# K.L.N. COLLEGE OF ENGINEERING

## Pottapalayam-630612, Sivagangai District

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Estd: 1994**

# CURRICULUM& SYLLABI

## I to IV Semesters

## REGULATIONS 2024

## For Post Graduate Program

## M.C.A - MASTEROFCOMPUTERAPPLICATIONS

## CHOICE BASED CREDIT SYSTEM

**(For the students admitted from the academic year 2024-2025 onwards)**

**K.L.N. COLLEGE OF ENGINEERING,POTTAPALAYAM**

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

## VISION OF THE INSTITUTION

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society

## MISSION OF THE INSTITUTION

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

## VISION OF THE DEPARTMENT

To create innovative pedagogy with the source of knowledge in the successive development of Computer Technology in current trends.

## MISSION OF THE DEPARTMENT

To produce technically skillful, competent, employable, software professionals and researchers with social responsibilities and ethical values.

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## PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Enables a student to implement a high performing system by selecting appropriate data model, Architecture and Platform

PSO 2: Enable the students to design and develop application software for real time systems by integrating various system-based components

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates will be able to

PEO1: Applytheircomputing skillstoanalyze,designanddevelopinnovativesoftware productstomeettheindustryneedsand excelassoftwareprofessionals.

PEO2: Pursuelifelonglearninganddoresearchinthecomputingfieldbasedonsolid technicalfoundations.

PEO3: Communicateandfunctioneffectivelyinteamsinmultidisciplinaryfieldswithinthe global,societalandenvironmentalcontext.

PEO4: Exhibitprofessionalintegrity,ethicsandanunderstandingofresponsibilityto contributetechnicalsolutionsforthesustainabledevelopment of society.

## PROGRAM OUTCOMES (POs)

The Graduate Attributes for MCA programme are as follows:

**PO1**:An abilitytoindependentlycarryoutresearch/investigationanddevelopmentworktosolvepracticalproblems

**PO2:**Anabilitytowriteandpresent asubstantialtechnicalreport/document

**PO3:**Students should be able to demonstrate a degree of mastery over the area asper the specialization of the program.The mastery should be at a level higherthantherequirementsin the appropriatebachelorprogram

**PO4:** Abletoselectsuitabledatamodels,appropriatearchitecture,andplatformtoimplementa systemwithgood performance.

**PO5:**Abletodesignandintegratevarioussystem-basedcomponentstoprovideuserinteractive solutionsforvarious challenges.

**PO6:**Abletodevelopapplicationsforrealtimeenvironmentsusingexistingandupcomingtechnologies

## PEO / PO Mapping

| PEO | POs | | | | | |
|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| I. | 3 | 1 | 3 | 3 | 3 | 3 |
| II. | 2 | 1 | 3 | 3 | 3 | 3 |
| III. | 3 | 3 | 2 | 3 | 2 | 2 |
| IV. | 2 | 1 | 2 | 1 | 1 | 2 |

(3-High,2-Medium, 1-Low)

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# REGULATIONS 2024

## For Post Graduate Program

## Master of Computer Applications

### CHOICE BASED CREDIT SYSTEM

## CATEGORY OF COURSES

i. **FOUNDATIONCOURSES (FC)** mayincludeMathematicsorother basiccourses

ii. **PROFESSIONAL CORE COURSES (PCC)** include the core courses relevant tothe chosen Specialization/branch.

iii. **PROFESSIONAL ELECTIVES COURSES (PE) include** the elective courses relevant to thechosenspecialization/branch.

iv. **Research Methodology and IPR Course (RMC)** covers topics on the process of research and patenting.

v. **EMPLOYABILITYENHANCEMENTCOURSES(EEC)**includeProjectWorkand/orInternship,Seminar,ProfessionalPractices,SummerProject,CaseStudyandIndustrial/PracticalTraining.

vi. **Open Elective Courses (OEC)** include the courses offered by MCA.

vii. **AUDITCOURSES (AC)**include the courses such as Constitution of India, Value Education etc.

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**REGULATIONS 2024**
**CHOICE BASED CREDIT SYSTEM**
**MASTER OF COMPUTER APPLICATIONS (FULL TIME)**
**CURRICULUM AND SYLLABUS**
**SEMESTER I**

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1 | 24FC101 | Probability and Statistics | FC | 4 | 4 | 0 | 0 | 4 |
| 2 | 24MC102 | Advanced Database Technology | PCC | 3 | 3 | 0 | 0 | 3 |
| 3 | 24MC103 | Python Programming | PCC | 3 | 3 | 0 | 0 | 3 |
| 4 | 24MC104 | Object Oriented Software Engineering | PCC | 3 | 3 | 0 | 0 | 3 |
| 5 | 24MC105 | Modern Operating Systems | PCC | 3 | 3 | 0 | 0 | 3 |
| 6 | 24RM101 | Research Methodology and IPR | RMC | 3 | 3 | 0 | 0 | 3 |
| 7 | | Audit Course – 1# | AC | 2 | 2 | 0 | 0 | 0 |
| **PRACTICALS** | | | | | | | | |
| 8 | 24MC1L1 | Python Programming Laboratory | PCC | 3 | 0 | 0 | 3 | 1.5 |
| 9 | 24MC1L2 | Advanced Database Technology Laboratory | PCC | 3 | 0 | 0 | 3 | 1.5 |
| 10 | 24MC1L3 | Communication Skills Laboratory– I | EEC | 2 | 0 | 0 | 2 | 1 |
| | | | **TOTAL** | 29 | 21 | 0 | 8 | 23 |

**SEMESTER II**

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1 | 24MC201 | Internet of Things | PCC | 3 | 3 | 0 | 0 | 3 |
| 2 | 24MC202 | Data Structures and Algorithms | PCC | 4 | 4 | 0 | 0 | 4 |
| 3 | 24MC203 | Machine Learning | PCC | 3 | 3 | 0 | 0 | 3 |
| 4 | 24MC204 | Advanced JAVA | PCC | 4 | 4 | 0 | 0 | 4 |
| 5 | | Professional Elective – I | PEC | 3 | 3 | 0 | 0 | 3 |
| 6 | | Professional Elective – II | PEC | 3 | 3 | 0 | 0 | 3 |
| 7 | | Audit Course – 2 # | AC | 2 # | 2 # | 0 | 0 | 0 |
| **PRACTICALS** | | | | | | | | |
| 8 | 24MC2L1 | Data Structures and Algorithms Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 9 | 24MC2L2 | Advanced JAVA Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 10 | 24MC2L3 | Machine Learning Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 11 | 24MC2L4 | Communication Skills Laboratory– I | EEC | 2 | 0 | 0 | 2 | 1 |
| | | | **TOTAL** | 34 | 20 | 0 | 14 | 27 |

**# - Audit Courses 1 and 2 – Optional**

## SEMESTER III

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1 | 24MC301 | Artificial Intelligence | PCC | 3 | 3 | 0 | 0 | 3 |
| 2 | 24MC302 | Cloud Computing | PCC | 3 | 3 | 0 | 0 | 3 |
| 3 | 24MC303 | Foundations of Data Science | PCC | 3 | 3 | 0 | 0 | 3 |
| 4 | 24MC304 | Security in Computing | PCC | 3 | 3 | 0 | 0 | 3 |
| 5 | | Professional Elective – III | PEC | 3 | 3 | 0 | 0 | 3 |
| 6 | | Open Elective – I | OEC | 3 | 3 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7 | 24MC3L1 | Full Stack Development Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 8 | 24MC3L2 | Cloud Computing Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| | | | **TOTAL** | 26 | 18 | 0 | 8 | 22 |

## SEMESTERIV

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **PRACTICAL** | | | | | | | | |
| 1 | 24MC4L1 | Project Work | EEC | 24 | 0 | 0 | 24 | 12 |
| | | | **TOTAL** | 24 | 0 | 0 | 24 | 12 |

**TOTAL NO. OF CREDITS: 84**

# BRIDGECOURSES

**(FortheM.C.Astudents admittedundernon-computer-sciencebackgroundcategory)**

| SL. NO. | COURSE CODE | COURSETITLE | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|
| **Classes are to be conducted and completed before the start of the class of first semester, Examinationswillbeconductedalongwithfirst semester** | | | | | | | |
| 1. | 24MCBC1 | Database Management Systems | 3 | 3 | 0 | 0 | 3 |
| 2. | 24MCBC2 | Programming in 'C' | 3 | 3 | 0 | 0 | 3 |
| 3. | 24MCBC3 | Mathematical Foundations of Computer Applications | 3 | 3 | 0 | 0 | 3 |
| **Classes are to be conducted and completed before the start of the class of second semester, Examinationswillbeconductedalongwith secondsemester** | | | | | | | |
| 4. | 24MCBC4 | Basics of Computer Networks | 3 | 3 | 0 | 0 | 3 |
| 5. | 24MCBC5 | Object Oriented Programming | 3 | 3 | 0 | 0 | 3 |
| 6. | 24MCBC6 | Computer Graphics And Multimedia Systems | 3 | 3 | 0 | 0 | 3 |

## FOUNDATION COURSES (FC)

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1. | 24FC101 | Probability and Statistics | FC | 4 | 4 | 0 | 0 | 4 |

## PROFESSIONAL CORE (PC)

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1. | 24MC102 | Advanced Database Technology | PCC | 3 | 3 | 0 | 0 | 3 |
| 2. | 24MC103 | Python Programming | PCC | 3 | 3 | 0 | 0 | 3 |
| 3. | 24MC104 | Object Oriented Software Engineering | PCC | 3 | 3 | 0 | 0 | 3 |
| 4. | 24MC105 | Modern Operating Systems | PCC | 3 | 3 | 0 | 0 | 3 |
| 5. | 24MC1L1 | Python Programming Laboratory | PCC | 3 | 0 | 0 | 3 | 1.5 |
| 6. | 24MC1L2 | Advanced Database Technology Laboratory | PCC | 3 | 0 | 0 | 3 | 1.5 |
| 7. | 24MC201 | Internet of Things | PCC | 3 | 3 | 0 | 0 | 3 |
| 8. | 24MC202 | Data Structures and Algorithms | PCC | 4 | 4 | 0 | 0 | 4 |
| 9. | 24MC203 | Machine Learning | PCC | 3 | 3 | 0 | 0 | 3 |
| 10. | 24MC204 | Advanced JAVA | PCC | 4 | 4 | 0 | 0 | 4 |
| 11. | 24MC2L1 | Data Structures and Algorithms Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 12. | 24MC2L2 | Advanced JAVA Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 13. | 24MC2L3 | Machine Learning Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 14. | 24MC301 | Artificial Intelligence | PCC | 3 | 3 | 0 | 0 | 3 |
| 15. | 24MC302 | Cloud Computing | PCC | 3 | 3 | 0 | 0 | 3 |
| 16. | 24MC303 | Foundations of Data Science | PCC | 3 | 3 | 0 | 0 | 3 |
| 17. | 24MC304 | Security in Computing | PCC | 3 | 3 | 0 | 0 | 3 |
| 18. | 24MC3L1 | Full Stack Development Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |
| 19. | 24MC3L2 | Cloud Computing Laboratory | PCC | 4 | 0 | 0 | 4 | 2 |

## Research Methodologies and IPR Courses (RMC)

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1 | 24RM101 | Research Methodology and IPR | RMC | 3 | 3 | 0 | 0 | 3 |

## EMPLOYABILITY ENHANCEMENT COURSES (EEC)

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1 | 24MC1L3 | Communication Skills Laboratory – I | EEC | 2 | 0 | 0 | 2 | 1 |
| 2 | 24MC2L4 | Communication Skills Laboratory – II | EEC | 2 | 0 | 0 | 2 | 1 |
| 3 | 24MC4L1 | Project Work | EEC | 24 | 0 | 0 | 24 | 12 |

## PROFESSIONALELECTIVES(PE)*

### SEMESTER II

### PROFESSIONALELECTIVE– I

| SL. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1 | 24MC2E1 | Introduction To Virtual Reality | PEC | 3 | 3 | 0 | 0 | 3 |
| 2 | 24MC2E2 | Mobile Computing | PEC | 3 | 3 | 0 | 0 | 3 |
| 3 | 24MC2E3 | Accounting and Financial Management | PEC | 3 | 3 | 0 | 0 | 3 |
| 4 | 24MC2E4 | Soft Computing | PEC | 3 | 3 | 0 | 0 | 3 |

**SEMESTERII**

**PROFESSIONALELECTIVE– II**

| S.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1 | 24MC2E5 | Computer Organization and Architecture | PEC | 3 | 3 | 0 | 0 | 3 |
| 2 | 24MC2E6 | Operation Research | PEC | 3 | 3 | 0 | 0 | 3 |
| 3 | 24MC2E7 | Service Oriented Architecture | PEC | 3 | 3 | 0 | 0 | 3 |
| 4 | 24MC2E8 | Business Data Analytics | PEC | 3 | 3 | 0 | 0 | 3 |

**SEMESTERIII**

**PROFESSIONALELECTIVE–III**

| S.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1 | 24MC3E1 | Software Testing and Quality Assurance | PEC | 3 | 3 | 0 | 0 | 3 |
| 2 | 24MC3E2 | Full Stack Development | PEC | 3 | 3 | 0 | 0 | 3 |
| 3 | 24MC3E3 | Professional Ethics in IT | PEC | 3 | 3 | 0 | 0 | 3 |
| 4 | 24MC3E4 | DevOpsandMicroservices | PEC | 3 | 3 | 0 | 0 | 3 |

**SEMESTERIII**

## OPEN ELECTIVE

| S.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1 | 24MCOE1 | Software Project Management | OEC | 3 | 3 | 0 | 0 | 3 |
| 2 | 24MCOE2 | Crypto Currency and Block Chain Technologies | OEC | 3 | 3 | 0 | 0 | 3 |
| 3 | 24MCOE3 | Data Warehousing and Data Mining | OEC | 3 | 3 | 0 | 0 | 3 |
| 4 | 24MCOE4 | Big Data Analytics | OEC | 3 | 3 | 0 | 0 | 3 |

**AUDIT COURSES(AC)**

| S.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1. | 24AC101 | ENGLISHFORRESEARCHPAPERWRITING | AC | 2 | 2 | 0 | 0 | 0 |
| 2. | 24AC102 | DISASTER MANAGEMENT | AC | 2 | 2 | 0 | 0 | 0 |
| 3. | 24AC103 | SANSKRITFOR TECHNICALKNOWLEDGE | AC | 2 | 2 | 0 | 0 | 0 |
| 4. | 24AC104 | VALUE EDUCATION | AC | 2 | 2 | 0 | 0 | 0 |
| 5. | 24AC105 | CONSTITUTION OF INDIA | AC | 2 | 2 | 0 | 0 | 0 |
| 6. | 24AC106 | PEDAGOGY STUDIES | AC | 2 | 2 | 0 | 0 | 0 |
| 7. | 24AC107 | STRESS MANAGEMENT BY YOGA | AC | 2 | 2 | 0 | 0 | 0 |
| 8. | 24AC108 | PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS | AC | 2 | 2 | 0 | 0 | 0 |

## SUMMARY

| S.No | Category | CreditsasperSemester | | | | Total Credits | Weightage |
|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | | |
| 1 | FC | 4 | - | - | - | 4 | 4.70 |
| 2 | PCC | 15 | 20 | 16 | - | 51 | 60.71 |
| 3 | PEC | - | 6 | 3 | - | 9 | 10.58 |
| 4 | EEC | 2 | | - | 12 | 14 | 16.47 |
| 5 | OEC | - | - | 3 | - | 3 | 3.5 |
| 6 | RMC | 3 | | | | 3 | 3.5 |
| 7 | AC | 0 | 0 | - | - | 0 | 0 |
| | | **24** | **26** | **22** | **12** | **84** | |

| 24FC101 | PROBABILITY AND STATISTICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 4 | 0 | 0 | 4 |

**OBJECTIVES:**

- The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modelling, climate prediction and computer networks etc.
- To understand the basic concepts of probability, one dimensional random variables and to introduce some standard distributions.
- To understand the basic concepts of multivariate normal distribution and principal components analysis.

| UNIT-I | LINEAR ALGEBRA | 12 |
|---|---|---|

Vector spaces – norms –- Inner Products – QR factorization – generalized eigenvectors – singular value decomposition and applications – pseudo inverse – least square approximations.

| UNIT–II | PROBABILITY AND DISTRIBUTIONS | 12 |
|---|---|---|

Probability –Axioms of probability- Conditional probability- Independence of Events- Baye'sTheorem-Discrete random variable- Probability mass function- Continuous random variable-Probability density function- Properties-Mean and Variance –Special distributions: Binomial and normal distributions.

| UNIT-III | CORRELATION AND REGRESSION | 12 |
|---|---|---|

Correlation – Coefficient of determination-Properties of correlation coefficient – Rank correlation- regression – Estimation of Regression line – Properties of regression coefficient- Method of least squares.

| UNIT-IV | MULTIVARIATE ANALYSIS | 12 |
|---|---|---|

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components – Population principal components – Principal components from standardized variables.

| UNIT-V | TESTING OF HYPOTHESIS | 12 |
|---|---|---|

Sampling distributions –Type I and Type II errors- one sample and two sample tests for mean of large samples test, one sample and two sample tests for mean of small samples (T-test), F – test for two sample standard deviations- Chi–square tests for independence of attributes and goodness of fit.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Calculate** the different norms using inner products. – **UNITI-(K3)**

**CO2:Apply** the concepts of probability to find statistical measures for discrete and continuous random variable. – **UNITII -(K3)**

**CO3:Calculate** the coefficient of correlation and obtain the line of regression between the random variables. - **UNIT III (K3)**

**CO4:Calculate** descriptive statistics, testing for multivariate normality using analysis of multivariate data. -**UNIT- IV (K3)**

**CO5:Apply** the concepts of testing of hypothesis for small and large samples. **UNIT- V (K3)**

**REFERENCES:**

1. Bronson, R.," Matrix Operation" Schaum's outline series, Tata McGraw Hill, New York, 2011.

2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

3. Devore, J. L., "Probability and Statistics for Engineering and the Sciences", 8th Edition, Cengage Learning, 2015.

4. Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistic", Sultan and Sons, New Delhi, 2001.

5. Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis", 6th Edition, Pearson Education, Asia, 2007.

| 24MC102 | ADVANCED DATABASE TECHNOLOGY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the working principles and query processing of distributed databases.
- To understand the basics of spatial, temporal and mobile databases and their applications.
- To distinguish the different types of NoSQL databases.
- To understand the basics of XML and create well-formed and valid XML documents.
- To gain knowledge about information retrieval and web search.

| UNIT I | DISTRIBUTED DATABASES | 9 |
|---|---|---|

Distributed Systems – Introduction – Architecture – Distributed Database Concepts – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing

| UNIT II | SPATIAL AND TEMPORAL DATABASES | 9 |
|---|---|---|

Active Databases Model – Design and Implementation Issues - Temporal Databases - Temporal Querying - Spatial Databases: Spatial Data Types, Spatial Operators and Queries – Applications - Mobile Databases: Mobile Transaction Models, Deductive Databases and Multimedia Databases

| UNIT III | NOSQL DATABASES | 9 |
|---|---|---|

NoSQL – CAP Theorem – Sharding - Document based – MongoDB Operation: Insert, Update, Delete, Query, Indexing, Application, Replication, Sharding – Cassandra: Data Model, Key Space, Table Operations, CRUD Operations, CQL Types – HIVE: Data types, Database Operations, Partitioning – HiveQL – OrientDB Graph database – OrientDB Features

| UNIT IV | XML DATABASES | 9 |
|---|---|---|

Structured, Semi structured, and Unstructured Data – XML Hierarchical Data Model – XML Documents – Document Type Definition – XML Schema – XML Documents and Databases

| UNIT V | INFORMATION RETRIEVAL AND WEB SEARCH | 9 |
|---|---|---|

IR concepts – Retrieval Models – Queries in IR system – Text Preprocessing – Inverted Indexing – Evaluation Measures – Web Search and Analytics – Current trends.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon Completion of the Course, the Students will be able to:**

**CO1: Demonstrate** a distributed database system and execute distributed queries. - **UNIT – I (K3)**

**CO2: Apply** Spatial and Temporal Database systems and implement it in Corresponding applications. - **UNIT – II (K3)**

**CO3: Use** NoSQL database systems and manipulate the data associated with it. - **UNIT – III (K3)**

**CO4: Demonstrate** XML database systems and validate with XML schema. - **UNIT – IV – (K3)**

**CO5: Apply** knowledge of information retrieval concepts on web databases. - **UNIT – V – (K3)**

**REFERENCES:**


1. AbrahamSilberschatz,HenryFKorth,S.Sudharshan,“DatabaseSystemConcepts”,Seventh Edition,McGraw Hill,2019.
2. R.Elmasri,S.B.Navathe,“FundamentalsofDatabaseSystems”,SeventhEdition,PearsonEducation/AddisonWesley,2017.
3. GuyHarrison,“NextGenerationDatabases,NoSQL,NewSQLandBigData”,FirstEdition,Apresspublishers,2015
4. JiaweiHan,MichelineKamber,JianPei, “DataMining:Conceptsand Techniques”, ThirdEdition,MorganKaufmann,2012.
5. BradDayley,“TeachYourselfNoSQLwithMongoDBin24Hours”,SamsPublishing,FirstEdition,2014.
6. C.J.Date,A.Kannan,S.Swaminathan,“AnIntroductiontoDatabase Systems”,EighthEdition,Pearson Education,2006
7. Data Base Management Systems” - Alexis Leon, Mathews Leon

| 24MC103 | PYTHON PROGRAMMING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand new Programming features in Python
- To provide skills on implementation of Data Structures in Python
- To enhance knowledge on Object Oriented Techniques in Python
- To improve skills on various Special Functions in Python
- To provide knowledge on Web Page Development

| UNIT - I | BASICS OF PYTHON | 9 |
|---|---|---|

Introduction- Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions- Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Strings: string slices, immutability, string functions and methods,string module

| UNIT – II | DATA STRUCTURES IN PYTHON | 9 |
|---|---|---|

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Sets- Tuples: tuple assignment, tuple as return value-Sets vs Tuples- Dictionaries: operations and methods; Arrays using NumPy

| UNIT – III | OBJECT ORIENTED PROGRAMMING AND FRAMEWORK | 9 |
|---|---|---|

Introduction to Python Classes- Creating a Class, Creating the constructor in python, Dunder Functions, Python Decorator, Python Property Decorator, Inner Classes, Operator Overloading, Different forms of Inheritance, Method Over riding, MRO,Frameworks- -Django

| UNIT – IV | FILE HANDLING AND EXCEPTION HANDLING | 9 |
|---|---|---|

Functions-Types of functions, File operations, File Modes, File Prototypes, Argument types, Files and Exception - Exception handling, catching exceptions, try –finally

| UNIT – V | DATABASE CONNECTIVITY | 9 |
|---|---|---|

Database Connectivity-SQLite, SQLite Module APIs, Connect to Database- create table, Insert, Select, update, delete; Tkinter – Events, Event driven programming- Keypress events, Mouse events, Automatic events from a timer

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Demonstrate** string function in Python -**UNIT – I – (K3)**
**CO2:Apply** various Data Structure concepts in Python - UNIT **– II – (K3)**
**CO3:Use** OOPs concepts in Python - **UNIT – III – (K3)**
**CO4:Apply** Modules, Files in Python -**UNIT – IV – (K3)**
**CO5:Apply** Database connectivity with Python -**UNIT – V – (K3)**

**REFERENCES:**

1. Martin C. Brown - Python: The Complete Reference - McGraw Hill Education
2. John V Guttag, —Introduction to Computation and Programming Using Python ‘‘, Revised Andexpanded Edition, MIT Press, 2013
3. E. Balagurusamy, Chairman - McGraw Hill Education India Private Limited, EBG Foundation, Coimbatore. - Introduction to Computing and Problem-Solving Using Python
4. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.

| 24MC104 | OBJECT ORIENTED SOFTWARE ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Tounderstandthephases inobject-orientedsoftware development
- Togainfundamentalconceptsofrequirementsengineering andanalysis.
- Toknowaboutthe differentapproachforobject-oriented designand itsmethods
- Tolearn abouthowtoperformobject-orientedtestingandhowtomaintainsoftware
- Toprovidevarioussoftwarequality and metrics.

| UNITI | SOFTWARE DEVELOPMENT AND PROCESS MODELS | 9 |
|---|---|---|

Introduction to Software Development-Challenges-Software Development Process-Iterative Development Process-Object Oriented Life Cycle Models –– PrescriptiveProcessModels:TheWaterfallModel,IncrementalModels(IncrementalandRAD)–Evolutionary ProcessModels(Prototyping,SpiralandConcurrentDevelopment)–AgileProcessModels.

| UNIT II | OBJECT ORIENTED ANALYSIS | 9 |
|---|---|---|

Object Oriented Analysis- RequirementsEngineeringTasks-Requirement Elicitation Process- Software Requirement Specification (SRS) Document – OOA- Identification of Classes and Relationships – Identifying State and Behavior – OOA- Use Case Modeling – Class Modeling – Dynamic Modeling - Analysis Object Models – Dynamic and Static

| UNIT III | OBJECT ORIENTED DESIGN | 9 |
|---|---|---|

DesigningConcepts- Abstraction–Modularity–Cohesion–Coupling- Design Principles – Hierarchical Object-Oriented Design- Object Modeling Technique-Object Oriented Design- Interaction Diagrams-Sequence Diagrams-

| UNIT IV | OBJECT ORIENTED TESTING | 9 |
|---|---|---|

Object Oriented Testing – Object Oriented Testing Methods -Software Testing- Software Verification Techniques-– Functional Testing- Structural Testing- Class Testing – Mutation Testing- Regression Testing - Software Testing Techniques – Static and Dynamic – Software Testing Tools

| UNIT V | SOFTWARE QUALITYAND OBJECT-ORIENTED METRICS | 9 |
|---|---|---|

Measuring Software Quality- Objectives of quality measurement- Classification of software quality metrics – Product Metrics, Process Metrics, Project Metrics, Object Oriented Metrics- Limitations of Software Metrics.

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Describe**object-oriented software using appropriate process models. – **UNIT – I – (K2)**

**CO2:Demonstrate** Object Oriented Analysis concepts for software project. -**UNIT – II – (K3)**

**CO3:Develop** Object Oriented Design Techniques forsoftware project. **UNIT – III – (K3)**

**CO4:Conduct**testingmethodsandcomparedifferenttestingtoolsforsoftware process. -**UNIT – IV – (K3)**

**CO5:Analyze** Object Oriented Software quality for software engineeringprocesses. -**UNIT –V – (K4)**

**REFERENCES:**


1. YogeshSingh,RuchikaMalhotra,“Object–OrientedSoftwareEngineering”,PHILearningPrivate Limited, Firstedition,2012
2. IvarJacobson.MagnusChristerson,PatrikJonsson,GunnarOvergaard,“ObjectOrientedSoftwareEngineering,AUseCaseDrivenApproach”,PearsonEducation,Seventh Impression,2009
3. Craig Larman, “Applying UML and Patterns, an Introduction to Object-Oriented Analysis andDesignandIterativeDevelopment”, PearsonEducation,ThirdEdition,2008
4. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young,Jim Connellan,Kelli A.Houston,“Object OrientedAnalysis & Design withApplications, Third Edition,PearsonEducation,2010
5. RogerS.Pressman,“SoftwareEngineering:APractitioner’sApproach,TataMcGraw-HillEducation, 8th Edition,2015
6. Bernd Bruegge, Allen H. Dutoit,“Object Oriented Software Engineering “Second Edition, Pearson Education, 2013
7. Daniel Galin, “Software Quality Assurance”, Pearson Education, 2012

| 24MC105 | MODERN OPERATING SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To provide basic knowledge about operating systems, their services, process concept and process synchronization
- To explore CPU scheduling concepts and Deadlocks
- To know about Memory Management concepts
- To know about disk structure and disk scheduling algorithms
- To provide knowledge about files and directories

| UNIT – I | INTRODUCTION | 9 |
|---|---|---|

Introduction – Computer systems structures: computer system operation – I/O structure – storage structure – storage hierarchy – Hardware protection – operating system structures: system components – operating system services – system calls – Processes: process concept – process scheduling – operations on processes – cooperating processes – Inter process communication

| UNIT - II | SCHEDULING AND DEADLOCK | 9 |
|---|---|---|

CPU Scheduling: Basic concepts – scheduling criteria – scheduling algorithms – Deadlocks: system model – Deadlock characterization – methods for handling deadlocks – deadlock prevention- deadlock avoidance – deadlock detection – Recovery from deadlock

| UNIT - III | MEMORY MANAGEMENT | 9 |
|---|---|---|

Memory management: Swapping – contiguous memory allocation – Paging – Segmentation – Segmentation with paging – Virtual memory: Demand paging – Process creation – Page replacement – Allocation of frames – thrashing

| UNIT - IV | MASS STORAGE STRUCTURE | 9 |
|---|---|---|

Mass storage structure – Disk structure – Disk scheduling – Disk management – Swap space management – RAID structure

| UNIT - V | FILE SYSTEM | 9 |
|---|---|---|

File system interface: File concept – Access methods – Directory structure- File system mounting – file Protection.

**Total Periods: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Apply** the concept of OS services, process concepts and process synchronization. **UNIT 1 (K3)**

**CO2:Illustrate** the CPU scheduling algorithms and Deadlock concepts. **UNIT 2 (K3)**

**CO3:Apply** memory management concepts and techniques in OS. **UNIT 3 (K3)**

**CO4:Demonstrate** the disk scheduling algorithms. -**UNIT 4 (K3)**

**CO5:Apply** the concepts of file and directories for OS. **UNIT 5 (K3)**

**REFERENCES:**

1. Abraham Silber Schatz Peter Galvin, Gagne, —OPERATING SYSTEMCONCEPTS‖, WilleyIndia Edition, Eighth Edition, 2010
2. Andrew Tanenbaum, —Modern operating systems‖, Third Edition, PHI Learning Pvt.Ltd.,2008.

| 24RM101 | RESEARCH METHODOLOGY AND IPR | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

To give an overview of the research methodology and explain the technique of defining a researchproblem and to explain the functions of the literature reviewin research. This course canexplain theartofinterpretationandtheartofwritingresearchreports.Alsoitexplainsvariousformsofthe intellectualpropertyitsrelevanceandbusinessimpactinthechangingglobalbusinessenvironment.

**PRE-REQUISITE: NIL**

| UNIT-I | RESEARCHMETHODOLOGY | 9 |
|---|---|---|

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good researchproblem,Errorsinselectingaresearchproblem,Scopeandobjectivesofresearchproblem.Approaches of investigation of solutions for research problem, data collection, analysis, interpretation,Necessary instrumentations. Effective literature studies, approaches, analysis, Plagiarism, Researchethics.

| UNIT-II | EFFECTIVETECHNICALWRITING | 9 |
|---|---|---|

Howtowritereport,PaperDevelopingaResearchProposal,Formatofresearchproposal,apresentationand Assessmentbyareviewcommittee

| UNIT - III | INTELLECTUALPROPERTYANDINTERNATIONALSCENARIO | 9 |
|---|---|---|

Nature of Intellectual Property:Patents, Designs,Trade andCopyright.Process of PatentingandDevelopment:technologicalresearch,innovation,patenting,development.InternationalScenario:I nternationalcooperationonIntellectualProperty.Procedureforgrantsofpatents, Patentingunder PCT.

| UNIT – IV | PATENTRIGHTS | 9 |
|---|---|---|

ScopeofPatentRights,Licensingand transferoftechnology,Patentinformationanddatabases,GeographicalIndications

| UNIT – V | NEWDEVELOPMENTSINIPR | 9 |
|---|---|---|

AdministrationofPatentSystem,NewdevelopmentsinIPR,IPRofBiologicalSystems,ComputerSoftwareetcTrad itionalknowledgeCase Studies,IPRandIITs.

**TOTAL:45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Explain** the scope and objectives of research problem – **UNIT – I- (K2)**

**CO2:Develop** effective technical writing for research proposal **UNIT – II- (K3)**

**CO3:Classify** the Intellectual property in IPR - **UNIT –III- (K3)**

**CO4:Illustrate** patent rights, indications - **UNIT – IV- (K3)**

**CO5:Predict** the new development in IPR - **UNIT –V- (K3)**

**TEXT BOOKS:**

1. Debora J. Halbert, “Resisting Intellectual Property (RIPE Series in Global Political Economy)”,Taylor&Francis Ltd.,2006.
2. W.H.Mayall,“IndustrialDesignforEngineers”,LondonIliffeBooksLtd. 1967.
3. Benjamin W. Niebel, “ProductDesignandProcessEngineering”,McGraw-HillInc.,US,1974.
4. Morris Asimow,“AnIntroductionToDesign”,Prentice-Hall,Inc.FirstEdition,1962.
5. Robert P. Merges, Peter S. Menell and Mark A. Lemley, “Intellectual Property in NewTechnologicalAge”,AspenLaw&Business,2012.
6. T.Ramappa,“IntellectualPropertyRightsUnderWTO:TasksBeforeIndia”,AHWheelerPublishingCo.Ltd.,2002.

**REFERENCES:**

1. S. MelvilleandW.Goddard,“ResearchMethodology:AnIntroductionforScienceandEngineeringStudents”, Juta&Co. Ltd., 1996.
2. RanjitKumar,“ResearchMethodology:AStep-by-StepGuidefor Beginners”,ThirdEdition,SAGEPublications Ltd.,2010

| 24MC1L1 | PYTHON PROGRAMMING LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**OBJECTIVES:**

- To understand the basic functionalities techniques in python
- To apply the various function techniques
- To implement the Object-oriented Techniques
- To create simple files and databases
- To create Windows and Events oriented programming concepts

**LIST OF EXPERIMENTS:**

1.Basic Programs using Python.

2. Implement Linear and Binary Search

3. Implement Selection and Merge Sorts

4. Create Classes and Objects

5. Create Modules and Packages

6. Construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list using NumPy

7. Read a file content and copy only the contents at even lines into a new file.

8. Create a table in SQLite and apply SQL queries

9. Create GUI components using Tkinter

10. Create Mouse Events using Tkinter

**TOTAL: 45 PERIODS**

**OUTCOMES:**
**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1**: **Apply** the concept of Basic Programs in python – **(K3)**
**CO2:Apply** any compound data structures - **(K3)**
**CO3**: **Build** Files and Databases in Python - **(K3)**
**CO4:Develop** window-based applications - **(K3)**
**CO5**: **Develop** mouse events using Tkinter-**(K3)**

| 24MC1L2 | ADVANCED DATABASE TECHNOLOGY LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**OBJECTIVES:**

- Tounderstandthe process ofdistributing tablesacrossmultiplesystems
- Tounderstandtheprocess ofstoring, retrievingspatialandtemporal data
- Tounderstandthe processofstoring, retrievingobjects in adatabase
- Tounderstandtheprocessofstoringandretrievingdatafrom anXMLDatabase
- Tousetheopen-source database for buildingamobileapplication

**LIST OF EXPERIMENTS:**

a. NOSQLExercises
   i. MongoDB–CRUDoperations,Indexing,Sharding
   ii. Cassandra:TableOperations,CRUDOperations, CQLTypes
   iii. HIVE:Datatypes,DatabaseOperations,Partitioning–HiveQL
b. MySQLDatabase Creation,Table Creation,Query
c. MySQLReplication–DistributedDatabases
d. Spatialdata storage andretrieval inMySQL
e. Temporaldatastorageand retrievalinMySQL
f. ObjectstorageandretrievalinMySQL
g. XMLDatabases,XMLtablecreation,XQuery FLWORexpression
h. MobileDatabaseQueryProcessingusingopen-source DB(MongoDB/MySQLetc)

**TOTAL: 45 PERIODS**

**SOFTWAREREQUIREMENTS**

1. Java/Python /R/Scala
2. Oracle,MySQL, MongoDB,Casandra, Hive

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Construct**and implementadvanceddatabases.- **(K3)**
**CO2:Use** bigdataframeworksandtools. - **(K3)**
**CO3:Use**SQL solve complex queries - **(K3)**
**CO4:Develop**anXMLdocumentandperformXQuery .- **(K3)**
**CO5: Develop** mobile databases in query processing by using open-source tools - **(K3)**

| 24MC1L3 | COMMUNICATION SKILLS LABORATORY - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- Toprovideopportunitiestolearners topracticetheircommunicativeskills tomakethembecome proficientusers ofEnglish.
- Toenablelearnerstofine-tunetheirlinguisticskills(LSRW)withthehelpoftechnologytocommunicate globally.
- To improve the performance of students' listening, speaking, reading and writing skills and thereby enhance their career opportunities.

**LIST OF ACTIVITIES:**

1. Listening:
   - Listening and practicing neutral accents
   - Listening to short talks and lectures and completing listening comprehension exercises
   - Listening to TED Talks
2. Speaking:
   - Giving one minute talks
   - Participating in small Group Discussions
   - Making Presentations
3. Reading:
   - Reading Comprehension
   - Reading subject specific material
   - Technical Vocabulary
4. Writing:
   - Formal vs Informal Writing
   - Paragraph Writing
   - Essay Writing
   - Email Writing

**REFERENCES / MANUALS / SOFTWARE**: Open Sources / websites

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1 : Listen and comprehend lectures in English**

CO2 : **Articulate well and give presentations clearly**

CO3 : **Participate in Group Discussions successfully**

CO4 : **Communicate effectively in formal and informal writing**

CO5 : **Write proficient essays and emails**

| 24MC201 | INTERNET OF THINGS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To study fundamental concepts of IoT
- To understand roles of sensors in IoT
- To Learn different protocols used for IoT design
- To be familiar with data handling and analytics tools in IoT
- Appreciate the role of big data, cloud computing and data analytics in a typical IoT system.
- Understand the role of IoT in various domains of Industry

| UNIT-I | FUNDAMENTALS OF IoT | 9 |
|---|---|---|

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

| UNIT-II | SENSORS IN IoT | 9 |
|---|---|---|

Sensors Networks: Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, Raspberry Pi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

| UNIT-III | IOT PROTOCOLS | 9 |
|---|---|---|

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, BACnet, Modbus. IP Based Protocols for IoT IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols

| UNIT-IV | DATA ANALYTICS AND SUPPORTING SERVICES | 9 |
|---|---|---|

Data Handling& Analytics: Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications.

| UNIT-V | IoT APPLICATIONS | 9 |
|---|---|---|

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Determine** the various concepts, terminologies and architecture of IoT systems- **UNIT – I – (K2)**
**CO2:Use** sensors and actuators for design of IoT. -**UNIT –II – (K3)**
**CO3:Apply** various protocols for design of IoT systems - **UNIT – III – (K3)**
**CO4:Use** various techniques of data storage and analytics in IoT - **UNIT – IV – (K3)**
**CO5:Demonstrate**various applications of IoT - **UNIT – V – (K3)**

**TEXTBOOK:**

1.David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IOT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things‖, Cisco Press, 2017

2.ArshdeepBahga, Vijay Madisetti, Internet of Things – A hands-on approach‖, Universities Press, 2015

**REFERENCES:**

1.OlivierHersent, David Boswarthick, Omar Elloumi, —‖The Internet of Things – Key applications and Protocols‖, Wiley, 2012 (for Unit 2).

2.Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stamatis,Karnouskos, Stefan Avesand. David Boyle, From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence‖, Elsevier, 2014.

