**3.6. Course Syllabi (5)**

The syllabus followed for the B.E. Information Technology is given below.

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| **Semester I** |
| **S No** | **Sub Code** | **Subject Title** | **L\*** | **T\*** | **P\*** | **Total Hours** | **Credits** |
| 1 | AM | 5101 | Engineering Mathematics-I | 3 | 1 | - | 4 | 4 |
| 2 | AP | 5101 | Engineering Physics | 3 | 1 | - | 4 | 4 |
| 3 | CS | 5101 | Object Oriented Programming | 3 | - | - | 3 | 3 |
| 4 | EE | 5101 | Basic Electrical & Electronics Engineering | 3 | 1 | - | 4 | 4 |
| 5 | IT | 5101 | Fundamentals of IT & Applications | 3 | 1 | - | 4 | 4 |
| 6 | IT | 5102 | Digital Electronic & Logic Design | 3 | 1 | - | 4 | 4 |
| 7 | AP | 5151 | Engineering Physics Lab | - | - | 2 | 2 | 1 |
| 8 | CS | 5151 | Object Oriented Programming lab | - | - | 2 | 2 | 1 |
| 9 | EE | 5151 | Basic Electrical & Electronics Engineering Lab | - | - | 2 | 2 | 1 |
| 10 | IT | 5151 | Fundamentals of IT & Applications lab | - | - | 3 | 3 | 1 |
|  |  |  | Total | 18 | 5 | 9 | 32 | 27 |
| 11 | GP | 5151 | General Proficiency | - | - | - |  | 1 |

**AM-5101 ENGINEERING MATHEMATICS-I**

**L T P Credits: 4**

**3 1 0**

**UNIT-I**

**Elementary transformations:** Row reduced Echelon forms, Rank of a matrix, normal form,linearly dependent and independent vectors, Consistency of system of linear equations, Linear transformations, Eigen values and eigenvectors, Properties of Eigen values, Reduction to diagonal form, Cayley-Hamilton Theorem, Inverse of a non-singular matrix, Idempotent matrices, Complex matrices.

(10 Hrs)

**UNIT-II**

**Sequences:** Convergence and divergence of an infinite series. Series of positive terms.Tests of convergence - Comparison test, Integral test, Ratio test, Raabe‘s test, Logarithmic test, Cauchy‘s root test, Alternating series, Leibnitz‘s rule, Absolute and conditional convergence, Power series.

(09 Hrs)

**UNIT-III**

**Functions of two or more variables**: Partial derivatives, Homogenous functions. Euler‘s Theorem, Total derivative, Derivative of an implicit function, Tangent and normal to a surface, Change of variables, Jacobians, Taylor‘s theorem for a function of two variables, Maxima and minima of a function of two variables, Lagrange‘s method of undetermined multipliers, Double integral, Change of order of integration, Triple integral, Change of variables, Applications to area and volume, Beta and Gamma functions.

(15 Hrs)

**UNIT-I V**

**Cartesian co-ordinate system:** Distance formula, Section formulae, Direction ratios anddirection cosines, Equation of a plane, Equations of a straight line, Condition for a line to lie in a plane, Coplanar lines, Shortest distance between two lines, Intersection of three planes, Equation of a sphere, Tangent plane to a sphere, Equations of a cone and a cylinder.

(14 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Advanced Engg. Mathematics | R. K. Jain, S.R.K. Iyengar | Narosa |
| An Introduction to Linear Algebra (for section I) | V. Krishnamurthy |  |
| Calculus (for sections II, III, IV) | Thomas & Finney | Pearson Education  |
| **Reference Books** |  |  |
| Elementary Course in Differential Equations | Denial A Murray | Longman |
| Advanced Engg. Mathematics | Erwin Kreyszig | Wiley Eastern Limited, New Delhi |
| Advanced Calculus – Theory and Problems | M.R.Spiegal | Schaum Publications, New York  |

**AP-5101/5201 ENGINEERING PHYSICS**

**L T P Credits: 4**

**3 1 0**

**UNIT – I**

**RELATIVITY:** Newtonian mechanics and Galilean transformations, Michelson-Morleyexperiment, postulates of special theory of relativity, Lorentz transformations, time dilation and length contraction, space-time interval, twin paradox, relativistic addition of velocities, variation of mass with velocity, mass energy equivalence, relativity and Doppler effect, basic ideas of optical gyroscope, cosmology and red shift.

