanding Cloud Security: Securing the cloud - Securing data - Establishing Identity and presence | **5** |
| **III** | **Introducing Service Oriented Architecture** – Defining SOA Communication – Managing and monitoring SOA. | **5** |
| **IV** | **Working with Cloud based storage**: Cloud storage definition – Provisioning Cloud storage – Exploring cloud backup solutions – Using Webmail services: Exploring Cloud mail Services – Exploring Instant messaging – Collaboration Technologies – Using Media and Streaming | **6** |
| **V** | **Introduction to VMWare Simulator**: Basics of VMWare, advantages of VMware virtualization, using Vmware workstation-understanding virtual machines. | **6** |
| **Learning Resources:*** **Recommended Texts**
1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Data and Computer Communications, W. Stallings, Prentice Hall of India, 2013.
* **Reference Books**
1. Cloud Computing – Second Edition by Dr. Kumar Saurabh, Wiley India
2. Jason Venner, ―Pro Hadoop- Build Scalable, Distributed Applications in the Cloud‖, A Press, 2009.
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **2** |
| **CO2** | **3** | **3** | **3** | **3** | **3** | **2** |
| **CO3** | **3** | **2** | **3** | **3** | **3** | **3** |
| **CO4** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **15** | **12** | **14** | **14** | **14** | **13** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE56-3** | **INTERFACING WITH VIRTUALIZATION** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Understand what social media is, the various channels through which it operates, and its role in marketing strategy.
* Develop social media marketing goals, objectives and content.
 |
| **Course Outcomes:** (for students: To know what they are going to learn)**CO1:**Preparing Facebook Ads and Instagram Ads and understand how to effectively brand their Social Media Pages.**CO2:**Establish a Video Marketing Strategy and learn YouTube Advertising.**CO3:** Demonstrate how to effectively brand their Twitter profile and use Twitter Ads.**CO4:**Understand how Consumer Generated Content and New Technologies are changing the Future of Social Media Marketing. **CO5:** Designing and developing an effective Blog.. |
| **Units** | **Contents** | **Required Hours** |
| **I** | **Introduction to Virtualization** Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations | **6** |
| **II** | **Types of hardware virtualization:** Full virtualization - partial virtualization - para virtualization Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization | **5** |
| **III** | **Hypervisors and Virtual machinesServer Virtualization:** Understanding Server Virtualization, types of server virtualization, Virtual machine basics, types of virtual machines, hypervisor concepts and types | **5** |
| **IV** | **Migrating into a Cloud Introduction:** Challenges while migrating to Cloud, Broad approaches to migrating into the cloudwhy migrate -deciding on cloud migration, the Seven-step model of migration into a cloud. | **6** |
| **V** | **Migration Risks and Mitigation**: Enterprise cloud computing paradigm, relevant Deployment Models for Enterprise Cloud Computing, Adoption and Consumption Strategies, issues for enterprise applications on the cloud. | **6** |
| **Learning Resources:*** **Recommended Texts**
1. David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach
* Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
* **Reference Books**
1. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011
2. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter,-TATA McGraw- Hill , New Delhi – 2010
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **2** |
| **CO2** | **2** | **3** | **2** | **3** | **2** | **2** |
| **CO3** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO4** | **2** | **2** | **2** | **2** | **2** | **2** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **13** | **12** | **12** | **13** | **12** | **12** |

**THIRD YEAR –SEMESTER- V**

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCI58** | **Summer Internship** |  | - | - | - | VI | 2 | 25 | 75 | 100 |

