**------------------------- COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE CMR ENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE**

**I YEAR I SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credits** |
| 1 | MA101BS | Linear Algebra and Calculus | 3 | 1 | 0 | 4 |
| 2 | AP102BS | Applied Physics | 3 | 1 | 0 | 4 |
| 3 | CS103ES | Programming for Problem Solving | 3 | 1 | 0 | 4 |
| 4 | EE104ES | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 5 | ME105ES | Engineering Workshop and IT Workshop | 0 | 0 | 3 | 1.5 |
| 6 | AP106BS | Applied Physics Lab | 0 | 0 | 3 | 1.5 |
| 7 | CS107ES | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 8 | EE108ES | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 |
| 9 | EN109HS | Employability skills- I (Business English for  Engineers) | 0 | 0 | 2 | 0 |
| 10 |  | **Induction Program** |  |  |  |  |
| **Total Credits** | | | 12 | 3 | 12 | 20 |

**I YEAR II SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credits** |
| 1 | MA201BS | Differential Equations and Vector Calculus | 3 | 1 | 0 | 4 |
| 2 | CH202BS | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 3 | CS203ES | Data Structures | 3 | 0 | 0 | 3 |
| 4 | ME204ES | Engineering Graphics | 1 | 0 | 4 | 3 |
| 5 | EN205HS | English | 2 | 0 | 0 | 2 |
| 6 | CH206BS | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 7 | CS207ES | Data Structures Lab | 0 | 0 | 2 | 1 |
| 8 | EN208HS | English Language and Communication Skills Lab | 0 | 0 | 3 | 1.5 |
| 9 | MA209BS | Employability skills-II (Aptitude) | 1 | 1 | 0 | 0 |
| **Total Credits** | | | **13** | **2** | **12** | **19** |

**------------------------- COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE CMR ENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE**

**II- YEAR I -SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Cre dits** |
| 1 | CS301PC | Database Management Systems | 3 | 0 | 0 | 3 |
| 2 | MA302BS | Computer Oriented Statistical Methods | 3 | 1 | 0 | 4 |
| 3 | CS303PC | Operating Systems | 3 | 0 | 0 | 3 |
| 4 | AI304PC | Object Oriented Programming Using C++ | 2 | 0 | 0 | 2 |
| 5 | DS305ES | Digital Logic Design | 3 | 0 | 0 | 3 |
| 6 | CS306PC | Database Management Systems Lab | 0 | 0 | 2 | 1 |
| 7 | CS307PC | Operating Systems Lab | 0 | 0 | 3 | 1.5 |
| 8 | AI308PC | Object Oriented Programming Using C++ Lab | 0 | 0 | 3 | 1.5 |
| 9 | \*MC309 | Gender Sensitization Lab | 0 | 0 | 2 | 0 |
| 10 | MC310 | Employability Skills-III | 0 | 0 | 2 | 0 |
| **Total Credits** | | | **14** | **1** | **12** | **19** |

**II-YEAR II -SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credi ts** |
| 1 | SM401MS | Business Economics & Financial Analysis | 3 | 0 | 0 | 3 |
| 2 | DS402PC | Discrete Mathematics | 3 | 0 | 0 | 3 |
| 3 | DS403PC | Introduction to Data Analytics | 3 | 01 | 0 | 4 |
| 4 | AI404PC | Java Programming | 3 | 0 | 0 | 3 |
| 5 | DS405PC | Computer Organization and Architecture | 3 | 1 | 0 | 4 |
| 6 | DS406PC | Data Analytics Using R Lab | 0 | 0 | 3 | 1.5 |
| 7 | AI407PC | Java Programming Lab | 0 | 0 | 3 | 1.5 |
| 8 | DS408PC | Computer Organization and Architecture Lab | 0 | 0 | 2 | 1 |
| 9 | \*MC409 | Environmental Science | 3 | 0 | 0 | 0 |
| 10 | MC410 | Employability Skills-IV | 0 | 0 | 2 | 0 |
| **Total Credits** | | | **18** | **2** | **10** | **21** |

**--------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE CMR ENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE**

**III YEAR I- SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Cours e Title** | **L** | **T** | **P** | **Credit s** |
| 1 | CS501PC | Design and Analysis of Algorithms | 3 | 1 | 0 | 4 |
| 2 | DS502PC | Data Mining | 3 | 0 | 0 | 3 |
| 3 | DS503PC | Computer Networks | 3 | 0 | 0 | 3 |
| 4 | DS504PC | Software Engineering | 3 | 0 | 0 | 3 |
| 5 |  | Professional Elective-1 | 3 | 0 | 0 | 3 |
| 6 | DS505PC | Data Mining Using Python Lab | 0 | 0 | 3 | 1.5 |
| 7 | DS506PC | Software Engineering Lab | 0 | 0 | 3 | 1.5 |
| 8 | DS507PC | Computer Networks Lab | 0 | 0 | 2 | 1 |
| 9 | \*MC509 | Intellectual Property Rights | 3 | 0 | 0 | 0 |
| 10 | MC510 | Employability Skills-V | 0 | 0 | 2 | 0 |
| **Total Credits** | | | **18** | **1** | **10** | **20** |

**III YEAR II- SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credits** |
| 1 | CS601PC | Compiler Design | 3 | 0 | 0 | 3 |
| 2 | CS602PC | Artificial Intelligence | 3 | 1 | 0 | 4 |
| 3 | CS603PC | Web Technologies | 3 | 0 | 0 | 3 |
| 4 |  | Professional Elective-II | 3 | 0 | 0 | 3 |
| 5 |  | Open Elective-I | 3 | 0 | 0 | 3 |
| 6 | EN604HS | Advanced Communications Skills Lab | 0 | 0 | 3 | 1.5 |
| 7 | DS605PC | Artificial Intelligence Using Python Lab | 0 | 0 | 2 | 1 |
| 8 | CS606PC | Web Technologies Lab | 0 | 0 | 3 | 1.5 |
| 9 | \*MC609 | Constitution of India | 3 | 0 | 0 | 0 |
| 10 | MC610 | Employability Skills-VI | 0 | 0 | 2 | 0 |
| **Total Credits** | | | **18** | **1** | **10** | **20** |

**--------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE CMR ENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE**

**IV YEAR I SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credits** |
| 1. | DS701PC | Machine Learning | 3 | 0 | 0 | 3 |
| 2. | DS702PC | Big Data Analytics | 3 | 0 | 0 | 3 |
| 3. |  | Professional Elective-III | 3 | 0 | 0 | 3 |
| 4. |  | Professional Elective-IV | 3 | 0 | 0 | 3 |
| 5. |  | Open Elective-II / MOOCs | 3 | 0 | 0 | 3 |
| 6. | DS703PC | Big Data Analytics Lab | 0 | 0 | 3 | 1.5 |
| 7. | DS704PE | Business Intelligence and Analytics Lab | 0 | 0 | 3 | 1.5 |
| 8. | DS705PROJ | Industry Oriented Mini project | 0 | 0 | 4 | 2 |
| 9. | DS706PROJ | Project-I | 0 | 0 | 6 | 3 |
| **Total Credits** | | | **15** | **0** | **16** | **23** |

**IV YEAR II SEMESTER**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credits** |
| 1. |  | Professional Elective-V | 3 | 0 | 0 | 3 |
| 2. |  | Professional Elective-VI | 3 | 0 | 0 | 3 |
| 3. |  | Open Elective-III / MOOCs | 3 | 0 | 0 | 3 |
| 4 | DS801PROJ | Seminar | 0 | 0 | 2 | 1 |
| 5. | DS802PROJ | Project-II | 0 | 0 | 16 | 8 |
| **Total Credits** | | | **9** | **0** | **18** | **18** |

**--------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE CMR ENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE**

### Professional Electives

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Professional Elective-I** | | | | | | |
| **S.No**  **.** | **Course Code** | **Course** | **L** | **T** | **P** | **C** |
| 1 | DS511PE | Time Series Analysis | 3 | 0 | 0 | 3 |
| 2 | DS512PE | Distributed Systems | 3 | 0 | 0 | 3 |
| 3 | DS513PE | Introduction to Data Science | 3 | 0 | 0 | 3 |
| 4 | DS514PE | Intelligent Database Systems | 3 | 0 | 0 | 3 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Professional Elective-II** | | | | | | |
| **S.No.** | **Course Code** | **Course** | **L** | **T** | **P** | **C** |
| 1 | CSD621P | Cryptography and Network Security | 3 | 0 | 0 | 3 |
| 2 | CSD622PE | Grid Computing | 3 | 0 | 0 | 3 |
| 3 | CSD623PE | Data Engineering | 3 | 0 | 0 | 3 |
| 4 | CSD624PE | Mathematical Modeling for Data Science | 3 | 0 | 0 | 3 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Professional Elective - III** | | | | | | |
| **S.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| 1 | DS731PE | Block chain Technology | 3 | 0 | 0 | 3 |
| 2 | DS732PE | Cloud Computing | 3 | 0 | 0 | 3 |
| 3 | DS733PE | Social Network Analysis | 3 | 0 | 0 | 3 |
| 4 | DS734PE | Information Retrieval Systems | 3 | 0 | 0 | 3 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Professional Elective - IV** | | | | | | |
| **S.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| 1 | DS741PE | Computer Forensics | 3 | 0 | 0 | 3 |
| 2 | DS742PE | Data Visualization | 3 | 0 | 0 | 3 |
| 3 | DS743PE | Business Intelligence and Analytics | 3 | 0 | 0 | 3 |
| 4 | DS744PE | Natural Language Processing | 3 | 0 | 0 | 3 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Professional Elective - V** | | | | | | |
| **S.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| 1 | DS851PE | Internet Of Things | 3 | 0 | 0 | 3 |
| 2 | DS852PE | Green Computing | 3 | 0 | 0 | 3 |
| 3 | DS853PE | Advanced Text and Media Analytics | 3 | 0 | 0 | 3 |
| 4 | DS854PE | Data Modeling and Simulation | 3 | 0 | 0 | 3 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
|  |  | **Professional Elective - VI** |  |  |  |  |
| 1 | DS861PE | Web Services | 3 | 0 | 0 | 3 |
| 2 | DS862PE | Augmented Reality and Virtual Reality | 3 | 0 | 0 | 3 |
| 3 | DS863PE | Deep Learning | 3 | 0 | 0 | 3 |
| 4 | DS864PE | Mobile Application Development | 3 | 0 | 0 | 3 |

**--------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE CMR ENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE**

### Open Electives

|  |  |  |
| --- | --- | --- |
| **Open Elective - I** | | |
|  | ECE |  |
| 1 | EC611 OE | Principles of Electronic Communications |
| 2 | EC612OE | Micro Processors, Micro controllers and Interfacing |
| 3 | EC613OE | Digital Image Processing |
| 4 | EC614OE | Digital Design with Verilog |
|  | ME |  |
| 1 | ME611 OE | Operations Research |
| 2 | ME612OE | Fundamentals of Mechanical engineering |
| 3 | ME613OE | Total Quality Management |
| 4 | ME614OE | Metallurgy of Non-Metallurgists / Engineering Materials |
|  | Cyber Security | |
| 1 | CS611OE | Database Management System |
| 2 | CS612OE | Operating Systems |
| 3 | CS613OE | Software Engineering |
| 4 | CS614OE | Java Programming |

|  |  |  |
| --- | --- | --- |
| **Open Elective - II** | | |
|  | ECE |  |
| 1 | EC721OE | Principles of Computer Communications and Networks |
| 2 | EC722OE | Introduction to Embedded Systems |
| 3 | EC723OE | Fuzzy Logic and Neural Networks |
| 4 | EC724OE | Electronics Measurements and Instrumentation |
|  | ME |  |
| 1 | ME721OE | Renewable Energy Sources |
| 2 | ME722OE | Disaster Management |
| 3 | ME723OE | Energy Management & Conservation |
| 4 | ME724OE | Advanced Optimization Techniques |
|  | Cyber Security | |
| 1 | CY711OE | Cyber Security |

|  |  |  |
| --- | --- | --- |
| **Open Elective - III** | | |
|  | ECE |  |
| 1 | EC831OE | Adhoc Wireless Networks |
| 2 | EC832OE | IOT Protocols and Its Applications |
| 3 | EC833OE | Soft Computing |
| 4 | EC834OE | Biomedical Instrumentation |
|  | ME |  |
| 1 | ME831OE | Fundamentals of Robotics |

|  |  |  |
| --- | --- | --- |
| 2 | ME832OE | Organizational Behavior |
| 3 | ME833OE | Industrial Safety, Health & Environmental Engineering |
| 4 | ME834OE | Entrepreneur Resource Planning / Industrial Management & Entrepreneurship |
|  | Cyber Security | |
| 1 | CY811OE | Malware Detection |

**-------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMR ENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech. DS- I Sem.**

|  |  |  |
| --- | --- | --- |
| **L** | **T** | **P C** |
| **3** | **1** | **0 4** |

#### (MA101BS) - Linear Algebra and Calculus

(Common to All Branches)

**Course Objectives**: To learn

* Types of matrices and their properties.
* Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
* Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
* Concept of Sequence.
* Concept of nature of the series.
* Geometrical approach to the mean value theorems and their application to the mathematical problems
* Evaluation of improper integrals using Beta and Gamma functions.
* Partial differentiation, concept of total derivative
* Finding maxima and minima of function of two and three variables.

**Course Outcomes**: After learning the contents of this paper the student must be able to

* + Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
  + Find the Eigen values and Eigen vectors
  + Reduce the quadratic form to canonical form using orthogonal transformations.
  + Analyze the nature of sequence and series.
  + Solve the applications on the mean value theorems.
  + Evaluate the improper integrals using Beta and Gamma functions
  + Find the extreme values of functions of two variables with/ without constraints.

### UNIT-I: Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method;.Gauss Seidel Iteration Method.

### UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors andtheir properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

### UNIT-III: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert’s ratio test; Raabe’s test; Cauchy’s Integral test; Cauchy’s root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

### UNIT-IV: Calculus:

Mean value theorems: Rolle’s Theorem, Lagrange’s Mean value theorem with their Geometrical Interpretation and applications, Cauchy’s mean value Theorem. Taylor’s Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

### UNIT-V: Multivariable calculus (Partial Differentiation and applications)

Partial Differentiation; Euler’s Theorem; Total derivative; Jacobian; Functional dependence independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

### TEXTBOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

### REFERENCES

* 1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
  2. Ramana B.V.Higher Engineering Mathematics, Tata McGraw Hill, New Delhi, 11th

Reprint, 2011

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech. DS- I Sem. L T P C**

**3 1 0 4**

**(AP102BS/AP202BS)- APPLIED PHYSICS**

(Common to CSE /IT/CSD/CSC)

### Course Objectives

* The course primarily aims at understanding the behavior of matter in the condensed state and tries to explorethe causes with reference to micro level mechanism of the solid matter.
* The objective of the first chapter is to study the micro level behavior of the quantum particles of the matter and their nature as wave and particle.
* The second chapter aims to assess the draw backs of the free electron theory leading to the introduction of the Band Theory of Solids.
* In the third chapter task to discuss dielectric and magnetic properties of the materials.
* In the fourth chapter, it is expected to understand the basic principles behind the coherent artificial light source (LASER) with reference to their construction, mechanism, operation and classification etc. In second part of this chapter aimed at to study an advanced communication system presently ruling the world throughout i.e. Fiber Optic communication system.
* In the fifth chapter plan to discuss on fabrication of nanoparticles and their characterization techniques.

**Course Outcomes**: After learning the contents of this paper the student must be able to

* Predict the behavior of particle and wave and solve their wave functions.
* Distinguish the different types of Semiconductor devices.
* Examine the Optoelectrical properties of semiconductor devices.
* Examine normal light and laser light and its application in communication.
* Observe the properties of the polarization and magnetic materials.

### UNIT-I:

1. **Principles of quantum mechanics:** Introduction to quantum physics, Waves and particles, Matter waves, de-Broglie Hypothesis, Characteristics of matter waves, Davisson and Germer’s experiment, Heisenberg’s uncertainty principle, Physical significance of the wave function, Schrodinger’s time - independent wave equation, Particle in one dimensional potential Box.
2. **Electron theory of Metals:** Draw backs of classical free electron theory, Electron in a periodic potential, Kronig-Penny model (Qualitative Treatment), Origin of energy band formation in solids, Classification of materials, Effective mass of an electron.

### UNIT-II

1. **Semiconductor Physics:** Introduction to semi conductors, Fermi level, Calculation of carrier concentration in intrinsic and extrinsic (p-type & n-type) semiconductors, Direct and indirect band gap semiconductors, Hall Effect and applications.
2. **Physics of Semiconductor Devices:** Formation of PN junction, I-V characteristics of PN junction diode, Construction, working and applications: LED, Photo diodes and Solar cells.

### UNIT-III

1. **Dielectric Properties:** Electric dipole, Dipole moment, Dielectric constant, Electronic, ionic and orientation polarizations and calculation of polarizabilities: electronic and ionic, Internal fields in solids, Clausius - Mossotti equation, concept of Piezo-electricity, Pyro- electricity and Ferro - electricity.
2. **Magnetic Properties:** Origin of magnetic moment, Bohr magneton, Classification of magnetic materials: dia, para, ferro, anti ferro and ferri magnetic materials on the basis of magnetic moment, Domain theory of ferro magnetism on the basis of hysteresis curve.

### UNIT-IV

1. **Lasers:** Characteristics of lasers, Absorption, Spontaneous and stimulated emission of radiation, Meta stable state, Population inversion, Lasing action, Einstein’s coefficients and relation between them, Ruby laser, Helium-neon laser, Diode laser and applications of lasers.
2. **Fiber Optics:** Principle and construction (structure) of an optical fiber, Acceptance angle, Numerical aperture, Types of optical fibers: step index and graded index fibres, Losses in optical fibers: absorption, scattering and bending and applications of optical fibres in communication.

### UNIT-V

**Nanotechnology:** Origin of nanotechnology, Nano scale, Surface to volume ratio, Quantum confinement, random molecular motion, dominance of electromagnetic forces, Bottom-up fabrication: Sol-Gel method, Top-down fabrication: Chemical vapour Deposition, Physical vapour deposition, Characterization techniques (XRD, SEM & TEM) and applications of nanotechnology.

### TEXT BOOKS

1. Principles of Physics by Halliday, Resnick, Walker, Wiley India Pvt Ltd, 9th Edition.
2. Introduction to Solid State Physics by Charles Kittel, Wiley India Pvt Ltd, 7th Edition
3. Engineering Physics by R.K.Gaur & S.L.Gupta, Dhanpat Rai Publications.
4. Solid State Physics by A J Dekker, Macmillan India Ltd.

### REFERENCE BOOKS

1. Modern Engineering Physics by Dr.K.Vijaya Kumar, Dr. S. Chandralingam, S.Chand & Company Ltd
2. Applied Physics by P.K.Mittal, I K International Publishers
3. Applied Physics by P.K. Palanisamy :Scitech publishers
4. Introduction to Nanotechnology by Charles P.Poole, Jr.Frank J ownes, John Wiley & sons
5. Applied Physics for Engineers by P. Madusudana Rao, Academic Publishing Company

1. Engineering Physics by Sanjay D Jain, Girish G Sahasrbudha: University Press.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech. DS- I Sem L T P C**

**3 1 0 4 (CS103 ES) -PROGRAMMING FOR PROBLEM SOLVING**

(Common to CSE/ECE/ME/INF/DS/AI-ML/CY/ME)

**Course Objectives:**

* To learn the fundamentals of computers.
* To understand the various steps in program development.
* To learn the syntax and semantics of C programming language.
* To learn the usage of structured programming approach in solving problems.

**Course Outcomes:** The student will learn

* To write algorithms and to draw flowcharts for solving problems.
* To convert the algorithms/flowcharts to C programs.
* To code and test a given logic in C programming language.
* To decompose a problem into functions and to develop modular reusable code.
* To use arrays, pointers, strings and structures to write C programs.
* Searching and sorting problems.

**Unit – 1**

**Introduction to Programming**

Introduction to components of a computer system: disks, primary and secondary memory, Processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured Programming. Introduction to C Programming Language: variables (with data types and space Requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, Static and register), type conversion, the main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent Branching with if, if-else, switch-case, ternary operator, go to, Iteration with for, while, do while Loops. I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, Stdout and Stderr, Command line arguments.