(10 Hrs)

**UNIT – II**

**QUANTUM MECHANICS:** Need of quantum mechanics, Basis of quantum mechanics,wave function, Schroedinger‘s time-independent and time-dependent equations, expectation values of physical quantities (position, momentum and energy), applications of time independent equation; for a particle in a box (one dimensional), step potential, finite square well potential, tunneling effect, problem of harmonic oscillator.

(10 Hrs)

**UNIT – III**

**STATISTICAL MECHANICS:** Introduction, principle of equal a priori probability, equilibriumstate of a dynamic system, thermodynamic probability, distribution of particles in compartments, phase space, Maxwell-Boltzmann statistics, speed distribution; need for quantum statistics, Bose-Einstein statistics, Planck‘s, Wein‘s displacement and Stephan‘s laws; Fermi-Dirac statistics, Free electron gas model, Fermi energy, average KE and speed of electron at 0K.

(10 Hrs)

**UNIT – IV**

**SUPERCONDUCTIVITY:** Introduction, type I & type II superconductors, Meissner‘s effect,isotope effect, effects of magnetic field, London‘s equations, penetration depth, specific heat, BCS theory (electron-lattice-electron interaction, Cooper-pair, coherence length, energy gap), high temperature superconductors, applications of superconductivity.

(06 Hrs)

**RADIATION PHYSICS AND LASERS :** Elementary ideas about interaction of chargedparticles, electromagnetic radiations and neutrons with matter, detection of radiations by: proportional counter, GM counter, scintillation detectors, solid state detectors and BF3 detector (basic principle only), applications of radiations in industry, agriculture and health science, radiation hazards.

**Lasers:** Principle of lasers, types of lasers (He-Ne, Ruby, CO2and semiconductor laser),applications of Lasers.

(06 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Concepts of Modern Physics | Arthur Beiser | McGraw Hill |
| Introduction to Solid Satate Physics | C. Kittel | (John-Wiley&Sons) Engineer |
| **Reference Books** |  |  |
| Modern Physics | Serway, Moses and Moyer | Thomson |

**CS-5101 OBJECT ORIENTED PROGRAMMING**

**L T P Credits-3**

**3 0 0**

**Objectives**

1. Be able to understand the difference between object oriented programming and procedural oriented language and data types in C++.
2. Be able to program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.
3. At the end of the course students will able to simulate the problem in the subjects like Operating system, Computer networks and real world problems.

**UNIT-I**

**Programming** Techniques**:** Steps in development of a program, Brief discussion of Flowchart, algorithm development & program debugging. Procedural & Applicative Programming, Functional & Logic Programming, Structured programming, Object oriented Programming.

**Program Structure:** Character set, comments, data types, logical, relational & binaryoperators, variables, constants, Standard I/O statements, Expressions. Automatic conversion & casting in data types.

(12 Hrs)

**UNIT II**

**Flow control:** If-Else, Nested If, GoTo, Switch, Break, continue, while, do-while, for loop. **Functions & Arrays:** Void functions, function declaration, parameter passing, call by value,call by reference, and return statement Function Overloading, Friend Function. Virtual functions, Declaration & Initialization of arrays, Accessing array elements, Array of structures, two dimensional & multi dimensional arrays.

(13 Hrs)

**UNIT III**

**Structures & Scope:** Declaration of a structure, Initialization, accessing structuremembers, nested structures, structures as function arguments, Typedef, unions Enumerated data, Block, Local & Global variables, Auto Static & External Variables.

**Objects & Classes:** Classes & objects in C++, Accessing data & member functions, private& public qualifiers, # include, #define & #undef directives Base & derived classes, multiple inheritance, constructors in derived classes, constructors in multiple inheritance, Operator overloading.

(13 Hrs)

**UNIT IV**

**Pointers in C++ :** Pointers, Pointers as function argument, Pointer as a structure member,Pointer arithmetic in objects and classes, pointers and strings, pointers to objects.

**File I/O:** Opening & closing a file, Reading & writing a file. Random access files. Updatingdata in random access files. Exception handling, throwing of a function or an object as an exception, multiple catch statements.

(10 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Let us C++ | Yashwant Kanetkar |  |
| Turbo C++ | Robert Lafore |  |
| **Reference Books** |  |  |
| Thinking in C++ | P B Mahapatra |  |
| Complete Reference C++ |  | TMH |

**EE-5101 BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

**L T P Credits-4**

**3 1 0**

**UNIT I**

**Introduction:** Concept of current, potential difference, Active and passive components,power and energy resistivity, effect of temp. on resistance, Heating effect of electric current,

Ohm's Law, Kirchoff‘s Law. Application of Ohm's Law and Kirchoff ‗s Law to solve simple DC circuits, Star-Delta transformation of resistors, superposition theorem, Thevenin's Theorem, Norton theorem, Max. power transfer theorem, Reciprocity Theorem.