**(Refer to the Regulations)**

**THIRD YEAR –SEMESTER- VI**

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCC61** | **IOT AND CLOUD TECHNOLOGIES** | **CC****XIII** | 6 | - | - | VI | 4 | 25 | 75 | 100 |
| **Learning Objectives** |
| LO1 | Learn basic concepts of Cloud Computing. |
| LO2 | To get an overview of MapReduce Concepts. |
| LO3 | To learn about infrastructure security, Data Security and Privacy. |
| LO4 | To understand access based on access management in data security  |
| LO5 | To generate security and privacy access for the end user |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **IoT Introduction:** Introduction to IoT – IoT definition – Characteristics – IoT Complete Architectural Stack – IoT enabling Technologies – IoT Challenges. Sensors and Hardware for IoT – Hardware Platforms – Arduino, Raspberry Pi, Node MCU - Protocols for IoT. | **18** |
| II | **Introduction to Cloud Computing** Cloud Computing – Definition – SPI Framework – Software Model – Cloud Services Delivery Model – Deployment Models – Key drivers – Impact on Users – Governance in the cloud – Barriers to Cloud Computing Adoption in the enterprise. Examples of Cloud Service Providers: Amazon Web services – Google – Microsoft Azure Services Platform – Sun Open Cloud Platform. | **18** |
| III | **Virtual Machines Provisioning and Migration Services** Introduction and Inspiration -Background and Related Work- Virtual Machines Provisioning and Manageability-Virtual Machine Migration Services- VM Provisioning and Migration in Action -Provisioning in the Cloud Context - Future Research Directions- The Anatomy of Cloud Infrastructures -Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- Capacity Management to meet SLA Commitments. | **18** |
| IV | **Data Security, Identity and Access Management Data security and storage:** Aspects of Data Security -Data Security Mitigation -Provider Data and Its Security. Identity and Access Management: Trust Boundaries and IAM -Why IAM? - IAM Challenges- IAM Definitions- IAM Architecture and Practice-Getting Ready for the Cloud - Relevant IAM Standards and Protocols for Cloud Services - IAM Practices in the Cloud-Cloud Authorization Management- Cloud Service Provider IAM Practice. | **18** |
| V | **Security and Privacy Security Management: Standards** – Security Management in the Cloud – Availability Management – Access Control. Privacy: What is Privacy – Data Life Cycle – Key Privacy Concerns – Who is responsible for protecting Privacy – Privacy Risk Management – Legal and Regulatory Implications. IoT and Cloud Integration: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment. | **18** |
| **TOTAL HOURS** | **90** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | * Design an IoT system with cloud infrastructure.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | * Implement the M2M Communication protocols in a prototype
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Understand the basic concepts of the main sensors used in electromechanical systems | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | * Understand/implement computer models of common engineering information types.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Understand storage mechanisms / analysis algorithms for data management in distributed & data intensive applications | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | **"**The Internet of Things: Enabling Technologies, Platforms, and Use Cases**", by Pethuru Raj and Anupama C. Raman ,CRC Press.** |
| 2 | **Adrian McEwen,** Designing the Internet of Things, Wiley, 2013. |
| 3 | **Tim Mather, Subra Kumaraswamy, ShahedLatif (2010),** Cloud Security and Privacy, OREILLY Media. |
| 4 | **RajkumarBuyya, James Broberg, AndrzejGoscinski(2011),**CLOUD COMPUTING Principles and Paradigms, John Wiley & Sons, Inc., Hoboken, New Jersey |
| **Reference Books** |
| 1. | **Ronald L. Krutz and Russell Dean Vines(2010),** Cloud Security, Wiley – India |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 2 | 3 |
| CO 5 | 3 | 2 | 3 | 3 | 3 | 3 |
| Weightageof coursecontributedtoeachPSO | 15 | 14 | 15 | 15 | 14 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCP62** | **IOT AND CLOUD TECHNOLOGIES LAB** | **CC****XIV** | 6 | - |  | 6 | 4 | 25 | 75 | 100 |

**Objectives**

To improve efficiency and bringing important information to the surface more quickly than a system depending on human intervention, provide easy, scalable access to computing resources and IT services.

**LIST OF PROGRAMS**

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.

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 Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.

4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.

5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.

6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature andhumidity readings on it.

7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.

8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when “1”/”0” is received from smartphone using Bluetooth.

9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud.

10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.

11. To install MySQL database on Raspberry Pi and perform basic SQL queries.

12. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.

13. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.

14. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.

15. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

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| **Course Outcomes** |
| CO | On completion of this course, students will |
| CO1 | Design an IoT system with cloud infrastructure. |
| CO2 | Implement the M2M Communication protocols in a prototype |
| CO3 | Understand the basic concepts of the main sensors used in electromechanical systems |
| CO4 | Understand/implement computer models of common engineering information types. |
| CO5 | Understand storage mechanisms / analysis algorithms for data management in distributed & data intensive applications |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 2 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 2 | 2 | 2 | 3 |
| CO 5 | 3 | 2 | 3 | 3 | 3 | 3 |
| Weightageof coursecontributedtoeachPSO | 15 | 14 | 14 | 13 | 14 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCC63** | **Artificial intelligence** | **CC XV** | 6 | - | - |  | 4 | 25 | 75 | 100 |
| **Learning Objectives** |
| **LO1** | Describe the concepts of Artificial Intelligence |
| **LO2** | Understand the method of solving problems using Artificial Intelligence |
| **LO3** | Understand natural language processing |
| **LO4** | Introduce the concept of Expert system, Fuzzy logic |
| **LO5** | Understand about operating system and their uses |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction to Artificial Intelligence** What is Artificial Intelligence? AI Technique, Representation of a problem as State space search, production systems, Problem characteristics, Production System characteristics – Issues in the design of search programs, Heuristic Search Techniques - Generate & Test Hill Climbing, Best First search, Problem reduction, Constraint satisfaction, Means-End Analysis | **15** |
| II | **Knowledge Representation** Approaches and issues in knowledge representation –Using Predicate Logic – Representing simple facts in logic – Representing Instance and ISA relationship – Computable functions and predicates – resolution – Natural deduction - Representing knowledge using rules –Procedural versus declarative knowledge – Logic programming - Forward versus backward reasoning – Matching – Control Knowledge - Symbolic reasoning under uncertainty - Logics for Nonmonotonic reasoning – Implementation Issues – Augmenting a problem solver – Implementation: Depth first search, Breadth first search | **15** |
| III | **Statistical Reasoning** Probability and Bayes‟ Theorem - Certainty factors and rule-based systems- Bayesian networks – Dempster - Shafer Theory - Weak slot-filler structure - Semantic nets – frames. Strong slot-filler structure- Conceptual dependency – Scripts – CYC – Syntatic – Semantic spectrum of Representation – Logic and slot-and-filler structure – Other representational Techniques | **15** |
| IV | **Game Playing, Planning & NLP** Minimax search procedure-Adding alpha-beta cutoffs- Additional Refinements – Iterative Deepening – Reference on specific games Planning - Components of a Planning system – Goal stack planning – Nonlinear planning using constraint posting- Hierarchical planning – Reactive systems.Natural Language Processing - Syntactic Analysis, Semantic Analysis, Discuses and Pragmatic Processing – Statistical Natural Language processing | **15** |
| V | **Learning & Advanced Topics in AI** What is learning? – Rote learning – Learning by taking advice – Learning in problem solving – Learning from examples: Induction – Explanation based learning – Discovery – Analogy – Formal learning theory - Neural Net learning and Genetic learning - Expert System: Representation-Expert System shells-Knowledge Acquisition. Fuzzy logic system – Crisp sets – Fuzzy sets – Fuzzy terminology – Fuzzy logic control – Sugeno style of Fuzzy inference processing – Fuzzy Hedges – Neuro Fuzzy systems. | **15** |
| **TOTAL HOURS** | **75** |
| **Course Outcomes** | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | * Design user interfaces to improve human–AI interaction and real-time decision-making. Evaluate the advantages, disadvantages, challenges, and ramifications of human–AI augmentation.
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | * Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | * Extract information from text automatically using concepts and methods from natural language processing (NLP), including stemming, n-grams, POS tagging, andparsing
 | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness.Determine the framework in which artificial intelligence and the Internet of things may function, including interactions with people, enterprise functions, and environments. | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** |
| 1 | **Elaine Rich, Kevin Knight** (2008), Shivsankar B Nair, Artificial Intelligence, Third Edition, Tata McGraw Hill Publication |
| **Reference Books** |
| 1. | **Russel S, Norvig P** (2010), Artificial Intelligence : A Modern approach,Third Edition, Pearson Education |
| 2. | **Dan W Patterson** (2007), Introduction to Artificial Intelligence and Expert System, Second Edition, Pearson Education Inc. |
|  3. | **Jones M**(2006), Artificial Intelligence application Programming, Second Edition, Dreamtech Press |
|  4. | **Nilsson** (2000), Artificial Intelligence : A new synthesis, Nils J Harcourt Asia PTE Ltd. |