### Unit – II

**Arrays, Strings, Structures and Pointers:** Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays. Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of

Pointers in self-referential structures, usage of self-referential structures in linked list (no Implementation), Enumeration data type

### Unit – III

**Preprocessor and File handling in C:** Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, Ifndef. Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random Access using fseek, ftell and rewind functions.

### Unit – IV

**Function and Dynamic Memory Allocation:** Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C Standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays Of different data types

### Unit – V

**Introduction to Algorithms:** Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

**TEXT BOOKS:**

1. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

**REFERENCE TEXT BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
5. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

I Year B.Tech DS-I Semester **L T P C**

**3 0 0 3**

(**EE104ES) BASIC ELECTRICAL ENGINEERING**

(Common to CSE/IT/CSD/CSC)

**I YEAR B.TECH DS- I SEM L T/P /D C**

**3 - /-/ - 3**

**(EE204ES) BASIC ELECTRICAL ENGINEERING**

**(Common to CSE, DS, IT, CY)**

**COURSE OBJECTIVES:**

* To introduce the concepts of electrical circuits and its components.
* To understand magnetic circuits, DC circuits and AC single phase and three phase circuits.
* To study and understand behavior of transformers.
* To study and understand behavior of DC machines.
* To study and understand behavior of AC machines.

**COURSE OUTCOMES:**

* To analyze and solve electrical circuits using network laws and theorems.
* To understand and analyze basic electric and magnetic circuits.
* To study the working principles of transformer.
* To understand working of dc machines.
* To understand working of ac machines.

**UNIT- I D.C CIRCUITS**

Electrical circuit elements (R,L,C), voltage and current sources, KVL & KCL, analysis of simple circuits with DC excitation. Superposition, Thevenin’s and Norton’s theorems. Time-domain analysis of first – order RL and RC circuits.

**UNIT-II A.C CIRCUITS**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, analysis of single-phase ac circuits consisting of R , L , C , RL , RC , RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuit, voltage and current relations in star and delta connections.

**UNIT-III: TRANFORMERS**

Ideal and practical transformers, equivalent circuits, losses in transformers, regulations and efficiency. Auto- transformer and three-phase transformer connections.

**UNIT-IV: DC MACHINES**

DC generators: Construction, working, emf equation and classification, DC motors: construction, working, back emf, torque equation, classification, characteristics, Loss components and efficiency.

**UNIT-V: AC MACHINES**

Generation of rotating magnetic fields , construction and working of a three-phase induction motor, significance of torque-slip characteristic, starting methods, Loss components and efficiency, construction and working of synchronous generators.

**Suggested Text-Books/Reference-Books:**

* 1. Basic electrical engineering -D. P. Kothari and I. J. Nagrath, 3rd edition 2010, Tata Mc Graw Hill.
  2. D.C.Kulshreshtha, “Basic electrical engineering”, Tata Mc Graw Hill, 2009.
  3. L.S. Bobrow ,“ Fundamentals of electrical engineering” , oxford university press, 2011.
  4. Electrical and Electronics Technology, E. Hughes, 10th edition, Pearson, 2010.
  5. Electrical engineering fundamental, Vincent Deltoro, second edition, Prentice Hall India, 1989.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech. DS- I Sem L T P C**

**0 0 3 1.5 (ME105ES/ ME205ES) -ENGINEERING WORKSHOP & IT WORKSHOP**

(Common to CSE/IT/CSD/CSC)

**Pre-requisites**: Practical skill

### Course Objectives:

* To Study of different hand operated power tools, uses and their demonstration
* To gain a good basic working knowledge required for the production of various engineering products.
* To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
* To develop a right attitude, team working, precision and safety at work place.
* It explains the construction, function, use and application of different working tools, equipment and machines.
* To study commonly used carpentry joints.
* To have practical exposure to various welding and joining processes.
* Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
* The IT Workshop for engineers is a training lab course spread over Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

**Course Outcomes:**

* Upon completion of the course, the students will be able to
* Apply safety norms while handling the workshop equipment
* Prepare required models using various engineering trades
* Make use of various power tools
* Ability how to solve the trouble shooting problems.
* Apply the tools for preparation of Project, preparing Excel sheet and preparation of PPT
* Install and make use of operating systems and MS office tools

**LIST OF EXPERIMENTS**

**Part-A: Engineering Workshop**

1. **House Wiring**

Power point, light fitting and switches.

1. **Carpentry**

Study of tools and joints; Practice in planning, chiseling, marking and sawing; Joints: Cross joint, T joint, Dove tail joint.

1. **Fitting**

Study of tools, practice in filing, cutting, drilling and tapping; Male and female joints, stepped joints**.**

1. **Tin Smithy**

Preparation of Open scoop, Cylinder, square/rectangular tray

1. **Black Smithy**

S-Hook, Square /Hexagonal headed bolt.

1. **Foundry**

Preparation of green sand mold using single piece / split pattern

1. **Demonstration of Power Tools**

Drilling machine, power hacksaw, grinding machine and wood cutting machine.

**Part-B: IT Workshop**

1. **WINDOWS OPERATING SYSTEM & DRIVERS INSTALLATION**

Windows 7/8/10. LAN, graphics, audio, video and command prompt, commands.

1. **NETWORK CONNECTIONS & TROUBLESHOOTING**

IP configurations, connecting devices in LAN through bridge, hub, switch; Wi-Fi, Li-Fi and Bluetooth settings; Crimping: Crossover, strait over. Hardware and software trouble shooting.

1. **Cyber Hygiene**

Introduction to Virus, worms, threats. Threats on Internet, Configure the Systems to be Internet safety, Install antivirus, personal firewall, block pop-ups, block active x downloads

1. **MS Word**

Prepare the project document and resume.

1. **MS Excel**

Spread sheet basics, modifying worksheets, formatting cells, formulas and functions, sorting and filtering, charts.

1. **MS Power Point**

Power point screen, working with slides, add content, work with text, working with tables, graphics, slide animation, reordering slides, adding sound to a presentation.

1. **PC Hardware**

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**TEXT BOOKS:**

* 1. Workshop Practice /B. L. Juneja / Cengage
  2. Workshop Manual / K. Venugopal / Anuradha.
  3. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream Tech

**REFERENCE BOOKS:**

1. Work Shop Manual - P. Kannaiah/ K. L. Narayana
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech. DS- I Sem L T P C**

**0 0 3 1.5**

**AP106BS/ AP206BS: APPLIED PHYSICS LAB**

(Common to CSE/IT/CSD/CSC)

**List of Experiments:**

* 1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
  2. Solar Cell: To study the V-I Characteristics of solar cell.
  3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
  4. Stewart – Gee’s experiment: Determination of magnetic field along the axis of a current carrying coil.
  5. Hall Effect: To determine Hall co-efficient of a given semiconductor.
  6. Photoelectric effect: To determine work function of a given material.
  7. LASER: To study the characteristics of LASER sources.
  8. Optical fibre: To determine the bending losses of Optical fibres.
  9. LCR Circuit: To determine the Quality factor of LCR Circuit.
  10. R-C Circuit: To determine the time constant of R-C circuit.
  11. Newton's rings experiment: Determination of radius of curvature of a plano convex lens

**Note: Any 8 experiments are to be performed**

### Reference

1. Applied Physics Lab Manual, CMREC, Hyderabad.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech. DS- I Sem L T P C**

**0 0 3 1.5**

**CS107ES: PROGRAMMING FOR PROBLEM SOLVING LAB**

(Common to CSE/ECE/MECH/IT/CSD / CSM/CSC)

[Note: The programs may be executed using any available Open Source/ Freely available IDE some of the Tools available are:

Code Lite: <https://codelite.org/> Code::Blocks:

<http://www.codeblocks.org/>

DevCpp: <http://www.bloodshed.net/devcpp.html> Eclipse: [http://www.eclipse.org](http://www.eclipse.org/)

This list is not exhaustive and is NOT in any order of preference]

**Course Objectives:** The students will learn the following:

* To work with an IDE to create, edit, compile, run and debug programs
* To analyze the various steps in program development.
* To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
* To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
* To Write programs using the Dynamic Memory Allocation concept.
* To create, read from and write to text and binary files

**Course Outcomes:** The candidate is expected to be able to:

* formulate the algorithms for simple problems
* translate given algorithms to a working and correct program
* correct syntax errors as reported by the compilers
* identify and correct logical errors encountered during execution
* represent and manipulate data with arrays, strings and structures
* use pointers of different types
* create, read and write to and from simple text and binary files
* modularize the code with functions so that they can be reused

## Practice sessions:

* 1. Write a simple program that prints the results of all the operators available in C (including pre/ post increment , bitwise and/or/not , etc.). Read required operand values from standard input.
  2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

## Simple numeric problems:

1. Write a program for fiend the max and min from the three numbers.
2. Write the program for the simple, compound interest.
3. Write program that declares Class awarded for a given percentage of marks, where mark

<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

1. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the outputshould be:

i. 5 x 1 = 5

5 x 2 = 10

5 x 3 = 15

h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

## Expression Evaluation:

1. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
2. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,\*, /, % and use Switch Statement)
3. Write a program that finds if a given number is a prime number
4. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
5. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a C program to find the roots of a Quadratic equation.
8. Write a C program to calculate the following, where x is a fractional value. 1-x/2 +x^2/4-x^3/6
9. Write a C program to read in two numbers, x and n, and then compute the sum of this

geometric progression: 1+x+x^2+x^3+ .. +x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

## Arrays and Pointers and Functions:

* 1. Write a C program to find the minimum, maximum and average in an array of integers.
  2. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
  3. Write a C program that uses functions to perform the following: i.Addition of Two Matrices
     1. Multiplication of Two Matrices
     2. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
  4. Write C programs that use both recursive and non-recursive functions i.To find the factorial of a given integer.
     1. To find the GCD (greatest common divisor) of two given integers.
     2. To find x^n
  5. Write a program for reading elements using pointer into array and display the values using array.
  6. Write a program for display values reverse order from array usingpointer.
  7. Write a program through pointer variable to sum of n elements from array.

## Files:

1. Write a C program to display the contents of a file to standard output device.
2. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
3. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
4. Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)

Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)

The program should then read all 10 values and print them back.

1. Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

## Strings:

1. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
2. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
3. Write a C program that uses functions to perform the followingoperations: i.To insert a sub-string in to a given main string from a given position.

ii. To delete n Characters from a given position in a given string.

1. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
2. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
3. Write a C program to count the lines, words and characters in a given text.

## Miscellaneous:

1. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
2. Write a C program to construct a pyramid of numbers as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | \* | 1 | 1 | \* |
| 1 2 | \* \* | 2 3 | 2 2 | \* \* |
| 1 2 3 | \* \* \* | 4 5 6 | 3 3 3 | \* \* \* |
|  |  |  | 4 4 4 4 | \* \* |
|  |  |  |  | \* |

## Sorting and Searching:

1. Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
2. Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
3. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
4. Write a C program that sorts the given array of integers using selection sort in descending order
5. Write a C program that sorts the given array of integers using insertion sort in ascending order
6. Write a C program that sorts a given array of names

## Suggested Reference Books for solving the problems:

1. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
4. Hall of India
5. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
6. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
7. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech.DS- I Semester L T P C**

**0 0 2 1**

**(EE108ES) BASIC ELECTRICAL ENGINEERING LAB**

(Common to CSE/IT/CSD/CSC)

**Course objectives:**

* To analyze a given network by applying various electrical laws and network theorems.
* To know the response of electrical circuits for different excitations
* To calculate, measure and know the relation between basic electrical parameters.
* To analyze the performance characteristics of DC and AC electrical machines.

**Course Outcomes:**

* Get an exposure to basic electrical laws.
* Understand the response of different types of electrical circuits to different excitations.
* Understand the measurement, calculation and relation between the basic electrical parameters.
* Understand the basic characteristics of transformers and electrical machines.

**List of experiments/demonstrations:**

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta- Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech.DS- I Sem L T P C**

**0 0 2 0 (EN210HS)** -**BUSINESS ENGLISH FOR ENGINEERS**

(Common to CSE//IT/CSD/CSC)

**Introduction**

The rapid breakdown of national barriers over the last decade has resulted in English language skills acquiring a great deal of importance in business sector. Ability to communicate at work place is vital, particularly in the present professional and business climate. In a world with ever-growing levels of globalization and interconnectivity, the significance of Business Communication increased rapidly. But lack of exposure towards Business Communication is a serious handicap for many aspirants. By recognizing this, the institution has focused to train the Engineering Students for Business Communication and motivating to appear BEC examination which is an internationally recognized qualification for getting employability. It has been introduced from B.Tech first year onwards, that can instruct and prepare the students to get the advantage when enter the job world. In today’s globalization, it is more significant to show employers that you can communicate in English effectively in every-day business circumstances.

**Learning Objectives:**

* 1. It provides language Skills for real life business situations and improves confidence among students.
  2. To train the students to qualify the BEC examination
  3. Develop study skills and communication skills in formal and informal situations.

**Course Outcomes:** Students should be able to

* + - Use Business English Language effectively in spoken and written Forms.
      * Comprehend the given texts and respond appropriately.
      * Communicate confidently in various contexts and different cultures.
      * Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

**Syllabus Exercise-I**

* Business Communication Skills, Interpersonal skills and Intrapersonal skills.
* Active and Effective Listening Skills.
* Reading skills: Skimming, Scanning.
* Verbal Ability: Fundamentals of Grammar - Sentence Structure - Parts of Speech.
* Online Communication- “The power of word of mouse”: an article on the power of online customer opinions
* Corporate culture- What kind of Company culture would suit you?

**Exercise-II**

* Corporate Communication: First impression, Personal Grooming, Corporate & Business etiquettes.
* Business Relationships: Career advice: letters to an advice column, corporate gift-giving, teamwork, thinking globally- “Global HR Management”: an article.
* Technical and Business Vocabulary: Idioms, Phrases, Collocations, Abbreviations, and Analogy.
* Reading Skills: Intensive Reading and Extensive Reading

**Exercise-III**

* Presentation Skills: Group Discussion, Presentations, Role Play and Telephone Handling and Interview skills.
* Reading Comprehension and Techniques: Interpreting bar charts, pie chart, table, and tree diagram.
* Listening to statistical information: short extracts- “Cafe Coffee Day”: an article on the growth of the Indian Coffee shop; “Shares and the stock exchange: a web page”; short articles from the financial news; “Teenage Entrepreneurs- Kalido”: an article on funding.

**Exercise-IV**

* Writing skills: Paragraph writing, Formal letter writing (Business letters and Official letters), E-mail, Memo, Report and Essay writing.
* Recruitment- Preparing for an interview, Staff development: “Advertisements for training courses: variation between a memo and an advert: sport and business” an article.
* Picture Description including Description of Photos/Images/Posters/Advertisement Analysis etc.,

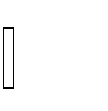
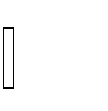
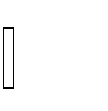
**Exercise-V**

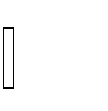
* Exercises on Common Errors in Grammar: Tenses, Passive forms, Model verbs, Degrees of comparison, Articles, Reference words, word types and Quantity expressions.
* Usage of Words: Model verbs of obligation, Contrast words, words to describe causes and effects.
* Practice of previous BEC Exam: Listening tracks, Reading, Writing and Speaking parts, Communication activities, and Exam skills practice.

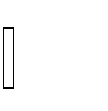
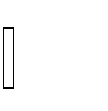
**REFERENCES:**

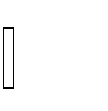
1. Business BENCHMARK, 2nd Edition, South Asian Edition Student’s Book- CUP
2. Swan, M. (2016). Practical English Usage. Oxford University Press.
3. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
4. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.

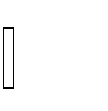
**Website links:**

 [http://www.cambridge.org](http://www.cambridge.org/) [http://www.learnenglish.com](http://www.learnenglish.com/) [http://www.eslgames.com](http://www.eslgames.com/)

 <https://www.cambridgeenglish.org/supporting-teachers/>

 [.https://britishcouncil.zoom.us/webinar/register/WN\_Ddm6jFvxTpWAfYwWeZzX\_Q](https://britishcouncil.zoom.us/webinar/register/WN_Ddm6jFvxTpWAfYwWeZzX_Q) [.https://www.cambridge.org/gb/education/elevate-trial/](https://www.cambridge.org/gb/education/elevate-trial/)

 <https://learnenglishteens.britishcouncil.org/skills/listening>

 https:/[/www.cambridgeenglish.org/teaching-english/resources-for-](https://www.cambridgeenglish.org/teaching-english/resources-for-teachers/webinars/assessing-writing-introducing-new-teacher-guides/) [teachers/webinars/assessing-writing-introducing-new-teacher-guides/](https://www.cambridgeenglish.org/teaching-english/resources-for-teachers/webinars/assessing-writing-introducing-new-teacher-guides/)

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**I Year B.Tech. DS- II.Sem L T P C**

**3 1 0 4**

**MA201BS: DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**

**Course Objectives:** To learn

* Methods of solving the differential equations of first and higher order.
* Concepts & properties of Laplace Transforms
* Solving differential equations using Laplace transform techniques
* Evaluation of multiple integrals and their applications.
* The physical quantities involved in engineering field related to vector valued functions
* The basic properties of vector valued functions and their applications to line, surface and volume integrals

**Course Outcomes:** After learning the contents of this paper the student must be able to

* Solve higher differential equation and apply the concept of differential equation to real world problems
* Use Laplace transform techniques for solving DE’s.
* Evaluate the multiple integrals and apply the concept to find areas, volumes.
* Evaluate the line, surface and volume integrals and converting them from one to another.

**UNIT-I: First Order ODE**

Exact, linear and Bernoulli’s equations; Applications: Newton’s law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

**UNIT-II**

**Ordinary Differential Equations of Higher Order:** Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type eas, sin ax , cos ax, polynomials in x, easV(x) and x V(x); method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre’s equation, Cauchy-Euler equation.

**UNIT-III: Multivariable Calculus (Integration)**

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped.

**UNIT-IV: Vector Differentiation**

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

**UNIT-V: Vector Integration**

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

**TEXT BOOKS**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.

**REFERENCES**

* 1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
  2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India,1984.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. I Year II Sem. L T P C**

**3 0 0 3**

**CH202BS/ CH102BS: ENGINEERING CHEMISTRY**

(Common to CSE//IT/CSD/CSC)

**Course Objectives**

* To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
* To impart basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them
* To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.

**Course Outcomes**: The basic concepts included in this course will help the student to gain:

* The knowledge of atomic, molecular and electronic changes, band theory related to conductivity
* The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.

.

**Unit-I: Water and its treatment**

Introduction – hardness of water – causes of hardness – types of hardness: temporary and permanent

– expression and units of hardness – Estimation of hardness of water by complexometric method. Numerical problems. Boiler troubles: Sludges, scales and Caustic embrittlement. Boiler feed water and its treatment –Internal treatment (Calgon conditioning, Phosphate conditioning and Colloidal conditioning). External Treatment- Softening of water by ion exchange processes. **Potable water** – specifications, steps involved in the treatment of potable water - Disinfection of potable water by chlorination and Ozonization Desalination of water – Reverse osmosis.

### UNIT-II: Molecular structure and Theories of Bonding: Atomic and Molecular orbitals

Linear Combination of Atomic Orbitals (LCAO), molecular orbital of diatomic molecules, molecular energy level diagram of N2, O2, and F2 molecules**.** π-molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT- Crystal Field Splitting of Transition metal ion d-orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

**Unit-III: Electrochemistry & Batteries**

**Electrochemistry:** Electrochemical cells: Daniel cell – cell notation, cell reaction and cell EMF – Numerical problems**. E**lectrochemical series and its applications- Nernst equation. Construction and functioning of Standard hydrogen electrode, calomel electrode, Determination of pH of a solution by using Quinhydrone and glass electrode.

**Batteries:** Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

**Fuel cells**: Hydrogen–Oxygen fuel cell, Methanol-Oxygen fuel cell, Advantages and Applications

**UNIT – IV: Fuels and Combustions**

Classification – solid fuels: coal – analysis of coal - proximate and ultimate analysis and their significance.

Liquid fuels – petroleum and its refining – cracking – types – fixed bed catalytic cracking. Knocking

– octane and cetane rating, synthetic petrol, Bergius and Fischer-Tropsch’s process.