(12 Hrs)

**UNIT II**

**AC Fundamentals:** Single phase AC, RMS and average values of different waveforms theirmathematical relations, form factor, peak factor, Various types of power, Power factor, 3 phase AC system; Star-Delta connections; Inter-Relation between phase voltage, current & line voltage, current; 3 phase power and power factor measurement methods and numerical problems.

(12 Hrs)

**UNIT III**

**Electromagnetism:** Concept of MMF, Flux, reluctance, permeability, Analogy with electriccircuits, Faraday's Law of Electromagnetic Induction, Lenz's idea of Hysteresis , eddy currents and its significance. Basic Principle and construction of AC/DC motors, classification of AC/DC motors, EMF equation, starting of motors, advantages of AC/DC Motors; Transformer-basic Principle and construction, classification, EMF equation, Transformation ratio, losses and efficiency.

(12 Hrs)

**UNIT IV**

**Basic Electronics:** Basic details of elements e.g. Diode, Zener Diode, transistor, thyristor,diac, triac and their applications, Transistors in CE, CB, CC configurations. Oscillators and amplifiers, advantages and disadvantages of +ve and –ve feedbacks, Introduction to OP-amp. Basic logic gates Number system, binary octal and hexadecimal numbers; Basic Introduction to the concept of modulation, need and modulation, modulation index, noise, AM,FM and their comparison. Introduction to transmitter and receiver.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Basic Electrical Engineering | D P Kothari & I J Nagrath | TMH |
| Principles of Electrical & Electronics | J.S. Dhillon, Jarnail Singh Dhillon & Diljinder Singh | Kalyani |
| **Reference Books** |  |  |
| Electrical Machines | I. J. Nagrath & Gopal | TMH |
| Electronic Devices & Circuits | Millman & Halkias | Mc GrawHill |
| Electrical Technology | B.L.Theraja | S.Chand |

**IT-5101** **FUNDAMENTALS OF IT AND APPLICATIONS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the basics of computer system, its architecture, database and Networks.
2. To understand the basic concepts, terminology of IT and familiar with the use of IT tools.
3. To Learn and explore new IT techniques in various applications and to identify the issues related to security.

**Unit I**

**Fundamentals:** Information Technology, Introduction to Computers, Number systems&Logic Gates.

**Computer Architecture:** Various units, Instruction Format, Instruction Set, Speed.

**Computer Software:** Categories, system s/w, Application s/w, Working of Input & OutputDevices, Computer Program & Computer Languages, Data communication & Computer Networks, Classification of Data Networks, LAN, MAN, WAN, Communication Protocols.

(11 Hrs)

**Unit II**

**Primary storage:** Types of RAM, ROM, Cache Memory, Flash & Auxiliary memory. **Secondary storage:** Classifications of secondary storage Devices, Magnetic disk, Magnetictape Optical Disk, Magneto-optical Disk)

**Operating systems:** Evolution Types, Functions

**Database Fundamentals:** Logical & physical concept, Architecture, Data Models DatabaseLanguages

**Introduction to Windows:** Working with Windows operations, Microsoft office.

(12 Hrs)

**Unit III**

**Internet:** Internet Connectivity, Working with Internet Protocols, WWW, Internet and WWW,Internet Addressing (IP address, domain name, domain address), URLs, Web pages, Web Browsers, Searching the Web – web Index, search engines, meta search engines, Electronic Mail–mailing basics, mailing list, news groups, bulletin boards.

(12 Hrs)

**Unit IV**

**Applications of IT:** Business through Computer, Computer for Education, Scientific use,Medicine &Health care, Engineering, and Manufacturing & Computer for Home, Theater, Film & Television, Legal practice & Law Enforcement.

**Social impacts of Information Technology:** Introduction, Privacy, Security and Integrity ofInformation, Disaster Recovery, Intellectual property rights, career opportunities in the field of IT.