**Mapping with Programme Outcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 |
| CO 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 3 | 3 | 3 | 3 | 3 |
| Weightage of course contributed to each PSO | 15 | 14 | 14 | 15 | 15 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE64-1** | **NETWORK technologies** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* To use the Hadoop tools like Hive, and Hbase, which provide interface to relational databases, are also covered as part of this course work.
* To Analyze data with unix tools
 |
| **Course Outcomes:** (forstudents: To know what they are going to learn)**CO1:** Understand the fundamentals of Big cloud and data architectures.**CO2:** Understand HDFS file structure and Mapreduce frameworks, and use them to solve complex problems, which require massive computation power. **CO3:** Understand HDFS file structure and Mapreduce frameworks, and use them to solve complex problems, which require massive computation power. **CO4:**Understand The Hive Shell.**CO5:** Understand and Comparison with traditional databases. |
| **Units** | **Contents** | **Required Hours** |
| **I** | **Networking fundamentals:** Internet, Circuit switching vs Packet switching, ISPs, Delay and Loss in Packet Switched Networks | **5** |
| **II** | **Physical Network Design:** Core- Distribution Layer -Access Layer - Data Flow - Selecting the Media- IP Subnet Design-VLAN Network. | **5** |
| **III** | **Advanced Router Configuration I:** Configuring Static Routing - Dynamic Routing Protocols - Configuring RIPv2 – TFTP—Trivial File Transfer Protocol | **6** |
| **IV** | **Network Security:** Denial of Service-Firewalls and Access Lists-Router Security-Switch Security-Wireless Security-VPN Security.  | **6** |
| **V** | **Introduction to VoIP**: The Basics of Voice over IP- Voice over IP Networks- VoIP Security | **6** |
| **Learning Resources:*** **Recommended Texts**
1. Jeffrey S. Beasley, PiyasatNilkaew - **"A Practical Guide to Advanced Networking"**,2015, Pearson
2. Shaikh Farhan, Shaikh MohdAshfaque “**Advanced Networking Technologies**” Tech-Neo Publications LLP,2019
* **Reference Books**
1. Alberto Leon-Garcia, IndraWidjaja “**Communication Networks**”, Second Edition, McGraw-Hill Education,2003
2. R. J. Cesarone, R. C. Hastrup, David Bell and G. Nelson**"Architectural Design for a Mars Communications & Navigation Orbital Infrastructure "**Jan 2000
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **2** | **2** | **3** |
| **CO2** | **3** | **3** | **2** | **3** | **3** | **2** |
| **CO3** | **2** | **2** | **3** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **2** | **3** | **2** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **14** | **13** | **13** | **13** | **13** | **14** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE64-2** | **DATA SECURITY** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Familiarize the student with the basic taxonomy and terminology of the computer networking area.
* To understand the basics of Data and Network Security
 |
| **Course Outcomes:** (forstudents: To know what they are going to learn)**CO1:**Understanding the concept of  Network security **CO2:**Learning about  Program and Application security.**CO3:** Evaluating Database security**CO4:**Learning the Network Security**CO5:** Developing secure software and systems |
| **Units** | **Contents** | **Required Hours** |
| **I** | Security in hardware and operating systems: Effect of hardware on security. Process and memory protection. Virtualization. Vulnerabilities. Unix, Linux,Windows. Hardened operating systems. Authentication. | **6** |
| **II** | Program and Application security : Malicious software. Language problems, buffer overflow, Java security. Application/content firewalls. Components. Security in .NET and Sun ONE. | **5** |
| **III** | Database security: Using views for authorization in relational databases. Authorization systems in Oracle and similar systems. SQL injection and other attacks. NoSQL databases. Data intensive systems security | **5** |
| **IV** | Network Security: Attacks. Secure layers. SSL/TLS, Kerberos, VPNs, Firewalls. Intrusion Detection. Wireless systems | **6** |
| **V** | Developing secure software and systems: Secure system design methodology. Use of patterns. Formal methods, model checking. Code-based secure lifecycles. Evaluation of security. | **6** |
| **Learning Resources:*** **Recommended Texts**
1. E.B.Fernandez, Ehud Gudes, Martin Olivier, “The design of secure systems”, to appear W. Stallings and L. Brown, Computer Security: Principles and practice (2nd Ed.), Pearson 2012
2. Behrouz Forouzan "Data Communication Networking". 4th Edition
* **Reference Books**
1. Michael W Lucas  Networking for Systems Administrator Snippet, 2009.
2. Andrew S. Tanenbaum Computer Networks- 5th Edition.
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **2** | **2** | **3** |
| **CO2** | **3** | **3** | **2** | **3** | **3** | **2** |
| **CO3** | **2** | **2** | **3** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **2** | **3** | **2** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **14** | **13** | **13** | **13** | **13** | **14** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE65-1** | **Data Mining AND WAREHOUSING**  | **SEC** | 2 | - | - | - | 2 | 25 | 75 | 100 |
| **Learning Objectives:*** To provide the knowledge on Data Mining and Warehousing concepts and techniques.
* To study the basic concepts of cluster analysis
* To study a set of typical clustering methodologies, algorithms and applications.
 |
| **Course Outcomes:****CO1:**To understand the basic concepts and the functionality of the various data mining and data warehousing component**CO2:** To know the concepts of Data mining system architectures**CO3:**To analyze the principles of association rules **CO4:** To get analytical idea on Classification and prediction methods.**CO5:** To Gain knowledge on Cluster analysis and its methods.  |
| **Recap:**(notforexamination)Motivation/previouslecture/relevantportionsrequiredforthecourse)[Thisisdoneduring2Tutorialhours) |
| **Units** | **Contents** | **Required Hours** |
| **I** | Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction. | **6** |
| **II** | Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization. | **6** |
| **III** | Mining Association Rules: Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases. | **6** |
| **IV** | Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation.  | **6** |
| **V** | Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Petitioning Methods – Hierarchical Methods-Density Based Methods  | **6** |
| **Learning Resources:*** **Recommended Texts**