Gaseous fuels - constituents, characterstics and applications of natural gas, LPG and CNG. Analysis of flue gas by Orsat’s apparatus – Numerical Problems.

Combustion – Definition, Calorific value of fuel – HCV, LCV; Determination of calorific value by Junker’s gas calorimeter – theoretical calculation of Calorific value by Dulong’s formula – Numerical problems on combustion

### Unit-V: Engineering Materials and Corrosion

Polymers: Introduction, classification and mechanism of polymerisation- Addition (Free radical polymerisation mechanism and Condensation polymerisation. Classification of polymers - Thermoplastics & Thermosetting resins. Types of Polymerization of polymers (i) Addition (ii) Condensation (iii) Co-Polymerization.

Preparation, properties and engineering application of PVC, Teflon and Bakelite. Fibers- characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fiber Reinforced Plastics (FRP) Glass Fibres – applications. Rubber – Natural rubber and its vulcanization. Synthetic Elastomers- Buna S, Butyl rubber and Thiokol Rubber.

Conducting polymers: Introduction, classification and mechanism of conduction in Poly-acetylene, applications of conducting polymers.

Biodegradable polymers: Introduction preparation, properties and applications of polylactic acid Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of wet corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion- nature of metal and nature of environment– Corrosion control methods – Cathodic protection (sacrificial anodic and impressed current). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (galvanization & tinning), metal cladding, Electroless plating ( Ni plating)

### TEXT BOOKS

1. Engineering Chemistry by P.C Jain and M.Jain, Dhanpatrai Publishing Company, New Delhi 2010.
2. Engineering Chemistry by Prasanta Rath,B. Rama Devi, Ch.Venkata Ramana Reddy and Subhendu Chakroborty, Cengage learning, New Delhi. 2019.
3. Physical Chemistry, by P.W. Atkins

### REFERENCE TEXT BOOKS

1. Engineering Chemistry by B. Siva Shankar, McGraw Hill Publishing Company Limited, New Delhi 3rd, 2015
2. Text Book of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co Publishers, New Delhi 2010

**-----------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech I Year II Sem. L T P C**

**3 1 0 4**

**CS203ES: DATA STRUCTURES**

(Common to CSE/ECE/MECH/IT/CSD/CSM/CSC)

**Prerequisites:** A course on “Programming for Problem Solving”.

**Course Objectives:**

* Exploring basic data structures such as stacks and queues.
* Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
* Introduces sorting and pattern matching algorithms

**Course Outcomes:**

* Ability to select the data structures that efficiently model the information in a problem.
* Ability to assess efficiency trade-offs among different data structure implementations or combinations.
* Implement and know the application of algorithms for sorting and pattern matching.
* Design programs using a variety of data structures, including hash tables, binaryand general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

**UNIT - I**

**Introduction to Data Structures**, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

**UNIT - II**

**Dictionaries**: linear list representation, skip list representation, operations - insertion, deletion and searching.

**Hash Table Representation:** hash functions, collision resolution-separate chaining, open

addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

**UNIT - III**

**Search Trees:** Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

**UNIT - IV**

**Graphs:** Graph Implementation Methods. Graph Traversal Methods.

**Sorting:** Heap Sort, External Sorting- Model for external sorting, Merge Sort.

**UNIT - V**

**Pattern Matching and Tries:** Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

**TEXTBOOKS:**

1. Fundamentals of Data Structures in C, 2ndEdition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, *PHI/Pearson*

*Education*.

**REFERENCE BOOKS:**

**1.** Data Structures: A Pseudocode Approach with C, 2ndEdition, R. F. Gilberg and B.A. Forouzan, CengageLearning.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech I Year II Sem. L T P C**

**1 0 4 3**

### [ME1204ES/ ME1104ES: ENGINEERING GRAPHICS

(Common to CSE /IT/CSD/CSC)

**Pre-requisites: Nil Course Objectives:**

* To provide basic concepts in engineering drawing.
* To impart knowledge about standard principles of orthographic projection of objects.
* To draw sectional views and pictorial views of solids.

**Course Outcomes:** At the end of the course, the student will be able to:

* Preparing working drawings to communicate the ideas and information.
* Read, understand and interpret engineering drawings.
* Estimate different projections of lines, planes, solids and sectional views
* Able to sketch two-dimensional orthographic drawings and three-dimensional isometric views
* Create and modify two-dimensional orthographic drawings using Auto CAD software

**UNIT – I**

**Introduction to Engineering Drawing:** Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

**UNIT- II**

**Orthographic Projections:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

**UNIT – III**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

**UNIT – IV**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

**UNIT – V**

**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

**Introduction to CAD:**

Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

**TEXTBOOKS:**

1. Engineering Drawing N.D. Bhatt /Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/Oxford

**REFERENCE BOOKS:**

1. Engineering Drawing / Basant Agrawal and MC.Agrawal/ McGraw-Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane /Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers
4. Engineering Drawing and Graphics / K.Venugopal/ New Age International Publishers
5. Engineering Drawing / K.L.Narayana, P.kannaiah/SCITECH

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. I Year II Sem. LT P C**

**2 0 0 2**

**EN205HS/ EN105HS: ENGLISH**

(Common to CSE /IT/CSD/CSC)

**INTRODUCTION**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.*

**Learning Objectives:** The course will help to

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

**Course Outcomes:** Students should be able to

* + Use English Language effectively in spoken and written forms.
  + Comprehend the given texts and respond appropriately.
  + Communicate confidently in various contexts and different cultures.
  + Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

**SYLLABUS UNIT –I**

**‘The Raman Effect’** from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

**Vocabulary Building**: The Concept of Word Formation --The Use of Prefixes and Suffixes. **Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions. **Reading:** Reading and Its Importance- Techniques for Effective Reading.

**Writing:** Paragraph writing– Types, Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents. Importance of Proper Punctuation

**UNIT –II**

**‘Ancient Architecture in India’** from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

**Vocabulary:** Synonyms and Antonyms, Idioms and Phrases.

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Improving Reading Comprehension Skills–Techniques for Good Comprehension **Writing:** Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, and Job Application with Resume.

**UNIT –III**

**‘Blue Jeans’** from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

**Vocabulary**: Odd words, one word substitution

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-skills of Reading- Skimming, Scanning

**Writing**: Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

**UNIT –IV**

**‘What Should You Be Eating’** from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

**Vocabulary**: Standard Abbreviations in English, Verbal Analogy

**Grammar:** Redundancies in Oral and Written Communication, Tag questions. **Reading**: Comprehension**-** Intensive Reading and Extensive Reading **Writing:** Writing Practices- Essay Writing, Précis Writing.

**UNIT –V**

**‘MokshagundamVisvesvaraya’** from the prescribed text book by JNTUH ‘Epitome of Wisdom’ – Maruthi Publications.

**Vocabulary**: Technical Vocabulary and their usage

**Grammar:** Error identification

**Reading: “If Poem”** by Rudyard Klipling

**Writing:** Creative writing- Advertisement making, Poster preparation, Technical Reports- Characteristics of a Report Writing,

**TEXTBOOK:**

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

**REFERENCES:**

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006) Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. I Year II Sem. L T P C**

**0 0 3 1.5**

**CH206BS: ENGINEERING CHEMISTRY LAB**

(Common to CSE /IT/CSD/CSC)

**LIST OF EXPERIMENTS: (PERFORM ANY 10 EXPERIMENTS)**

**Volumetric Analysis:**

**Experiment No. 1:** Determination total hardness of water by complex metric method using EDTA.

**Experiment No. 2:** Estimation of ferrous iron in the given solution by permanganometry.

**Experiment No. 3:** Estimation of amount of chloride in water.

**Conductometry:**

**Experiment No. 4:** Estimation of HCl by Conductometric titrations

**Experiment No. 5:** Estimation of Acetic acid by Conductometric titrations

**Potentiometry:**

**Experiment No. 6:** Estimation of Ferrous iron by Potentiometry using KMnO4

**Experiment No. 7:** Estimation of HCl by Potentiometry using NaOH

**pH Metry:**

**Experiment No. 8:** Estimation of HCl by pH Metry using NaOH

**Colorimetry:**

**Experiment No. 9:** Estimation of Manganese by Colorimetry.

**Physical properties:**

**Experiment No. 10:** Determination of surface tension of liquid by using stalagmometer

**Experiment No. 11:** Determination of viscosity of liquid by using Ostwald’s viscometer.

**Drug Synthesis:**

**Experiment No. 12:** Preparation of Aspirin and Paracetamol.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. I Year II Sem. L/ T/P/C**

**0/0/2/1**

**CS207ES: DATA STRUCTURES LAB(Using C)**

(Common to CSE/ECE/MECH/IT/CSD/CSM/CSC)

**Prerequisites:** A Course on “Programming for problem solving”.

**Course Objectives:**

* It covers various concepts of C programming language
* It introduces searching and sorting algorithms
* It provides an understanding of data structures such as stacks and queues.

**Course Outcomes:**

* + Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
  + Ability to Implement searching and sorting algorithms

**LIST OF EXPERIMENTS**

1. Write a program that uses functions to perform the following operations on singly linked list.
   1. Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doublylinked list.
   1. Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.
   1. Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   1. Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   1. Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   1. Bubble sort ii) Selection sort iii) Insertion sort
7. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:
   1. Linear search ii) Binary search
8. Write a program to implement the tree traversal methods.
   1. In Order ii)Post order iii) Pre order
9. Write a program to implement the graph traversal methods.

**TEXTBOOKS:**

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein,

*PHI/Pearson Education*.

**REFERENCE:**

1. Data Structures: A Pseudo code Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage *Learning*.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech I Year II Sem. L T P C**

**0 0 3 1.5**

**EN208HS: ENGLISH LANGUAGE AND COMMUNICATION SKILS LAB**

(Common to CSE/IT/CSD/CSC)

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**

* To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
* To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
* To bring about a consistent accent and intelligibility in students’ pronunciation of English by providing an opportunity for practice in speaking
* To improve the fluency of students in spoken English and neutralize their mother tongue influence
* To train students to use language appropriately for public speaking and interviews

**Learning Outcomes:** Students will be able to attain

* Better understanding of nuances of English language through audio- visual experience and group activities
* Neutralization of accent for intelligibility
* Speaking skills with clarity and confidence which in turn enhances their employability skills

**Syllabus:**

English Language and Communication Skills Lab (ELCS) shall have two parts:

* 1. Computer Assisted Language Learning (CALL)Lab
  2. Interactive Communication Skills (ICS)Lab

**Listening Skills**

Objectives

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

* + Listening for general content
  + Listening to fill up information
  + Intensive listening
  + Listening for specific information

**Speaking Skills**

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
   * Oral practice: Just A Minute (JAM)Sessions

* Describing objects/situations/people
* Role play – Individual/Group activities

**Exercise – I**

**CALL Lab**: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

**ICS Lab**: Ice-Breaking Activity and JAM Session

**Exercise – II**

**CALL Lab**: Structure of Syllables – Past Tense Marker and Plural Marker, Weak Forms and Strong Forms.

**ICS Lab:** Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions – Telephone Etiquette.

**Exercise - III**

**CALL Lab:** Minimal Pairs- Word Accent and Stress Shifts.

**ICS Lab**: How to make Formal Presentations.

**Exercise – IV**

**CALL Lab**: Listening for General Details, Intonation and Common Errors in Pronunciation.

**ICS Lab**: Public Speaking- Making a Short Speech – Extempore.

**Exercise – V**

**CALL Lab:** Listening for Specific Details, Neutralization of Mother Tongue Influence and Conversation Practice

**ICS Lab**: Interview Skills*.* Mock Interviews.

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

1. **Computer Assisted Language Learning (CALL)Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

**System Requirement (Hardware component):**

*Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

* 1. Computers with Suitable Configuration
  2. High Fidelity Headphones

1. **Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. I Year II Sem. L T P C**

**0 0 2 0**

**MA209BS: APTITUDE**

**Course Objectives:**

* To enhance the problem solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations.

**Course Outcomes:**

* Students will be expected to actively do mathematics such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections. The Quantitative techniques is organized around big mathematical and statistical concepts.

**UNIT-I:**

**H.C.F & L.C.M:** Division Method, Factorization method, H.C.F.& L.C.M. of fractions.

**Averages:** Arithmetic mean, Geometric mean, Harmonic mean.

**Problems on Ages:** using algebraic equations.

**Percentages:** Percentage difference, Percentage increase & decrease, fraction to Percentage, Percentage vs per cent.

**UNIT-II:**

**Profit & Loss:** Cost price, selling price, percentages of profit & loss. **Partnerships:** definition, Ratio of division of gains, working and sleeping partners. **Simple & compound interest:** Principal amount, interest, time & rate of interest.

**UNIT-III:**

**Time & Work:** Introduction, time & work by using fractions and percentages, negative work.

**Pipes & Cisterns:** Inlet, Outlet, time to emptying & filling a tank.

**UNIT-IV:**

**Time & Distance:** Time, speed, Average and Distance related problems.

**Boats & Streams:** Upstream, downstream, still water, stream related problems. Average speed, distance, speed when time is given.

**Problems on trains:** pass a point, Stationary object of length, moving objects same & opposite directions.

**UNIT-V:**

**Permutations & Combinations:** Definitions, permutations with repetitions allowed & not allowed, rank of dictionary words.

**Probability:** Basic definitions, axioms, addition theorem, conditional probability, multiplication theorem, total

probability theorem, baye’s theorem.

**TEXTBOOKS:**

1. Quantitative aptitude by Dr.R.S.Aggarwal, S.Chand Publications

**REFERENCES:**

1. [Fast Track Objective Arithmetic](https://amzn.to/2ZPul7k) by [Rajesh Verma, Arihant Publications; Fourth edition (2018)](https://amzn.to/2ZPul7k)
2. [Quantitative Aptitude for All Competitive Examinations](https://amzn.to/2LjDsI4) by [Abhijit Guha,McGraw Hill Education; Sixth](https://amzn.to/2LjDsI4) [edition (25 November 2016).](https://amzn.to/2LjDsI4)

# II YEAR

**I SEMESTER SYLLABUS**

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**3 0 0 3**

**CS301PC/IT403P4: DATABASE MANAGEMENT SYSTEMS**

(Common to CSE/CSD/CSC)

**Prerequisites:** A course on “Data Structures”.

**Course Objectives:**

* + To understand the basic concepts and the applications of database systems.
  + To master the basics of SQL and construct queries using SQL.
  + Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

**Course Outcomes:**

* + Gain knowledge of fundamentals of DBMS, database design and normal forms
  + Master the basics of SQL for retrieval and management of data.
  + Be acquainted with the basics of transaction processing and concurrency control.
  + Familiarity with database storage structures and access techniques

**UNIT - I**

**Database System Applications:** A Historical Perspective, File Systems versus a DBMS**,** the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

**Introduction to Database Design**: Database Design and ER Diagrams, Entities, Attributes, and

Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the E-R Model

**UNIT - II**

**Introduction to the Relational Model**: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views.

Relational Algebra**,** Tuple relational Calculus, Domain relational calculus.

**UNIT - III**

**SQL: QUERIES, CONSTRAINTS, TRIGGERS:** form of basic SQL query, UNION, INTERSECT, and

EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

**Schema Refinement**: Problems caused by redundancy, decompositions, problems related to

decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

**UNIT - IV**

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

**UNIT - V**

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

**TEXT BOOKS:**

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata McGraw Hill*

3rd Edition

1. Database System Concepts, Silberschatz, Korth, *McGraw Hill*, V Edition.

**REFERENCES:**

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C. J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah,*SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student* Edition.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**3 1 0 4**

**MA302BS: COMPUTER ORIENTED STATISTICAL METHODS**

**Pre-requisites:** Mathematics courses of first year of study.

**Course Objectives:** To learn

The theory of Probability, and probability distributions of single and multiple random variables The sampling theory and testing of hypothesis and making inferences

Stochastic process and Marko chains.

**Course Outcomes:** After learning the contents of this paper the student must be able to Apply the concepts of probability and distributions to some case studies Correlate the material of one unit to the material in other units

Resolve the potential misconceptions and hazards in each topic of study.

**UNIT - I**

**Probability**: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes’ Rule.

**Random Variables and Probability Distributions**: Concept of a Random Variable, Discrete

Probability Distributions, Continuous Probability Distributions, Statistical Independence.

**UNIT - II**

**Mathematical Expectation**: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev’s Theorem.

**Discrete Probability Distributions**: Introduction and Motivation, Binomial, Distribution, Geometric Distributions and Poisson distribution.

**UNIT - III**

**Continuous Probability Distributions:** Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions.

**Fundamental Sampling Distributions:** Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t –Distribution, F-Distribution.

**UNIT - IV**

**Estimation & Tests of Hypotheses**: Introduction, Statistical Inference, Classical Methods of Estimation.: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean , Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

**Statistical Hypotheses**: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

**UNIT - V**

**Stochastic Processes and Markov Chains**: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

**TEXT BOOKS:**

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Edition. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

**REFERENCE BOOKS:**

1. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons Ltd,2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**3 0 0 3**

**CS303PC: OPERATING SYSTEMS**

(Common to CSE/IT/CSD/CSM/CSC)

**Prerequisites:**

A course on “Computer Programming and Data Structures”. A course on “Computer Organization and Architecture”.

**Course Objectives:**

Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection) Introduce the issues to be considered in the design and development of operating system Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

**Course Outcomes:**

* Will be able to control access to a computer and the files that may be shared
* Demonstrate the knowledge of the components of computer and their respective roles in computing.
* Ability to recognize and resolve user problems with standard operating environments.
* Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

**UNIT - I**

**Operating System - Introduction**, Structures - Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

**UNIT - II**

**Process and CPU Scheduling** - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

**System call interface for process management**-fork, exit, wait, waitpid, exec

**UNIT - III**

**Deadlocks** - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

**Process Management and Synchronization** - The Critical Section Problem, Synchronization

Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors **Inter process Communication Mechanisms:** IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

**UNIT - IV**

**Memory Management and Virtual Memory** - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

**UNIT - V**

**File System Interface and Operations** -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open creates, read, write, close, lseek, stat, ioctl system calls.

**TEXT BOOKS:**

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

**REFERENCE BOOKS:**

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, MH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**2 0 0 2**

**AI304PC: OBJECT ORIENTED PROGRAMMING USING C++**

**(Common to CSD/CSM/CSC) Prerequisites:** A course on “Programming for Problem Solving using C”.

**Course Objectives:**

* Introduces Object Oriented Programming concepts using the C++language.
* Introduces the principles of data abstraction, inheritance and polymorphism;
* Introduces the principles of virtual functions and polymorphism
* Introduces handling formatted I/O and unformatted I/O
* Introduces exception handling

**Course Outcomes:**

* Able to develop programs with reusability
* Develop programs for file handling
* Handle exceptions in programming
* Develop applications for a range of problems using object-oriented programming techniques

**UNIT - I**

**Object-Oriented Thinking:** Different paradigms for problem solving, need for OOP paradigm, differences between OOP and Procedure oriented programming, Overview of OOP concepts- Abstraction, Encapsulation, Inheritance and Polymorphism.

**C++ Basics:** Structure of a C++ program, Data types, Declaration of variables, Expressions,

Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References. Flow control statement- if, switch, while, for, do, break, continue, goto statements. Functions - Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions. Dynamic memory allocation and de-allocation operators-new and delete, Preprocessor directives.

**UNIT - II**

**C++ Classes and Data Abstraction:** Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

**UNIT - III**

**Inheritance:** Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class.

**Virtual Functions and Polymorphism:** Static and Dynamic binding, virtual functions, Dynamic

binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

**UNIT - IV**

**C++ I/O:** I/O using C functions, Stream classes hierarchy, Stream I/O, File streams and String streams, Overloading operators, Error handling during file operations, Formatted I/O.

**UNIT - V**

**Exception Handling:** Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Rethrowing an exception,

Catching all exceptions.

**TEXT BOOKS:**

1. The Complete Reference C++, 4th Edition, Herbert Schildt, Tata McGraw Hill.
2. Problem solving with C++: The Object of Programming, 4th Edition, Walter Savitch, Pearson Education.