**Security Issues:** Firewalls and proxy application gateways public and private keyencryption, digital signatures.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Fundamental of Computers | V. Raja Raman | PHI |
| Fundamentals of Computer | Yadav | BPB |
| **Reference Books** |  |  |
| Programming and Information Technology |  |  |
| Internet Complete Reference | Harley Hahy | McGrawHill |
| Fundamental of IT | AxexB Leoh | LeonTechWorld |

**IT-5102 DIGITAL ELECTRONICS AND LOGIC DESIGN**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To perform conversions among different number systems, became familiar with basic logic gates and understand Boolean algebra and simplify simple Boolean functions by using basic Boolean properties & design of combinational circuits such as MUX, DEMUX, Encoder and Decoder etc.
2. To understand the design of sequential Circuits such as Flip-Flops, Registers, and Counters.
3. To obtain a basic level of Digital Electronics knowledge and set the stage to perform the analysis and design of Complex Digital electronic Circuits.

**UNIT I**

**Number Systems And Codes:** Number systems, binary number system, octal numbersystem, hexadecimal number system, signed and unsigned numbers, different type of codes, binary operations- addition, subtraction, multiplication, division, 1s and 2s complement of a number. Introduction to gates and various logic families: An example of TTL for NAND/NOR gates, CMOS circuits for NAND/NOR gates, Introduction to IC technology (SSI, MIS, VLSI).

(10 Hrs)

**UNIT II**

**Logic Circuits:** Introduction to Boolean algebra and Boolean variables, AND, or, NAND,NOR gates and inverter, MIN-TERM and MAX-TERM realization, MAX\_TERM representation, logical functions using Karnaugh map and Quine-macluskey methods, Plotting, Labeling and Reading the K-map, Don‘t care Map entries, Map reduction resulting in Product -of-sum expressions, minimization and combinational design, Multiplexers, de-multiplexers, encoders, decoders, adders, subtractors, parity generators, parity checkers, code converter.

(14 Hrs)

**UNIT III**

**Sequential Circuits:** Introduction to programmable logic arrays, PLDs, FPGA.

**Registers and counters:** Introduction, designing of series and parallel registers, Designingof synchronous and asynchronous counters, designing of up and down counters, ring counters.

(12 Hrs)

**UNIT IV**

**Semiconductor Memories**: Introduction, memory organization, classification andcharacteristics of memories, sequential memories, read only memories, read and write memories, content addressable memories, programmable logic arrays, charged coupled device memory.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| An engineering approach | William I. Fletcher | Prentice-Hall |
| to Digital design |  |  |
| Digital design: principles and | J. F. Wakerly | Pearson Edu |
| practice package |  |  |
| **Reference Books** |  |  |
| Digital Design | M. Morris Mano | PHI |
| Digital Principles & Applications | Malvino & Leech | TMH |

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: CS-5151 Subject Title: Object oriented Programming Lab**

**Class: GIT Semester: 1st**

**L T P Credits: 1**

**0 0 2**

**Objectives**

1. To familiarize the students with language environment.
2. To implement various concepts related to language.

**LIST OF PRACTICALS**

1. W.A.P to find the area of circle/rectangle.
2. W.A.P to find Simple Interest.
3. W.A.P to evaluate an expression and study precedence of operators.
4. W.A.P to illustrate the use of Implicit and Explicit type casting.
5. W.A.P to generate pyramid of digits using nested loops.
6. W.A.P to generate Fibonacci series.
7. W.A.P to find the maximum of given numbers.
8. W.A.P to pass arguments by value and by address.
9. W.A.P to illustrate the use of reference parameters.
10. W.A.P of Switch statement.
11. W.A.P to illustrate function overloading.
12. W.A.P to illustrate the use of default arguments.
13. W.A.P to find the average and standard deviation of n numbers.
14. W.A.P to reverse a string.
15. W.A.P to covert a given string from uppercase to lowercase.
16. W.A.P to delete a given digit and print the number.
17. W.A.P to count the number of vowels in a given sentence.
18. W.A.P to search a given item in a list.
19. W.A.P to add/multiply two matrices.
20. W.A.P to add diagonal elements of two matrices.
21. W.A.P to calculate the sum of all the elements of a matrix using function.
22. W.A.P to find the factorial of a number using recursive function.
23. W.A.P to illustrate the use of pointer variable.
24. W.A.P to create a pointer to function.
25. W.A.P to create a structure and access all structure members inside main function using -> (arrow) and **.** (period/dot) operators.
26. W.A.P of Union
27. W.A.P to create a Class Employee with the following specifications:
	1. private members : name 20 characters, Employee ID int, Basic, DA, HRA Float, salary Float, calculate\_sal() function computes the salary and returns it. Salary is the sum of Basic, DA and HRA.
	2. public members: Readdata() function accepts the data values and invokes the calculate() function.Display() function shows the results on screen.
28. W.A.P to create a friend function which would be able to swap the values of data members of two objects of same class.
29. W.A.P to initialize the objects using constructors.
30. W.A.P to create pointer to class members and objects.
31. W.A.P to implement polymorphism feature for ‘+’ operator.
32. W.A.P to illustrate Single/Multiple/Multilevel/Hybrid Inheritance.
33. W.A.P to illustrate the derivation and execution of constructor and destructor member functions in case of Inheritance.
34. W.A.P to create a file. Record structure and the name of file are given by user.
35. W.A.P to count the number of words and lines in a file.
36. W.A.P to illustrate the use of seekg() and seekp() member functions.
37. W.A.P that makes use of the: try, catch and throw keywords.
38. W.A.P to catch all types of exceptions.
39. W.A.P that contains multiple catch statements.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: EE-5151 Subject Title: Basic Electrical & Electronics Engineering Lab**