1. Han and M. Kamber, “Data Mining Concepts and Techniques”, 2001, Harcourt India Pvt. Ltd, New Delhi.* **Reference Books**
1. K.P. Soman, Shyam Diwakar, V. Ajay “Insight into Data Mining Theory and Practice “,  Prentice Hall of India Pvt. Ltd, New Delhi
2. Parteek Bhatia, ‘Data Mining and Data Warehousing: Principles and Practical Techniques’,  Cambridge University Press, 2019
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **2** | **2** | **2** |
| **CO2** | **3** | **3** | **3** | **3** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **3** | **3** | **3** |
| **CO4** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **15** | **14** | **14** | **14** | **14** | **13** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCE65-2** | **MASTER WEB DESIGNING IN PHOTOSHOP** | **SEC** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **Learning Objectives:**(for teachers: what they have to do in the class/lab/field)* Understand and Demonstrate contested definitions of the adobe Illustrator user interface
* Exploring debates about the Adobe via tools within the emerging field
 |
| **Course Outcomes:** (forstudents: To know what they are going to learn)**CO1:**Identify and adapt the elements of the adobe Illustrator user interface and demonstrate knowledge of their functions.**CO2:**Demonstrate knowledge of how to work with brushes,symbols, graphic styles, and patterns.**CO3:** Analyse the usage of Color Tools and Shape tools**CO4:**Demonstrate knowledge of how to use drawing and shape tools**CO5:** Apply the knowledge of painting practically |
| **Units** | **Contents** | **Required Hours** |
| **I** | **Workspace:** Workspace Basics-Workspace overview-Customizing the workspace | **6** |
| **II** | **Tools**: Tool Panel Overview-Improved User Interface -Tool Galleries-Files and Templates-Using multiple- Artboards- Viewing Artwork. | **5** |
| **III** | **Drawing Basics**-Drawing simple lines and shapes-Drawing Pixel aligned paths for web Workflows-Drawing with the pen, Pencil or Flare tool-Editing Paths-Adjust Path Segments- Symbolism tools and symbol sets-Symbols. | **5** |
| **IV** | **Selecting Colors**-Using and creating swatches-Color groups-Create color themes with kuler-Adjusting Colors. | **6** |
| **V** | **Painting**: Painting with fills strokes-Live Paint groups-Brushes-Gradients- Meshes-Patterns. | **6** |
| **Learning Resources:*** **Recommended Texts**
1. Adobe Illustrator CC Classroom in a Book, 1 edition, Pearson Education India.
2. Adobe Illustrator CC Classroom in a Book (2017 release) 1st Edition, Kindle Edition
* **Reference Books**
1. Adobe Illustrator CS6 Classroom in a Book by adobe create team
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **2** |
| **CO2** | **3** | **3** | **3** | **3** | **3** | **2** |
| **CO3** | **3** | **2** | **3** | **3** | **3** | **3** |
| **CO4** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **15** | **12** | **14** | **14** | **14** | **13** |