**REFERENCES:**

1. The C++ Programming Language, 3rd Edition, B. Stroutstrup, Pearson Education.
2. OOP in C++, 3rd Edition, T. Gaddis, J. Walters and G. Muganda, Wiley Dream Tech Press.
3. Object Oriented Programming in C++, 3rd Edition, R. Lafore, Galigotia Publications Pvt. Ltd.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**3 0 0 3**

**DS305ES: DIGITAL LOGIC DESIGN**

**Course Objectives:**

1. Comprehend different number systems including the binary system and Boolean algebraic principles.
2. Create minimal realizations of single and multiple output Boolean functions;
3. Design and analyze combinational circuits using medium scale integrated (MSI) components, including arithmetic logic units;
4. Apply strategies for state minimization, state assignment, for the implementation of synchronous Finite State Machines
5. Design of Combinational Programmable Logic Devices (CPLDs) like PROM, PAL, and PLA and develop HDL Models for Logic Circuits.

**Course Outcomes:**

At the end of the course, the student will be able to

1. Apply knowledge of fundamental Boolean principles and manipulation to design Logic Circuits.
2. Apply various techniques of Boolean function simplification to create minimal expressions.
3. Create combinational circuits for a specified behavior with minimal specification.
4. Synthesize Sequential circuits with minimal states.
5. Realize combinational circuitry using Combinational PLDs and develop & test HDL models of Logic Circuits.

**UNIT I**

**Binary Systems**: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

**Boolean Algebra And Logic Gates**: Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.

**UNIT II**

**Gate-Level Minimization**: The Map method, Four-variable map, Five-variable map, Product of Sum’s simplifications, don’t care conditions, NAND and NOR implementation, other two level implementations, Exclusive-OR Function.

**UNIT III**

**Combinational Logic**: Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

**UNIT IV**

**Synchronous Sequential Logic**: Sequential Circuits, Latches, Flip-Flops, Analysis of clocked sequential circuits, State Reduction and Assignment, Design Procedure.

**Registers and Counters:** Registers, Shift registers, Ripple Counters, Synchronous Counters, other counters.

**UNITV**

**Memory and Programmable Logic**: Introduction, Random Access Memory, Memory decoding, Error detection and correction, Read only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.

**Hardware Description Language:** Hardware Description Language, Definition, Structural Definition of HDL, HDL models for Combinational circuits, HDL for models for Sequential circuits.

**Text Books:**

1. Digital Design with an Introduction to the Verilog HDL – Fifth Edition, M. Morris Mano, Pearson Education.
2. Fundamentals of Logic Design – Roth, 7thEdition,Thomson.

**References:**

1. Switching and Finite Automata Theory by ZVI.Kohavi, Tata McGraw Hill.
2. Switching and Logic Design – CVS Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata Mc GrawHill.
4. Fundamentals of Digital Logic and Micro Computer Design, 5th Edition, M.Rafiquzzaman (John Willey)

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem L T P C**

**0 0 2 1**

**CS306PC/IT406PC: DATABASE MANAGEMENT SYSTEMS LAB**

**(Common to CSE/IT/CSD/CSC)**

**Pre-requisites:**

Pre-requisite of course “Database Management Systems”

**Course Objectives:**

Introduce ER data model, database design and normalization Learn SQL basics for data definition and data manipulation

**Course Outcomes:**

Design database schema for a given application and apply normalization Acquire skills in using SQL commands for data definition and data manipulation.

Develop solutions for database applications using procedures, cursors and triggers

**LIST OF EXPERIMENTS:**

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraintsetc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

**TEXT BOOKS:**

* 1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
  2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

**REFERENCES BOOKS:**

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C.J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S. Shah and V. Shah,*SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**0 0 3 1.5**

**CS307PC: OPERATING SYSTEMS LAB (Using UNIX/LINUX)**

**(Common to CSE/IT/CSD/CSM/CSC)**

**Prerequisites:**

* A course on “Programming for Problem-solving”.
* A course on “Computer Organization and Architecture”.

**Pre-requisite:**

* A course on “Operating Systems”.

**Course Objectives:**

* To provide an understanding of the design aspects of operating system concepts through simulation
* Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

**Course Outcomes:**

* Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
* Able to implement C programs using Unix system calls

**LIST OF EXPERIMENTS:**

1. Write C programs to simulate the following CPU Scheduling algorithms
   1. FCFS b)SJF c)Round Robin d)priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   1. Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques
   1. Paging b) Segmentation

**TEXT BOOKS:**

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

**REFERENCE BOOKS:**

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, MH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. II Year I Sem. L/T/P/ C**

**0/0/3/1.5**

**AI308PC: OBJECT ORIENTED PROGRAMMING USING C++ LAB**

**(Common to CSD/CSM/CSC)**

**Prerequisites:** A course on “Programming for Problem Solving”.

**Course Objectives**

Introduces object-oriented programming concepts using the C++ language. Introduces the principles of data abstraction, inheritance and polymorphism; Introduces the principles of virtual functions and polymorphism

Introduces handling formatted I/O and unformatted I/O Introduces exception handling

**Course Outcomes**

* Ability to develop applications for a range of problems using object-oriented programming techniques

**LIST OF EXPERIMENTS**

1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. Write a C++ program to declare Struct. Initialize and display contents of member variables.
3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
5. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary)**.**
6. Write a C++ to illustrate the concepts of console I/O operations.
7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
8. Write a C++ program to allocate memory using new operator.
9. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
10. Write a C++ program to create an array of pointers. Invoke functions using array objects.
11. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**0 0 2 0**

**MC309: GENDER SENSITIZATION LAB**

(An Activity-based Course) (Common to CSE/IT/CSD/CSC)

**COURSE DESCRIPTION**

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender- based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

**Objectives of the Course:**

* To develop students’ sensibility with regard to issues of gender in contemporary India.
* To provide a critical perspective on the socialization of men and women.
* To introduce students to information about some key biological aspects of genders.
* To expose the students to debates on the politics and economics of work.
* To help students reflect critically on gender violence.
* To expose students to more egalitarian interactions between men and women.

**Learning Outcomes:**

* Students will have developed a better understanding of important issues related to gender in contemporary India.
* Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
* Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
* Students will acquire insight into the gendered division of labour and its relation to politics and economics.
* Men and women students and professionals will be better equipped to work and live together as equals.
* Students will develop a sense of appreciation of women in all walks offline.
* Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

**UNIT - I: UNDERSTANDING GENDER**

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men

- Preparing for Womanhood. Growing up Male. First lessons inCaste.

**UNIT – II: GENDER ROLES AND RELATIONS**

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

**UNIT – III: GENDER AND LABOUR**

Division and Valuation of Labour-Housework: The Invisible Labor- “My Mother doesn’t Work.” “Share the Load.”-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.

-Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

**UNIT – IV: GENDER - BASED VIOLENCE**

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “*Chupulu”.*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-“I Fought for my Life….”

**UNIT – V: GENDER AND CULTURE**

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

* ***Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on “Gender”.***

**ESSENTIAL READING**: The Textbook, “*Towards a World of Equals: A Bilingual Textbook on Gender” written* by A.Suneetha1, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Academy, Telangana Government in 2015.**

**ASSESSMENT AND GRADING:**

* Discussion & Classroom Participation:20%
* Project/Assignment:30%
* End Term Exam:50%

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

### MC310: Employability Skills – III Python Course Syllabus

**Unit - 1**

**Module 1**: Introduction to Python and Computer Programming, Python - a tool, not a reptile, there is more than one Python, Let's start our Python adventure

**Module 2:** Data Types, Variables, Basic Input-Output Operations, Basic Operators, Your first program, Python literals, Operators - data manipulation tools, Variables - data-shaped boxes, How to talk to computer?

### Unit - 2

**Module 3**: Boolean Values, Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations, Making decisions in Python, Python's loops, Logic and bit operations in Python, Lists - collections of data, Sorting simple lists - the bubble sort algorithm, Lists - some more details, Lists in advanced applications

**Module 4:** Functions, Tuples, Dictionaries, and Data Processing, Writing functions in Python, How functions communicate with their environment? Returning a result from a function, Scopes in Python, Let's make some fun... sorry, functions, Tuples and dictionaries

**Module 5:** Modules, Packages, String and List Methods, and Exceptions, Using modules, Some useful modules, What is package? Errors - the programmer's daily bread, The anatomy of exception, Some of the most useful exceptions, Characters and strings vs. computers, Python's nature of strings, String methods, Strings in action, Four simple programs

### Unit - 3

**Module 6:** The Object-Oriented Approach: Classes, Methods, Objects, and the Standard Objective Features; Exception Handling, and Working with Files, Basic concepts of object programming, A short journey from procedural to object approach, Properties, Methods, Inheritance - one of object programming foundations, Exceptions once again, Generators and closures, Processing files, Working with real files

### Unit - 4

**Module 7**: Data Structures, List Data Structures, Stacks, Queues, Searching & Sorting, Trees, Graphs

### Unit - 5

**Module 8:** Databases Management, MySQL & Mongo DB, Creating Database, Insertion, Deletion, Updating, Selection

### II YEAR

1. **SEMESTER SYLLABUS**

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year II Sem. L T P C**

**3 0 0 3**

**SM401MS/SM501MS: BUSINESS ECONOMICS & FINANCIAL ANALYSIS**

**(Common to CSE/IT/CSD/CSC)**

**Prerequisites:** None

**Course Objective:** To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

**Course Outcome:** The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm’s financial position by analyzing the Financial Statements of a Company.

**UNIT – I**

**Introduction to Business and Economics:**

**Business**: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

**Economics:** Significance of Economics, Micro and Macro Economic Concepts, Concepts and

Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

**UNIT - II**

**Demand and Supply Analysis:**

**Elasticity of Demand:** Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

**Supply Analysis:** Determinants of Supply, Supply Function & Law of Supply.

**UNIT - III**

**Production, Cost, Market Structures & Pricing:**

**Production Analysis:** Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

**Cost analysis**: Types of Costs, Short run and Long run Cost Functions.

**Market Structures**: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

**Pricing:** Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit

Analysis.

**UNIT - IV**

**Financial Accounting:** Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

**UNIT - V**

**Financial Analysis through Ratios:** Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

**TEXT BOOKS:**

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

**REFERENCES:**

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year II Sem. L T P C**

**3 0 0 3**

**DS402PC/CS305PC: DISCRETE MATHEMATICS**

**(Common to CSD/CSC)**

**Prerequisites:** An understanding of Mathematics in general is sufficient.

**Course Objectives**

* Introduces the elementary discrete mathematics for computer science and engineering.
* Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

**Course Outcomes:**

* Ability to understand and construct precise mathematical proofs
* Ability to use logic and set theory to formulate precise statements
* Ability to analyze and solve counting problems on finite and discrete structures
* Ability to describe and manipulate sequences
* Ability to apply graph theory in solving computing problems

**UNIT - I**

**The Foundations: Logic and Proofs:** Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

**UNIT - II**

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

**UNIT - III**

**Algorithms, Induction and Recursion:** Algorithms, The Growth of Functions, Complexity of Algorithms

**Induction and Recursion:** Mathematical Induction, Strong Induction and Well-Ordering, Recursive

Definitions and Structural Induction, Recursive Algorithms, Program Correctness

**UNIT - IV**

**Discrete Probability and Advanced Counting Techniques:** An Introduction to Discrete Probability, Probability Theory, Bayes’ Theorem, Expected Value and Variance

**Advanced Counting Techniques:** Recurrence Relations, Solving Linear Recurrence Relations,

Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion- Exclusion, Applications of Inclusion-Exclusion

**UNIT - V**

**Graphs:** Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

**Trees:** Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees

**TEXT BOOK:**

1. Discrete Mathematics and its Applications with Combinatory and Graph Theory- Kenneth H Rosen, 7th Edition, TMH.

**REFERENCES BOOKS:**

1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and

R. Manohar, TMH,

1. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nded, Pearson Education.
2. Discrete Mathematics- Richard Johnsonbaugh, 7ThEdn., Pearson Education.
3. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M.Parmenter.
4. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech. II Year II Sem. L T P C**

**3 0 0 3**

**DS403PC: INTRODUCTION TO DATA ANALYTICS**

**Prerequisites**

1. A course on “Database Management Systems”
2. Knowledge of probability and statistics

**Course Objectives:** To explore the fundamental concepts of data analytics.

* To learn the principles and methods of statistical analysis
* Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
* To understand the various search methods and visualization techniques.

**Course Outcomes:** After completion of this course students will be able to

* Understand the impact of data analytics for business decisions and strategy
* Carry out data analysis/statistical analysis
* To carry out standard data visualization and formal inference procedures
* Design Data Architecture
* Understand various Data Sources

**UNIT - I**

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Processing & Processing.

**UNIT - II**

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

**UNIT - III**

Regression: Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

**UNIT - IV**

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, over fitting, Pruning and Complexity, Multiple Decision Trees etc.

Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

**UNIT - V**

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

**TEXT BOOKS:**

1. Student’s Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

3.

**REFERENCE BOOKS:**

1. Introduction to Data Mining, Tan, Steinbach and Kumar, AddisionWisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W.Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford University Anand Raja Raman Mill way Labs Jeffrey D Ullman Stanford University.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year IISem. L T P C**

**3 0 0 3**

**AI404PC: JAVA PROGRAMMING**

**(Common to CSD/CSM/CSC)**

**Course Objectives:**

* To introduce the object oriented programming concepts.
* To understand object oriented programming concepts, and apply them in solving problems.
* To introduce the principles of inheritance and polymorphism; and demonstrate howthey relate to the design of abstract classes
* To introduce the implementation of packages and interfaces
* To introduce the concepts of exception handling and multithreading.
* To introduce the design of Graphical User Interface using applets and swing controls.

**Course Outcomes:**

* Able to solve real world problems using OOP techniques.
* Able to understand the use of abstract classes.
* Able to solve problems using java collection framework and I/oclasses.
* Able to develop multithreaded applications with synchronization.
* Able to develop applets for web applications.
* Able to design GUI based applications

**UNIT - I**

**Object-Oriented Thinking**- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

**Inheritance**– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

**UNIT - II**

**Packages**- Defining a Package, CLASSPATH, Access protection, importing packages.

Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

**Stream based I/O** (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

**UNIT - III**

**Exception handling** - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

**Multithreading**- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

**UNIT - IV**

**The Collections Framework** (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable ,Properties, Stack, Vector,More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

**UNIT - V**

**GUI Programming with Swing** – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

**Event Handling**- The Delegation event model- Events, Event sources, Event Listeners, Event

classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

**A Simple Swing Application, Applets** – Applets and HTML, Security Issues, Applets and

Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, **The Swing Buttons**- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

**TEXT BOOKS:**

1. Java The Complete Reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

**REFERENCE BOOKS:**

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley &Sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chaudhary, 2nd edition, Oxford Univ.Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year I Sem. L T P C**

**3 1 0 4**

**DS405PC/CS302PC: COMPUTER ORGANIZATION AND ARCHITECTURE**

**(Common to CSE/IT/CSD/CSM/CSC)**

**Pre-requisite:** A Course on “Digital Logic Design and Microprocessors”.

**Course Objectives:**

* The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
* It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
* Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

**Course Outcomes:**

* Understand the basics of instructions sets and their impact on processor design.
* Demonstrate an understanding ofthe design of the functional units of a digital computer system.
* Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
* Design a pipeline for consistent execution of instructions with minimum hazards.
* Recognize and manipulate representations of numbers stored in digital computers

**UNIT - I**

**Digital Computers:** Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

**Register Transfer Language and Micro operations:** Register Transfer language, Register Transfer,

Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

**Basic Computer Organization and Design:** Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

**UNIT - II**

**Micro programmed Control:** Control memory, Address sequencing, micro program example, design of control unit.

**Central Processing Unit:** General Register Organization, Instruction Formats, Addressing modes,

Data Transfer and Manipulation, Program Control.

**UNIT - III**

**Data Representation:** Data types, Complements, Fixed Point Representation, Floating Point Representation.

**Computer Arithmetic:** Addition and subtraction, multiplication Algorithms, Division Algorithms,

Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

**UNIT - IV**

**Input-Output Organization:** Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory,

Cache Memory.

**UNIT - V**

**Reduced Instruction Set Computer:** CISC Characteristics, RISC Characteristics.

**Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

**Multi Processors:** Characteristics of Multi processors, Interconnection Structures, Inter processor

arbitration, Inter processor communication and synchronization, Cache Coherence.

**TEXT BOOK:**

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

**REFERENCES:**

1. Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year II Sem. L T P C**

**0 0 3 1.5**

**DS406PC: DATA ANALTICS USING R LAB**

**Course Objectives:**

* To explore the fundamental concepts of data analytics.
* To learn the principles and methods of statistical analysis
* Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
* To understand the various search methods and visualization techniques.

**Course Outcomes:** After completion of this course students will be able to

* Implement of data analytics for business decisions and strategy
* Carry out data analysis/statistical analysis
* To carry out standard data visualization and formal inference procedures List of Experiments:

1. Introduction to R tool for data analytics
2. Basic Statistics and Visualization in R
3. K-means Clustering
4. Implement Association Rules
5. Implement Linear Regression
6. Implement Logistic Regression
7. Implement Naive Bayesian Classifier
8. Implement the Decision Trees
9. Simulate Principal component analysis
10. Simulate Singular Value Decomposition

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21**

**CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year II Sem. L T P C**

**0 0 3 1.5**

**AI407PC: JAVA PROGRAMMING LAB**

**(Common to CSD/CSM/CSC)**

**Course Objectives:**

* To write programs using abstract classes.
* To write programs for solving real world problems using java collection framework.
* To write multithreaded programs.
* To write GUI programs using swing controls in Java.
* To introduce java compiler and eclipse platform.
* To impart hands on experience with java programming.

**Course Outcomes:**

* Able to write programs for solving real world problems using java collection framework.
* Able to write programs using abstract classes.
* Able to write multithreaded programs.
* Able to write GUI programs using swing controls in Java.

**Note:**

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add

more problems to the list as needed.

**LIST OF EXPERIMENTS:**

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a forloop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,\*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3. **a)** Develop an applet in Java that displays a simple message.
   1. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
6. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list.

Display the contents of the list after deletion.

1. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color. Initially, there is no message shown.
2. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
3. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.
4. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
5. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
6. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.
7. Write a Java program to list all the files in a directory including the files present in all its subdirectories.
8. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order
9. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

**REFERENCE BOOKS**

* 1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition *Pearson* education.
  2. Thinking in Java, Bruce Eckel*, Pearson* Education.
  3. Java Programming, D. S. Malik and P. S. Nair, *Cengage* Learning.
  4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, *Pearson*.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.TECH II Year II Sem. L T P C**

**0 0 2 1**

#### DS408ES: COMPUTER ORGANIZATION AND ARCHITECTURE LAB

**Exercises in Digital Logic Design**

1. Implement Logic gates using NAND and NOR gates
2. Design a Full adder using gates
3. Design and implement the 4:1 MUX, 8:1 MUX using gates /ICs.
4. Design and Implement a 3 to 8 decoder using gates
5. Design a 4 bit comparator using gates/IC
6. Design and Implement a 4 bit shift register using Flip flops
7. Design and Implement a Decade counter

**Exercises in Micro Processor programming:**

Write assembly language programs for the following using GNU Assembler.

1. Write assembly language programs to evaluate the expressions:
   1. a = b + c – d \* e
   2. z = x \* y + w – v +u / k
2. Considering 8-bit, 16 bit and 32 bit binary numbers as b, c, d, e.
3. Considering 2 digit, 4 digit and 8 digit BCD numbers.

Take the input in consecutive memory locations and also Display the results by using “int xx” of 8086. Validate program for the boundary conditions.

1. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.

a. Arrange in ascending and descending order.

1. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.
2. Find max and minimum
3. Find average

Considering 8-bit, 16 bit binary numbers and 2 digit, 4digit and 8 digit BCD numbers. Display the results by using “int xx” of 8086. Validate program for the boundary conditions.

1. Write an ALP of 8086 to take a string of as input (in ‘C’ format)and do the following Operations on it.
2. Find the length
3. Find it is Palindrome or n.

Considering 8-bit, 16 bit binary numbers and 2 digit, 4digit and 8 digit BCD numbers. Display the results by using “int xx” of 8086. Validate program for the boundary conditions.

1. Write an ALP of 8086 to take a string of as input (in ‘C’ format) and do the following Operations on it.

a. Find whether given string substring or not.