3.DieterUckelmann, Mark Harrison, Michahelles, Florian (Eds), —‖Architecting the Internet of Things‖, Springer, 2011.

4.Michael Margolis, —Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects‖, 2nd Edition, O'Reilly Media, 2011.

| 24MC202 | DATA STRUCTURES AND ALGORITHMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 4 | 0 | 0 | 4 |

**OBJECTIVES:**

- To learn linear data structures-Stack, Queue and Linked List
- To learn non linear data structures –Tree and Graphs
- To be exposed to sorting ,searching and hashing techniques
- To be familiar with the various algorithm design techniques
- To apply the algorithm design techniques to real world problems and analyze them

| UNIT I | LINEAR DATA STRUCTURES | 12 |
|---|---|---|

Introduction - Abstract Data Types (ADT) – Stack ADT – Operations on Stack - Applications of stack – Infix to postfix conversion – evaluation of expression - Queue ADT – Operations on Queue - Circular Queue - Applications of Queue. List ADT - Singly Linked Lists – Doubly Linked Lists - Applications of linked list – Polynomial Addition

| UNIT II | NON-LINEAR DATA STRUCTURES | 12 |
|---|---|---|

**Trees** and its representation -Binary Tree – Expression trees – Binary tree traversals – Applications of trees – Binary search tree - Balanced Trees - AVL Tree- Heap- Heap operations

**Graph** and its representation - Graph Traversals - Depth-first traversal – Breadth-first traversal - Applications of graphs-shortest-path algorithms – Minimum spanning tree – Prim's and Kruskal'salgorithms.

| UNIT III | SORTING, SEARCHING AND HASH TECHNIQUES | 12 |
|---|---|---|

Sorting algorithms: Insertion sort - Bubble sort - Quick sort - Searching: Linear search –BinarySearch - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing.

| UNIT IV | ALGORITHM DESIGN AND ANALYSIS | 12 |
|---|---|---|

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – GreedyAlgorithms – Knapsack Problem – Dynamic Programming – Warshall‘s Algorithm for FindingTransitive Closure.

| UNIT V | P & NP PROBLEMS | 12 |
|---|---|---|

Backtracking – N-Queen's Problem – Subset sum problem- Branch and Bound –Assignment Problem - Traveling salesman problem– Knapsack problem- Approximation algorithms for NP-hard problems – Travelling salesman problem.

**TOTAL :60 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Demonstrate** the operations of Linear Data Structures **[Unit I]** [K3]

**CO2:Demonstrate**Non-Linear Data Structure **[UNIT II]** [K3]

**CO3:Determine**the various sorting and searching techniques **[Unit III]** [K3]

**CO4:Apply** different algorithm design strategies **[UNIT IV]** [K3]

**CO5:Calculate** the Efficiency of given algorithm. **[UNIT V]** [K3]

**REFERENCES:**

1. AnanyLevitin —Introduction to the Design and Analysis of Algorithms‖ Pearson Education, 2015

**1.** E. Horowitz, S.Sahni and Dinesh Mehta, —Fundamentals of Data structures in C++‖, University Press, 2007

3. E. Horowitz, S. Sahni and S. Rajasekaran, —Computer Algorithms/C++‖, Second Edition, University Press, 2007

4. Tanaenbaum A.S.,Langram Y. Augestein M.J, —Data Structures using C‖ Pearson Education , 2004

5. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Third Edition, PHI Learning Private Ltd, 2012.

| 24MC203 | MACHINE LEARNING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Togainknowledgeonfoundationsofmachinelearningandapplysuitable dimensionalityreductiontechniquesforan application
  - Toselecttheappropriatemodelandusefeatureengineering techniques
  - Togainknowledge onProbabilityandBayesian Learningtosolvethegivenproblem
  - Todesignandimplementthemachinelearning techniquesforreal worldproblems
  - Toanalyze, learnandclassifycomplexdatawithout predefinedmodelsalso

| Unit I | INTRODUCTION | 9 |
|---|---|---|

Human Learning - Types – Machine Learning - Types - Problems not to be solved - Applications -Languages/Tools– Issues. Preparing to Model: Introduction - Machine Learning Activities – Typesofdata-Exploringstructure ofdata-Dataqualityandremediation-DataPre-processing

| Unit II | MODEL EVALUATION AND FEATURE ENGINEERING | 9 |
|---|---|---|

ModelSelection-TrainingModel-ModelRepresentationandInterpretability-EvaluatingPerformanceofaModel-ImprovingPerformanceofaModel-FeatureEngineering:FeatureTransformation-FeatureSubsetSelection

| UNIT III | Bayesian Learning | 9 |
|---|---|---|

BasicProbabilityNotation-Inference–Independence-Bayes'Rule.BayesianLearning:Maximum Likelihood and Least Squared error hypothesis-Maximum Likelihood hypotheses forpredicting probabilities- Minimum description Length principle -Bayes optimal classifier – NaïveBayesclassifier-Bayesian Beliefnetworks –EMalgorithm

| Unit IV | PARAMETRIC MACHINE LEARNING | 9 |
|---|---|---|

Logistic Regression: Classification and representation– Cost function – Gradientdescent–Advancedoptimization– Regularization-Solvingtheproblemsonoverfitting.Perceptron–Neural Networks – Multi – class Classification – Backpropagation – Non-linearity with activationfunctions(Tanh,Sigmoid,Relu,PRelu) – Dropoutas regularization

| Unit V | NON PARAMETRIC MACHINE LEARNING | 9 |
|---|---|---|

k- Nearest Neighbors- Decision Trees – Branching – Greedy Algorithm - Multiple Branches –Continuous attributes – Pruning.Random Forests: ensemble learning. Boosting – Adaboostalgorithm.SupportVectorMachines– LargeMarginIntuition–LossFunction-HingeLoss–SVMKernels

**TOTAL :45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:**UnderstandaboutDataPreprocessing,Dimensionalityreduction - **UNIT – I – (K2)**

**CO2:**Applypropermodelforthegivenproblemand usefeatureengineeringtechniques**– UNIT – II – (K3)**

**CO3:**Make use of Probability Technique to solve the given problem- **UNIT – III – (K3)**

**CO4:C**hoose and apply appropriate algorithm to learn and classify the data- **UNIT – V – (K3)**

**CO5:**Analyze the working model and features of Decision tree**– UNIT – IV– (K3)**

**REFERENCES:**


1. Ethem Alpaydin,“IntroductiontoMachineLearning3e (AdaptiveComputationandMachine LearningSeries)”,ThirdEdition, MITPress,2014
2. TomM.Mitchell,“MachineLearning”,IndiaEdition,1st Edition,McGraw-HillEducationPrivate Limited,2013
3. Saikat Dutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning",1stEdition,PearsonEducation,2019
4. ChristopherM.Bishop,“PatternRecognitionandMachineLearning”,RevisedEdition, Springer,2016.
5. AurelienGeron,“Hands-OnMachineLearningwithScikit-Learn,Keras,andTensorFlow”, 2nd Edition,O'Reilly,2019
6. StephenMarsland,“MachineLearning–AnAlgorithmicPerspectiveǁ,SecondEdition, ChapmanandHall/CRCMachineLearningandPatternRecognitionSeries,2014.

| 24MC204 | ADVANCED JAVA | L | T | P | C |
|---|---|---|---|---|---|
| | | 4 | 0 | 0 | 4 |

**OBJECTIVES:**

- To understand the fundamentals of web programming and client-side scripting.
- To learn server-side development using servlets, web sockets.
- To learn the Spring framework and build applications using Spring.
- To learn and implement the concept of Java Persistence API.
- To learn the advanced client side scripting and framework

| UNIT-1 | INTRODUCTION TO OOPS CONCEPTS | 12 |
|---|---|---|

Introduction to Java – version – Data types – Control Statements – Function Arrays – Multidimensional Array - Introduction to oops – objects – class – Inheritance – Polymorphism – Abstraction – Encapsulation – Exception Handling – Exception Handling Mechanism – try, catch, throws – Threading – Multithreading – Streams – IO Streams – Byte Array Streams – Buffered Streams – Files – Introduction to Utility Packages

| UNIT-II | INTRODUCTION TO WEB &SERVER-SIDE PROGRAMMING | 12 |
|---|---|---|

Introduction to Web: Server - Client - Communication Protocol (HTTP), Classes - Modules – Fetch API – Storage: Local Storage, Cookies, Indexed DB, JSON- Web Server: Web Containers - Web Components, Servlet: Lifecycle - Request - Servlet Context - Response - Filter - Session - Dispatching Requests

| UNIT-III | SPRING | 12 |
|---|---|---|

Spring Configuration and Spring Boot, Spring MVC, Spring Bean Lifecycle – DispatcherServlet and Configuration - Interceptors – Annotations, Controllers - Views - Input Validation -File UploadContainerDependency and IOC.

| UNIT-IV | AOP, JAVA PERSISTENCE API AND HIBERNATE | 12 |
|---|---|---|

Aspect Oriented Programming (AOP) - Entity: Basic, Embeddable and Collection Types - Identifiers - Entity Relationship - Inheritance, Persistence Context and Entity Manager, JPQL, Criteria API, Spring Data JPA - Specification and Projection.

| UNIT-V | ADVANCED SPRING PROGRAMMING | 12 |
|---|---|---|

Spring Boot JDBC - Spring Boot Actuator - Spring Cloud -Spring Boot Testing - Spring Security Architecture, Spring Cache - Building RESTful Web Services

**TOTAL : 60 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Describe** the OOPs concepts**- UNIT-I (K2)**

**CO2:Develop** server side Web Application **- UNIT-II (K3)**

**CO3:Develop** Web Application using Spring. **- UNIT-III (K3)**

**CO4:Use** Java Persistence API to develop Java application. **- UNIT-IV (K3)**

**CO5:Develop** a full-stack Single Page Application using React, Spring and JPA. **- UNIT-V (K3)**

**REFERENCES:**

1.David Flanagan, “Java Script: The Definitive Guide”, O’Reilly Media, Inc, 7th Edition, 2020

2. Matt Frisbie, "Professional JavaScript for Web Developers", Wiley Publishing, Inc, 4th Edition, ISBN: 978-1-119-36656-0, 2019

3. Alex Banks, Eve Porcello, "Learning React", O’Reilly Media, Inc, 2nd Edition, 2020

4. David R. Heffelfinger, "Java EE 8 Application Development", Packt Publishing, First edition2017

5. Benjamin Muschko, "Gradle in Action", Manning Publications, First edition2014

6. IulianaCosmina, Rob Harrop, Chris Schaefer, Clarence Ho, "Pro Spring 5: An In-Depth Guide to the Spring Framework and Its Tools", Apress, Fifth edition2017

| 24MC2L1 | DATA STRUCTURES AND ALGORITHMS LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- To develop skills in design and implementation of data structures and their applications
- To learn and implement linear, non linear and tree data structures
- To study, implement and analyze the sorting technique.
- To implement some common algorithm design techniques

**LIST OF EXPERIMENTS:**

1. Stack ADT implementation – Array implementation
2. Infix to postfix conversion
3. Queue ADT implementation – Linked list implementation
4. Singly Linked List operations
5. Binary Tree implementation.
6. Binary Search tree implementation
7. Graph Traversals (Breadth First and Depth First search)
8. Minimum Spanning Tree Implementation (Prim's/ Kruskal's)
9. Merge Sort –Divide and Conquer
10. Knapsack Problem – Greedy method
11. Warshall's Algorithm for finding transitive closure using Dynamic programming

**TOTAL: 60 PERIODS**

**OUTCOMES:**
**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Demonstrate** the various Linear Data Structures –[K3]
**CO2:Demonstrate** Tree Operations - [K3]
**CO3:Demonstrate** Graph Operations- [K3]
**CO4:Apply** different sorting techniques-[K3]
**CO5:Apply** Greedy method to find the shortest path problem - [K3]

| 24MC2L2 | ADVANCED JAVA LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- To implement the client-side scripting
- To implement server-side development using servlets, web sockets.
- To build applications using Spring.
- To implement the concept of Java Persistence API.
- To development the advanced client-side scripting and framework.

**LIST OF EXPERIMENTS:**

1. Create an event registration application using JavaScript. It should implement different widgets for registration form and registered records view using tabs. It should perform the form validation.
2. Create a JavaScript application in an Object-Oriented way using Classes and Modules. It should also use browser storage for persistence
3. Build a web application using Gradle. The server side of the application should implement RESTful APIs using Servlet and do necessary logging. The client side of the application should be a single page application which consumes the RESTful APIs through AJAX.
4. Build a chat application using WebSocket.
5. Create a Spring MVC application. The application should handle form validation, file upload, session tracking.
6. Implement a RESTful Spring Boot application using Spring REST, Spring Security and Spring Cache.
7. Design a system using JPA and Hibernate. The system should have multiple entities and relationships between the entities. The database schema should be generated through Hibernate. Provide RESTful endpoints for CRUD operations for the defined entities. Also, support pagination and searching using JPA's JPQL and Criteria API.
8. Create a Spring RESTful Application with Spring Data JPA. Support pagination and searching using Specifications.
9. Create a React application with different components and interactions between the components.
10. Develop a full-stack application using React and Spring. Make use of Spring REST, Spring Security, Spring Data JPA, Hibernate, Spring Boot, Gradle and ReactJS state and component mechanism

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Develop** the client side of the web application. – **(K3)**
**CO2:Develop** and deploy server-side applications using J2EE. - **(K3)**
**CO3: Use** Spring Boot framework in web development. -**(K3)**
**CO4:Develop** database systems in both NoSQL and SQL environments. -**(K3)**
**CO5:Develop** a full stack single page application using React, Spring Boot, and a Database and test using gradle. - **(K3)**

| 24MC2L3 | MACHINE LEARNING LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- To understand about data cleaning and data preprocessing
- To familiarize with the Supervised Learning algorithms and implement them in practical situations.
- TofamiliarizewithunsupervisedLearningalgorithmsandcarryontheimplementationpart.
- To involve the students to practice ML algorithms and techniques.
- Learn and use algorithms for real time datasets.

**LIST OF EXPERIMENTS:**

1.Demonstratehowdoyoustructure data in Machine Learning

2.Implement data preprocessing techniques on real time dataset

3.Implement Feature subset selection techniques

4.Demonstratehowwillyoumeasuretheperformanceofamachinelearningmodel

5.WriteaprogramtoimplementthenaïveBayesianclassifierforasampletrainingdataset. Compute the accuracy of the classifier, considering few test data sets.

6.Writeaprogramtoconstruct Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using the standard Heart Disease DataSet.

7.Apply EM algorithm to cluster a set of data stored in a CSV file.

8.Write a program to implement k-Nearest Neighbor algorithm to classify the dataset.

9.Apply the technique of pruning for a noisy data monk2 data, and derive the decision tree from this data. Analyze the results by comparing the structure of pruned and unpruned tree.

10.BuildanArtificialNeuralNetworkbyimplementingtheBackpropagationalgorithmandtest the same using appropriate datasets

11.Implement Support Vector Classification for linear kernels.

12.ImplementLogisticRegressiontoclassifyproblemssuchasspamdetection.Diabetespredictions andsoon.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Apply** data preprocessing technique and explore the structure of data to prepare for predictive modeling

**CO2: Understand** how to select and train a model and measure the performance.

**CO3: Apply** feature selection techniques in Machine Learning

**CO4:** ConstructBayesianNetworkforappropriateproblem

**CO5: L**earn about parametric and non- parametric machine learningalgorithmsand**implement**to Practicalsituations

| 24MC2L4 | COMMUNICATION SKILLS LABORATORY - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- To provide opportunities to learners to practice their communication skills to make them become proficient users of English.
- To enable learners to fine-tune their linguistic skills (LSRW) with the help of Technology to communicate globally.
- To enhance the performance of learners at placement interviews and group discussions and other recruitment procedures

1. **SOFT SKILLS**

· People skills

· Interpersonal skills

· Team building skills

· Leadership skills

· Problem solving skills

2. **PRESENTATION SKILLS**

· Preparing slides with animation related to the topic

· Introducing oneself to the audience

· Introducing the topic

· Presenting the visuals effectively –5 minute presentation

3. **GROUP DISCUSSION SKILLS**

· Participating in group discussions

· Brainstorming the topic

· Activities to improve GD skills.

4. **INTERVIEW SKILLS**

· Interview etiquette –dress code –body language

· Attending job interviews

· Answering questions confidently

**TOTAL: 30 PERIODS**

**REFERENCES / MANUALS / SOFTWARE**: Open Sources / websites

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:**Students will be able to make presentations and participate in Group discussions with confidence.

**CO2**:Students will be able to perform well in the interviews.

**CO3:**Students will make effective presentations.

| 24MC301 | ARTIFICIAL INTELLIGENCE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- ToprovideastrongfoundationonfundamentalconceptsinArtificialIntelligence.
- ToenableProblem-solvingthroughvarioussearchingtechniques.
- Toapply Knowledge Representation in AI techniques.
- To provide Reasoning and Planning techniques in detail.
- To know the various Learning Techniques in detail.

| UNIT- I | INTRODUCTION | 9 |
|---|---|---|

AI Problems-Underlying Assumption- AI Technique- Level of the model- AI Applications Intelligent Agents- Agents and Environments- Good Behavior: The concept of Rationality- Nature of Environments- Task Environments.

| UNIT II | PROBLEM SOLVING BY SEARCH TECHNIQUES | 9 |
|---|---|---|

Defining Problem as a State Space Search- Production Systems- Problem Characteristics- Production System HeuristicSearch Techniques-Generate and Test – Hill Climbing- Best-First search- The A* Algorithm – Problem Reduction- The AO* Algorithm

| UNIT III | KNOWLEDGE REPRESENTATION | 9 |
|---|---|---|

Knowledge Representation - Representations and Mapping- Approaches to knowledge representations- Using Predicate Logic- Representing simple facts in logic- Representing Instance and ISA Relationships- Computable functions and predicates- Representing knowledge using Rules- Procedural versus Declarative knowledge

| UNITIV | REASONING AND PLANNING | 9 |
|---|---|---|

Forward versus Backward Reasoning- Symbolic Representation under Uncertainty- Nonmonotonic Reasoning- Logics for Nonmonotonic Reasoning- Implementation issues- Implementation: Depth First Search, Breadth-First Search- Planning- Overview- An Example Domain – Components of a Planning system

| UNIT V | LEARNING | 9 |
|---|---|---|

Learning-Forms of Learning-Supervised Learning- Role Learning- Learning by taking advice- Learning by parameter adjustment-- Learning from Examples-Induction, Winston's Learning Program- Learning Decision Trees- Explanation based Learning- Analogy-Online Learning

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Determine** the basic and fundamental of Artificial Intelligence Techniques – **UNIT – I – (K3)**

**CO2:Use**different problem-solvingapproach to AIproblems. – **UNIT – II – (K3)**

**CO3:Use**differentknowledgerepresentationschemesfortypicalAIproblems. –**UNIT – III – (K3)**

**CO4: Construct** the various Reasoning and Planning Techniques. - – **UNIT – IV – (K3)**

**CO5:Solve** AI Problem using different Learning Techniques – **UNIT –V – (K3)**

**REFERENCES:**


1. Stuart J. Russell and Peter Norvig—Artificial Intelligence: AModern Approach, PearsonEdition, Third Edition,2022
2. ElaineRichandKevinKnight,ArtificialIntelligence,ThirdEdition,TataMcGraw-Hill,2010.
3. PatrickH.Winston."ArtificialIntelligence",Thirdedition,PearsonEdition,2006.
4. DanW.Patterson,IntroductiontoArtificialIntelligenceandExpertSystems,PHI,2006.
5. NilsJ.Nilsson,ArtificialIntelligence:AnewSynthesis,HarcourtAsiaPvt.Ltd.,2000.
6. I.Bratko,Prolog:ProgrammingforArtificialIntelligence,Fourthedition,Addison-WesleyEducationalPublishersInc.,2011.GerhardWeiss,MultiAgentSystems,SecondEdition,MITPress, 2013

| 24MC302 | CLOUD COMPUTING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the basic concepts of Distributed systems.
- To learn about the current trend and basics of Cloud computing.
- To be familiar with various Cloud concepts.
- To expose with the Server, Network and storage virtualization.
- To be aware of Microservices and DevOps.

| UNIT I | DISTRIBUTED SYSTEMS | 9 |
|---|---|---|

Introduction to Distributed Systems – Characterization of Distributed Systems – Distributed Architectural Models –Remote Invocation – Request-Reply Protocols – Remote Procedure Call – Remote Method Invocation – Group Communication – Coordination in Group Communication – Ordered Multicast – Time Ordering – Physical Clock Synchronization – Logical Time and Logical Clocks.

| UNIT II | BASICS OF CLOUD COMPUTING | 9 |
|---|---|---|

Cloud Computing Basics – Desired features of Cloud Computing – Elasticity in Cloud – On demand provisioning - Applications – Benefits – Cloud Components: Clients, Datacenters & Distributed Servers – Characterization of Distributed Systems – Distributed Architectural Models - Principles of Parallel and Distributed computing - Applications of Cloud computing – Benefits – Cloud services – Open-source Cloud Software: Eucalyptus, Open Nebula, Open stack, Aneka, Cloud Sim.

| UNIT III | CLOUD INFRASTRUCTURE | 9 |
|---|---|---|

Cloud Architecture and Design – Architectural design challenges – Technologies for Network based system - NIST Cloud computing Reference Architecture – Public, Private and Hybrid clouds– Cloud Models:IAAS, PAAS and SAAS– Cloud storage providers - Enabling Technologies for the Internet of Things – Innovative Applications of the Internet of Things.

| UNIT IV | CLOUD ENABLING TECHNOLOGIES | 9 |
|---|---|---|

Service Oriented Architecture – Web Services – Basics of Virtualization – Emulation – Types of Virtualization – Implementation levels of Virtualization – Virtualization structures – Tools & Mechanisms – Virtualization of CPU, Memory & I/O Devices – Desktop Virtualization – Server Virtualization – Google App Engine – Amazon AWS - Federation in the Cloud.

| UNIT V | MICROSERVICES AND DEVOPS | 9 |
|---|---|---|

Defining Microservices - Emergence of Microservice Architecture – Design patterns of Microservices – The Mini web service architecture – Microservice dependency tree – Challenges with Microservices - SOA v Microservice – Microservice and API – Deploying and maintaining Microservices – Reason for having DevOps– Overview of DevOps– Core elements of DevOps– Life cycle of DevOps– Adoption of DevOps - DevOps Tools – Build, Promotion and Deployment in DevOps.