**Class: GIT Semester: 1st**

**L T P Credits: 1**

**0 0 2**

**LIST OF PRACTICALS**

1. a. To verify Kirchhoff’s Law (KCL)

b. To verify Kirchhoff’s Voltage Law (KVL)

1. To verify star delta transformation.
2. To verify the superposition theorem.
3. To verify Thevenin’s Theorem.
4. To verify maximum power transfer theorem.
5. a. To study the AC sinusoidal waveform on CRO and find its amplitude, frequency and time period.

b. to find the phase difference of two sinusoidal waveforms on CRO.

1. To measure the power and power factor of 3 phase balanced circuit by using two wattmeter methods.
2. To find the voltage transmission ratio of a single phase transformer.
3. a. To perform open circuit test on single phase transformer.

b. To perform short circuit test on the same transformer.

c. calculate the complete parameters of the equivalent circuit of this transformer.

d. calculate the efficiency at ¼, ½, and 3/4th, full load and 1.25 times full load and plot the efficiency current versus loads.

1. Study the construction of DC machine.
2. To verify the truth table and logic circuit of OR Gate.
3. To verify the truth table and logic circuit of AND gate.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-5151 Subject Title: Fundamentals of IT & Applications Lab**

**Class: GIT Semester: 1st**

**L T P Credits: 1**

**0 0 3**

**Objectives**

1. To learn the working knowledge of hardware and software of computer.
2. To learn the use of database such as Microsoft access.
3. To learn the various features of MS-Office.
4. To familiarize the students with the network devices and the internet.

**LIST OF PRACTICALS**

1. To identify the different parts of a computer system.
2. To study how each and every parts of a computer system works.
3. Learn how each and every parts of the computers work together to produce good output
4. To study the different types of primary and secondary memories of computer system.
5. To identify external ports and interfacing.
6. To identify Pc cards and interfacing.
7. Study how to partition and format harddisk.
8. To install various system software like Microsoft Windows, Linux, Unix etc.
9. To install various application software like word processing software, database software etc
10. To study various tools of Microsoft Office (MS Word,MS Excel,MS Paint etc)
11. To get an overview of Network Devices.

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| **Semester II** |
| **S No** | **Sub Code** | **Subject Title** | **L\*** | **T\*** | **P\*** | **Total Hours** | **Credits** |
| 1 | AC | 5201 | Engineering Chemistry | 3 | 1 | - | 4 | 4 |
| 2 | AM | 5201 | Engineering Mathematics-II | 3 | 1 | - | 4 | 4 |
| 3 | HU | 5201 | Communication Skills | 3 | - | - | 3 | 3 |
| 4 | IT | 5201 | Data Structures | 3 | 1 | - | 4 | 4 |
| 5 | IT | 5202 | Microprocessor & Interfacing | 3 | 1 | - | 4 | 4 |
| 6 | IT | 5203 | Internet Programming | 3 | - | - | 3 | 3 |
| 7 | AC | 5251 | Engineering Chemistry lab | - | - | 2 | 2 | 1 |
| 8 | HU | 5251 | Communication Skills Lab | - | - | 2 | 2 | 1 |
| 9 | IT | 5251 | Data Structures lab | - | - | 2 | 2 | 1 |
| 10 | IT | 5252 | Microprocessor & Interfacing lab | - | - | 2 | 2 | 1 |
| 11 | IT | 5253 | Internet Programming lab | - | - | 2 | 2 | 1 |
|  |  |  | Total | 18 | 4 | 10 | 32 | 27 |
| 12 | GP | 5251 | General Proficiency | - | - | - |  | 1 |
| 13 | TP | 5251 | Industrial Training (8 weeks during Summer Vacation) | - | - | - |  | 2 |