1. Write an ALP of 8086 to take a string of as input (in ‘C’ format) and do thefollowing Operations on it
2. Find the Armstrong number
3. Find the Fibonacci series for n numbers Display the results by using “int xx” of 8086.
4. Write the ALP to implement the above operations as procedures and call from the main procedure.
5. Write an ALP of 8086 to find the factorial of a given number as a Procedure and call from the main program which display the result.

**REFERENCE BOOKS:**

1. Switching theory and logic design –A. Anand Kumar PHI, 2013
2. Advanced microprocessor & Peripherals-A. K. Ray and K. M. Bherchandavi, TMH, 2nd edition.
3. Switching and Finite Automatic theory-ZVI. Kohavi, Niraj K.Jha Cambridge, 3rd edition
4. Digital Design –Morris Mano, PHI, 3rd edition
5. Microprocessor and Interfacing –Douglas V. Hall, TMGH 2nd edition.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

**B.Tech, II Year II Semester L T P C**

**3 0 0 0**

**MC409/MC309: ENVIRONMENTAL SCIENCE**

(Common to CSE/IT/CSD/CSC)

**Course Objectives:**

* 1. Understanding the importance of ecological balance for sustainable development.
  2. Understanding the impacts of developmental activities and mitigation measures.
  3. Understanding the environmental policies and regulations
  4. Integrate human ecology and science of environmental problems.
  5. The effect of human activities on atmospheric pollution

**Course Outcomes:**

Based on this course, the Engineering graduate will

1. Understand the harmonious co-existence in between nature and human being
2. Recognize various problems related to environment degradation.
3. Develop relevant research questions for environmental investigation.
4. Generate ideas and solutions to solve environmental problems due to soil, air and water pollution.
5. Evaluate and develop technologies based on ecological principles and environmental regulations which in turn helps in sustainable development.

**UNIT-I**

**Ecosystems:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem resources and resilience, ecosystem value, services and carrying capacity.

**UNIT-II**

**Natural Resources:** Classification of Resources: Living and Non-Living resources, natural capital & Resources water resources: use and over utilization of surface and ground water, conflicts over water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT-III**

**Biodiversity and Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In- Situ and Ex-situ conservation. National Biodiversity act.

**UNIT-IV**

**Environmental Pollution and Control Technologies:** Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Waste water Treatment methods: Primary, secondary and Tertiary.

**Global Environmental Issues and Global Efforts:** Climate change and impacts on human

environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. Anthropogenic activities, influence on the occurrence of COVID-19 Pandemic? How environment benefitted due to global lockdown arising out of corona outbreak.

**UNIT-V**

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Life cycle analysis (LCA), Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Resource exploitation, Crazy Consumerism, Environmental Education, Environmental Ethics, Concept of Green Building.

**TEXT BOOKS:**

1. Environmental Studies by Anubha Kaushik, 4th Edition, New Age International Publishers.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

**REFERENCE BOOKS:**

1. Text book of Environmental Science and Technology - Dr. M.Anji Reddy 2007, BS Publications.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela.2008 PHI Learning Pvt.Ltd.
4. Environmental Science by Daniel B. Botkin& Edward A. Keller, Wiley INDIA edition.
5. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.
6. Environmental Studies by R. Rajagopalan, Oxford University Press.

**------------------------COMPUTER SCIENCE AND ENGINEERING-DATA SCIENCE 2020-21 CMRENGINEERING COLLEGE (AUOTONOMOUS), HYDERABAD.**

### MC410: Employability Skills – IV Java Course Syllabus

**Unit: 1**

**Introduction:** Why Java, Paradigms, Diff B/W Java & Other (C, C++), Java History, Java Features, Java programming format, Java Statements, Java Data Types

### Unit: 2

**OOPS (Object Oriented Programming & Systems):** Introduction, Object, Constructors, This Key Word, Inheritance, Super Key Word, Polymorphism (Over Loading & Over Riding), Abstraction, Interface, Encapsulation, Introduction to all predefined packages, User Defined Packages, Access Specifiers

### Unit: 3

**STRING Manipulation:** String, String Buffer

**Array:** What is Array, Single Dimensional Array, Multi-Dimensional Array, Sorting of Arrays

### Unit: 4

**Packages: Exception Handling:** Introduction, Pre-Defined Exceptions, Try-Catch-Finally, Throws, throw, User Defined Exception examples

**I/O Streams:** Introduction, Byte-oriented streams, Character – oriented streams, File

### Unit: 5

**Multithreading:** Introduction, Thread Creations, Thread Life Cycle, Life Cycle Methods, Synchronization, Wait() notify() notify all() methods

**Wrapper Classes:** Introduction, Byte, Short, Integer, Long, Float, Double, Character, Boolean classes

**Inner Classes:** Introduction, Member Inner Class, Static Inner Class, Local Inner Class, Anonymous Inner Class,

**Collection Frame Work:** Introduction, Util Package interfaces, List, Set, Map, List Interface 7 Its Classes, Set Interface & Its Classes, Map Interface & Is Classes

# B.TECH. III YEAR

**I SEMESTER SYLLABUS**

#### CS501PC: DESIGN AND ANALYSIS OF ALGORITHMS (Common to CSC, CSD, CSE, IT)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **B.TECH. III Year I Sem.** | **L** | **T** | **P** | **C** |
| **Course Code: CS501PC** | **3** | **1** | **0** | **4** |
| **Prerequisites** |  |  |  |  |

* A course on “Computer Programming”
* A course on “Data Structures”

#### Course Objectives

* Introduces the notations for analysis of the performance of algorithms.
* Introduces the data structure disjoint sets.
* Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
* Describes how to evaluate and compare different algorithms using worst-, average-, and best- case analysis.
* Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

#### Course Outcomes

* Ability to analyze the performance of algorithms
* Ability to choose appropriate data structures and algorithm design methods for a specified application
* Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

**UNIT - I Introduction:** Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation. Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen’s matrix multiplication.

**UNIT - II Disjoint Sets:** Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen’s problem, sum of subsets problem, graph coloring

**UNIT - III Dynamic Programming:** General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

**UNIT - IV Greedy method:** General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

**UNIT - V Branch and Bound**: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP- Complete classes, Cook’s theorem.

#### TEXT BOOKS

* 1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

#### REFERENCES

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

#### DS502PC: DATA MINING

**B.Tech. III Year I Sem. L T P C**

#### Course Code: DS502PC 3 0 0 3

**Course Objectives:**

* To learn data mining concepts and understand association rules mining.
* To discuss classification algorithms learn how data is grouped using clustering techniques.
* To develop the abilities of critical analysis to data mining systems and applications.
* To implement practical and theoretical understanding of the technologies for data mining
* To understand the strengths and limitations of various data mining models;

#### Course Outcomes:

* Ability to perform the preprocessing of data and apply mining techniques on it.
* Ability to identify the association rules, classification and clusters in large data sets.
* Ability to solve real world problems in business and scientific information using data mining
* Ability to classify web pages, extracting knowledge from the web

#### UNIT - I

**Introduction to Data Mining**: Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

#### UNIT - II

**Association Rules:** Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP- Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

#### UNIT - III

**Classification:** Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive- Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

#### UNIT - IV

**Clustering:** Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm;

Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

#### UNIT - V

**Web and Text Mining:** Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

#### TEXT BOOKS:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
3. Data mining Techniques and Applications, Hongbo Du Cengage India Publishing

#### REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

#### DS503PC: Computer Networks (common to CSD,CSE,CSM)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **B.Tech. III Year I Sem.** | **L** | **T** | **P** | **C** |
| **Course Code: DS503PC** | **3** | **0** | **0** | **3** |
| **Prerequisites** |  |  |  |  |

* + A course on “Programming for problem solving”
  + A course on “Data Structures”

#### Course Objectives

* + The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
  + Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

#### Course Outcomes

* + Gain the knowledge of the basic computer network technology.
  + Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
  + Obtain the skills of subnetting and routing mechanisms.
  + Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

#### UNIT - I

**Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks:** ARPANET, Internet.

**Physical Layer: Guided Transmission media:** twisted pairs, coaxial cable, fiber optics, Wireless transmission.

#### UNIT - II

**Data link layer:** Design issues, framing, Error detection and correction.

**Elementary data link protocols:** simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

**Sliding Window protocols:** A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

**Medium Access sub layer:** The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

#### UNIT - III

**Network Layer: Design issues, Routing algorithms:** shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

#### UNIT - IV

**Transport Layer:** Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

#### UNIT - V

**Application Layer:** Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

#### TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

#### REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

#### DS504PC: SOFTWARE ENGINEERING

**B.Tech. III Year I Sem. L T P C**

#### Course Code: DS504PC 3 0 0 3

**Course Objectives**

* The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
* Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

#### Course Outcomes

* Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
* Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
* Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

#### UNIT - I

**Introduction to Software Engineering:** The evolving role of software, changing nature of software, software myths.

**A Generic view of process:** Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

#### UNIT - II

**Software Requirements:** Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

**Requirements engineering process:** Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

**System models:** Context models, behavioral models, data models, object models, structured methods.

#### UNIT - III

**Design Engineering:** Design process and design quality, design concepts, the design model.

**Creating an architectural design:** software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

#### UNIT - IV

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, black- box and white-box testing, validation testing, system testing, the art of debugging.

**Product metrics:** Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

#### UNIT - V

**Metrics for Process and Products:** Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

#### TEXT BOOKS:

1. Software Engineering, A practitioner’s Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

#### REFERENCES:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

#### DS511PE: TIME SERIES ANALYSIS (PROFESSIONAL ELECTIVE – I)

**B.Tech. III Year I Sem. L T P C**

#### Course Code: DS511PE 3 0 0 3

**Prerequisites:** Little knowledge about mathematics and programming

#### Course Objectives

* The Knowledge of basic concepts in time series analysis and forecasting
* Understanding the use of time series models for forecasting and the limitations of the methods.

#### Course Outcomes

* Ability to criticize and judge time series regression models.
* Distinguish the ARIMA modelling of stationary and nonstationary time series
* Compare with multivariate times series and other methods of applications

**UNIT 1**: Introduction Of Time series Analysis Introduction to Time Series and Forecasting -Different types of data-Internal structures of time series Models for time series analysis-Autocorrelation and Partial autocorrelation. Examples of Time series Nature and uses of forecasting-Forecasting Process-Data for forecasting –Resources for forecasting.

**UNIT 2:** Statistics Background For Forecasting Graphical Displays -Time Series Plots - Plotting Smoothed Data - Numerical Description of Time SeriesData - Use of Data Transformations and Adjustments- General Approach to Time Series Modeling and Forecasting- Evaluating and Monitoring Forecasting Model Performance.

**UNIT 3:** Introduction - Least Squares Estimation in Linear Regression Models - Statistical Inference in Linear Regression- Prediction of New Observations - Model Adequacy Checking -Variable Selection Methodsin Regression - Generalized and Weighted Least Squares- Regression Models for General Time Series Data- Exponential Smoothing-First order and Second order.

**UNIT 4:** Autoregressive Integrated Moving Average (Arima) Models Autoregressive Moving Average (ARMA) Models - Stationary and Inevitability of ARMA Models -Checking for Stationarity using Variogram- Detecting Nonstationarity - Autoregressive Integrated Moving Average (ARIMA) Models - Forecasting using ARIMA - Seasonal Data - Seasonal ARIMA ModelsForecasting using Seasonal ARIMA Models Introduction

* Finding the “BEST” Model -Example: Internet Users Data- Model Selection Criteria - Impulse Response Function to Study the Differences in Models - Comparing Impulse Response Functions for Competing Models.

**UNIT 5:** Multivariate Time Series Models And Forecasting Multivariate Time Series Models and Forecasting

* Multivariate Stationary Process- Vector ARIMAModels - Vector AR (VAR) Models - Neural Networks and Forecasting -Spectral Analysis – Bayesian Methods in Forecasting.

#### TEXT BOOKS

1. Introduction To Time Series Analysis And Forecasting, 2nd Edition, Wiley Series In Probability And Statistics, By Douglas C. Montgomery, Cheryl L. Jen(2015)
2. Master Time Series Data Processing, Visualization, And Modeling Using Python Dr. Avishek Pal Dr. Pks Prakash (2017)
3. Time Series Analysis And Forecasting By ExampleSørenBisgaardMurat Kulahci Technical University Of Denmark Copyright © 2011 By John Wiley & Sons, Inc. All Rights Reserved.

#### REFERENCE BOOKS

1. Peter J. Brockwell Richard A. Davis Introduction To Time Series And Forecasting Third Edition.(2016).
2. Multivariate Time Series Analysis and ApplicationsWilliam W.S. Wei Department of Statistical Science Temple University, Philadelphia, PA, SA This edition first published 2019 John Wiley & Sons Ltd
3. Time Series Analysis by James D Hamilton Copyright © 1994 by prince town university press.

#### DS512PE: DISTRIBUTED SYSTEMS (PROFESSIONAL ELECTIVE – I)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **B.Tech. III Year I Sem.** | **L** | **T** | **P** | **C** |
| **Course Code: DS512PE**  **Prerequisites** | **3** | **0** | **0** | **3** |

* + A course on “Operating System”

#### Course Objectives:

* + To understand what and why a distributed system is.
  + To understand theoretical concepts, namely, virtual time, agreement and consensus protocols.
  + To understand IPC, Group Communication & RPC Concepts.
  + To understand the DFS and DSM Concepts.
  + To understand the concepts of transaction in distributed environment and associated concepts, namely, concurrency control, deadlocks and error recovery.

#### Course Outcomes:

* + Able to comprehend and design a new distributed system with the desired features.
  + Able to start literature survey leading to further research in any subarea.
  + Able to develop new distributed applications.

#### UNIT- I

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. System Models: Introduction, Architectural Models, Fundamental Models.

#### UNIT- II

**Time and Global States:** Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems.

#### UNIT- III

**Inter Process Communication:** Introduction, The API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication,

Case Study: IPC in UNIX. Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications,

**Case Study:** JAVA RMI.

#### UNIT- IV

**Distributed File Systems:** Introduction, File Service Architecture,

**Case Study 1:** Sun Network File System,

**Case Study 2:** The Andrew File System.

**Name Services:** Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name

**Distributed Shared Memory:** Introduction, Design and Implementation Issues, Sequential Consistency and IVY case study, Release Consistency, Munin Case Study, Other Consistency Models.

#### UNIT- V

**Transactions and Concurrency Control:** Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

**Distributed Transactions:** Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.

#### TEXT BOOK:

1.Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 4th Edition, 2009.

#### REFERENCE BOOKS:

1. Distributed Systems, Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2nd Edition, PHI.
2. Distributed Systems, An Algorithm Approach, Sukumar Ghosh, Chapman & Hall/CRC, Taylor & Fransis Group, 2007.

#### DS513PE: INTRODUCTION TO DATA SCIENCE (PROFESSIONAL ELECTIVE – I)

**B.Tech. III Year I Sem. L T P C**

#### Course Code: DS513PE 3 0 0 3

**Prerequisites**

* A course on “Computer Oriented Statistical Methods”
* A course on “Data Mining”

#### Course Objectives:

* To learn Evolution of Data Science, Applications of Data Science in various fields and Data Security Issues.
* To learn various Data Collection Strategies
* To learn the Descriptive Statistics for Prediction and Decision Making.
* Outline the importance of data in making a business decision

#### Course Outcomes:

* Outline the importance of data in making a business decision
* Demonstrate the principles and Applications of data science,
* Use appropriate modeling and analyze techniques for data science problems, and Data Security Issues.
* Apply various Data Collection Strategies
* Solve the Descriptive Statistics problems for Prediction and Decision Making.

#### Unit – I: Introduction

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

#### Unit – II: Data Collection and Data Pre-Processing

Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

#### Unit – III: Exploratory Data Analytics

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

#### Unit – IV: Model Development

Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

#### Unit – V: Model Evaluation

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

#### TEXT BOOK:

1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”, PACKT, 2016.

#### REFERENCES:

1. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O'Reilly, 2015.
2. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013
3. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.

#### DS514PE: INTELLIGENT DATABASE SYSTEM (PROFESSIONAL ELECTIVE – I)

**B.Tech. III Year I Sem. L T P C**

#### Course Code: DS514PE 3 0 0 3

**Prerequisites**

* A course on “Database Management Systems”

#### Course Objectives:

* Understand the concepts of intelligent database.
* Make study of the Database installation then create the database with user and apply SQL.
* Understand the concepts of knowledge-based systems and apply with AI

#### Course Outcome:

* Design and create the small applications
* Analyze and Implement for various real-time applications in Intelligent Database System

#### UNIT 1: Introduction to IDBS

Informal definition of the domain - General characteristics of IDBSs - Data models and the relational data model - taxonomy of intelligent database systems - Guidelines for using intelligent database systems.

#### UNIT 2: Semantic Data Models

Nested and semantic data models – Introduction - The nested relational model - Semantic models - Hyper- semantic data models - Object-oriented approaches to semantic data modeling – Object oriented database systems - Basic concepts of a core object-oriented data model - Comparison with other data models - Query languages and query processing - Operational aspects – Systems - The ODMG standard - The object-relational data model - Java and databases – Conclusions - Active database systems - Basic concepts – Issues – Architectures - Research relational prototypes—the Starburst Rule System - Commercial relational approaches.

#### UNIT 3: Knowledge-Based Systems- AI Context

Characteristics and classification of the knowledge-based systems – Introduction - The resolution principle - Inference by inheritance – Conclusion - Deductive database systems - Basic concepts - DATALOG language - Deductive database systems and logic programming systems—differences - Architectural approaches - Research prototypes - Updates in deductive databases - Integration of deductive database and object database technologies - Constraint databases - Conclusions.

#### UNIT 4: Knowledge-Based Systems

Introduction - Architectural solutions - The 'general bridge' solution - Extending a KBS with components proper to a DBMS - The 'tight coupling' approach – Conclusion - Advanced solutions: Introduction - A 'knowledge level' approach to the interaction with an IAS- TELOS - a language for implementing very large 'integral approach' systems- The CYC project - Other projects based on a 'conceptual representation' approach

* Lexical approaches to the construction of large KBs.

#### UNIT 5: Applications in IDBS

Introduction - Temporal databases - Basic concepts - Temporal data models - Temporal query languages – Ontologies -Ontology theoretical foundations - Environments for building ontologies - Structured, semi- structured and unstructured data - Multimedia database - Semi-structured data - Mediators – Motivation – Architecture - Application of mediators to heterogeneous systems – Proposals - Multi-Agents systems - Main issues in designing a multi-agent system - Open problems. Internet indexing and retrieval - Basic indexing methods - Search engines or meta-searchers - Internet spiders - Data mining - Data mining tasks - Data mining tools - Medical and legal information systems - Medical information systems - Legal information systems – Conclusions.

#### TEXT BOOKS

1. Elisa Bertino, Barbara Catania, GianPieroZarri, “Intelligent Database Systems”,Collection ACM Press.

#### REFERENCE BOOKS

1. Ngoc ThanhNguyen, RadoslawKatarzyniak,and Shyi-MingChen (Eds.), "AdvancesinIntelligent Information andDatabase Systems ", Springer, 2010.

#### DS505PC: Data Mining Using Python Lab

**B.Tech. III Year I Sem. L T P C**

#### Course Code: DS505PC 0 0 3 1.5

**Course Objectives:**

* To obtain practical experience using data mining techniques on real world data sets.
* Emphasize hands-on experience working with all real data sets.

#### Course Outcomes:

* Ability to add mining algorithms as a component to the exiting tools
* Ability to apply mining techniques for realistic data.

#### List of Sample Problems:

**WEEK- 1:** Introduction to Python libraries for Data Mining :NumPy, SciPy, Pandas, Matplotlib, Scikit-Learn Write a Python program to do the following operations:

#### Library: NumPy

1. Create multi-dimensional arrays and find its shape and dimension
2. Create a matrix full of zeros and ones
3. Reshape and flatten data in the array
4. Append data vertically and horizontally
5. Apply indexing and slicing on array
6. Use statistical functions on array - Min, Max, Mean, Median and Standard Deviation Subtasks: (Turn in your answers to the following tasks)

**WEEK-2:** Write a Python program to do the following operations:

#### Library: NumPy

1. Dot and matrix product of two arrays
2. Compute the Eigen values of a matrix
3. Solve a linear matrix equation such as 3 \* x0 + x1 = 9, x0 + 2 \* x1 = 8
4. Compute the multiplicative inverse of a matrix
5. Compute the rank of a matrix
6. Compute the determinant of an array

**WEEK-3:** UNDERSTANDING DATA

Write a Python program to do the following operations:

#### Data set: brain\_size.csv, Library: Pandas

1. Loading data from CSV file
2. Compute the basic statistics of given data - shape, no. of columns, mean
3. Splitting a data frame on values of categorical variables
4. Visualize data using Scatter plot

**WEEK-4:** CORRELATION MATRIX

Write a python program to load the dataset and understand the input data

#### Dataset: Pima Indians Diabetes Dataset, Library : Scipy

1. Load data, describe the given data and identify missing, outlier data items
2. Find correlation among all attributes
3. Visualize correlation matrix

#### WEEK -5 DATA PREPROCESSING – HANDLING MISSING VALUES

Write a python program to impute missing values with various techniques on given dataset.