**TOTAL:45 PERIODS**

**OUTCOMES:**
**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Use** Distributed systems in Cloud Environment. -**UNIT – I - (K3)**
**CO2: Demonstrate** the main concepts, key technologies, strengths and limitations of Cloud Computing. **UNIT – II - (K3)**
**CO3: Identify** the Architecture, Infrastructure and delivery models of Cloud computing- **UNIT– III- (K3)**
**CO4:** Choose and use the appropriate current technology for the implementation of Cloud- **UNIT – IV- (K3)**
**CO5: Demonstrate** Microservices and DevOps in Cloud environments. -**UNIT – V - (K3)**

**REFERENCES:**

1.Kai Hwang, Geoffrey C. Fox & Jack J. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, First Edition,2012
2. Andrew S. Tanenbaum& Maarten Van Steen, “Distributed Systems - Principles and Paradigms”, Third Edition, Pearson, 2017.
3. Thomas Erl, ZaighamMahood& Ricardo Puttini, “Cloud Computing, Concept, Technology & Architecture”, Prentice Hall, Second Edition, 2013.
4. Richard Rodger, “The Tao of Microservices”, ISBN 9781617293146, Manning Publications, First Edition, December 2017.
5. Magnus Larsson, “Hands-On Microservices with Spring Boot and Spring Cloud: Build and DeployMicroservices using spring cloud, Istio and Kubernetes”, Packt Publishing Ltd, First Edition, September 2019
6. Jim Lewis, “DEVOPS: A complete beginner’s guide to DevOps best practices”, ISBN-13:978-1673259148, ISBN-10: 1673259146, First Edition,2019

| 24MC303 | FOUNDATIONS OF DATA SCIENCE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To impart knowledge andexplore the need of Data Science
- Apply various statistics measures in Data Science
- Data manipulation using Python
- Correlation and Regression analysis
- Data visualization using Python

| UNIT - I | BASICS OF DATA SCIENCE | 9 |
|---|---|---|

Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications

| UNIT – II | STATISTICS | 9 |
|---|---|---|

Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs – averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – interquartile range –variability for qualitative and ranked data

| UNIT – III | DATA MANIPULATION USING PYTHON | 9 |
|---|---|---|

Basics of NumPy arrays – aggregations – computations on arrays – comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – hierarchical indexing – combining datasets – aggregation and grouping – pivot tables

| UNIT – IV | NORMAL DISTRIBUTION, CORRELATION & REGRESSION ANALYSIS | 9 |
|---|---|---|

Normal distributions – z scores – normal curve problems – finding proportions – finding scores – correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient – regression – regression line – least squares regression line

| UNIT – V | DATA VISUALIZATION USING PYTHON | 9 |
|---|---|---|

Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density – three-dimensional plotting – geographic data – data analysis using stats models and seaborn – graph plotting using Plotpy – interactive data visualization using Bokeh

**TOTAL:45 PERIODS**

**OUTCOMES:**
**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Apply** the skills of data inspecting and cleansing -**UNIT – I - (K3)**

**CO2: Determine** the relationship between data dependencies using statistics - **UNIT – II - (K3)**

**CO3: Use** Python tools to handle data -**UNIT – III - (K3)**

**CO4: Classify** the relationship between the variables using statistical techniques - **UNIT – IV- (K3)**

**CO5: Use** Python tools to visualize the data - **UNIT – V - (K3)**

**Text Book:**

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016. (Unit – I)
2. Robert S. Witte and John S. Witte, “Statistics”, 11th Edition, Wiley Publications, 2017. (Unit – II, IV)
3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. (Unit – III, V)

**Reference Book:**

1. Uma Maheswari, R. Sujatha, “Introduction to Data Science – Practical Approach with R and Python”, Wiley, 2021.

2. Nicholas J. Horton, Ken Kleinman,” Using R and RStudio for Data Management, Statistical Analysis, and Graphics”, CRC Press, Second edition, 2015.

3. John Main Donald, W. John Braun,” Data Analysis and Graphics Using R: An Example-Based Approach”, University Press, Cambridge, Third edition, 2010.

4. K.G. Srinivasa, G. M. Siddesh, ChetanShetty, “Statistical Programming in R”, Oxford University Press, New Delhi, 2017.

| 24MC304 | SECURITY IN COMPUTING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Tounderstandthebasicsofcryptography
- Learntofindthevulnerabilitiesinprogramsandtoovercomethem,
- Knowthedifferentkinds ofsecuritythreats innetworks andits solution
- Knowthedifferentkinds ofsecuritythreatsindatabases andsolutionsavailable
- Learnaboutthemodelsandstandardsforsecurity.

| UNIT-I | ELEMENTARYCRYPTOGRAPHY | 9 |
|---|---|---|

Terminology and Background – Substitution Ciphers – Transpositions – Making Good EncryptionAlgorithms-DataEncryptionStandard-AESEncryptionAlgorithm–PublicKeyEncryption– Cryptographic HashFunctions –KeyExchange–Digital Signatures–Certificates

| UNIT – II | PROGRAMSECURITY | 9 |
|---|---|---|

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – ControlsAgainst Program Threat – Control of Access to General Objects – User Authentication – Good CodingPractices – Open Web Application Security Project Flaws – Common Weakness Enumeration MostDangerousSoftwareErrors

| UNIT – III | SECURITYIN NETWORKS | 9 |
|---|---|---|

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL –IPSec – ContentIntegrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – IntrusionDetectionSystems–Securee-mail.

| UNIT – IV | SECURITYINDATABASES | 9 |
|---|---|---|

Security requirements of database systems – Reliability and Integrity in databases –Redundancy – Recovery–Concurrency/Consistency–Monitors–SensitiveData–Typesofdisclosures–Inference-findingandconfirmingSQL injection

| UNIT – V | SECURITYMODELSANDSTANDARDS | 9 |
|---|---|---|

SecureSDLC –SecureApplicationTesting–Security architecturemodels–TrustedComputingBase Bell-LaPadula Confidentiality Model – Biba Integrity Model – Graham-Denning Access ControlModel – Harrison-Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Compliances – PCIDSS–SecurityStandards-ISO27000family ofstandards–NIST.

**TOTAL: 45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Demonstrate**cryptographicalgorithmsforencryptinganddecryptionforsecuredata transmission **– UNIT –I – (K2)**

**CO2:Discuss**theimportanceofDigitalsignatureforsecuree-documentsexchange**– UNIT–II – (K2)**

**CO3: Determine** theprogramthreats forgoodprogrammingpractice **– UNIT–III –(K3)**

**CO4:Apply**datavulnerability andSQLinjection **– UNIT –IV –(K3)**

**CO5:Develop**theknowledgeofsecuritymodelsand publishedstandards**– UNIT –V –(K3)**

**REFERENCES:**


1. CharlesP.Pfleeger,ShariLawrencePfleeger,“SecurityinComputing”,FourthEdition,PearsonEducation,2007.
2. MichaelWhitman,HerbertJ.Mattord,“ManagementofInformationSecurity”,ThirdEdition, CourseTechnology,2010.
3. WilliamStallings,“CryptographyandNetworkSecurity:PrinciplesandPractices”,FifthEdition,PrenticeHall,2010.
4. MichaelHoward,DavidLeBlanc,JohnViega,“24DeadlySinsofSoftwareSecurity:ProgrammingFlawsandHowtoFix Them”,FirstEdition, McGraw HillOsborneMedia,2009.
5. Matt Bishop,“ComputerSecurity:ArtandScience”,First Edition, Addison-
6. Wesley,2002.
7. https://www.owasp.org/index.php/Top_10_2010
8. https://www.pcisecuritystandards.org/security_standards/pci_dss.shtml
9. http://cwe.mitre.org/top25/index.html
10. JustinClarke“SQLinjectionAttacksanddefense”Elsevier,2012

| 24MC3L1 | FULL STACK DEVELOPMENT LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- ToimplementtheclientsideofthewebapplicationusingJavaScript.
- TounderstandJavaScriptonthedesktop using NodeJS.
- Todevelopaweb applicationusingNodeJSandExpress.
- ToimplementaSPAusingReact.
- TodevelopafullstacksinglepageapplicationusingReact,NodeJS,andaDatabase(MongoDBorSQL).

**LISTOF EXPERIMENTS:**

1. Createaform andvalidatethecontents oftheformusingJavaScript.
2. Get data using Fetch API froman open-source endpoint and display the contents in theform ofacard.
3. Create a NodeJS server that serves static HTML and CSS files to the user without usingExpress.
4. Create a NodeJS server using Express that stores data from a form as a JSON file anddisplays itinanotherpage.Theredirectpage shouldbeprepared usingHandlebars.
5. Create a NodeJS server using Express that creates, reads, updates and deletes students'details and stores them in MongoDB database. The information about the user should beobtainedfromaHTMLform.
6. Create a NodeJS server that creates, reads, updates and deletes event details and storesthem in a MySQL database. The information about the user should be obtained from aHTMLform.
7. Createacounterusing ReactJS
8. Create a Todo application using ReactJS. Store the data to a JSON file using a simpleNodeJSserverandretrieve theinformationfromthesameduringpagereloads.
9. Create a simple Sign up and Login mechanism and authenticate the user using cookies.The user information can be stored in either MongoDB or MySQL and the server should bebuiltusing NodeJSandExpressFramework.
10. Create and deploy a virtual machine using a virtual box that can be accessed from the hostcomputer using SSH.
11. Createadocker containerthatwilldeployaNodeJSpingserverusingtheNodeJSimage.

**TOTAL:60PERIODS**

**SOFTWAREREQUIREMENTS:**

1. NodeJS/Express JS, ReactJS, Docker, any IDE like NOTEPAD++/visual studiocode/sublimetextetc.,
2. MySQL,MongoDB

**OUTCOMES:**
**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Develop** and deploy the client side of the web application. - **(K3)**

**CO2: Develop** and deploy server side applications using NodeJS.**– (K3)**

**CO3:Use**Express framework in web development. – **(K3)**

**CO4: Develop**an architectdatabasesystemsinbothNoSQLandSQLenvironments. – **(K3)**

**CO5: Develop** a full stack single page application using React, NodeJS, and a Database Anddeployusingcontainers.- **(K3)**

| 24MC3L2 | CLOUD COMPUTING LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- Be exposed to tool kits for cloud and Hadoop environment.
- Be familiar with migration of Virtual Machines from one node to another
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop Distributed File System (HDFS) to set up single and multi-node clusters.

**List of Experiments:**

1. Find procedure to run the virtual machine of Ubuntu configuration.
2. Find procedure to run the virtual machine of Windows-10 configuration
3. Install a C compiler in the virtual machine and execute any 'C' programs.
4. Find procedure to run the virtual machine of Windows - XP Configuration.
5. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
6. Find procedure to run the virtual machine configuration in Hyper-V
7. Find procedure to install storage controller (Disk Management)and interact with it.
8. Show the virtual machine migration based on the certain condition from one node to another
9. Use any open-source cloud software to run real time applications. (Eucalyptus, FUSE)
10. Setup Azure Devops

**TOTAL:60PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Use** various virtualization tools such as Virtual box/VMware workstation. (K3)
**CO2:Apply** C Compiler in Virtual Machine for various C Programs. (K3)
**CO3:Design** and Implement applications on the Cloud environment. (K3)
**CO4:Experiment** with Hadoop cluster concept (K3)
**CO5:Use** the map reduce tasks and implement for various applications. (K3)

| 24MC2E1 | INTRODUCTION TO VIRTUAL REALITY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the basic functioning of virtual Reality systems.
- To understand the concepts of Geometric modeling and Geometrical Transformations
- To learn Animating the Virtual Environment.
- To learn applications of Virtual Environment.
- To understand various types of Hardware's and software's in virtual Reality systems

| UNIT-I | INTRODUCTION | 9 |
|---|---|---|

Virtual Reality & Virtual Environment : Introduction – Computer graphics – Real time computer graphics – Flight Simulation – Virtual environments –requirement – benefits of virtual reality- 3D Computer Graphics : Introduction – The Virtual world space – positioning the virtual observer – the perspective projection – Human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modeling – Illumination models – Reflection models – Shading algorithms

| UNIT-II | GEOMETRIC MODELING GEOMETRICAL TRANSFORMATIONS | 9 |
|---|---|---|

Geometric Modeling: Introduction – From 2D to 3D – 3D space curves – 3D boundary representation - Geometrical Transformations: Introduction – Frames of reference – Modeling transformations – Instances – Picking – Flying – Scaling the VE – Collision detection - A Generic VR system: Introduction – The virtual Environment

| UNIT – III | VIRTUAL ENVIRONMENT | 9 |
|---|---|---|

Animating the Virtual Environment: Introduction – The dynamics of numbers – Linear and Non-linear interpolation - The animation of objects – linear and non-linear translation - shape & object in betweening – freeform deformation – particle system- Physical Simulation: Introduction – Objects falling in a graphical field –Rotating wheels – Elastic collisions – projectiles – simple pendulum – springs – Flight dynamics of an aircraft

| UNIT – IV | VR HARDWARES & SOFTWARES | 9 |
|---|---|---|

Human factors : Introduction – the age- the ear- the somatic senses - VR Hardware : Introduction – sensor hardware – Head-coupled displays –Aquatic hardware – Integrated VR systems-VR Software: Introduction – Modeling virtual world –Physical simulation- VR toolkits – Introduction to VRML

| UNIT – V | VR APPLICATION | 9 |
|---|---|---|

Introduction – Engineering – Entertainment – Science – Training – The Future: Introduction – Virtual environments – modes of interaction

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

- **Develop** 3D virtual environments.**(K3)**
- **Develop** 3D interaction techniques. **(K3)**
- **Develop** immersive virtual reality applications. **(K3)**
- **Select** types of Hardware's and software's in virtual Reality systems
- **Develop** and design research ideas and results**(K3)**

Text Book:

1. John Vince, “Virtual Reality Systems “, Pearson Education Asia, 2002

Reference Book:

1. Adams, “Visualizations of Virtual Reality”, Tata McGraw Hill, 2000.
2. Grigore C. Burdea, Philippe Coiffet , “Virtual Reality Technology” , WileyInterscience, Edition,1994.
3. William R. Sherman, Alan B. Craig, “Understanding Virtual Reality: Interface, Application, and Design”, Morgan Kaufmann, 1st Edition, 2002.