**AC-5201 ENGINEERING CHEMISTRY**

**L T P Credits-4**

**3 1 0**

**UNIT-I**

**BONDING AND MOLECULAR STRUCUTRE:** Chemical bonds (Ionic, Covalent and coordinatebond) polarity in bonds, Fajan rules, Valence bond theory, hybridization (*s, p* and *d* orbitals with examples) LCAO method, Molecular orbital theory (MOT), bonding and antibonding orbitals, MO diagrams of homo and heteronuclear diatoms molecules/ions, Bond order and magnetic properties from MOT, Metallic bond (Electron sea model, VB Model, band theory). Hydrogen bonding (types & consequences).

(10 Hrs)

**UNIT-II**

**SOLID STATE CHEMISTRY:** Introduction, symmetry elements (planes of symmetry, axes ofsymmetry and center of symmetry), law of rational indices, crystallographic systems, space lattices,Bragg‘s law, imperfections in crystals (Frenkel, Schottey and non-stochiometric defects), conductivity in ionic solids and in organic polymers, types of semiconductors, superconductors and insulators.

(06 Hrs)

**MOLECULAR ELECTRONIC AND NANO CHEMISTRY:** Need for molecular devices, molecularelectronics, definition, molecular wires and rectifiers, types of molecular wires with examples, insulation of molecular wires, preliminary idea about measurement of conductivity by various methods(AFM, optical electron transfer etc.), molecular switches : types( pH, optical, temperature, fluorescence with example), logic gates: YES, NOT,AND and OR logic gates with examples, self-assembly.

(04 Hrs)

**UNIT-III**

**REDOX REACTION AND ELECTRO CHEMSITRY:** Electrolytic conductance (specific, equivalentand molar conductance) factors affecting conductance, strong and weak electrolytes, Kohlrausch‘s law, Effect of dilution on ionic and equivalent conductance. Oxidation, reduction, oxidation number, redox reactions in terms of oxidation number, oxidation reduction as electron transfer process, equivalent weights of oxidizing and reducing agents, Electrochemical cell,Types of electrodes, electrode potential,EMF,cell reactionsl, EMF of galvanic cell, electrochemical series & its applications, Nernst‘s equation, relationship of E with equilibrium constant and free energy,primary and secondary batteries, Fuel Cells (acid, alkaline and carbonate).

(10 Hrs)

**UNIT-IV**

**ANALYTICAL CHEMISTRY:** UV-VIS spectroscopy: Introduction, Theory, Frank-Condon Principle,Lambert-Beer Law, Instrumentation, Electronic Transitions, chromophore, auxochrome, bathochromic, hypsochromic, hypochromics, and hyperchromic shifts, effect of polarity and conjugation on max., Applications of UV spectroscopy in simple organic molecules. **IR spectroscopy**: Introduction, Theory, selection rules, Simple harmonic oscillator, Factors affectingmolecular vibrations, FT-IR, Instrumentation, Finger print region, Applications of IR to simple functional groups (carbonyl, hydroxyl, amino, carboxylic acids & their derivatives)

**NMR** **spectroscopy**: Introduction, Theory, Instrumentation, Chemical shift( shielding & deshielding of protons, Factors effecting Chemical shift(Inductive, anisotrophic, hydrogen bonding), spin-spin interactions, coupling constant, Applications (ethanol, benzene, isopropanol and acetic acid)

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| Inorganic Chemistry | P W Atkins |  |
| Physical chemistry | P W Atkins |  |
| J.Chem | MB Ward | Ed.,78,321-328(2000) |
| Inorganic Chemistry | Jolly |  |
| Science | 254, 1312-19 (1991) | Seto CT. |
| Instrumental Methods of Analysis | Willard, Merrit & Dean |  |
| Fundametal of Analytical Chemistry | Skoog & West |  |
| Solid state Chemistry | Antheny West |  |
| Supramolecular Chemistry | Atwood |  |

**AM-5201 ENGINEERING MATHEMATICS-II**

**L T P Credits-4**

**3.1.0**

**UNIT-I**

Higher order linear differential equation with constant coefficients, complementary function and particular integral, Method of variation of parameters, Cauchy‘s and Legendre‘s equations, Formation of partial differential equation, Lagrange‘s linear partial differential equation, Non-linear partial differential equation of first order. Charpit‘s method,

Homogenous linear partial differential equations with constant coefficients.