1. Remove rows/ attributes
2. Replace with mean or mode
3. Write a python program to perform transformation of data using Discretization (Binning) and normalization (MinMaxScaler or MaxAbsScaler) on given dataset.

#### WEEK -6 ASSOCIATION RULE MINING- APRIORI

Write a python program to find rules that describe associations by using Apriori algorithm between different products given as 7500 transactions at a French retail store.

#### Libraries: NumPy, SciPy, Matplotlib, Pandas

* 1. Dataset:https://drive.google.com/file/d/1y5DYn0dGoSbC22xowBq2d4po6h1JxcTQ/view?usp=sharing a)

Display top 5 rows of data

* 1. Find the rules with min\_confidence : .2, min\_support= 0.0045, min\_lift=3, min\_length=2

#### WEEK -7 CLASSIFICATIONS – LOGISTIC REGRESSION

Classification of Bank Marketing Data The data is related with direct marketing campaigns of a Portuguese banking institution. The marketing campaigns were based on phone calls. Often, more than one contact to the same client was required, in order to access if the product (bank term deposit) would be ('yes') or not ('no') subscribed. The dataset provides the bank customers‟ information. It includes 41,188 records and 21 fields. The classification goal is to predict whether the client will subscribe (1/0) to a term deposit (variable y).

#### Libraries: Pandas, NumPy, Sklearn, Seaborn

Write a python program to

a. Explore data and visualize each attribute

b.Predict the test set results and find the accuracy of the model

c. Visualize the confusion matrix d) Compute precision, recall, F-measure and support

#### WEEK-8 CLASSIFICATION - KNN

Dataset: The data set consists of 50 samples from each of three species of Iris: Iris setosa, Iris virginica and Iris versicolor. Four features were measured from each sample: the length and the width of the sepals and petals, in centimetres.

#### Libraries: import numpy as np

Write a python program to

a. Calculate Euclidean Distance. b.Get Nearest Neighbors

c. Make Predictions.

#### WEEK-9 CLASSIFICATION - DECISION TREES

Write a python program

1. to build a decision tree classifier to determine the kind of flower by using given dimensions.
2. training with various split measures( Gini index, Entropy and Information Gain)
3. Compare the accuracy

#### WEEK -10 CLUSTERING – K-MEANS

Predicting the titanic survive groups: The sinking of the RMS Titanic is one of the most infamous shipwrecks in history. On April 15, 1912, during her maiden voyage, the Titanic sank after colliding with an iceberg, killing 1502 out of 2224 passengers and crew. This sensational tragedy shocked the international community and led to better safety regulations for ships. One of the reasons that the shipwreck led to such loss of life was that there were not enough lifeboats for the passengers and crew. Although there was some element of luck involved in surviving the sinking, some groups of people were more likely to survive than others, such as women, children, and the upper-class.

#### Libraries: Pandas, NumPy, Sklearn, Seaborn, Matplotlib

Write a python program

1. To perform preprocessing
2. To perform clustering using k-means algorithm to cluster the records into two i.e. the ones who survived and the ones who did not.

#### WEEK -11 CLASSIFICATIONS – BAYESIAN NETWORK

**Predicting Loan Defaulters:** A bank is concerned about the potential for loans not to be repaid. If previous loan default data can be used to predict which potential customers are liable to have problems repaying loans, these "bad risk" customers can either be declined a loan or offered alternative products. Dataset: The stream named bayes\_bankloan.str, which references the data file named bankloan.sav. These files are available from the Demos directory of any IBM® SPSS® Modeler installation and can be accessed from the IBM SPSS Modeler program group on the Windows Start menu.

The bayes\_bankloan.str file is in the streams directory.

1. Build Bayesian network model using existing loan default data
2. Visualize Tree Augmented

#### Naïve Bayes model

* 1. Predict potential future defaulters, and looks at three different Bayesian network model types (TAN, Markov, Markov-FS) to establish the better predicting model.

#### WEEK-12 CLASSIFICATION – SUPPORT VECTOR MACHINES (SVM)

A wide dataset is one with a large number of predictors, such as might be encountered in the field of bioinformatics (the application of information technology to biochemical and biological data).

A medical researcher has obtained a dataset containing characteristics of a number of human cell samples extracted from patients who were believed to be at risk of developing cancer. Analysis of the original data showed that many of the characteristics differed significantly between benign and malignant samples.

Dataset: The stream named svm\_cancer.str, available in the Demos folder under the streams subfolder. The data file is cell\_samples. data. The dataset consists of several hundred human cell sample records, each of which contains the values of a set of cell characteristics. a) Develop an SVM model that can use the values of these cell characteristics in samples from other patients to give an early indication of whether their samples might be benign or malignant.

**Hint:** Refer UCI Machine Learning Repository for data set.

#### References:

1. https://[www.dataquest.io/blog/sci-kit-learn-tutorial/](http://www.dataquest.io/blog/sci-kit-learn-tutorial/) 2.https://[www.ibm.com/support/knowledgecenter/en/SS3RA7\_sub/modeler\_tutorial\_ddita/modeler\_tutorial\_d](http://www.ibm.com/support/knowledgecenter/en/SS3RA7_sub/modeler_tutorial_ddita/modeler_tutorial_d) dita-gentopic1.html

3. https://archive.ics.uci.edu/ml/datasets.php

#### DS506PC: SOFTWARE ENGINEERING LAB

**B.Tech. III Year I Sem. L T P C**

#### Course Code DS506PC 0 0 3 1.5

**Prerequisites**

1. A course on “Programming for Problem Solving”

#### Co-requisite

1. A Course on “Software Engineering”

#### Course Objectives

1. To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

#### Course Outcomes

1. Ability to translate end-user requirements into system and software requirements
2. Ability to generate a high-level design of the system from the software requirements
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.

#### List of Experiments

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

#### Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

#### TEXT BOOKS:

* 1. Software Engineering, A practitioner’s Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
  2. Software Engineering- Sommerville, 7th edition, Pearson Education.
  3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

#### DS507PC: COMPUTER NETWORKS LAB (COMMON TO CSD,CSE and CSM)

**B.Tech. III Year I Sem. L T P C**

#### Course Code: DS507PC 0 0 2 1

**Course Objectives:**

* To understand the working principle of various communication protocols.
* To understand the network simulator environment and visualize a network topology and observe its performance.
* To analyze the traffic flow and the contents of protocol frames.

#### Course Outcomes:

* Implement data link layer farming methods.
* Analyze error detection and error correction codes.
* Implement and analyze routing and congestion issues in network design.
* Implement Encoding and Decoding techniques used in presentation layer.
* To be able to work with different network tools.

#### List of Experiments:

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra’s algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Wireshark
    1. Packet Capture Using Wire shark
    2. Starting Wire shark
    3. Viewing Captured Traffic
    4. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    1. NS2 Simulator-Introduction
    2. Simulate to Find the Number of Packets Dropped
    3. Simulate to Find the Number of Packets Dropped by TCP/UDP
    4. Simulate to Find the Number of Packets Dropped due to Congestion
    5. Simulate to Compare Data Rate& Throughput.
    6. Simulate to Plot Congestion for Different Source/Destination
    7. Simulate to Determine the Performance with respect to Transmission of Packets

#### \*MC509: INTELLECTUAL PROPERTY RIGHTS

**B.Tech. III Year I Sem. L T P C**

#### Course Code:\*MC509 3 0 0 0

**UNIT – I**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

#### UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

#### UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

#### UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

#### UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

#### TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

#### MC510: EMPLOYABILITY SKILLS – V

**(Competitive Programming and Logical Aptitude) (Common to CSE/CSM/CSD/CSC/IT/ECE)**

#### B.Tech. III Year I Sem L T P C

**0 0 2 0**

#### Course Objectives:

* To enable students to understand the representation and use of primitive data types, built indata structures and allocation used in memory.
* To enable students to understand the concept of stack, queue, link list, tree, graph, memory allocation, garbage collection and applications of Data Structures.
* To understand the fundamentals of data structures and data representations.
* To define high level of abstraction of various linear and nonlinear data structures.
* To study the representation, implementation and applications of linear and nonlinear data structures.

#### Course Outcomes:

* To code and test a given logic in C programming language.
* To decompose a problem into functions and to develop modular reusable code.
* To use arrays, pointers, strings and structures to write C programs.
* Searching and sorting problems.
* Students will be able to understand the concept of stack, queue, link list, tree, graph, memory allocation, garbage collection and applications of Data Structures.
* Students can able to crack the interview with the skills.

#### UNIT-I:

Basics, data types, Operations, Type Casting, IO operations, Conditional statement (if, if else, else if, nested if),switch case, Control statements(while, do while, for),jump Control statements(break, continue, go to), Functions, command line arguments, preprocessor Directive, Recursion, storage classes, Arrays-one dimensional, Multi-dimensional arrays, Character arrays-one dimensional, two dimensional, String handling functions, Introduction to pointers, pointer arithmetic, pointers and functions, pointers and arrays, function pointers, Types of pointers, double pointers, triple pointers, constant pointer, pointer to constant. Dynamic memory allocation (malloc, realloc, calloc, free), type def.

#### UNIT-II:

Structures – initiating structures, structures and arrays, structures and, pointers, structures, and Functions, Structures, functions and pointers and unions, Enumerated data type, bit fields Files-file handling reading and writing characters, writing and reading, structure in textformat, writing and reading in binary format.

#### UNIT-III:

Introduction to data structures, complexities, array data structures Searching(linear, binary), Sorting(bubble, insertion, selection),Sorting(quick, merge, heap),Stacks, Queues, Linked list Linked list implementation.

#### UNIT-IV:

Quantitative Aptitude

Number Systems, HCF and LCM, Simplifications and averages, Ratios and Proportions, problems on ages, Percentages, profit and loss, Partnerships, Time and work, Time, Speed and Distance Allegation or Mixtures, Permutations, Combinations & Probability, Simple& Compound Interest

Reasoning Ability:

Number Series, Coding-decoding, Blood Relations, Directions, and Seating Arrangements, Logical Venn diagram & Syllogisms, Clocks Calendars, Cubes & Dices

#### UNIT-V:

Verbal Ability:

All Grammar Concepts ( Tenses, SVA, Articles, Prepositions, Adjectives, Adverbs, Voices, Speeches etc),Spotting Errors, Sentence Correction, Jumbled Sentences/ Para jumbles- Verbal Logics, Extensive practice on Reading Comprehension & Cloze Tests, Vocabulary- Revision & Practice on Synonyms, Antonyms, Verbal Analogies, One word substitutes, Idioms etc Critical Reasoning- Assumptions, Arguments, Courses of action etc) Sentence Completion & Summaries Essay Writing, Practice E-mail Writing, and Extensive practice on Public speaking & Group discussions, Corporate Interview skills.

#### TEXT BOOKS:

1. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Quantitative Aptitude Fully Solved Book in English By Dr. R S Agarwal

#### REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

**https://**[**www.hackerrank.com**](http://www.hackerrank.com/) **https://**[**www.codechef.com**](http://www.codechef.com/) **https://codeforces.com**

# YEAR

**II-SEMESTER SYLLABUS**

#### CS601PC: COMPILER DESIGN

**(common to CSC,CSD,CSE, IT)**

#### B.Tech. III Year. II-Sem L T P C

**Course Code: CS601PC 3 0 0 3**

#### Prerequisites

1. A course on “Formal Languages and Automata Theory”
2. A course on “Computer Organization and architecture”
3. A course on “Computer Programming and Data Structures”

#### Course Objectives:

1. Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
2. Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation and data flow analysis.

#### Course Outcomes:

1. Demonstrate the ability to design a compiler given a set of language features.
2. Demonstrate the the knowledge of patterns, tokens & regular expressions for lexical analysis.
3. Acquire skills in using lex tool & yacc tool for developing a scanner and parser.
4. Design and implement LL and LR parsers
5. Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
6. Design algorithms to generate machine code.

#### UNIT - I

**Introduction:** The structure of a compiler, the science of building a compiler, programming language basics Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical- Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

#### UNIT - II

**Syntax Analysis:** Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

#### UNIT - III

**Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

#### UNIT - IV

**Run-Time Environments:** Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

#### UNIT - V

**Machine-Independent Optimization:** The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

#### TEXT BOOK:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

#### REFERENCES:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O’reilly
2. Compiler Construction, Louden, Thomson.

#### DS602PC: ARTIFICIAL INTELLIGENCE

**B.Tech. III Year II Sem. L T P C**

#### Course Code: DS602PC 3 1 0 4

**Course Objectives:**

* To learn the difference between optimal reasoning vs. human like reasoning
* To understand the notions of state space representation, exhaustive search, heuristic
* search along with the time and space complexities
* To learn different knowledge representation techniques
* To understand the applications of AI: namely Game Playing, Theorem Proving,
* Expert Systems, Machine Learning and Natural Language Processing Course Outcomes:
* Possess the ability to formulate an efficient problem space for a problem expressed in English.
* Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
* Possess the skill for representing knowledge using the appropriate technique
* Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing

#### UNIT - I

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications. Problem Solving - State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A\*, Constraint Satisfaction. Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning.

#### UNIT – II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

#### UNIT - III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

#### UNIT-IV

Machine-Learning Paradigms: Introduction. Machine Learning Systems. Supervised and Unsupervised Learning. Inductive Learning. Learning Decision Trees,

Deductive Learning. Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed- Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

#### UNIT-V

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

#### TEXT BOOKS:

1. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011 Russell,
2. Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Second Edition. 2004.
3. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.

#### REFERENCE BOOK:

1. Introduction to Artificial Intelligence by Eugene Charniak, Pearson.
2. Introduction to Artificial Intelligence and expert systems Dan W.Patterson. PHI.
3. Artificial Intelligence by George Fluger reason fifth edition.

#### CS603PC: WEB TECHNOLOGIES

**(common to CSC,CSD,CSE, IT)**

#### B.Tech. III Year. II-Sem L T P C

**Course Code: CS603PC 3 0 0 3**

#### Course Objectives:

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Java script and AJAX.

#### Course Outcomes:

1. Gain knowledge of client-side scripting, validation of forms and AJAX programming
2. Understand server-side scripting with PHP language
3. Understand what is XML and how to parse and use XML Data with Java
4. To introduce Server-side programming with Java Servlets and JSP

#### UNIT- I

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

#### UNIT- II

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

#### UNIT - III

Introduction to Servlets: Common Gateway Interface (CGt), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

#### UNIT - IV

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

#### UNIT - V

Client-side Scripting: Introduction to Java script, Java script language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

#### TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

#### REFERENCE BOOKS

1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech
2. Java Server Pages —Hans Bergsten, SPD O’Reilly,
3. Java Script, D.Flanagan
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.

#### DS621PE: CRYPTOGRAPHY AND NETWORK SECURITY (Professional Elective-II)

**B.Tech. III Year II Sem. L T P C**

#### Course Code: DS621PE 3 0 0 3

**Course Objectives:**

* Explain the objectives of information security
* Explain the importance and application of each of confidentiality, integrity, authentication and availability
* Understand various cryptographic algorithms.
* Understand the basic categories of threats to computers and networks
* Describe public-key cryptosystem.
* Describe the enhancements made to IPv4 by IPSec
* Understand Intrusions and intrusion detection
* Discuss the fundamental ideas of public-key cryptography.
* Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
* Discuss Web security and Firewalls

#### Course Outcomes:

* Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
* Ability to identify information system requirements for both of them such as client and server.
* Ability to understand the current legal issues towards information security.

#### UNIT – I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

#### UNIT – II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

#### UNIT – III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA- 512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

#### UNIT – IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

#### UNIT – V

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key

Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

#### TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

#### REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 3rdEdition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

#### CSD622PE: GRID COMPUTING (Professional Elective-II)

**B.Tech. III Year II Sem. L T P C**

#### Course Code: DS622PE 3 0 0 3

**Course Objective:**

* To provide an overview of the basic concepts of Grid Computing.
* To highlight the advantages of deploying Grid Computing.

#### Course Outcome:

* Design and implement Grid computing applications using Globus or similar toolkits
* To illustrate the practical adoption of a Grid deployment through real life case studies.

#### UNIT – I: Grid Computing:

Introduction Grid Computing Worldwide Initiatives Grid Computing Organizations and Their Roles The Grid Computing Anatomy The Grid Computing Road Map.

#### UNIT – II: The New Generation Of Grid Computing Applications:

Merging the Grid Services Architecture with the Web Services Architecture.

#### UNIT – III: The Grid Computing Technological Viewpoints:

Open Grid Services Architecture (OGSA) Some Sample Use Cases that Drive the OGSA The OGSA Platform Components Open Grid Services Infrastructure (OGSI) OGSA Basic Services

**UNIT – IV: The Grid Computing Toolkits:** GLOBUS GT3 Toolkit: Architecture GLOBUS GT3 Toolkit: Programming Model.

**UNIT – V: Globus GT3 Toolkit:** A Sample Implementation GLOBUS GT3 Toolkit: High-Level Services OGSI.NET Middleware Solutions.

#### TEXT BOOK:

1. Joshy Joseph Craig Fellenstein: “Grid Computing”, 1st ed., IBM Press, 2003,

#### REFERENCE BOOKS:

* 1. Joshy Joseph & Craig Fellenstein, “Grid Computing”, PHI, PTR-2003.
  2. Ahmar Abbas, “Grid Computing: A Practical Guide to technology and Applications”, Charles River media – 2003.
  3. Ian Foster, Carl Kesselman, “The Grid2: Blueprint for a New Computing Infrastructure”. Morgan Kaufman, New Delhi, 2004
  4. Fran Bermn, Geoffrey Fox, Anthony Hey J.G., “Grid Computing: Making the Global Infrastructure a Reality”, Wiley, USA, 2003
  5. Maozhen Li, Mark Baker, The Grid: Core Technologies, John Wiley & Sons, 2005.

#### DS623PE: Data Engineering (Professional Elective-II)

**B.Tech. III Year II Sem. L T P C**

#### Course Code: DS623PE 3 0 0 3

**Course Objective:**

* To provide an overview of the basic concepts of Data modeling.
* The student will understand the relational and non relational data base design and data base clustering tools.
* The student will understand machine learning

#### Course Outcome:

* Master the basic of SQL for retrieval and management of data.
* Apply Relational and non-relational database design
* Apply data base clustering tools and techniques

#### UNIT 1: Data Modeling Introduction

Types of databases, data storage techniques, create a table in my SQL and Apache Cassandra.

Use a relational database, difference between OLAP and OLTP databases. Create normalized data tables and Implement denormalized schemas (e.g. STAR, Snowflake, and FACT constilation schemas ) No SQL databases vs. RDBMS, Create a No SQL database in Apache Cassandra Data Engineer vs. Data Scientists, Basic Data Engineering Skills,

#### UNIT 2: Relational and non-relational database design

Data Warehouse architecture, ETL process, to denormalize a database (3NF to Star). Create an OLAP cube from facts and dimensions and learn to compare column vs. row oriented approaches. create an AWS account and understand their services. Set up Amazon S3, IAM, VPC, EC2, RDS PostgreSQL, Azure, IBM, Google Cloud basics.

Big Data: What is big data? data science vs data analytics, the 4Vs of Big Data, Why Big Data? The Problem with ETL Scaling Up, Scaling Out, Data Warehouse vs. Data Lake.

#### UNIT 3: Database clustering tools and techniques

Hadoop: What is Hadoop? What makes Hadoop so popular, Hadoop Ecosystem Components,

Docker: Docker and usage Preconfigured Images, Kubernetes Container Deployment, Docker micro services, Kubernetes, Docker container orchestration, REST APIs , HTTP Post/Get , API Design Implementation.