Extensive Reading:

- www.vresources.org
- www.vrac.iastate.edu
- www.w3.org/MarkUp/VRML/

| 24MC2E2 | MOBILE COMPUTING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Learn the Mobile Computing Architecture concept.
- Tolearnthebasicconcepts,awareoftheGSM,GPRSArchitecture.
- Tohaveanexposureabout wirelessprotocols -WLAN,Bluetooth,WAP.
- ToKnowtheMobileIPNetworkLayerofMobilecommunication
- Tounderstandtheconceptof MobileTransportLayer

| UNIT –I | WIRELESS COMMUNICATION FUNDAMENTALS | 9 |
|---|---|---|

Mobile Computing Architecture –Signal Propagation-FrequencySpectrum-Multiplexing-Spreadspectrum-GSMvsCDMA-Comparisonof2G3G, 4G —MAC Protocols — SDMA- TDMA- FDMA- CDMA

| UNIT – II | MOBILE TELECOMMUNICATION SYSTEM | 9 |
|---|---|---|

Global System for Mobile Communications (GSM) –GSM Architecture-GSM Entities-GSM Addresses and Identifiers- Mobility Management- General Packet Radio Service (GPRS) and Packet Data Network- GPRS Network Architecture- GPRS Network Operations- Data Services and Applications for GPRS

| UNIT – III | MOBILE WIRELESS SHORT-RANGE NETWORKS | 9 |
|---|---|---|

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11 ArchitectureWLANMAC-SecurityofWLANPowerManagement-BluetoothArchitectureBluetoothenabledDevicesNetwork-LayersinBluetoothProtocol-Securityin Bluetooth

| UNIT – IV | MOBILE IP NETWORK LAYER | 9 |
|---|---|---|

IP and Mobile IP network layers- Goals, Assumptions and Requirements-Mobile IP Architecture-Packet delivery and Handover Management- Location Management- Registration- Tunneling and Encapsulation- Route Optimization.

| UNIT – V | TRANSPORT LAYER AND APPLICATION LAYERS | 9 |
|---|---|---|

Conventional TCP/IP Transport Layer Protocols-UDP- TCP Data Flow Control-Congestion Control-Classical TCP Improvements-Indirect TCP- Snooping TCP- Mobile TCP-Transaction Oriented TCP-Wireless Application Protocol (WAP)- Architecture-Wireless Datagram Protocol (WDP)-Wireless Transport Layer Security (WTLS)

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeable**

**CO1: Discuss** the basic concept of Mobile Computing Architecture – **UNIT – I – (K3)**

**CO2:Illustrate**the concept of GSM Architecture and GPRS Architecture – **UNIT – II – (K3)**

**CO3:Apply**the WLANEquipment, Topologiesand their Technologiesforshortrange Networks – **UNIT – III – (K3)**

**CO4:Use**PacketDeliveryand HandoverManagementinIPNetworkLayer- – **UNIT – IV – (K3)**

**CO5:Compare**thedifferenttypesof TCP – **UNIT – V – (K3)**

**REFERENCES:**

1. AsokeKTalukder,HasanAhmed,RoopaRYavagal–MobileComputing**II**,TataMcGrawHill PubAug– 2010

2. Raj Kamal –Mobile Computing**II** OxfordHigher Education, Second Edition, 2012

3. PeiZheng,LarryL. Peterson, BruceS.Davie,Adrian Farrell–WirelessNetworking Complete**II** MorganKaufmann Series in Networking,2009(Introduction, WLANMAC)

4. VijayKGarg–WirelessCommunications &Networking Morgan Kaufmann Series, 2010

5 JochenSchillar–Mobile Communications, Pearson Education second Edition, 2009

6 WilliamStallings,WirelessCommunicationandNetworks,PearsonEducation,2009.

7 C.SivaRamMurthyandB.SManoj,AdHocWirelessNetworks,PearsonEducation,2004.

| 24MC2E3 | ACCOUNTING AND FINANCIAL MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the basic principles of Double entry system and preparation of balancesheet.
- Tounderstandthe processofestimating thecost ofaparticularproduct.
- To Prepare the estimate for various business activities such as purchase, sale,productionand cash budgets
- Toensure decisionmakingprocessofanorganization.

| UNIT – I | FINANCIALACCOUNTING | 9 |
|---|---|---|

Meaning and Scope of Accounting-Principles-Concepts-Conventions-Accounting Standards-FinalAccounts-TrailBalance-TradingAccount-ProfitandLossAccount-BalanceSheet-AccountingRatioAnalysis-FundsFlowAnalysis-CashFlowAnalysis

| UNIT – II | ACCOUNTING | 9 |
|---|---|---|

Meaning-Objectives-Elements of Cost-Cost Sheet-Marginal Costing and Cost Volume ProfitAnalysis-BreakEvenAnalysis-Applications-Limitations-StandardCostingandVarianceAnalysis-Material-Labor-Overhead-Sales-ProfitVariances

| UNIT – III | BUDGETSANDBUDGETINGCONTROL | 9 |
|---|---|---|

BudgetsandBudgetaryControl-Meaning-Types-SalesBudget-ProductionBudget-CostofProduction Budget-Flexible Budgeting-Cash Budget-MasterBudget-Zero Base Budgeting-ComputerizedAccounting.

| UNIT – IV | INVESTMENTDECISIONAND COSTOF CAPITAL | 9 |
|---|---|---|

Objectives and Functions of Financial Management-Risk-Return Relationship-Time Value ofMoney Concepts-Capital Budgeting-Methods of Appraisal-Cost of Capital Factors AffectingCost of Capital- Computation for Each Source of Finance and Weighted Average Cost ofCapital.

| UNIT – V | FINANCINGDECISIONANDWORKINGCAPITAL MANAGEMENT | 9 |
|---|---|---|

CapitalStructure-FactorsAffectingCapitalStructure-DividendPolicy-TypesofDividendPolicy-ConceptsofWorkingCapital-WorkingCapitalPolicies-FactorsaffectingWorkingCapital-Estimationof WorkingCapitalRequirements

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Calculate**tounderstandthebalancesheetpreparationanddo analysis **– UNIT –I –(K3)**

**CO2:Compute** thebudgetpreparationand controlofacompany **– UNIT –II –(K3)**

**CO3:Derive** the state ofaffairsofaparticular firm /company. **– UNIT –III –(K3)**

**CO4:Develop** the fiscal policiesoftheorganization. **– UNIT –IV –(K3)**

**CO5:Compute**thefactors tobeconsideredininvestmentpolicies. **– UNIT –V –(K3)**

**REFERENCES:**


1. AswatDamodaran, “Corporate Finance Theory and Practice”, John Wiley& Sons,2008
2. Brigham, Ehrhardt, “Financial Management Theory and Practice” 11th Edition,Cengage Learning,2008
3. I.M.Pandey, “Management Accounting”, Vikas Publishing House Pvt. Ltd., 3rdEdition, 2009
4. I.M. Pandey,” FinancialManagement”,VikasPublishing HousePvt.Ltd.,9thEdition, 2009
5. M.Y.Khan and P.K.Jain, “Financial Management, Text, Problems and Cases”, Tata McGrawHill,5thEdition,2008
6. S.N.Maheswari, “Financial and Management Accounting”, Sultan Chand & Sons, 5 edition,2010
7. Srivatsava,Mishra,“FinancialManagement”,OxfordUniversity

| 24MC2E4 | SOFT COMPUTING TECHNIQUES | L | T | P | C |
|---|---|---|---|---|---|
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**OBJECTIVES:**

- To gain knowledge of soft computing theories and its fundamentals.
- To design a soft computing system required to address a computational task.
- To learn and apply artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms in problem solving and use of heuristics based on human experience.
- To introduce the ideas of fuzzy sets, fuzzy logic and to become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.
- To familiarize with genetic algorithms and other random search procedures while seeking global optimum in self – learning situations

| UNIT – I | FUZZY COMPUTING | 9 |
|---|---|---|

Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion Membership Functions, Interference in Fuzzy Logic, Fuzzy If – Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzification and Defuzzification, Fuzzy Controller, Industrial Applications.

| UNIT – II | FUNDAMENTALS OF NEURAL NETWORKS | 9 |
|---|---|---|

Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks. Various Learning Techniques; Perception and Convergence Rule, Auto-Associative and Hetero-Associative Memory

| UNIT – III | BACKPROPAGATION NETWORKS | 9 |
|---|---|---|

Back Propagation (Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation Learning Methods, Effect of Learning Rule Co – Efficient; Back Propagation Algorithm, Factors Affecting Back Propagation Training, Applications

| UNIT – IV | COMPETITIVE NEURAL NETWORKS | 9 |
|---|---|---|

Kohenen's Self Organizing Map – SOM Architecture, learning procedure – Application; Learning Vector Quantization – learning by LVQ; Adaptive Resonance Theory – Learning procedure – Applications.

| UNIT – V | GENETIC ALGORITHM | 9 |
|---|---|---|

Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Demonstrate** Fuzzy set theory **– UNIT –I-(K2)**

**CO2:Derive** neural networks to pattern classification and regression problems using a soft computing approach – **UNIT –II-(K3)**

**CO3:Apply** ANN Back propagation algorithm for classification **– UNIT III –(K3)**

**CO4:Develop** applications using neural networks **– UNIT IV – (K3)**

**CO5:Apply** genetic algorithms to optimization problems **– UNIT V – (K3)**

**REFERENCES:**


1. J.S.R. Jang, C.T. Sun and E. Mizutani, “Neuro – Fuzzy and Soft Computing”, Pearson Education, 2004.
2. S. Rajasekaran and G.A. VijayalakshmiPai, “Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications”, PHI Learning, 2nd Edition, 2017.
3. S.N. Sivanandam, S. N. Deepa, “Principles of Soft Computing”, Third Edition, Wiley, 2018.
4. Simon Haykin, “Neural Networks and Learning Machines”, Pearson, 3rd Edition, 2009.
5. Timothy Ross, “Fuzzy Logic with Engineering Applications”, Wiley Publications, 4 th Edition 2016.

| 24MC2E5 | COMPUTER ORGANIZATION AND ARCHITECHTURE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Tounderstandthevariousnumbersystems
- TobecomefamiliarwithBoolean algebra
- Tostudythedifferenttypes ofcombinationalandsequentialcircuits
- Tocomprehendthebasisoperations thathappeninaCPU
- Tolearn the Computer Architecture and Parallel Processing
- Tobecomefamiliarwiththe Memory ArchitectureandI/O Systems

| UNIT – I | DIGITALFUNDAMENTALS | 9 |
|---|---|---|

Number Systems and Conversions - Complements– SOP, POS- Boolean Algebra and Simplifications - Minimization ofBooleanFunctions–KarnaughMap,QuinMcCluskyMethod.LogicGates–NANDNORimplementation.

| UNIT – II | COMBINATIONALANDSEQUENTIALCIRCUITS | 9 |
|---|---|---|

DesignofCircuits–Adder/Subtractor–Encoder–Decoder–MUX/DEMUX–Flipflops– Triggering–Master–SlaveFlip Flop–State Diagramand Minimization–Registers

| UNIT – III | BASICSTRUCTURE OFCOMPUTER | 9 |
|---|---|---|

FunctionalUnits-BasicOperationalConcepts–Busstructures–instruction and instruction sequencing – Hardware Software Interface – Addressing modes – InstructionSets – RISCand CISC–ALU Design–Fixed pointand Floating-pointoperations

| UNIT – IV | COMPUTER ARCHITECTURE AND PARALLEL PROCESSING | 9 |
|---|---|---|

Superscalar Architecture – VLIW Architecture – Pipelining and types of Hazards – Parallel Processing - – Multiple Processor Organization – Cluster Computer Architecture – Symmetric Multiprocessor

| UNIT – V | MEMORY ARCHITECTURE AND I/O SYSTEMS | 9 |
|---|---|---|

Parallel Architecture Taxonomy –- Shared Memory Architecture – Centralized and Distributed. Memory – Virtual, Cache, Associative -Programmed I/O – DMA and Interrupts – I/O Devices

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Solve**usinglaws of Booleanalgebraand Karnaughmapmethod – **UNIT – I – (K3)**

**CO2:Construct**variouscombinationalandsequentialcircuits - **UNIT – II – (K3)**

**CO3:Determine**thevarious addressingmodes - **UNIT – III – (K3)**

**CO4: Classify** the various Computer Architecture techniques. **UNIT – IV – (K3)**

**CO5:Analyze**thevarious Memory Architecture and I/O systems - **UNIT –V – (K4)**

**REFERENCES:**

1. CarlHamacher,ZvonkoVranesicandSafwatZaky,fifthedition,–ComputerOrganization‖ TataMcGrawHill, 2015
2. David A.Patterson andJohnL.Hennessy, —Computer OrganizationandDesign, Fourth EditionMorganKaufmann Publishers, 2011.
3. WilliamStallings,Computer Organization &Architecture,Tenth Edition, Pearson Education, 2015.
4. M.MorrisMano&MichaelB.Cilepti,DigitalDesign‖,FourthEdition,PearsonEducation,2011.
5. M.Morris Mano, –ComputerSystem Architecture**‖**, Third Edition, Prentice Hall ofIndia, 2009.
6. B.Govindarajalu – Computer Architecture and Organization – Design Principles and ApplicationsTata McGraw Hill Publishing Company Limited. 2014
7. K.A. Parthasarathy, A. Ramachandran, R. Purushothaman Advanced Computer Architecture – Second Edition Tata McGraw Hill, 2015.

| 24MC2E6 | OPERATION RESEARCH | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand, develop and solve mathematical model of linearprogrammingproblems.
- Tounderstand, developandsolvemathematicalmodelofTransportandassignmentproblems.
- Tounderstandnetworkmodelingforplanningandschedulingtheprojectactivities.

| UNIT – I | LINEARPROGRAMMINGMODELS | 9 |
|---|---|---|

MathematicalFormulation-GraphicalSolutionoflinearprogrammingmodels–Simplexmethod–ArtificialvariableTechniques.

| UNIT – II | TRANSPORTATIONANDASSIGNMENTMODELS | 9 |
|---|---|---|

Mathematicalformulationoftransportationproblem-Methodsforfindinginitialbasicfeasiblesolution–optimumsolution-degeneracy–Mathematicalformulationofassignmentmodels–HungarianAlgorithm.

| UNIT – III | INTEGERPROGRAMMINGMODELS | 9 |
|---|---|---|

Formulation–Gomory‟sIPPmethod–Gomory‟smixedintegermethod–Branchandboundtechnique.

| UNIT – IV | SCHEDULINGBYPERTAND CPM | 9 |
|---|---|---|

NetworkConstruction–CriticalPathMethod–ProjectEvaluationandReviewTechnique–ResourceAnalysisinNetworkScheduling.

| UNIT – V | QUEUEINGMODELS | 9 |
|---|---|---|

CharacteristicsofQueuingModels–PoissonQueues- (M/M/ 1): (FIFO/ ∞ /∞), (M/ M/1) : (FIFO/N/∞),(M /M/C):(FIFO/∞/∞),(M /M/C):(FIFO/N/∞)models.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Apply**simplexmethodtosolveLPP**– UNIT – I – (K3)**

**CO2:Solve**transportationandassignmentproblem**– UNIT –II-(K3)**

**CO3:Solve**pureandmixedIPP**– UNIT – III –(K3)**

**CO4:Determine**thecritical path and PERT calculation of the project network **–UNIT – IV-(K3)**

**CO5:Classify**thevariousqueuingmodelsusingsingle, multipleserver,finiteandInfinite capacity-**UNIT-V- (K3)**

**REFERENCES:**


1. TahaH.A., “OperationsResearch: AnIntroduction “8thEdition, PearsonEducation,2008
2. N. DVohra, “QuantitativeTechniquesinManagement”, TataMcGrawHill,2010
3. Gross, D. andHarris, C.M., “FundamentalsofQueueingTheory”,WileyStudent,3rdEdition, NewJersy,2004
4. A.M. Natarajan, P.Balasubramani,A.Tamilarasi, “OperationsResearch”,Pearson Education, Asia, 2005
5. Premkumar Gupta, D.S. Hira, “OperationsResearch”, S. Chand&CompanyLtd, NewDelhi,3rd Edition,2008

| 24MC2E7 | SERVICE ORIENTED ARCHITECTURE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To provide fundamental concepts of xml and web services
- To understand Service Oriented Architecture and its principles.
- To gain knowledge about WS standards
- To be familiar with building application based on SOA
- To learn SOA support in .NET and J2EE

| UNIT – I | XML AND WEBSERVICES | 9 |
|---|---|---|

Introduction- XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Web service architecture – Overview

| UNIT – II | SOA BASICS | 9 |
|---|---|---|

Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA — Principles of Service orientation – Service layers.

| UNIT – III | WEB SERVICE STANDARDS | 9 |
|---|---|---|

Descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Service-Level Interaction Patterns – Orchestration and Choreography

| UNIT – IV | BUILDING SOA-BASED APPLICATIONS | 9 |
|---|---|---|

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines — Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security

| UNIT – V | SOA SUPPORT IN J2EE | 9 |
|---|---|---|

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT)

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Illustrate** the need of various XML Technologies in SOA **– UNIT – I –(K3)**
**CO2:Demonstrate** the Serviced Oriented Architecture and the composition of Web Service in it**– UNIT –II –(K3)**
**CO3:Illustrate** how the various Web Service Standards are related to each other in SOA**– UNIT – III–(K3)**
**CO4:Build** SOA based Applications **– UNIT – IV –(K3)**
**CO5:Construct** web services according to user needs using J2EE **– UNIT – V –(K3)**

**REFERENCES:**

1. Thomas Erl, —Service-Oriented Architecture: Concepts, Technology, and Design‖, Pearson Education, 2006.
2. Heather Williamson, —XML, The Complete Reference‖, McGraw Hill Education, 2012.
3. Frank. P. Coyle, —XML, Web Services and The Data Revolution‖, Pearson Education, 2002.
4. SandeepChatterjee, James Webber, —Developing Enterprise Web Services. An Architect's Guide‖, Pearson Education, 2005
5. Newcomer, Lomow, —Understanding SOA with Web Services‖, Pearson Education, 2005

| 24MC2E8 | BUSINESS DATA ANALYTICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Tounderstandthebasicsof business analyticsandits lifecycle.
- Togainknowledgeaboutfundamentalbusinessanalytics.
- Tolearnmodelingfor uncertaintyandstatisticalinference.
- TounderstandanalyticsusingHadoopandMapReduceframeworks.
- Toacquireinsightonother analyticalframeworks.

| UNIT – I | OVERVIEWOFBUSINESSANALYTICS | 9 |
|---|---|---|

Introduction – Drivers for Business Analytics – Applications of Business Analytics: Marketing andSales,HumanResource,Healthcare,ProductDesign,ServiceDesign,CustomerServiceandSupport – Skills Required for a Business Analyst – Framework for Business Analytics Life Cycle forBusiness AnalyticsProcess.

| UNIT – II | ESSENTIALSOFBUSINESSANALYTICS | 9 |
|---|---|---|

Descriptive Statistics – Using Data – Types of Data – Data Distribution Metrics: Frequency, Mean,Median, Mode, Range, Variance, Standard Deviation, Percentile, Quartile, z-Score, Covariance,Correlation – Data Visualization: Tables, Charts, Line Charts, Bar and Column Chart, Bubble Chart,HeatMap– DataDashboards.

| UNIT – III | MODELING UNCERTAINTY & STATISTICAL INFERENCE | 9 |
|---|---|---|

ModelingUncertainty:EventsandProbabilities–ConditionalProbability–Random Variables–Discrete Probability Distributions – Continuous Probability Distribution –Statistical Inference: DataSampling– SelectingaSample–PointEstimation–SamplingDistributions–IntervalEstimation–HypothesisTesting.

| UNIT – IV | ANALYTICSUSINGHADOOPANDMAPREDUCE FRAMEWORK | 9 |
|---|---|---|

Introducing HADOOP – RDBMS versus HADOOP – HADOOP Overview – HDFS (HADOOP Distributed FileSystem) – Processing Data with HADOOP – Introduction to MapReduce –Features of MapReduce – AlgorithmsUsingMap-Reduce:Matrix-vectorMultiplication,RelationalAlgebraOperations,GroupingandAggregation– Extensionsto MapReduce

| UNIT – V | OTHERDATAANALYTICALFRAMEWORKS | 9 |
|---|---|---|

OverviewofApplicationdevelopmentLanguagesforHADOOP–Pig Latin–Hive–HiveQuery Language (HQL) – Introduction to Pentaho, JAQL – Introduction to Apache: Sqoop, Drill andSpark,ClouderaImpala– Introductionto NoSQLDatabases–HBase andMongoDB.