(14 Hrs)

**UNIT-II**

Laplace transforms of elementary functions, Properties of Laplace transform, Transform of derivatives and integrals, Evaluation of integrals by Laplace transforms, Inverse Laplace transforms, Convolution theorem, Solution of ordinary differential equations, Unit step function and unit impulse function, Engineering applications, Fourier series. Change of interval, Even and odd functions, Half-range series, Applications to standard waveforms.

(12 Hrs)

**UNIT-III**

Limit of a complex function, Differentiation, Analyticity, Cauchy-Riemann equations, Harmonic functions, Conformal mapping, Some special transformations- translation, inversion and rotation, Bilinear transformation.

(10 Hrs)

**UNIT-IV**

Differentiation of a variable vector, Scalar and vector point functions, Vector operator – Del, Gradient, curl and divergence - their physical interpretation and applications, Directional derivative, Line, surface and volume integrals, Theorems of Green (in plane), Gauss and Stoke (without proof) - their verification and applications.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Advanced Engineering Mathematics | R.K.Jain & S.R.K. Iyengar | Narosa Publishing |
| Calculus: Analytical Geometry | House G.B. Thomas & R.L. Finney | Addison Wesley |
| **Reference Books** |  |  |
| Advanced Engineering Mathematics | Erwin Kreyszig | Wiley Eastern |
| Advanced Calculus | David Widder | PHI |
| Advanced Modern Engg. Mathematics | Glyn James | Pearson |

**HU-5101/5201 COMMUNICATION SKILLS**

**L T P Credits:3**

**3 0 0**

**Unit -I**

**SPEECH MECHANISM:** Organs of speech, Consonants & Vowels (basics) Cardinal VowelScale, Production of Speech Sounds, Description & Classification of Speech Sounds.

(12 Hrs)

**Unit-II**

**WRITING AND SPEAKING SKILLS:** Written and Oral Communication, Technical PaperReading, Note Taking, Précis Writing, Paragraph Writing.

(10 Hrs)

**Unit-III**

**BUSINESS COMMUNICATION:** Business Letters, Interpersonal Communication, DraftingNotices, Memos, Agenda and Minutes of Meetings, Applications for Jobs, Facing Interviews

(12 Hrs)

**Unit-IV**

**BASICS OF GRAMMER:** Narration, Voice, Words Often Confused, Use of Prepositions.

(10 Hrs)

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| **RECOMMENDED BOOKS** |  |  |
| **Title** | **Author** | **Publisher** |
| An Introduction to Pronunciation of English | Gimson | ELBS |
| English Pronouncing Dictionary | Daniel Jones | ELBS |
| New International Business English | Leo Jones | Cambridge |
| Collins Cobuild English Grammar | John Sinclair ed. | Collins |

**IT-5201** **DATA STRUCTURES**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To access how the choices of data structure & algorithm methods impact the performance of program.
2. To solve problems based upon different data structure & also write programs.
3. To choose an appropriate data structure for a particular problem

**UNIT I**

**Introduction:** Basic concepts and notations; Data structures and Data Structure operations;Mathematical Notation and Functions; Algorithmic complexity and time-space trade off. **Recursion**: Recursion; types of recursion; Examples of recursion–the exponential power ofa number, Fibonacci numbers, the greatest common divisor, Towers of Hanoi.

**Arrays:** Introduction; One dimensional array–storage, Traversing, Insertion, Deletion,Searching; Multidimensional arrays – Two dimensional arrays, General multidimensional arrays, String Manipulation: Storage structure – Fixed length, Variable length, Linked list storage; String operations – Indexing, Concatenation, length etc.

(12 Hrs)

**UNIT II**

**Linked List**: Introduction; Basic concepts of linked list–Memory representation, Building alinked list, Traversing, Insertion, Deletion, Searching; Double linked list; Merging two lists; Header linked list; Circular linked list.

**Stacks & Queues:** Stack: Representation of stack, Implementation of stack; PolishNotation; Queues; Implementing queues; Circular queues; Double ended queue; Priority Queues.