**UNIT 4: Databases:** SQL Databases, Database Design, SQL Queries Stored Procedures, ODBC/JDBC Server Connections, NoSQL Stores, KeyValue Stores (HBase), Document Store HDFS, Document Store MongoDB, Hive Warehouse, Impala, Kudu, Time Series Databases, MPP Databases (Greenplum).

Data Processing / Analytics – Frameworks,

MapReduce, Apache Spark, Spark on YARN, RDD, DataFrame, Spark coding with Scala, Spark coding with Python, SparkSQL.

#### UNIT 5: Machine Learning:

Training and applying models, deep learning, Machine Learning in production, Data Visualization, Android & IOS, design APIs for mobile apps,

Webservers: Tomcat, Jetty, Node RED, and React. Business Intelligence Tools:

Tableau, PowerBI, Quliksense, Device Management, digital twin, Active Directory, Building A Data Platform Example, Lambda Architecture, Kappa Architecture, Kappa Architecture with Kudu, Data Architecture, Analytics Requirements for Streaming, Analytics Requirements For Batch Processing, Data Visualization,

#### TEXT BOOK:

1. The Data Engineering Cookbook by Andreas Kretz
2. DW 2.0 – The Architecture for the Next Generation of Data Warehousing by The Father of Data Warehousing W.H. Inmon
3. Learning Spark by Holden Karau
4. Spark: The Definitive Guide: Big Data Processing Made Simple by Bill Chambers

#### REFERENCE:

1. Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R, and Data Visualization
2. Docker for Data Science: Building Scalable and Extensible Data Infrastructure Around the Jupyter Notebook Server December 2017 by Joshua Cook .

#### DS624PE: Mathematical Modeling for Data Science (Professional Elective-II)

**B.Tech. III Year II Sem. L T P C**

#### Course Code: DS624PE 3 0 0 3

**Prerequisites:**

* A Course on “Computer Oriented Statistical Methods”
* A Course on “Python programming / Data Analytics using R”

#### Course Objective:

* Upon completion of this course, the students will be able to
* Perform exploratory analysis on the datasets
* Knowledge of basic concepts in time series analysis and forecasting
* Understand the various distribution and sampling
* Understanding the use of time series models for forecasting and the limitations of the methods.

#### Course Outcomes:

* Perform Hypothesis Testing on datasets
* Ability to criticize and judge time series regression models.
* Apply statistical inference for Regression
* Distinguish the ARIMA modeling of stationary and non-stationary time series
* Apply statistical inference for Classification
* Compare with multivariate times series and other methods of applications

#### UNIT 1: EXPLORATORY ANALYSIS

Elements of Structured, Estimates of Location - Mean, Median, Mode, Outliers, Estimates of Variability- Standard Deviation, Z-Score, Frequency Table and Histograms, Correlation

INTRODUCTION OF TIMESERIES ANALYSIS

Introduction to Time Series and Forecasting -Different types of data-Internal structures of time series- Models for time series analysis-Autocorrelation and Partial autocorrelation.Examples of Time series Nature and uses of forecasting-Forecasting Process-Data for forecasting – Resources for forecasting.

#### UNIT 2: DATA SAMPLING AND DISTRIBUTION

Normalization, Sampling Data-Simple Random sampling, Stratified, Cluster Sampling, Sampling Error/Bias. Boot straping, Central Limit Theorem, Confidence intervals, Normal distribution, Binomial distribution, Poisson distribution

STATISTICS BACKGROUND FOR FORECASTING

Graphical Displays -Time Series Plots - Plotting Smoothed Data - Numerical Description of Time Series Data

* Use of Data Transformations and Adjustments- General Approach to Time Series Modeling and Forecasting- Evaluating and Monitoring Forecasting Model Performance.

#### UNIT 3: HYPOTHESIS

A/B Testing, Hypothesis Tests- null, one-way, two-way, P-value, Type 1 & 2 errors, t-tests, multiple testing, degrees of freedom, ANOVA, Chi-Square Tests, Power and Sample Size.

TIME SERIES REGRESSION MODEL

Introduction - Least Squares Estimation in Linear Regression Models - Statistical Inference in Linear Regression- Prediction of New Observations - Model Adequacy Checking -Variable Selection Methods in Regression - Generalized and Weighted Least Squares- Regression Models for General Time Series Data- Exponential Smoothing-First order and Second order.

#### UNIT 4: REGRESSION AND PREDICTION

Simple Linear Regression, Multiple Linear Regression, Confidence and Prediction Intervals, Categorical Variables, Multicollinearity, Polynomial Regression

AUTOREGRESSIVE INTEGRATED MOVING AVERAGE (ARIMA) MODELS

Autoregressive Moving Average (ARMA) Models - Stationarity and Invertibility of ARMA Models - Checking for Stationarity using Variogram- Detecting Nonstationarity - Autoregressive Integrated Moving Average (ARIMA) Models - Forecasting using ARIMA - Seasonal Data - Seasonal ARIMA Models- Forecasting using Seasonal ARIMA Models Introduction - Finding the “BEST” Model -Example: Internet Users Data- Model Selection Criteria - Impulse Response Function to Study the Differences in Models- Comparing Impulse Response Functions for Competing Models .

#### UNIT 5: CLASSIFICATION

Naive Bayes, Discriminant Analysis, Logistic Regression, Evaluating Classification Models, Strategies for Imbalanced Data.

MULTIVARIATE TIME SERIES MODELS AND FORECASTING

Multivariate Time Series Models and Forecasting - Multivariate Stationary Process- Vector ARIMA Models - Vector AR (VAR) Models - Neural Networks and Forecasting -Spectral Analysis - Bayesian Methods in Forecasting.

#### TEXT BOOKS

1. Bruce, Peter, and Andrew Bruce. Practical statistics for data scientists: 50 essential concepts." O'Reilly Media, Inc.", 2017.
2. Introduction To Time Series Analysis And Forecasting, 2nd Edition, Wiley Series In Probability And Statistics, By Douglas C. Montgomery, Cheryl L. Jen(2015)

https://b-ok.cc/book/2542456/2fa941

1. Master Time Series Data Processing, Visualization, And Modeling Using Python Dr. Avishek Pal Dr. Pks Prakash (2017)

https://b-ok.cc/book/3413340/2eb247

1. Time Series Analysis And Forecasting By Example Søren Bisgaard Murat Kulahci Technical University Of Denmark Copyright © 2011 By John Wiley & Sons, Inc. All Rights Reserved.

https://b-ok.cc/book/1183901/9be7ed

#### REFERENCE BOOKS

1. Dodge, Yadolah, ed. Statistical data analysis and inference. Elsevier, 2014.
2. Ismay, Chester, and Albert Y. Kim. Statistical Inference via Data Science: A Modern Dive into R and the Tidyverse.CRC Press, 2019.
3. Peter J. Brock well Richard A. Davis Introduction To Time Series And Forecasting Third Edition.(2016).

https://b-ok.cc/book/2802612/149485

1. Multivariate Time Series Analysis and ApplicationsWilliam W.S. Wei Department of Statistical

Science Temple University, Philadelphia, PA, SA This edition first published 2019 John Wiley & Sons Ltd. https://b-ok.cc/book/3704316/872fbf

1. Time Series Analysis by James D Hamilton Copyright © 1994 by prince town university press. https://b-ok.cc/book/3685042/275c71

#### EN604HS: ADVANCED COMMUNICATION SKILLS LAB

**III Year B.Tech. CSE I-Sem L T P C**

#### 0 0 3 1.5

1. **INTRODUCTION:**

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use ‘good’ English and perform the following:

* Gathering ideas and information to organize ideas relevantly and coherently.
* Engaging in debates.
* Participating in group discussions.
* Facing interviews.
* Writing project/research reports/technical reports.
* Making oral presentations.
* Writing formal letters.
* Transferring information from non-verbal to verbal texts and vice-versa.
* Taking part in social and professional communication.

#### OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

#### 3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language

* Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

1. Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
2. Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one’s writing.
3. Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e- mails/assignmentsetc.
4. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.
5. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

* Spacious room with appropriate acoustics.
* Round Tables with movable chairs
* Audio-visual aids
* LCD Projector
* Public Address system
* P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
* T. V, a digital stereo & Camcorder
* Headphones of High quality

1. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

* Oxford Advanced Learner’s Compass, 7th Edition
* DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
* Lingua TOEFL CBT Insider, by Dream tech
* TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

#### TEXT BOOKS:

* 1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
  2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

#### REFERENCES:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw- Hill 2009.

#### CS605PC: ARTIFICIAL INTELLIGENCE USING PYTHON LAB

**B.Tech. III Year II Sem. L T P C**

#### Course Code: DS605PC 0 0 2 1

**Course objectives:**

* To understand the concept of Artificial intelligence
* To understand different types of machine learning and models
* To understand the principles of pattern recognition with estimation and classification technique

#### Course Outcomes

* To apply various search algorithms of artificial intelligence.
* To apply knowledge representation and reasoning techniques.
* To apply different types of machine learning and models
* To design principles of pattern recognition with estimation and apply classification technique

#### List of Experiments

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python
3. Write a program in prolog to solve Tower of Hanoi
4. Write a program in python to solve 8 Puzzle problems
5. Write a program in python to solve 4-Queens problem
6. Write a program in python to solve Traveling salesman problem
7. Write a program in python for Water jug problem
8. Write a Program to Implement Monkey Banana Problem using Python.
9. Write a Program to Implement Missionaries-Cannibals Problems using Python.
10. Write a Program to Implement N-Queens Problem using Python.

#### Lead Experiment

1. Write a Program to Implement Tic-Tac-Toe game using Python
2. Write a python program to implement simple Chatbot?

#### Text Book:

1. Learn Python the Hard Way: 3rd Edition. ...
2. Python Programming: An Introduction to Computer Science (3rd Edition)
3. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

#### Reference Books:

1 .Automate The Boring Stuff With Python, 2nd Edition: Practical Programming For Total Beginners.

2. Python: The Complete Reference, Martin C. Brown (Author)

#### CS606PC: WEB TECHNOLOGIES LAB

**(common to CSC,CSD,CSE, IT)**

#### Year B.Tech. II-Sem L T P C

**Course code: CS606PC 0 0 3 1.5**

#### Course Objective:

* To prepare PHP scripts
* Use JavaScript
* PHP to validate form input entry Understand, analyze and create XML documents and XML Schema
* Understand, analyze and build web applications using PHP

#### Course Outcomes:

Upon successful completion of this course, the students will be able to:

* Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's Create web pages using HTML and Cascading Styles sheets
* Analyze a web page and identify its elements and attributes
* Create dynamic web pages using JavaScript
* Build web applications using PHP
* Create XML documents and XML Schema
* Understand, analyze and apply the role of languages like HTML, CSS, XML

#### Experiments

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
   1. Find the length of a string.
   2. Count no of words in a string.
   3. Reverse a string.
   4. Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble[:](http://www.amazon.com/) [www.amazon.com.](http://www.amazon.com/) The website should consist the following pages.
   1. Home page
   2. Registration and user Login
   3. User Profile Page
   4. Books catalog
   5. Shopping Cart
   6. Payment By credit card
   7. Order Conformation
6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
7. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information fromthe XML document.
8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

#### MC609: CONSTITUTION OF INDIA

**B.TECH II Year II Sem. L T P C**

#### Course code: MC609 3 0 0 0

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

#### MC610: CYBER SECURITY

**B.Tech. III Year II Sem. L T P C**

#### Course Code: MC610 3 0 0 3

**UNIT – I**

Introduction to Cybercrime: Introduction, Cyber crime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

#### UNIT - II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

#### UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

#### UNIT – IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

#### UNIT - V

Cyber Security: Organizational Implications, Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

#### TEXT BOOK:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

#### REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press. 2. Introduction to Cyber Security, Chwan-Hwa (john) Wu, J. David Irwin. CRC Press T&F Group

# B.TECH.IV YEAR I –SEMEMISTER SYLLABUS

#### DS701PC: MACHINE LEARNING

**B.Tech. IV Year. I-Sem L T P C**

#### Course Code: CDS701PC 3 1 0 4

**Prerequisites**

1. Data Structures
2. Knowledge on statistical methods

#### Course Objectives

1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.

#### Course Outcomes

1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problemsin different areas
3. Understand the Neural Networks and its usage in machine learning application.

#### UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

#### UNIT – II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, ageneral approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

#### UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

#### UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, Q–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

#### UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

#### TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

#### REFERENCES:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

#### DS702PC: Big Data Analytics

**B.Tech. IV Year I Sem. L T P C**

#### Course Code: DS702PC 3 0 0 3

**Course Objectives:**

* Understand the basic concepts and importance of Big Data Familiarize with the installation of Hadoop and how to analyze the Big Data
* Understand the design concepts of HDFS
* Provide good insight for developing a MapReduce applications
* Understand Hadoop environment.
* Explore the concepts of Pig, Hive, Spark and HBase

#### Course Outcomes:

* Explain the concepts and challenges of big data
* Determine why existing technologies are inadequate to analyze the large data.
* Outline the operations viz. Collect, manage, store, query, and analyze various forms of big data.
* Apply large-scale analytic tools to solve some of the open big data problems.
* Analyze the impact of big data for business decisions and strategies.
* Design different big data applications.

#### UNIT I

Introduction to Big Data: Bigdata characteristics, Data Storage and Analysis, Comparison with other systems, Apache, Hadoop Ecosystem, VMWare Installation of Hadoop. Analyzing the Data with Hadoop, Scaling Out. Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, Security.

**UNIT II**: HDFS: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems, The Java Interface, Data flow. MapReduce: Developing a MapReduce application, The Configuration API, Setting up the Development Environment, Running Locally on Test Data, Running on a Cluster.

UNIT III: How MapReduce Works: Anatomy of a MapReduce, Job Run, Failures, Shuffle and Sort, Task Execution. MapReduce Types and Formats: MapReduce Types, Input formats, output formats.

#### UNIT IV:

Hive: Installing Hive, Running Hive, Comparison with traditional Databases, HiveQL, Tables, Querying Data. Spark: Installing Spark, Resilient Distributed Datasets, Shared Variables, Anatomy of a Spark Job Run.

Pig: Installing and Running Pig, an Example, Comparison with Databases, Pig Latin, User Defined Functions, Data Processing Operators.

**UNIT V:** Introduction to NoSQL, SQL vs NoSQL, Advantages of NoSQL, Types of NoSQL database, MongoDB, Key value store, Tabular, and Document based.

HBase: HBasics, Installation, clients, Building an Online Query Application.

#### Text Books:

1. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj
2. SPARK: The Definitive Guide, Bill Chambers & Matei Zaharia, O'Reilley, 2018 Edition
3. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013
4. 4.P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World Polyglot Persistence", Addison-Wesley Professional, 2012
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012

#### Reference Books:

1. "Hadoop Operations", O'Reilley, Eric Sammer, 2012
2. "Programming Hive", O'Reilley, E. Capriolo, D. Wampler, and J. Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilley, Lars George, 2011
4. "Cassandra: The Definitive Guide", O'Reilley, Eben Hewitt, 2010
5. "Programming Pig", O'Reilley, Alan Gates, 2011

#### DS731PE: BLOCKCHAIN TECHNOLOGY ( Professional Elective – III ) B.Tech. IV Year I Sem. L T P C

**Course Code: DS731PE 3 0 0 3**

#### Prerequisites

* Knowledge in security and applied cryptography;
* Knowledge in distributed databases

#### Course Objectives:

* To Introduce block chain technology and Crypto currency

#### Course Outcomes:

* Learn about research advances related to one of the most popular technological areas• today.

#### UNIT- I

Introduction: Block chain or distributed trust, Protocol, Currency, Crypto currency, How a Crypto currency works, Crowd funding.

#### UNIT- II

Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environment

#### UNIT- III

Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bit coin MOOCs.

#### UNIT - IV

Currency, Token, Tokenizing, Campus coin, Coin drop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency.

#### UNIT - V

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

#### TEXTBOOK:

1. Block chain Blue print for Economy by Melanie Swan

#### REFERENCE:

* 1. Block chain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher

#### DS732PE: CLOUD COMPUTING(Professional Elective – III )

**B.Tech. IV Year I Sem. L T P C**

#### Course Code : DS732PE 3 0 0 3

**Pre-requisites:**

* A course on “Computer Networks”
* A course on “Operating Systems”
* A course on “Distributed Systems”

#### Course Objectives:

* This course provides an insight into cloud computing
* Topics covered include- distributed system models, different cloud service models, service oriented architectures, cloud programming and software environments, resource management.

#### Course Outcomes:

* Ability to understand various service delivery models of a cloud computing architecture.
* Ability to understand the ways in which the cloud can be programmed and deployed.
* Understanding cloud service providers.

#### UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

#### UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

#### UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

#### UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

#### UNIT V

Cloud Service Providers: EMC, EMC IT, Captive Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

#### TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

#### REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O’Reilly, SPD, rp 2011.

#### DS733PE: SOCIAL NETWORK ANALYSIS( Professional Elective – III ) B.Tech. IV Year I Sem. L T P C

**Course Code : DS733PE 3 0 0 3**

#### Course Objectives:

* Understand the concept of semantic web and related applications.
* Learn knowledge representation using ontology.
* Understand human behavior in social web and related communities
* Learn visualization of social networks.

#### Course Outcomes

* Analyze the concept of semantic web and related applications.
* Explore knowledge representation using ontology.
* Analyze human behavior in social web and related communities

#### UNIT I :

Introduction

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

#### UNIT II

Modelling, Aggregating and Knowledge Representation

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modeling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

#### UNIT III

Extraction and Mining Communities In Web Social Networks

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

#### UNIT IV

Predicting Human Behaviour and Privacy Issues

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

#### UNIT V

Visualization and Applications of Social Networks

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

#### TEXT BOOKS:

1. Peter Mika, “Social Networks and the Semantic Web”, , First Edition, Springer 2007.
2. Borko Furht, “Handbook of Social Network Technologies and Applications”, 1st Edition, Springer, 2010.

#### REFERENCES:

1. Guandong Xu ,Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, “Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively”, IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, “Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling”, IGI Global Snippet, 2009.

#### DS734PE: INFORMATION RETRIEVAL SYSTEMS (Professional Elective – III )

**B.Tech. IV Year I Sem. L T P C**

#### Course Code : DS734PE 3 0 0 3

**Prerequisites:**

* Data Structures Course Objectives:
* To learn the important concepts and algorithms in IRS
* To understand the data/file structures that is necessary to design, and implement information retrieval (IR) systems.

#### Course Outcomes:

* Ability to apply IR principles to locate relevant information large collections of data
* Ability to design different document clustering algorithms
* Implement retrieval systems for web search tasks.
* Design an Information Retrieval System for web search tasks.

#### UNIT - I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

#### UNIT - II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

#### UNIT - III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

#### UNIT - IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies.

#### UNIT - V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non- Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

#### TEXT BOOK:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

#### REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

#### DS741PE: COMPUTER FORENSICS ( Professional Elective – IV ) B.Tech. IV Year I Sem. L T P C

**Course Code: DS741PE 3 0 0 3**

#### Course Objectives:

* Understand the concepts of computer investigations.
* Identify current practices for data discovery recovery and acquisition.

#### Course outcomes

* Explain and apply the concepts of computer investigations.
* Perform e-mail investigations.
* Apply current practices for data discovery recovery and acquisition.
* Conduct basic computer forensic analysis.

#### UNIT – I

Computer Forensics Fundamentals:

What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

#### UNIT-II

Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving

— Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration —Practical Implementation.

#### UNIT – III

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case

#### UNIT – IV

Current Computer Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools. phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

#### UNIT - V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS- DOS startup tasks, virtual machines.

#### TEXT BOOKS

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

#### REFERENCE BOOKS

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, AddisonWesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.
3. Computer Evidence Collection & Presentation by Christopher L.T. Brown, Firewall Media. 4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media.
4. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH 2005
5. Windows Forensics by Chad Steel, Wiley India Edition.

#### DS742PE: DATA VISUALIZATION (Professional Elective – IV ) B.Tech. IV Year I Sem. L T P C

**Course Code: DS742PE 3 0 0 3**

#### Course Objectives:

* Understand principles of visual perception.
* Classify visualization techniques for various data analysis tasks.

#### Course Outcome:

* Explain principles of visual perception.
* Apply core skills for visual analysis.
* Apply visualization techniques for various data analysis tasks.
* Design information dashboard.