**TOTAL:45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Identify**thereal-worldbusiness problemsandmodelwithanalyticalsolutions. **– UNIT – I (K3)**

**CO2:Solve**analyticalproblemswithrelevantmathematicsbackgroundknowledge. **– UNIT –II –(K3)**

**CO3:Identify**anyreal-world decision-making problemtohypothesisandapplysuitable Statisticaltesting. **– UNIT – III –(K3)**

**CO4:Demonstrate**simpleapplicationsinvolving analyticsusingHADOOPandMapReduce**– UNIT IV– (K3)**

**CO5:Use**open-sourceframeworksformodelingand storingdata. **– UNIT – V –(K3)**

**REFERENCES:**

1. U.DineshKumar,“BusinessAnalytics:TheScienceofData-DrivenDecisionMaking”,Wiley, FirstEdition,2017.
2. UmeshRHodeghatta,UmeshaNayak,“BusinessAnalyticsUsingR–APracticalApproach”, Apress,First Edition2017.
3. JeffreyD.Camm,JamesJ.Cochran,MichaelJ.Fry,JeffreyW.Ohlmann,DavidR.Anderson, “EssentialsofBusinessAnalytics”,CengageLearning,secondEdition,2016.
4. RuiMiguelForte,“MasteringPredictiveAnalyticswithR”,PacktPublication,FirstEdition2015.
5. VigneshPrajapati,“BigDataAnalyticswithRandHadoop”,PacktPublishing,FirstEdition2013.
6. AnandRajaraman,JeffreyDavidUllman,“MiningofMassiveDatasets”,CambridgeUniversity Press,FirstEdition2012.
7. A.Ohri,“RforBusinessAnalytics”, Springer,First Edition,2012

| 24MC3E1 | SOFTWARE TESTING AND QUALITY ASSURANCE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Toknowthebehaviorofthetestingtechniquesandtodesigntestcasestodetecttheerrorsinthe software
- Toget insightintothelevelsoftestingintheuser environment
- Tounderstand standard principlesto checktheoccurrenceofdefectsandits removal.
- Tolearnthefunctionalityofautomatedtestingtoolstoapplyinthespecialized environment.
- Tounderstandthemodels andmetrics ofsoftwarequalityandreliability.

| UNIT – I | TESTINGTECHNIQUES&TESTCASEDESIGN | 9 |
|---|---|---|

Using White Box Approach to Test design - Test Adequacy Criteria – Static Testing Vs.Structural Testing — Code Functional Testing — Coverage and Control Flow Graphs — Covering Code Logic — Paths — Their Role in White box Based Test Design — CodeComplexity Testing – Evaluating Test Adequacy Criteria. Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements basedtesting–BoundaryValueAnalysis–Decisiontables–EquivalenceClassPartitioning–State-based testing — Cause-effect graphing — Error guessing — Compatibility testing — Userdocumentationtesting–Domaintesting–CasestudyforControlFlowGraphandState-basedTesting.

| UNIT – II | LEVELSOFTESTING | 9 |
|---|---|---|

The Need for Levels of Testing- Unit Test Planning –Designing the Unit Tests – The TestHarness – Running the Unit tests and Recording Results – Integration Tests – DesigningIntegrationTests– IntegrationTestPlanning–ScenarioTesting–DefectBashElimination.System Testing — Acceptance testing — Performance testing — Regression Testing -Internationalization testing - Ad-hoc testing – Alpha, Beta Tests- Testing OO systems –UsabilityandAccessibilityTesting– ConfigurationTesting-CompatibilityTesting–Testingthedocumentation–WebsiteTesting-CaseStudyforUnitandIntegrationTesting.

| UNIT – III | TESTINGFORSPECIALIZEDENVIRONMENT | 9 |
|---|---|---|

TestingClient/ServerSystems–TestinginaMultiplatformEnvironment-TestingObject-Oriented Software – Object Oriented Testing – Testing Web based systems – Web basedsystem – Web Technology Evolution – Traditional Software and Web based Software –Challenges in Testing for Web-based Software – Quality Aspects – Web Engineering – TestingofWebbasedSystems.CaseStudyforWebApplicationTesting

| UNIT – IV | TESTAUTOMATION | 9 |
|---|---|---|

SelectingandInstallingSoftwareTestingTools-SoftwareTestAutomation–Skillsneededfor Automation — Scope of Automation — Design and Architecture for Automation — RequirementsforaTestTool–ChallengesinAutomation–TrackingtheBug–Debugging–CasestudyusingBugTrackingTool.

| UNIT – V | SOFTWARETESTINGANDQUALITYMETRICS | 9 |
|---|---|---|

Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics- Defect Removal Effectiveness -FMEA - Quality Function Deployment – TaguchiQualityLossFunction–CostofQuality.CaseStudyforComplexityandObject

**TOTAL:45 PERIODS**

**OUTCOMES:**
**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Apply** various testingtechniques to test the software. **- UNIT –I-(K3)**

**CO2:Determine**the method to debug theproject. **- UNIT –II-(K3)**

**CO3:Use**variousautomationtools totesttheapplicationsinthespecializedenvironment**-**

**UNIT –III-(K3)**

**CO4:Determine** bug tracking tools to test the web applications **- UNIT –IV-(K3)**

**CO5:Determine** qualityand reliabilitymetricsto ensuretheperformanceof thesoftware**- UNIT –V-(K3)**

**REFERENCES:**

1. AdithyaP.Mathur,"FoundationsofSoftwareTesting–Fundamentalsalgorithmsand techniques",Dorling Kindersley(India)Pvt.Ltd.,PearsonEducation,2008
2. BorisBeizer,"SoftwareTestingTechniques",DreamTechPress,2009
3. DaleH.Besterfiled, "TotalQualityManagement", PearsonEducationAsia,Third Edition, IndianReprint(2011).
4. EdwardKit,"SoftwareTestingintheRealWorld–ImprovingtheProcess",Pearson Education,1995
5. Glenford J. Myers, Tom Badgett, Corey Sandler, "The Art of Software Testing", 3rdEdition,John Wiley &SonsPublication,2012
6. IlleneBurnstein,"PracticalSoftwareTesting",SpringerInternationalEdition,Chennai,2003.
7. NareshChauhan,"SoftwareTestingPrinciplesandPractices"OxfordUniversityPress,New Delhi ,2010
8. RonPatton,"SoftwareTesting",SecondEdition,PearsonEducation, 2009
9. RenuRajani, PradeepOak,"SoftwareTesting– EffectiveMethods,Toolsand Techniques",TataMcGrawHill,2004
10. SrinivasanDesikanandGopalaswamyRamesh,"SoftwareTesting–Principlesand Practices",PearsonEducation, 2009.
11. StephanKan,"MetricsandModelsinSoftwareQuality",Addison–Wesley,Second Edition,2004
12. WilliamPerry, "Effective Methods of Software Testing",Third Edition, Wiley Publishing.

| 24MC3E2 | FULL STACK DEVELOPMENT | L | T | P | C |
|---|---|---|---|---|---|
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**OBJECTIVES:**

- To understand the fundamentals of web programming and client side scripting.
- To learn server side development usingNodeJS.
- To understand API development with Express Framework.
- To understand and architect databases using NoSQL and SQLdatabases.
- To learn the advanced client-sidescripting and ReactJSframework

| UNIT – I | INTRODUCTION TO CSS and JAVASCRIPT | 9 |
|---|---|---|

IntroductiontoWeb:Server-Client-CommunicationProtocol(HTTP)–StructureofHTMLDocuments – Basic Markup tags – Working with Text and Images with CSS– CSS Selectors – CSSFlexbox-JavaScript: Data typesandVariables - Functions-Events – AJAX: GET andPOST

| UNIT – II | SERVER-SIDEPROGRAMMINGWITHNODEJS | 9 |
|---|---|---|

Introduction to Web Servers – JavaScript in the Desktop with NodeJS – NPM – Serving files with the http module– Introduction to the Express framework– Server-side renderingwith Templating Engines – Static Files –async / await-Fetching JSON from Express

| UNIT – III | ADVANCEDNODEJSANDDATABASE | 9 |
|---|---|---|

Introduction to NoSQL databases– MongoDB system overview -Basic querying with MongoDBshell – Request body parsing in Express – NodeJSMongoDB connection – Adding and retrieving data to MongoDB from NodeJS – Handling SQL databases from NodeJS – Handling Cookies in NodeJS– Handling User Authentication with NodeJS

| UNIT – IV | ADVANCEDCLIENT-SIDEPROGRAMMING | 9 |
|---|---|---|

ReactJS:ReactDOM-JSX-Components-Properties–FetchAPI-StateandLifecycle—JSLocalstorage-Events-Lifting State Up-Composition and Inheritance

| UNIT – V | APPIMPLEMENTATIONINCLOUD | 9 |
|---|---|---|

CloudprovidersOverview–VirtualPrivateCloud–Scaling(HorizontalandVertical)–VirtualMachines,–Docker Container– Kubernetes

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Develop**client side scripting using HTML, CSS and JS.**- UNIT – I – (K3)**

**CO2: Construct** thearchitect the server side of the web application. **– UNIT – II – (K3)**

**CO3: Develop**web **Applications** using NodeJS. **– UNIT – III – (K3)**

**CO4: Construct**NoSQL databases with MongoDB. **– UNIT – IV – (K3)**

**CO5: Develop**a full-stack Single Page Application using React, NodeJS and MongoDB and deploy on Cloud. **– UNIT – V – (K3)**

**REFERENCES:**


1. DavidFlanagan,“JavaScript:TheDefinitiveGuide”,O’ReillyMedia,Inc,7thEdition,2020
2. MattFrisbie,"Professional JavaScript for Web Developers", WileyPublishing,Inc,4thEdition, ISBN:978-1-119-36656-0,2019
3. AlexBanks,EvePorcello,"LearningReact”, O’Reilly Media, Inc,2ndEdition,2020
4. MarcWandschneider,“LearningNode”,Addison-WesleyProfessional,2nd Edition, 2016
5. JoeBeda,KelseyHightower,BrendanBurns,“Kubernetes:UpandRunning”,O’ReillyMedia, 1st edition,2017
6. PaulZikopoulos,ChristopherBienko, ChrisBacker, ChrisKonarski,SaiVennam,“Cloud WithoutCompromise”, O’ReillyMedia,1st edition,2021

| 24MC3E3 | PROFESSIONAL ETHICS IN IT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Tounderstandtheconcepts of computerethicsintheworkenvironment.
- Tounderstandthethreatsincomputingenvironment
- To understandtheintricaciesof accessibilityissues
- Toensuresafeexits whendesigning thesoftwareprojects

| UNIT – I | INTRODUCTIONTOETHICS | 9 |
|---|---|---|

DefinitionofEthics-Right, Good, Just-TheRationalBasisofEthics-TheoriesofRight: Intuitionistvs.End-Basedvs.Duty-Based-Rights,Duties,Obligations-TheoryofValue-ConflictingPrinciplesandPriorities-TheImportanceofIntegrity-TheDifferenceBetweenMorals, Ethics, and Laws -Ethics in the Business World – Corporate Social Responsibility- Creating an Ethical Work Environment Including Ethical Considerations in Decision Making

| UNIT – II | ETHICSININFORMATIONTECHNOLOGY, INTERNETCRIME | 9 |
|---|---|---|

IT Professionals-Are IT Workers Professionals-Professional Relationships ThatMustBeManaged-ProfessionalCodesofEthics-ProfessionalOrganizations-Certification-ITProfessional Ethics, Three Codes of Ethics, Management Conflicts. The Reveton Ransom Ware Attacks -IT Security Incidents: A Major Concern - Why Computer Incidents Are So Prevalent -TypesofExploits-TypesofPerpetrators-FederalLawsforProsecutingComputerAttacks-ImplementingTrustworthyComputing-RiskAssessment-EstablishingaSecurityPolicy-Educating Employees and Contract Workers

| UNIT – III | FREEDOMOFEXPRESSION,PRIVACY | 9 |
|---|---|---|

First Amendment Rights -Obscene Speech-Defamation -Freedom of Expression: Key Issues -Controlling Access to Information on the Internet -Strategic Lawsuit Against Public Participation (SLAPP)-Anonymity on the Internet-Hate Speech- Privacy Protection and the Law-InformationPrivacy-Privacy Laws,Applications,andCourtRulings-Key Privacy andAnonymity Issues-DataBreaches-ElectronicDiscovery-ConsumerProfiling-WorkplaceMonitoring-advancedSurveillanceTechnology

| UNIT – IV | FREEDOMOFEXPRESSION,INTELLECTUALPROPERTYRIGHTS | 9 |
|---|---|---|

Intellectual Property Rights-Copyrights-Copyright Term - Eligible Works -Fair Use Doctrine – SoftwareCopyrightProtection–CopyrightLawsandtheinternet-CopyrightandPiracy–Patents--Software Patents -Cross-Licensing Agreements -Trade Secrets-Trade Secret Laws -EmployeesandTradeSecrets-KeyIntellectualPropertyIssues-Plagiarism-ReverseEngineering-Open-SourceCode-CompetitiveIntelligence-Trademark Infringement-Cyber squatting

| UNIT – V | SOCIALNETWORKINGETHICSANDETIQUETTES | 9 |
|---|---|---|

Social networking Website – Business Applications of Online Social Networking- Social Network Advertising-The Use of Social Networks in the Hiring Process-Social Networking Ethical Issues –Cyber bullying-Online Virtual Worlds-Crime in Virtual Worlds- Educational and Business Uses of Virtual Worlds

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1: Determine** situations and to internalize the need for applying ethical principles, values to tackle various situations. **UNIT I – (K3)**

**CO2: Develop** aresponsible attitude towards the use of technology. **UNIT II – (K3)**

**CO3: Compute**the societalimpactontheproducts/projectstheydevelopintheircareer-**UNIT-III– (K3)**

**CO4: Demonstrate** the code of ethics and standards of computer professionals.

**Unit IV – (K3)**

**CO5: Identify**the Ethical Issues in Social Networking – **UNIT V – (K3).**

**REFERENCES:**


1. CarolineWhitback," Ethics inEngineeringPracticeand Research ", Cambridge University Press, 2nd Edition 2011.
2. George Reynolds, "EthicsinInformationTechnology",CengageLearning,6th Edition2018.
3. Barger, Robert. (2008). Computer ethics:Acase-basedapproach.CambridgeUniversity Press1st Edition.
4. JohnWeckertandDouglasAdeney,ComputerandInformationEthics,Greenwood Press,FirstEdition1997.
5. PennyDuquenoy,SimonJonesandBarryGBlundell, "Ethical,legalandprofessional Issuesincomputing",MiddlesexUniversityPress,FirstEdition2008.
6. SaraBaase, "AGiftofFire:Social,Legal,andEthicalIssuesforComputingTechnology", 4th Edition,PearsonIndia, 2018.
7. http://www.infosectoday.com/Articles/Intro_Computer_Ethics.html

| 24MC3E4 | DEVOPSANDMICROSERVICES | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To introduce Micro services and Containers.
- To understand the key concepts and principles of DevOps
- To be familiar with most common DevOpstools
- To explain the business benefits of DevOpsandcontinuous delivery.
- TorecallspecificDevOpsmethodologiesandframeworks

| UNIT - I | INTRODUCTIONTOMICROSERVICES | 9 |
|---|---|---|

DefinitionofMicroservices–Characteristics-MicroservicesandContainers–InteractingwithOtherServices–MonitoringandSecuringtheServices–ContainerizedServices– Deploying on Cloud

| UNIT – II | MICROSERVICESARCHITECTURE | 9 |
|---|---|---|

Monolithic architecture- Microservices architectural style- Benefits - Drawbacks of Microservicesarchitecturalstyle-decomposingmonolithicapplicationsintoMicroservices

| UNIT – III | DevOpsTools | 9 |
|---|---|---|

History of DevOps- DevOps and Software Development Life Cycle – Waterfall Model-Agile Model – DevOps LifeCycle – DevOps Tools: distributed version of control tool **Git-** Automation testing tools- **Selenium**–reportgeneration–**TestNG–**UserAcceptanceTesting – **Jenkins**

| UNIT – IV | MICROSERVICESINDEVOPSENVIRONMENT | 9 |
|---|---|---|

Evolution of Microservices and DevOps – Benefits of combining DevOps and Microservices- workingof DevOps and Microservices in Cloud environment - DevOps Pipeline representation for a NodeJSbasedMicroservices

| UNIT – V | VELOCITYANDCONTINUOUSDELIVERY | 9 |
|---|---|---|

Velocity-DeliveryPipeline-teststack-Small/UnitTest–medium/integrationtesting–systemtesting-JobofDevelopmentandDevOps-JobofTestandDevOps–JobofOpandDevops-InfrastructureandthejobofOps

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Select** the Microservices design and apply the principles.

**CO2:Apply**Microservices in DevOps

**CO3:Understand**aboutDevOpsandthecommontoolsusedinDevOps.

**CO4:Develop**andintegrate projectsusingDevOps

**CO5:Deploy**andmonitorprojectsusingDevOps

**REFERENCES:**

1.NamitTanasseri,RahulRai, MicroserviceswithAzure, 1st Edition, PacktPublishing, UK,2017

2.EberhardWolff,Microservices: FlexibleSoftwareArchitecture,1st Edition, PearsonEducation,2017

3.JamesAScott,APracticalGuidetoMicroservicesandContainers,MapRDataTechnologies–book.https://mapr.com/ebook/microservices-and-containers/assets/microservices-and-containers.pdf

4.JoynerJoseph, DevOpsfor Beginners,FirstEdition, MihailsKonoplovspublisher,2015.

5.GeneKim, Kevin Behr, George Spafford, The Phoenix Project, A Novel about IT, DevOps,5th Edition,IT Revolution Press,2018.

6.MichaelHüttermann,DevOpsfor Developers, 1st Edition, APress, e-book,2012.

| 24MCOE1 | SOFTWARE PROJECT MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software
- To Analyze Risk Identification and Resource Allocation
- To Identify Globalization issues in project management

| UNIT – I | OVERVIEW OF SOFTWARE PROJECT MANAGEMENT | 9 |
|---|---|---|

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimateefforts, identify activity risks, and allocate resources, TQM, Six Sigma

| UNIT – II | EVALUATION AND COSTING OF SOFTWARE | 9 |
|---|---|---|

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, structured methods.

| UNIT – III | SOFTWARE ESTIMATION TECHNIQUES AND ACTIVITY PLAN | 9 |
|---|---|---|

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model

| UNIT – IV | RISK MANAGEMENT AND RESOURCE ALLOCATION | 9 |
|---|---|---|

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

| UNIT – V | CHALLENGES IN PROJECT MANAGEMENT | 9 |
|---|---|---|

Globalization issues in project management: Evolution of globalization- challenges in building global teams-models for the execution of some effective management techniques for managing global teams. Impact of the internet on project management: Introduction – the effect of internet on project management – managing projects for the internet – effect on project management activities.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Demonstrate** the software project planning in Detail – **UNIT I – K2**

**CO2:Determine** the cost benefit evaluation techniques – **UNIT II – K3**

**CO3:Compare** the software estimation techniques available in SPM – **UNIT III – K3**

**CO4: Relate** the risk identification and risk analysis – **UNIT IV – K3**

**CO5:Discuss** the globalization challenges in project management – **UNIT V – K4**

1. Bob Hughes & Mike Cotterell, “Software Project Management”, Tata McGraw- Hill Publications, Fifth Edition 2012
2. Gopalswamy Ramesh, “Managing Global Software Projects”, Tata McGraw Hill Publishing Company, 2003
3. Futrell, “Quality Software Project Management”, Pearson Education India, 2008

**References:**

1. Richard H.Thayer “Software Engineering Project Management”, IEEE Computer Society
2. S. A. Kelkar,” Software Project Management” PHI, New Delhi, Third Edition ,2013 4.
3. http://en.wikipedia.org/wiki/Comparison_of_project_management_software
4. http://www.ogc.gov.uk/methods_prince_2.asp

| 24MCOE2 | CRYPTOCURRENCY AND BLOCKCHAIN TECHNOLOGIES | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the basics of Cryptocurrency
- To understand the working of digital tokens and wallets
- To understand the working of contracts
- To understand the working of block chain platforms

| UNIT – I | OVERVIEW OF BLOCKCHAIN | 9 |
|---|---|---|

Why Blockchain - The Structure of Blockchain - Data Structure of Blockchain - Data Distribution in Blockchain - Block Validation. **Block Validators**: Consensus - Proof of Work – Proof of Stake - Proof of Activity - Proof of Elapsed Time - Proof of Burn

| UNIT – II | CRYPTOCURRENCY | 9 |
|---|---|---|

**Bitcoin**: Bitcoin Working - Bitcoin Transactions - Bitcoin Mining - Value of Bitcoin - Community, Politics and Regulations – Advantages – Disadvantages. **Ethereum:** Overview – Decentralized Application. **Components of Ethereum:** Smart contracts – Ether - Ethereum Clients - Ethereum Virtual Machine – Etherscripter

| UNIT – III | DEVELOPMENT FRAMEWORKS | 9 |
|---|---|---|

**Digital Tokens:** Overview - Initial Coin Offering – OmiseGO – EOS – Tether. **Meta Mask:** Wallet Seed – Meta Mask Transactions. **Mist:** Overview - Mist wallet. **Truffle:** Features of Truffle – Development Truffle boxes - Community truffle box.

| UNIT – IV | HYPERLEDGER | 9 |
|---|---|---|

**Hyperledger Fabric:** Introduction - Fabric v/s Ethereum – HyperledgerIroha - Features of Iroha. **HyperledgerSawtooth:** Components of sawtooth - Proof of Elapsed time.

| UNIT – V | BLOCKCHAIN PLATFORMS | 9 |
|---|---|---|

Multichain - HydraChain. **Future Blockchain**: IOTA – Corda - Chain Core.**Blockchain Framework**: CoCo Framework – Tierion – BigchainDB.