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| 23UDSCF66 | **Quantitative Aptitude** | **SEC** | 2 | - | - | - | 2 | 25 | 75 | 100 |

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| **LearningObjectives:**(forteachers:whattheyhavetodointheclass/lab/field)* To improve the quantitative skills of the students
* To prepare the students for various competitive exams
 |
| **Course Outcomes:** (for students: To know what they are going to learn)**CO1:**To gain knowledge on LCM and HCF and its related problems**CO2:**To get an idea of age, profit and loss related problem solving. **CO3:**Able to understand time series simple and compound interests**CO4:**Understanding the problem related to probability, and series**CO5:**Able to understand graphs, charts  |
| **Units** | **Contents** | **Required Hours** |
| **I** |  Numbers- HCF and LCM of numbers-Decimal fractions- Simplification- Square roots and cube roots- Average- problems on Numbers  | **6** |
| **II** | Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership- Chain rule | **6** |
| **III** | Time and work - pipes and cisterns - Time and Distance - problems on trains -Boats and streams - simple interest - compound interest - Logarithms - Area –Volume and surface area-races and Games of skill. | **6** |
| **IV** | Permutationandcombination-probability-TrueDiscount-BankersDiscount* Height and Distances-Odd man out & Series.
 |  |
| **V** | Calendar - Clocks - stocks and shares - Data representation - Tabulation – Bar Graphs- Piecharts-Linegraphs | **6** |
| **Learning Resources:*** **Recommended Texts**
1. “Quantitative Aptitude”, R.S. AGGARWAL., S. Chand&CompanyLtd.,
* **Webresources: Authentic** Web resources related to Competitive examinations
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| **MAPPING TABLE** |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **2** | **3** |
| **CO2** | **3** | **3** | **3** | **3** | **3** | **3** |
| **CO3** | **3** | **2** | **2** | **2** | **3** | **3** |
| **CO4** | **3** | **3** | **2** | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** |
| **Weightage of course contributed to each PSO** | **15** | **13** | **13** | **13** | **14** | **15** |

**THIRD YEAR –SEMESTER- V**

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| **Subject Code** | **Subject Name** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** |
| **CIA** | **External** | **Total**  |
| **23UDSCX67** | **Extension Activity** |  | - | - | - | - | 1 | 100 | - | 100 |

**(Refer to the Regulations)**