Unit 1:

Introduction to Data Visualization Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization ( Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar) Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics).

Unit 2:

Basics of Data Visualization - Tables Reading Data from Standard text files ( .txt, .csv, XML), Displaying JSON content Outputting Basic Table Data( Building a table, Using Semantic Table, Configuring the columns), Assuring Maximum readability( Styling your table, Increasing readability, Adding dynamic Highlighting), Including computations, Using data tables library, relating data table to a chart

Unit 3:

Visualizing data Programmatically Creating HTML5 CANVAS Charts( HTML5 Canvas basics, Linear interpolations, A simple column Chart, Adding animations), Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations). 06 4

Unit 4:

Introduction to D3.js Getting setup with D3, Making selections, changing selection’s attribute (attr()), D3 strives to be declarative, Changing methods, appending new elements, Putting all together, Selecting multiple elements with d3.selectall(), Busilding Bar charts with selections 12 Data-joins; Conceptual overview of data joins, Enter and binding data, using a data join to make a Bar chart, Using anonymous functions to access bound data, finishing the rest of chart, storing data in objects Sizing charts and Axes( Linear scales, Using smart margin conventions, adding axes, Ordinal scales and axes), Loading and filtering .

Unit 5:

Advanced Data Visualization Making charts interactive and Animated: Data joins, updates and exits, interactive buttons, Updating charts, Adding transactions, using keys Adding a Play Button: wrapping the update phase in a function, Adding a Play button to the page, Making the Play button go, Allow the user to interrupt the play, sequence 06 4.

#### Text Book(s):

1. Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, “JavaScript and jQuery for Data Analysis and Visualization”, WROX
2. Ritchie S. King, Visual story telling with D3” Pearson

#### Reference Books:

1. A Julie Steele and Noah Iliinsky, Designing Data Visualizations: Representing Informational Relationships, O’Relly
2. Andy Kirk, Data Visualization: A Successful Design Process, PAKT
3. Scott Murray, Interactive Data Visualization for Web, O’Relly

#### DS743PE: DISTRIBUTED DATABASES (Professional Elective – IV)

1. **Year B.Tech. I-Sem L T P C**

#### COURSE CODE: DS743PE 3 0 0 3

**Prerequisites:** A course on “Database Management Systems”

#### Course Objectives:

* The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems. Introduce basic principles and implementation techniques of distributed database systems.
* Equip students with principles and knowledge of parallel and object-oriented databases.
* Topics include distributed DBMS architecture and design; query processing and optimization;
* distributed transaction management and reliability; parallel and object database management systems.

#### Course Outcomes:

* Understand theoretical and practical aspects of distributed database systems.
* Study and identify various issues related to the development of distributed database system.
* Understand the design aspects of object-oriented database system and related development.

#### UNIT - I

Introduction: Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas. Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.

Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

#### UNIT - II

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data. Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

#### UNIT - III

Transaction Management: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

#### UNIT - IV

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning. Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

#### UNIT - V

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

#### TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

#### REFERENCE BOOK:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: “Database Systems: The Complete Book”, Second Edition, Pearson International Edition

#### DS744PE: NATURAL LANGUAGE PROCESSING( Professional Elective – IV) B.Tech. IV Year I Sem. L T P C

**Course Code: DS744PE 3 0 0 3**

#### Course Objectives:

* Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
* Show sensitivity to linguistic phenomena and an ability to model them with formal grammar

#### Course Outcomes

* Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
* Able to design, implement, and analyze NLP algorithms
* Able to design different language modeling Techniques.

UNIT-I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT-II

Syntax Analysis: Parsing Natural Language, Treebank’s: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT-III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT-IV

Predicate-Argument Structure: Predicate- Argument Structure, Meaning Representation Systems, Software.

UNIT-V

Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling

#### TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

#### REFERENCE:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

#### DS703PC: BIG DATA ANALYTICS LAB

**B.Tech. IV Year I Sem. L T P C**

#### Course Code: DS703PC 0 0 3 1.5

**Course Objectives:**

* To become familiar with Hadoop distributions, configuring Hadoop and performing File management tasks
* Understand approaches for building Hadoop MapReduce programs for real-time applications.

#### Course Outcomes:

* Experiment MapReduce in Hadoop frameworks
* Implement MapReduce programs in variety applications
* Explore MapReduce support for debugging
* Different approaches for building Hadoop MapReduce programs for real-time applications.

#### List of Experiments

1. Install Apache Hadoop
2. Develop a MapReduce program to calculate the frequency of a given word in a given file.
3. Develop a MapReduce program to find the maximum temperature in each year.
4. Develop a MapReduce program to find the grades of student’s.
5. Develop a MapReduce program to implement Matrix Multiplication.
6. Develop a MapReduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.
7. Develop a MapReduce to analyze weather data set and print whether the day is shinny or cool day.
8. Develop a MapReduce program to find the number of products sold in each country by considering sales data containing fields like.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Transaction\_Date | Product Price | Payment \_Type Na me City | state | country Account\_ Created |
| Last\_Login | Latitude | Longitude |  |  |

1. Develop a MapReduce program to find the tags associated with each movie by analyzing movie lens data.

#### DS704PC: MACHINE LEARNING USING PYTHON LAB

**B.Tech. IV Year I Sem. L T P C**

#### Course Code: DS704PC 0 0 3 1.5

**Course Objective:** The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

**Course Outcomes:** After the completion of the course the student can able to:

1. Understand complexity of Machine Learning algorithms and their limitations;
2. Understand modern notions in data analysis-oriented computing;
3. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

#### List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye’s rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbors classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR1 VAR2 CLASS

|  |  |  |
| --- | --- | --- |
| 1.713 | 1.586 | 0 |
| 0.180 | 1.786 | 1 |
| 0.353 | 1.240 | 1 |
| 0.940 | 1.566 | 0 |
| 1.486 | 0.759 | 1 |
| 1.266 | 1.106 | 0 |
| 1.540 | 0.419 | 1 |
| 0.459 | 1.799 | 1 |
| 0.773 | 0.186 | 1 |

1. The following training examples map descriptions of individuals onto high, medium and low credit- worthiness.

medium skiing design single twenties no -> highRisk high golf trading married forties yes -> lowRisk

low speedway transport married thirties yes -> medRisk medium football banking single thirties yes -> lowRisk high flying media married fifties yes -> highRisk

low football securitysingle twenties no -> medRisk medium golf media

single thirties yes -> medRisk medium golf transport married forties yes -> lowRisk high skiing banking single thirties yes -> highRisk low golf unemployed married forties

yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

1. Implement linear regression using python.
2. Implement Naïve Bayes theorem to classify the English text
3. Implement an algorithm to demonstrate the significance of genetic algorithm
4. Implement the finite words classification system using Back-propagation algorithm

# B.TECH.IV YEAR – II –SEMESTER SYLLABUS

#### DS851PE: INTERNET OF THINGS( Professional Elective-V)

**IV Year B.Tech. II -Sem L T P C**

#### Course Code : DS851PE 3 0 0 3

**Course Objectives:**

* To introduce the terminology, technology and its applications
* To introduce the concept of M2M (machine to machine) with necessary protocols
* To introduce the Python Scripting Language which is used in many IoT devices
* To introduce the Raspberry PI platform, that is widely used in IoT applications
* To introduce the implementation of web-based services on IoT devices

#### Course Outcomes

* Interpret the impact and challenges posed by IoT networks leading to new architectural models.
* Compare and contrast the deployment of smart objects and the technologies to connect themto network.
* Appraise the role of IoT protocols for efficient network communication.
* Elaborate the need for Data Analytics and Security in IoT.
* Illustrate different sensor technologies for sensing real world entities and identify the applicationsof IoT in Industry.

#### UNIT - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

#### UNIT - II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

#### UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

**UNIT - IV** IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

#### UNIT - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

#### TEXT BOOK

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

#### DS8522PE : GREEN COMPUTING( Professional Elective-V)

**B.Tech. IV Year II Sem. L T P C**

#### Course Code : DS852PE 3 0 0 3

**Course Objectives:**

* To learn the fundamentals of Green Computing.
* To analyze the Green computing Grid Framework.
* To understand the issues related with Green compliance.
* To study and develop various case studies.

#### Course Outcomes:

* To understand the concepts of technologies that conform to low-power computation
* To understand green (power-efficient) technologies for components of one single computer, such as CPU, memory and disk, and appreciate cutting edge designs for these components
* To have a basic understanding of a variety of technologies applied in building a green system and to identify the various key sustainability and green IT trends
* To discuss the various laws, standards and protocols for regulating green IT’
* Be able to use a range of tools to help monitor and design green systems

#### UNIT I

FUNDAMENTALS: Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

#### UNIT II

GREEN ASSETS AN MODELING: Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

#### UNIT III

GRID FRAMEWORK: Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

#### UNIT IV

GREEN COMPLIANCE: Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

#### UNIT V

CASE STUDIES :The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

#### TEXT BOOKS:

1. Bhuvan Unhelkar, ―Green IT Strategies and Applications-Using Environmental Intelligence‖, CRC Press, June 2014.
2. Woody Leonhard, Katherine Murray, ―Green Home computing for dummies‖, August 2012.

#### REFERENCES

1. Alin Gales, Michael Schaefer, Mike Ebbers, ―Green Data Center: steps for the Journey‖, Shroff/IBM rebook, 2011.
2. John Lamb, ―The Greening of IT‖, Pearson Education, 2009.
3. Jason Harris, ―Green Computing and Green IT- Best Practices on regulations & industry‖, Lulu.com, 2008
4. Carl speshocky, ―Empowering Green Initiatives with IT‖, John Wiley & Sons, 2010.
5. Wu Chun Feng (editor), ―Green computing: Large Scale energy efficiency‖, CRC Press

#### DS853PE : ADVANCED TEXT AND MEDIA ANALYTICS( Professional Elective-V)

**B.Tech. IV Year II Sem. L T P C**

#### Course Code: DS853PE 3 0 0 3

**Course Objectives:**

* Text analytics concepts and applications
* Fundamental of Information retrieval and natural language processing
* Text analytics framework
* Develop social media measurement plans and analytics reports, and communicate findings and recommendations effectively
* Examine the ethical and legal implications of leveraging social media data;

#### Course Outcomes:

* + Explain the text analytics framework.
  + Analyze various sources of text data.
  + Measure machine learning model performance with appropriate metrics.
  + Interpret the results, gain insights, and recommend possible actions from analytics performed on text data.

**UNIT I:** Introduction & Why Social Media Analytics Matter, Social Media Metrics Refresher, Setting Goals, Objectives and Benchmarks, Measurement and Attribution Across the Customer Journey, Using Excel to Analyze Data – Part 1.

**UNIT II:** Using Excel to Analyze Data – Part 2, Making Actionable Recommendations, Drawing Meaningful Insights, Reporting Social Media Analytics, Examining Case Studies, Brand Lift and Conversion Studies.

**UNIT III**: Introduction to Inference and Programming Introduction to Research Design and Data Analysis using Programming and Simulation Based Methods as Learning Tools:Data Management and Analysis for Large Scale Data Structures Introduction to Parallel Programming in R for Analysis and Exploration of Social Media Data: Text as Data Introduction to Regular Expressions, Document-by-Term matrices, and Construct Validity.

**UNIT IV:**Basic Text Mining Principles, The History of Text Mining, The Seven Practice Areas of Text Analytic, Conceptual Foundations of Text Mining and Preprocessing Steps, Applications and Use Cases for Text Mining, Text Mining Methodology, Three Common Text Mining Software Tools.

**UNIT V:**Advanced Topics, Text Classification and Categorization, Prediction in Text Mining: The Data Mining Algorithms of Predictive Analytics, Entity Extraction, Feature Selection and Dimensionality Reduction, Singular Value Decomposition in Text Mining, Web Analytics and Web Mining, Clustering Words and Document, Leveraging Text Mining in Property and Casualty Insurance, Focused Web Crawling, The Future of Text and Web Analytics.

#### TEXTBOOKS:

1. Driscoll, Jesse. 2016. “Prison States & Games of Chicken” in S. Desposato, Ethics and Experiments: Problems and Solutions for Social Scientists and Policy Professionals, Taylor and Francis.
2. Margetts, Helen. 2017. “Political Behaviour and the Acoustics of Social Media” Nature Human Behaviour 1 (0086). https://doi.org/10.1038/s41562-017-0086

#### REFERENCES:

1. Adam D. I. Kramer, Jamie E. Guillory, Jeffrey T. Hancock. 2014. “Emotional contagion through social networks” Proceedings of the National Academy of Sciences 111(24):8788-8790.
2. Lorenzo Coviello, Yunkyu Sohn, Adam D. I. Kramer, Cameron Marlow, Massimo Franceschetti, Nicholas A. Christakis, James H. Fowler. 2014. “Detecting Emotional Contagion in Massive Social Networks” PLOS ONE 9(3):e90315.

#### DS854PE: Data Modeling and Simulation( Professional Elective-V) B.Tech. IV Year II Sem. L T P C

**Course Code : DS854PE 3 0 0 3**

#### Course objectives

* To learn the methodologies and tools for simulation and modeling of a real time problem/ mathematical model.
* To learn modeling and simulation (M&S) methodologies considering both practical and theoretical aspects
* To learn defense industry and game programming.

#### Course outcomes

* + To Develop a small applications for simulation and modeling of a real time problem/ mathematical model.
  + To Develop Entity modeling for real time case studies.

**UNIT-I:** Introduction To Modeling & Simulation – What is Modeling and Simulation? – Complexity Types – Model Types – Simulation Types – M&S Terms and Definitions Input Data Analysis – Simulation Input Modeling – Input Data Collection • Data Collection ProblemsPractical Suggestions • Effect of Period of Time

* Input Modeling Strategy • Histograms • Probability Distributions • Selecting a Probability Distribution • Evaluating Goodness of Fit

**Unit-II:** Random Variate Generation – Random Numbers – Random Number Generators – Random Variate Generation • Factors to be considered • General principles –Inverse Transform Method –Acceptance- Rejection Method –Composition Method –Relocate and Rescale Method • Specific distributions Output Data Analysis – Introduction • Types of Simulation With Respect to Output Analysis • Stochastic Process and Sample Path • Sampling and Systematic Errors • Mean, Standard Deviation and Confidence Interval – Analysis of Finite-Horizon Simulations • Single Run • Independent Replications • Sequential Estimation – Analysis of Steady-State Simulations • Removal of Initialization Bias (Warm-up Interval) • Replication- Deletion Approach • Batch-Means Method

**UNIT-III:** Comparing Systems via Simulation – Introduction – Comparison Problems • Comparing Two Systems • Screening Problems • Selecting the Best • Comparison with a Standard • Comparison with a Fixed Performance Discrete Event Simulations – Introduction • Next-Event Time Advance • Arithmetic and Logical Relationships • Discrete-Event Modeling Approaches – Event-Scheduling Approach – Process- Interaction Approach

**Unit-IV:** Entity Modeling – Entity Body Modeling – Entity Body Visualization – Entity Body Animation – Entity Interaction Modeling – Building Modeling Distributed Simulation – High Level Architecture (HLA) – Federation Development and Execution Process (FEDEP) – SISO RPR FOMBehavior Modeling – General AI Algorithms • Decision Trees • Neural Networks • Finite State Machines • Logic Programming • Production Systems – Path Planning • Off-Line Path Planning • Incremental Path Planning • Real-Time Path Planning – Script Programming • Script Parsing • Script Execution

**Unit-V**:Optimization Algorithms – Genetic Algorithms – Simulated AnnealingExamples: Sensor Systems Modeling – Human Eye Modeling – Optical Sensor Modeling – Radar Modeling

#### TEXTBOOK:

1. Jerry Banks, “Handbook of Simulation: Principles, Methodology, Advances, Applications, and Practice”, John Wiley & Sons, Inc., 1998.
2. George S. Fishman, “Discrete-Event Simulation: Modeling, Programming and Analysis”, Springer-Verlag New York, Inc., 2001.

#### REFERENCE BOOKS:

* 1. Andrew F. Seila, Vlatko Ceric, Pandu Tadikamalla, “Applied Simulation Modeling”, Thomson Learning Inc., 2003.

#### DS861PE: WEB SERVICES(Professional Elective – VI)

**B.Tech. IV Year II Sem. L T P C**

#### CourseCode:DS861PE 3 0 0 3

**Course Objectives:**

* To Understand Web Services and implementation model for SOA
* To Understand the SOA, its Principles and Benefits
* To Understand XML concepts
* To Understand paradigms needed for testing Web Services
* To explore different Test Strategies for SOA-based applications
* To implement functional testing, compliance testing and load testing of Web Services
* To Identify bug-finding ideas in testing Web Services

#### Course Outcomes:

* Define a web service.
* Deploy a web service within Apache Axis
* Understand the SOAP protocol.
* Understand SOAP messages passed between server and client.
* Create, read and understand the Web Services Description Language files.

#### UNIT – I :

Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

**UNIT – II :**Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services. Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

**UNIT – III** :Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.

**UNIT – IV :**Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Referencing and addressing Web Services, Web Services Notification

**UNIT – V :**SOA and web services security considerations, Network-level security mechanisms, Application- level security topologies, XML security standards, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS-Metadata Exchange.

#### TEXT BOOKS:

1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.

#### REFERENCE BOOKS:

1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
3. Java Web Services, D.A. Chappell & T. Jewell, O’Reilly, SPD.
4. McGovern, et al., “Java web Services Architecture”, Morgan Kaufmann Publishers, 2005.
5. J2EE Wer Services, Richard Monson-Haefel, Pearson Education.

#### DS862PE: AUGMENTED REALITY AND VIRTUAL REALITY (Professional Elective – VI)

**B.Tech. IV Year II Sem. L T P C**

#### CourseCode:DS862PE 3 0 0 3

**Course Objectives:**

* This course provides students with an opportunity to explore the research issues in Augmented Reality and Virtual Reality (AR &VR).
* It also makes the students know the basic concept and framework of virtual reality

#### Course Outcomes:

* This course provides students with an opportunity to explore the research issues in Augmented Reality and Virtual Reality (AR&VR).

#### UNIT I:

Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality. Multiple Models of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual /Auditory / Haptic Devices.

#### UNIT II:

Visual Computation in Virtual Reality: Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large Scale Environments & Real Time Rendering.

#### UNIT III:

Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, Object Grasp. Development Tools and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc.

#### UNIT IV:

Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR. Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality,

#### UNIT V:

Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

#### TEXTBOOK:

1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

#### REFERENCE BOOKS:

1. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009

#### DS863PE: DEEP LEARNING (Professional Elective – VI)

**B.Tech. IV Year II Sem. L T P C**

#### CourseCode: DS863PE 3 0 0 3

**COURSE OBJECTIVES:**

* To introduce the foundations of Artificial Neural Networks
* To acquire the knowledge on Deep Learning Concepts
* To learn various types of Artificial Neural Networks
* To gain knowledge to apply optimization strategies

#### Course Outcomes:

* Ability to understand the concepts of Neural Networks
* Ability to select the Learning Networks in modeling real world systems
* Ability to use an efficient algorithm for Deep Models
* Ability to apply optimization strategies for large scale applications

**UNIT-I:** Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

**UNIT-II:** Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

**UNIT – III:** Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

**UNIT – IV:** Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

**UNIT – V**: Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second- Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

#### TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall

#### REFERENCE BOOK:

1. Deep Learning From Scratch: Building with Python from First Principles by Seth Weidman published by O`Reilley
2. Grokking Deep Learning by Andrew W. Trask published by Manning Publications.

#### DS864PE: MOBILE APPLICATION DEVELOPMENT (Professional Elective – VI)

**B.Tech. IV Year II Sem. L T P C**

#### CourseCode:DS864PE 3 0 0 3

Course Objectives

* To demonstrate their understanding of the fundamentals of Android operating systems
* To improves their skills of using Android software development tools
* To demonstrate their ability to develop software with reasonable complexity on mobile platform
* To demonstrate their ability to deploy software to mobile devices
* To demonstrate their ability to debug programs running on mobile devices

#### Course Outcomes

* Student understands the working of Android OS Practically.
* Student will be able to develop Android user interfaces
* Student will be able to develop, deploy and maintain the Android Applications.

**UNIT – I :** Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

**UNIT – II:** Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non- editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

**UNIT – III:** Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

**UNIT – IV:** Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

**UNIT – V:** Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

#### TEXT BOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

#### REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.