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Identify** Block Chain as Data structure and Distribution Data **- UNIT I – K3**

**CO2:Apply** the transactions of Crypto currency. **– UNIT II – K3**

**CO3**:**Identify** the different ways to achieve Block chain Technology-**UNIT III – K3**

**CO4**:**Identify** and build smart contracts – **UNIT IV – K3**

**CO5:Use** smart contract for real world application in a Blockchain Platform. – **UNIT V – K3**

**REFERENCES**

1. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guide toBlockchainTechnology and Blockchain Programming', Create Space Independent PublishingPlatform, 1 st Edition, 2017.

2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder.Bitcoin and cryptocurrency technologies: a comprehensive introduction. 1st Edition, PrincetonUniversity Press, 2016.

3. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin andcryptocurrency, IEEE Symposium on security and Privacy, 1 st Edition, 2015.

4. Antony Lewis, The Basics of Bitcoin and Blockchain: An Introduction to Cryptocurrenciesand the Technology that Powers Them, Mango Publishing group, 2018

5. Tiana Laurence, Introduction to Blockchain Technology, 1 st Edition, Van Haren Publishing,2019.

| 24MCOE3 | DATA WAREHOUSING AND DATA MINING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

- 
- **OBJECTIVES:**
  - ToexposethestudentstotheconceptsofDatawarehousingArchitectureandImplementation
  - ToUnderstandDataminingprinciplesandtechniquesandIntroduceDMasacuttingedge business intelligence
  - Tolearntouseassociationruleminingforhandlinglargedata
  - Tounderstandtheconceptofclassificationfortheretrievalpurposes
  - Toknowtheclusteringtechniquesindetailsforbetterorganizationandretrievalofdata
  - To identify Business applicationsandTrendsofDatamining

| UNIT – I | DATA WAREHOUSE | 9 |
|---|---|---|

Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model-SchemasforMultidimensionalDatabases– OLAPOperations– DataWarehouseArchitecture – Indexing – OLAP queries & Tools.

| UNIT – II | DATAMINING&DATAPREPROCESSING | 9 |
|---|---|---|

Introduction to KDDprocess– Knowledge DiscoveryfromDatabases-NeedforDataPreprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

| UNIT – III | ASSOCIATIONRULEMINING | 9 |
|---|---|---|

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

| UNIT – IV | CLASSIFICATION&PREDICTION | 9 |
|---|---|---|

Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor.

| UNIT – V | CLUSTERING | 9 |
|---|---|---|

ClusterAnalysis:-Typesof Datain ClusterAnalysis –ACategorizationof MajorClustering Methods– Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Outlier Analysis.

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

CO1: **Describe** techniques to store voluminousdataforonline processing **– UNIT I – (K2)**

CO2: **Explain** the Preprocessing techniques forminingapplications **– UNIT II – (K2)**

CO3: **Apply**theassociation rulesformining thedata **– UNIT III – (K3)**

CO4: **Develop**anddeployappropriate classificationtechniques **– UNIT IV – (K3)**

CO5: **Apply** Clustering techniques forthehighdimensionaldata**– Unit V – (K3)**

**REFERENCES:**


1. JiaweiHanandMichelineKamber,“DataMiningConceptsandTechniques”SecondEdition, Elsevier, Reprinted 2008.
2. K.P. Soman, ShyamDiwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, PrenticeHall of India, 2006.
4. BERSON, ALEX & SMITH, STEPHEN J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
5. Pang-NingTan,MichaelSteinbachandVipinKumar,“IntroductiontoDataMining”,Pearson Education, 2007
6. PRABHUDataWarehousing,PHILearningPrivate Limited,NewDelhi,2012,,
7. PONNIAH,PAULRAJ,DataWarehousingFundamentals,JohnWiley&Sons,NewDelhi,2011
8. MARAKAS,GEORGEM,ModernDataWarehousing,Mining,andVisualization, Pearson Education, 2011

| 24MCOE4 | BIG DATA ANALYTICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Toexplorethefundamentalconceptsof bigdataanalytics
- Tolearntoanalyzethebigdatausing intelligenttechniques.
- Tounderstandthevarioussearchmethodsandvisualizationtechniques.
- Tolearntousevarioustechniquesforminingdatastream.
- Tounderstandtheapplicationsusing MapReduceConcepts.

| UNIT – I | INTRODUCTIONTOBIG DATA | 8 |
|---|---|---|

Introduction to BigData Platform – Challenges of Conventional Systems -Intelligent data analysis – Natureof Data –AnalyticProcessesandTools -Analysis vs Reporting -Modern DataAnalytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

| UNIT – II | MININGDATASTREAMS | 9 |
|---|---|---|

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data ina Stream– FilteringStreams –Counting DistinctElements inaStream –Estimating Moments –CountingOneness inaWindow– DecayingWindow - RealtimeAnalytics Platform(RTAP) Applications -Case Studies - Real Time SentimentAnalysis, Stock Market Predictions.

| UNIT – III | HADOOP | 10 |
|---|---|---|

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing theData with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

| UNIT – IV | HADOOPENVIRONMENT | 9 |
|---|---|---|

Setting up aHADOOP Cluster - Cluster specification - Cluster Setup and Installation - HADOOP Configuration-Security inHADOOP-AdministeringHADOOP–HDFS - Monitoring-Maintenance-HADOOP benchmarks- HADOOP in the cloud

| UNIT – V | FRAMEWORKS | 9 |
|---|---|---|

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive -fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

**TOTAL:45PERIODS**

**OUTCOMES:**

**Upon CompletionoftheCourse,theStudentswillbeableto:**

**CO1:Demonstrate** bigdata platforms **– UNIT I (K3)**

**CO2:Illustrate** efficient algorithmsfor mining thedatafromlargevolumes. **– UNIT II (K3)**

**CO3:Determine** HADOOPand Map Reducetechnologiesassociated withbigdataanalytics**-UNIT III (K3)**

**CO4: Develop** BigDataapplicationsUsingPigand Hive **– UNIT IV (K3)**

**CO5: Apply** to variousbig dataanalysistechniques **– UNIT V (K3)**

**REFERENCES:**

1.MichaelBerthold,DavidJ.Hand,"IntelligentDataAnalysis",Springer,2007.

2.TomWhite"Hadoop:TheDefinitiveGuide"ThirdEdition,O'reillyMedia,2012.

3.Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012

4.AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

5.Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.

6.GlennJ.Myatt, "MakingSenseof Data",JohnWiley&Sons, 2007

7.PeteWarden, "Big DataGlossary",O'Reilly,2011.

8.Jiawei Han, MichelineKamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

9.DaRuan,GuoquingChen,EtienneE.Kerre,GeertWets,IntelligentDataMining,Springer,2007

10.Paul Zikopoulos ,Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corrigan , Harness the Powerof Big Data The IBMBig Data Platform, Tata McGrawHill Publications, 2012

11.Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author) , Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses,WileyPublications,2013

12.Zikopoulos, Paul, ChrisEaton, Understanding Big Data:AnalyticsforEnterprise ClassHadoop and Streaming Data, Tata McGraw Hill Publications, 2011

| 24AC101 | ENGLISHFORRESEARCHPAPERWRITING | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

Thiscourseisintended toprovideanintegratedframeworkforthestudentscanableto:

- Understandthathowtoimproveyourwritingskillsandlevelofreadability
- Learnaboutwhattowriteineachsection
- UnderstandtheskillsneededwhenwritingaTitle
- Ensurethegoodqualityofpaper atveryfirst-timesubmission

| UNIT – I | | 4 |
|---|---|---|

Planning and Preparation,Word Order, Breaking uplong sentences,Structuring Paragraphs andSentences, Being ConciseandRemovingRedundancy,AvoidingAmbiguityandVagueness.

| UNIT – II | | 4 |
|---|---|---|

ClarifyingWhoDidWhat,HighlightingYourFindings,HedgingandCriticising,ParaphrasingandPlagiarism,Sections ofa Paper,Abstracts andIntroduction.

| UNIT – III | | 4 |
|---|---|---|

ReviewoftheLiterature,Methods,Results,Discussion,Conclusions,TheFinalCheck.

| UNIT – IV | | 4 |
|---|---|---|

Keyskillsareneededwhen writingaTitle,KeyskillsareneededwhenwritinganAbstract,KeyskillsareneededwhenwritinganIntroduction,SkillsneededwhenwritingaReviewoftheLiterature.

| UNIT - V | | 4 |
|---|---|---|

SkillsareneededwhenwritingtheMethods,SkillsneededwhenwritingtheResults,Skillsareneededwhenwritingtheeiscussion,Skillsareneeded whenwritingtheConclusions.

| UNIT - VI | | 4 |
|---|---|---|

Usefulphrases,Howtoensurepaperisasgoodasitcouldpossiblybethefirst-timesubmission.

**TOTAL:24PERIODS**

**REFERENCES:**


1. RobertGoldbort,“WritingforScience”,YaleUniversityPress,2006.
2. RobertADayandBarbaraGastel,“HowtoWriteandPublishaScientificPaper”,SeventhEdition,GreenwoodPress,2011.
3. Nicholas J Higham,“Handbook of Writing for the Mathematical Sciences”, Society forIndustrialandAppliedMathematics,1998.
4. AdrianWallwork,“English forWritingResearchPapers”,Springer,2011.

| 24AC102 | DISASTER MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction andhumanitarianresponse.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice frommultipleperspectives.
- Develop an understanding of standards of humanitarian response and practical relevance inspecific typesofdisastersandconflictsituations.
- Criticallyunderstandthestrengthsandweaknessesofdisastermanagementapproaches,planningandprogram mingindifferentcountries,particularlytheirhomecountryorthecountriestheyworkin

| UNIT – I | INTRODUCTION | 4 |
|---|---|---|

**Disaster:** Definition,FactorsandSignificance,Difference betweenHazardandDisaster.

**NaturalandManmadeDisasters:**Difference,Nature,TypesandMagnitude.

| UNIT – II | REPERCUSSIONS OF DISASTERS AND HAZARDS | 6 |
|---|---|---|

**Repercussionsof Disasters andHazards:**EconomicDamage,Loss of Human andAnimalLife,Destruction ofEcosystem.

**NaturalDisasters:**Earthquakes,Volcanisms,Cyclones,Tsunamis,Floods,DroughtsandFamines,Landslides andAvalanches.

**Man-madeDisaster:**NuclearReactorMeltdown,IndustrialAccidents,OilSlicksandSpills,Outbreaks ofDisease andEpidemics,WarandConflicts.

| UNIT – III | DISASTER PRONE AREAS IN INDIA | 4 |
|---|---|---|

**DisasterProneareasinIndia:**StudyofSeismicZones,AreasPronetoFloodsandDroughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special ReferencetoTsunami;Post-DisasterDiseasesandEpidemics.

| UNIT – IV | DISASTER PREPAREDNESS AND MANAGEMENT | 4 |
|---|---|---|

**DisasterPreparednessandManagementPreparedness:**MonitoringofPhenomenaTriggeringa Disaster orHazard.

**Evaluation of Risk:** Application ofRemoteSensing, DatafromMeteorologicaland otherAgencies.

**Media Reports:**GovernmentalandCommunityPreparedness.

| UNIT - V | RISK ASSESSMENT | 6 |
|---|---|---|

**RiskAssessmentDisasterRisk:** ConceptandElements,Disaster RiskReduction, Globaland National DisasterRisk Situation.Techniques of Risk Assessment,Global Co-Operation In RiskAssessmentandWarning,People'sParticipationinRiskAssessment.StrategiesforSurvival.

**TOTAL:24PERIODS**

**REFERENCES:**


1. NishithRaiandA.K.Singh,"DisasterManagementinIndia:Perspectives,Issues andStrategies",NewRoyalBookCompany,2007.
2. PardeepSahni,AlkaDhamejaandUmaMedury,"DisasterMitigation:ExperiencesandReflection s",Prentice HallIndiaLearningPrivateLimited,2001.
3. S.L.Goel,"DisasterAdministrationandManagement:TextandCaseStudies",Deep&DeepPublic ationPvt.Ltd.,2007

| 24AC103 | SANSKRITFOR TECHNICALKNOWLEDGE | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

- Thiscourseisintendedtoprovideanintegratedframeworkforthestudentscanableto:
- GetaworkingknowledgeinillustriousSanskrit,thescientificlanguageintheworld.
- LearningofSanskrittoimprovebrainfunctioning.
- LearningofSanskrittodevelopthelogicinmathematics,scienceandothersubjectsenhancing thememorypower.
- Theengineering scholarsequipped withSanskritwillbeabletoexplorethehugeknowledgefromancientliterature.

| **UNIT – I** | | **8** |
|---|---|---|
| AlphabetsinSanskrit,Past/Present/FutureTense,SimpleSentences | | |
| **UNIT – II** | | **8** |
| Order,Introductionofroots,Technicalinformationabout SanskritLiterature | | |
| **UNIT – III** | | **8** |
| TechnicalconceptsofEngineering-Electrical,Mechanical,Architecture,Mathematics | | |

**TOTAL : 24 PERIODS**

**REFERENCES:**

1. H.R.VishwasandSamskritaBharati,“Abhyâsapustakam”,Samskrita-BhartiPublication,NewDelhi.
2. VempatiKutumbaShastri, “TeachYourselfSanskrit: PrathamaDiksha (Sanskrit)”,Rashtriya SanskritSamsthana,Delhi,2012.
3. SureshSoni,“India’sGloriousScientificTradition”,Prabh tPrakashan,2006.

| 24AC104 | VALUE EDUCATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

Thiscourseisintendedtoprovideanintegratedframeworkforthestudentscanableto:

- Understandthevalueofeducationandself-development.
- Imbibegoodvaluesinstudentsand Know abouttheimportanceofcharacter.
- LearntheimportanceofHumanvaluesanddevelopingtheoverallpersonality.

| UNIT – I | | 6 |
|---|---|---|

Valuesandself-development–
Socialvaluesandindividualattitudes,Workethics,Indianvisionofhumanism,Moralandnon-moralValuation,StandardsandPrinciples,Valuejudgments.

| UNIT – II | | 6 |
|---|---|---|

Importanceofcultivationofvalues.Senseofduty,Devotion,Self-reliance,Confidence, Concentration,Truthfulness,Cleanliness,Honesty,Humanity,Poweroffaith, NationalUnity.Patriotism, Lovefornature, Discipline.

| UNIT – III | | 6 |
|---|---|---|

PersonalityandBehaviorDevelopment-SoulandScientificattitude, PositiveThinking,Integrity and Discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger,DignityofLabour,Universalbrotherhoodandreligious tolerance,TrueFriendship,Happinessvs. Suffering, Love for Truth, Aware of Self-Destructive habits, Association and Cooperation, Doingbestforsavingnature.

| UNIT – IV | | 6 |
|---|---|---|

CharacterandCompetence–Holybooksvs.Blindfaith,Self-ManagementandGoodhealth, Science of reincarnation,Equality,Non-violence,Humility,Role of Women,All religions andsamemessage,MindyourMind,Self-control,Honesty,Studyingeffectively.

**TOTAL:24PERIODS**

**REFERENCES:**

**1.**S.K.Chakraborty,"ValuesofEthicsforOrganization:TheoryandPractice",OxfordUniversityPress,1999.

| 24AC105 | CONSTITUTION OF INDIA | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

Thiscourseisintendedtoprovideanintegratedframeworkforthestudentscanableto:

- Understand the premises informing the twin themes of liberty and freedom from a civilrights perspective.
- Address the growth of Indian opinion regarding modern Indian intellectuals' constitutionalrole and entitlement to civil and economic rights as well as the emergence of nationhood inthe earlyyears ofIndiannationalism.
- Address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917anditsimpactontheinitialdraftingoftheIndianConstitution.

| UNIT – I | HISTORYOFMAKINGOFTHEINDIANCONSTITUTION | 4 |
|---|---|---|

History, Drafting Committee (Composition and Working)

| UNIT – II | PHILOSOPHYOFTHEINDIANCONSTITUTION | 4 |
|---|---|---|

Preamble, Salient Features

| UNIT – III | CONTOURSOFCONSTITUTIONALRIGHTSANDDUTIES | 4 |
|---|---|---|

- FundamentalRights
- Rightto Equality
- RighttoFreedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties

| UNIT – IV | ORGANS OF GOVERNANCE: | 4 |
|---|---|---|

- Parliament
- Composition
- QualificationsandDisqualifications
- PowersandFunctions
- Executive
- President
- Governor
- CouncilofMinister
- Judiciary,AppointmentandTransferofJudges,QualificationsPowersandFunctions

| | | |
|---|---|---|
| **UNIT-V** | **LOCALADMINISTRATION:** | **4** |
| ➢ District'sAdministrationhead:RoleandImportance<br>➢ Municipalities: Introduction, Mayor and role of Elected Representative,CEOofMunicipalCorporation<br>➢ Pachayatiraj:Introduction<br>➢ PRI:ZilaPachayat<br>➢ Electedofficialsandtheirroles<br>➢ CEOZilaPachayat:Positionandrole<br>➢ Blocklevel:OrganizationalHierarchy(Differentdepartments)<br>➢ Villagelevel:RoleofElectedandAppointedofficials<br>➢ Importanceofgrass rootdemocracy | | |
| **UNIT-VI** | **ELECTIONCOMMISSION:** | **4** |
| ➢ ElectionCommission:RoleandFunctioning<br>➢ ChiefElectionCommissionerandElectionCommissioners<br>➢ StateElectionCommission:RoleandFunctioning<br>➢ InstituteandBodiesforthewelfareofSC/ST/OBCandwomen | | |
| | | **TOTAL:24 PERIODS** |

**REFERENCES:**


1. TheConstitutionofIndia,January1950(BareAct),Gazetteof**India**.
2. S.N.Busi,"Dr.B.R.AmbedkarFramingofIndianConstitution",Vol.1to6,FirstEdition,2016.
3. M.P.Jain,JusticeJastiChelameswarandJusticeDamaSeshadriNaidu,"IndianCon stitutionLaw",LexisNexis,2018.
4. D.D.Basu,"IntroductiontotheConstitutionofIndia",LexisNexis,2011.

| 24AC106 | PEDAGOGY STUDIES | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

Thiscourseisintended toprovideanintegratedframeworkforthestudentscanableto:

- Review existing evidence on the review topic to inform programme design and policymaking undertaken by the Department for International Development (DFID), otheragenciesand researchers.
- Identifycriticalevidencegapstoguidethedevelopment.
- Whatpedagogicalpracticesarebeingusedbyteachersinformalandinformalclassroomsindevel opingcountries?
- What is the evidence on the effectiveness of these pedagogical practices, in whatconditions,andwithwhatpopulationoflearners?
- Howcanteachereducation(curriculumand Practicum)andtheschoolcurriculumandguidancematerialsbestsupporteffectivepedagogy?

| UNIT-I | INTRODUCTIONANDMETHODOLOGY | 5 |
|---|---|---|

- Aimsandrationale,Policybackground,Conceptualframeworkandterminology.
- Theoriesoflearning,Curriculum,Teachereducation.
- Conceptualframework,Researchquestions.
- OverviewofmethodologyandSearching.

| UNIT-II | THEMATICOVERVIEW | 4 |
|---|---|---|

- Pedagogical practices are being used by teachers in formal and informal Class roomsindevelopingcountries.
- Curriculum,Teachereducation.

| UNIT-III | EVIDENCEONTHEEFFECTIVENESSOFPEDAGOGICALPRACTICES | 5 |
|---|---|---|

- Methodologyfortheindepthstage:Qualityassessmentofincludedstudies.
- How can teachereducation (Curriculum andPracticum)andtheschool curriculumandguidancematerialsbestsupporteffectivepedagogy?
- Theory ofchange.
- Strengthandnatureofthebodyofevidenceforeffectivepedagogicalpractices.
- Pedagogictheoryandpedagogicalapproaches.
- Teachers'attitudesandbeliefsandPedagogicstrategies.

| UNIT-IV | PROFESSIONALDEVELOPMENT | 5 |
|---|---|---|

- Alignmentwithclassroompracticesandfollow-upsupport.
- Peersupport.
- Supportfromtheheadteacherandthecommunity.
- CurriculumandAssessment.
- Barrierstolearning:Limitedresourcesandlargeclasssizes.

| UNIT-V | RESEARCHGAPSANDFUTUREDIRECTIONS | 5 |
|---|---|---|

- Researchdesign
- Contexts
- Pedagogy
- Teachereducation
- Curriculumandassessment
- Disseminationandresearchimpact

**TOTAL:24PERIODS**

**REFERENCES:**


1. Jim Ackers and Frank Hardman, “Classroom Interaction in Kenyan Primary Schools”, Compare, Vol. 31, No. 2, 2001. pp. 245-261.
2. MamtaAgrawal, “Curricular reform in schools: The importance of evaluation”, Journal of Curriculum Studies, Vol. 36, No. 3, 2004. pp. 361-379.
3. Kwame Akyeampong, “Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER), Country Report One, London, DFID, March 2003.
4. Kwame Akyeampong, KattieLussier, John Pryor and Jo Westbrook, “Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count?”, International Journal of Educational Development, Vol. 33, No. 3, 2013. pp. 272–282.
5. Robin J Alexander, “Culture and Pedagogy: International Comparisons in Primary Education”, Wiley-Blackwell, 2001.
6. www.pratham.org/images/resource%20working%20paper%202.pdf.

| 24AC107 | STRESS MANAGEMENT BY YOGA | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

Thiscourseisintendedtoprovideanintegratedframeworkforthestudentscanableto:

- Achieveoverallhealthofbodyandmind
- Overcomestress
- Develophealthymindinahealthybodythusimprovingsocialhealthalso
- Improveefficiency

| UNIT-I | ASHTANGA | 8 |
|---|---|---|

DefinitionsofEightpartsofyoga.

| UNIT-II | YAMANDNIYAM | 8 |
|---|---|---|

DoandNotDoinlife

- Ahinsa,Satya,Astheya,Bramhacharyaand Aparigraha
- Shaucha,Santosh,Tapa,Swadhyay,Ishwarpranidhan

| UNIT-III | ASANANDPRANAYAM | 8 |
|---|---|---|

- Variousyogaposesandtheirbenefitsfor mindand body
- Regularizationofbreathingtechniquesanditseffects- TypesofPranayam

**TOTAL:24 PERIODS**

**REFERENCES:**

1. "YogicAsanasfor Group Training - Part-I", Janardan Swami YogabhyasiMandal,Nagpur.
2. Swami Vivekananda, "Raja-Yoga or Conquering the Internal Nature", Vedanta Press,1998.

| 24AC108 | PERSONALITYDEVELOPMENTTHROUGHLIFEENLIGHTENMENT SKILLS | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**OBJECTIVES:**

Thiscourseisintended toprovideanintegratedframeworkforthestudentscanableto:

- Learntoachievethehighestgoalhappily
- Becomeapersonwithstablemind,pleasing personalityanddetermination
- Awakenwisdominstudents
- StudyofShrimad-Bhagwad-Geetawillhelpthestudentindevelopinghispersonalityandachievethehighestgoalinlife
- ThepersonwhohasstudiedGeetawillleadthenationandmankindtopeaceandprosperity
- StudyofNeetishatakamwillhelpindevelopingversatilepersonalityofstudents

| UNIT – I | NEETISATAKAM-HOLISTICDEVELOPMENTOFPERSONALITY | 8 |
|---|---|---|

- Verses-19,20,21,22(Wisdom)
- Verses- 29, 31, 32(PrideandHeroism)
- Verses-26,28,63,65(Virtue)
- Verses-52,53,59(Dont's)
- Verses-71,73,75,78(Do's)

| UNIT – II | APPROACHTODAY-TO-DAYWORKANDDUTIES: SHRIMADBHAGWADGEETA | 8 |
|---|---|---|

- Chapter2-Verses -41,47,48
- Chapter3-Verses -13,21,27,35
- Chapter6-Verses -5,13,17,23, 35
- Chapter18–Verses -45, 46,48

| UNIT – III | STATEMENTSOFBASICKNOWLEDGE:SHRIMADBHAGWADGEETA | 8 |
|---|---|---|

- Chapter2-Verses-56, 62,68
- Chapter12-Verses -13,14,15,16,17,18

**Personalityofrolemodel:ShrimadBhagwadGeeta**

- Chapter2-Verses –17
- Chapter3-Verses -36, 37,42
- Chapter4-Verses -18, 38,39
- Chapter18-Verses-37, 38,63

**TOTAL:24PERIODS**

**REFERENCES:**

1. SwamiSwarupananda,"SrimadBhagavadGita",by AdvaitaAshram,Kolkata.
2. Pt.Gopinath,"ThreeSatakamofBharatrhari(Niti,Srngara,Vairagya)",RashtriyaSanskritSansthan,2010.

| 24MCBC1 | DATABASE MANAGEMENT SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the fundamentals of data models and conceptualize and depict a database System using ER diagram.
- To make a study of SQL and relational database design.
- To know about data storage techniques and query processing.
- To impart knowledge in transaction processing, concurrency control techniques and recovery procedures.

| UNIT-I | INTRODUCTION | 9 |
|---|---|---|

Filesystems versus Databasesystems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – E-R Modeling.

| UNIT – II | RELATIONAL MODEL AND QUERY EVALUATION | 9 |
|---|---|---|

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views — Constraints

| UNIT – III | DATA BASE DESIGN & APPLICATION DEVELOPMENT | 9 |
|---|---|---|

Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued, Dependencies and Fourth Normal Form.

| UNIT – IV | TRANSACTION PROCESSING | 9 |
|---|---|---|

Query Processing - Transaction Processing – Properties of Transactions - Serializability – Locking Techniques – Validation Techniques – Recovery concepts – Log Based Recovery.

| UNIT - V | FILES AND INDEXING | 9 |
|---|---|---|

File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+tree – Static Hashing

**TOTAL : 45 PERIODS**

**COURSE OUTCOMES:**

Upon Completion of the course, the students will be able to

**CO1:** Describe the DBMS Architecture and Data Models. **– UNIT I – (K2)**

**CO2:** Demonstrate the use of basic and complex SQL queries –**UNIT II – (K3)**

**CO3:** Apply the concept of normal forms in database design -**UNIT III- (K3)**

**CO4:** Demonstrate the use of transactions, locks and log based recovery - **UNIT IV – (K3)**

**CO5:** Describe in detail hashing and indexing **– UNIT V (K2)**

**REFERENCES:**

1. Abraham Silberschatz, Henry F. Korth and S. Sundarshan "Database System Concepts", Seventh Edition, McGraw Hill, 2017.
2. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education Delhi, 2017

3.RaghuRamakrishnan,—DatabaseManagementSystemsǁ,FourthEdition,McGrawHillCollegePublications,2015.
4.LeeChao,“DatabaseDevelopmentandManagement”,AuerbachPublications, 1st edition,2010
5.CarlosCoronel,PeterRob,andStephenMorris,“DatabasePrinciplesFundamentalsofDesign,Implementation, andManagement–10thEdition”,CourseTechnology,CengageLearning,2013
6.C.J.Date,“AnIntroductiontoDatabaseSystems”,EighthEdition,PearsonEducationDelhi,2003

| 24MCBC2 | PROGRAMMING IN 'C' | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To know the data types supported by C
- To know the control and looping statements available in C
- To know how to use pointers in C

| UNIT-I | INTRODUCTION | 9 |
|---|---|---|

History of C, Character set, constants, variables, data types, declaration of variables, assigning values to variables, operators, input-output library functions, basic structure of C program, programming examples

| UNIT-II | CONTROL STATEMENTS AND LOOPING STATEMENTS | 9 |
|---|---|---|

Conditional Control Statements, if, if-else, nested if-else, switch-case, Loop Control Statements, while, do-while, for, Nested Loops, programming examples

| UNIT-III | ARRAYS, STRUCTURES | 9 |
|---|---|---|

Arrays - Types of arrays - Initialization - Accessing - examples- Structures: Declaration of Structure Variables, Initialization of Structure Variables, Accessing Structure Members, Reading and Displaying Structure Variables, Pointers to structures, Array of structures, Arrays within structures, Nested structures, Programming Example

| UNIT-IV | FUNCTIONS | 9 |
|---|---|---|

Functions: Parameter Passing Techniques, call by value, call by address, Using Pointers as Arguments, Function Returning value, Functions Returning Address, Function Returning Pointers, Programming examples

| UNIT-V | POINTERS | 9 |
|---|---|---|

Declaration of Pointer Variables, Assigning Address to Pointer Variables, Pointer to Pointer, Pointer Arithmetic. Programming examples

**TOTAL:45 PERIODS**

**COURSEOUTCOMES:**

Upon Completionof thecourse, thestudents willbeable to

**CO1:** Describe the data types & input, output functions. **–UNIT – I – (K2)**

**CO2:** Demonstrate the use of control and looping statements –**UNIT – II – (K3)**

**CO3:** Develop programs using arrays &structures -**UNIT – III-(K3)**

**CO4:** Develop the programs using functions.- **UNIT – IV – (K3)**

**CO5:** Apply the concepts of pointers in C Programs. **– UNIT –V (K3)**

**REFERENCES:**

1. Byron S Gottfried, —Programming with C‖, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006.
2. BrianW. Kernighan and Dennis M. Ritchie, “The C programming Language”,2006, Prentice-Hall.
3. Deitel and Deitel, “C How to Program”, Pearson Education. 2013,7th Edition.
4. Kamthane, A.N., “Programming with ANSI and Turbo C”, Pearson Education, Delhi, 2006.
5.Mastering C- by K R Venugopal,Sudeep R Prasad McGraw Hill Education (India) Private Limited; Second edition 2015.
6. PradipDey, ManasGhosh, —Computer Fundamentals and Programming in C, Second Edition, Oxford University Press, 2013.
7. ReemaThareja, “Programming in C”, Oxford University Press, 2011.
8. YashavantKanetkar, “Understanding Pointers In C”, 4th Revised & Updated Edition, 2011, BPB Publications.

| 24MCBC3 | MATHEMATICALFOUNDATIONSFORCOMPUTER APPLICATIONS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- The primary objective of this course is to provide mathematical background and sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, formal languages and finite state automata.
- This course will extend student ‘s Logical and Mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

| UNIT – I | MATRIX ALGEBRA | 9 |
|---|---|---|

Matrices, Rank of Matrix, Solving System of Equations-Eigen values and Eigenvectors-Inverse of a Matrix.

| UNIT – II | BASIC SET THEORY | 9 |
|---|---|---|

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion-Relations-Properties of relations-Matrices of relations.

| UNIT-III | MATHEMATICAL LOGIC | 9 |
|---|---|---|

Propositions and logical operators-Truth Table-Propositions generated by a set-Equivalence and implication-Basic laws-Some more connectives.

| UNIT-IV | FORMAL LANGUAGES | 9 |
|---|---|---|

Languages and Grammars-Phrase Structure Grammar-Classification of Grammars-Pumping Lemma For Regular Languages-Context Free Languages.

| UNIT-V | FINITESTATE AUTOMATA | 9 |
|---|---|---|

Finite State Automata-Deterministic Finite State Automata (DFA),Non-Deterministic Finite State Automata (NFA)-Equivalence of DFA and NFA.

**TOTAL: 45PERIODS**

**OUTCOMES:**
**Upon Completion of the Course, the Students will be able to:**

**CO1:Discuss** the basic knowledge of matrix, Rank of a matrix **– UNIT – I- (K2)**

**CO2:Apply** the set theory, function and relations concept needed for designing and solving problems **– UNIT – II- (K3)**

**CO3:Predict** PCNF&PDNF and its conversion. Apply predict calculus **– UNIT – III- (K3)**

**CO4:Analyze**theacquiredknowledgeofformallanguagestotheengineeringareas like compiler design **– UNIT – IV- (K4)**

**CO5:Apply** finite automata theory and construct NFA, DFA and its conversion**. - UNIT – V (K3)**

| 24MCBC4 | BASICS OF COMPUTER NETWORKS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Tounderstandnetworking concepts andbasiccommunication model
- To understandnetwork architectures and componentsrequired for datacommunication.
- Toanalyzethefunctionanddesignstrategyofphysical,datalink,networklayerandtransport layer
- Toacquirebasicknowledgeofvariousapplicationprotocol forinternetsecurityissues andservices.

| UNIT-I | NETWORKFUNDAMENTALS | 9 |
|---|---|---|

Uses of Networks – Categories of Networks -Communication model –Data transmissionconcepts and terminology — Protocol architecture — Protocols — OSI — TCP/IP — LANTopology-Transmissionmedia.

| UNIT-II | DATALINKLAYER | 9 |
|---|---|---|

Datalinkcontrol-FlowControl–ErrorDetectionandErrorCorrection-MAC–Ethernet,Tokenring - BlueTooth–Bridges.

| UNIT-III | NETWORKLAYER | 9 |
|---|---|---|

Network layer — Switching concepts — Circuit switching — Packet switching –IP —— Datagrams—IPaddresses-IPV6– Routing Protocols –DistanceVector–LinkState.

| UNIT-IV | TRANSPORTLAYER | 9 |
|---|---|---|

Transportlayer–service–Connectionestablishment–Flowcontrol–Transmissioncontrolprotocol – Congestion control and avoidance– User datagram protocol.

| UNIT-V | APPLICATIONSANDSECURITY | 9 |
|---|---|---|

Applications-DNS-SMTP–WWW–SNMP-DES-RSA.

**TOTAL:45 PERIODS**

**OUTCOMES:**

**CO1: Describe**the networkterminology **– UNIT – I – (K2)**

**CO2:Identify** thecomponents required tobuilddifferenttypesofnetworks **– UNIT – II- (K3)**

**CO3:Demonstrate** the functionalities neededfordata communication in network layer **– UNIT–III- (K3)**

**CO4:Illustrate** the functionalityat Transportlayer forgivenapplication **– UNIT – IV- (K3)**

**CO5:Classify** the variousapplicationprotocolsandservicesavailable. **– UNIT – V- (K3)**

**REFERENCES:**

1. Achyut S Godbole,AtulHahate, " Data Communications and Networks", Secondedition2011
2. Andrew S.TannenbaumDavid J. Wetherall, "Computer Networks"Fifth Edition ,PearsonEducation2011
3. DouglasE.Comer,InternetworkingwithTCP/IP(VolumeI)Principles,ProtocolsandArchitecture‖,SixthEdition, Pearson Education,2013.
4. Forouzan, "DataCommunicationandNetworking",FifthEdition,TMH2012.
5. JamesF. Kurose,KeithW.Ross, "ComputerNetworking:ATop-downApproach,PearsonEducation,Limited,sixthedition,2012.
6. John Cowley, "Communications and Networking : An Introduction", Springer IndianReprint,2010.
7. LarryL.Peterson&BruceS.Davie,"ComputerNetworks– AsystemsApproach",FifthEdition,MorganKaufmann,2012
8. WilliamStallings,DataandComputerCommunications‖,Tent Edition,PearsonEducation,2013
9. WayneTomasi,"IntroductiontoDatacommunicationsandNetworking",Pearson2011

| 24MCBC5 | OBJECT ORIENTED PROGRAMMING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc
- To understand and apply the principles hiding, localization and modularity in software development.
- Use the generic programming features of C++.
- Design and implement reliable and maintainable object-oriented applications of moderate complexity composed of several classes

| UNIT-I | FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING | 9 |
|---|---|---|

Object–Oriented Programming concepts – Encapsulation – Programming Elements –Program Structure – Enumeration Types –– Functions and Pointers – Function Invocation – Overloading Functions – Scope and Storage Class – Pointer Types – Arrays and Pointers – Call–by–Reference – Assertions.

| UNIT-II | IMPLEMENTING ADTS AND ENCAPSULATION | 9 |
|---|---|---|

Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics – implementation of simple ADTs.

| UNIT-III | POLYMORPHISM | 9 |
|---|---|---|

ADT Conversions – Overloading – Overloading Operators – Unary Operator Overloading – Binary Operator Overloading

| UNIT-IV | INHERITANCE | 9 |
|---|---|---|

Derived Class – Typing Conversions and Visibility – Code Reuse – Virtual Functions – Templates and Inheritance – Run–Time Type Identifications – Exceptions – Handlers – Standard Exceptions.

| UNIT IV | TEMPLATES | 9 |
|---|---|---|

Template Class – Function Templates – RTTI Templates - Class Templates

**Total : 45 Periods**

**OUTCOMES:**

**CO1:Describe** theobject-oriented programming concepts. **– UNIT – I- (K2)**
**CO2:Use** proper class protection mechanism to provide security. **– UNIT – II- (K3)**
**CO3:Demonstrate** the use of polymorphism in OOPS. **– UNIT –III- (K3**
**CO4:Demonstrate** the use of Inheritance concepts and exceptions in OOPS **– UNIT – IV- (K3)**
**CO5:Classify** the features of C++ including templates **– UNIT – V- (K3)**

**Reference Books:**

1. HM Deitel and PJ Deitel “C++ How to Program”, Seventh Edition, 2010, Prentice Hall
2. S.B Lippman, Josee, JoseeLajoie, Barbara, “ C++ Premier” 4 Edition, Pearson , 2012
3. E Balagurusamy, “Object oriented Programming with C++”, 3 Edition, 2006, Tata McGraw Hill

| 24MCBC6 | COMPUTER GRAPHICS AND MULTIMEDIASYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To provide knowledge and understanding in the fundamental principles of Computer
- To understand the basic concepts related to Multimedia Applications

| UNIT-I | INTRODUCTION | 9 |
|---|---|---|

Overview of Graphics System - Line Drawing and Circle Drawing Algorithms - DDA - Line Clipping - Text Clipping.

| UNIT-II | 2D TRANSFORMATIONS | 9 |
|---|---|---|

Two dimensional transformations – Scaling and Rotations - Interactive Input methods - Window view port mapping transformation.

| UNIT-III | 3D TRANSFORMATIONS | 9 |
|---|---|---|

3D Concepts - Projections – Parallel Projection - Perspective Projection – Visible Surface Detection Methods

| UNIT-IV | OVERVIEW OF MULTIMEDIA | 9 |
|---|---|---|

Multimedia hardware & software - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring.

| UNIT-V | MULTIMEDIA SYSTEMS AND APPLICATIONS | 9 |
|---|---|---|

Multimedia communication systems – Data base systems – Presentation requirements – Video conferencing – Virtual reality – Interactive video.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**CO1: Describe** the fundamentals of Graphics System **– UNIT – I- (K2)**
**CO2:Apply** two dimensional transformations in Graphic systems. **– UNIT – II- (K3)**
**CO3:Apply** three dimensional transformations in Graphic systems. **– UNIT – III- (K3)**
**CO4:Demonstrate** the different forms of Multimedia. **– UNIT – IV- (K3)**
**CO5:Apply** the Multimedia communication systems in Multimedia Applications.**–UNIT–V- (K3)**

**REFERENCES**

1. Hearn D and Baker M.P, “Computer graphics – C Version”, 2nd Edition, Pearson Education, 2004 (unit 1, 2 &3).

2. Ralf Steinmetz, Klara Steinmetz, “Multimedia Computing, Communications and Applications”, Pearson education, 2004 (unit 4 & 5).