(13 Hrs)

**UNIT III**

**Binary Trees**: Introduction; types of Binary trees; Complete Binary trees; Extended binarytree; Search tree, Representation of Binary trees in memory; Searching a Binary Tree; Operations of Binary Trees; Traversing, insertion and deletion of nodes in a binary Tree; Minimum weighted path length algorithm; Application of Binary trees: Polish notations and expression trees; Heap tree;; Balanced Binary tree, Multiway trees: B-trees; Threaded Binary Trees.

(12 Hrs)

**UNIT IV**

**Graphs**: Basic concepts & definitions; Representation of Graphs: Path Matrix, Adjacencylist; Shortest Path Algorithms; Graph Traversal; Topological sorting, Spanning Trees

**Sorting & Searching:** Linear search; Binary search; Bubble sort; Insertion sort; Quick sort;Selection sort; Shell sort; Merge sort; Heap sort; Radix sort.

(11 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Data Structures using C and C++ | A.M. Tanenbaum | PHI |
| Data Structures | Lipschutz | TMH |
| **Reference Books** |  |  |
| Data Structures and algorithms in C++ | Frozen | Thomson |
| Data Structures and algorithms in C++ | Drozdek Adam | Thomson |
| Introduction to Data Structures with Applications | Trembley Sorenson | TMH |

**IT-5202** **MICROPROCESSORS AND INTERFACING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Introduction to the Architecture and programming of the microprocessor 8085.
2. Learning about interfacing and various applications of microprocessor.
3. A study of advanced microprocessors.

**UNIT I**

**Introduction:** Architecture of 8085 Microprocessor, 8085 Instruction Set, Instructionclassification, Addressing modes of 8085, Timing diagram, Fetch Cycle, Execution Cycle, Instruction cycle and Machine cycle.

(10 Hrs)

**UNIT II**

**Programming the 8085**: Programming examples like Looping, Counting, Data transfer,Logic operations, Sorting, Time Delay programs. Use of stack and subroutines, Code conversion, BCD to Binary, Binary to BCD, BCD arithmetic, ASCII to Hex and Hex to ASCII Conversion.

(11 Hrs)

**UNIT III**

**Interfacing Peripherals and Applications**: Interrupts, Software and Hardware, Enabling,Disabling and masking of interrupts. 8085 based Microcomputer system, Memory organization, Memory mapped I/O, I/O mapped I/O, I/O operations, Programmed I/O, Interrupt driven I/O, DMA. Support chips like 8255, Programming examples with 8255 I/O ports, Industrial examples.

(13 Hrs)

**UNIT IV**

**Interfacing and Advanced Microprocessor**: Analog to Digital Converters and Digital toAnalog Converters, ADC 0801 and ADC 0808 interfacing with microprocessor. 8253 Timer, Use of timer and wave form generation, 8279 Programmable key board/ Display interface, Sample programs, Industrial application examples, Introduction to the architecture of 8086, 8088, Advancements made in 80186, 80286 and 80386, Introduction to Micro controller Evolution of 8031/8051 family micro controller.

(14 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Microprocessor Architecture Programming and Applications with the 8085/8080A | R. S. Goankar | Wiley Eastern Ltd |
| Microprocessor, interfacing, programming & Hardware | D.V. Hall | PHI |
| **Reference Books** |  |  |
| Introduction to Microprocessors | A.P. Mathur | Tata McGraw Hill |
| Microprocessor systems 8086 & 8080 family | Liu & Gibsion | PHI. |
| Introduction to 8086 programming and interfacing | UffenBeck | PHI |
| The 8051 Microcontroller and Embedded systems | Mazidi, & Mazidi | Pearson Edu. |

**IT-5203** **INTERNET PROGRAMMING**

**L T P Credits-3**

**3 0 0**

**Objectives**

1. Learn the basic concepts& techniques of java.
2. Learn the advanced concepts of java.
3. Generate an application based upon the concepts of java & advance java.

**UNIT I**

**Introduction**: Brief history, How Java Works, JVM, JIT, Java features, using Java with otherTools, Native code, Java script, Active JDBC, Java Beans Java Applets Vs Java Applications, Building Application with Jdk, Building Applets with JDK, HTML for Java Applets, Working with Java Objects, Data types, Arrays, Classes, inheritance, encapsulation and Polymorphism, constructors and Finalizers, Garbage collection, Built-in Data types, Scope Rules, Using Arrays creating and copying array.

(11 Hrs)

**UNIT II**

**Interfaces and Packages**: Wrapper class, string class, Casting, using this and Super, usingJava interface, using Java Packages Overview of exception handling, Method to use exception handling, Method available to exceptions (The throw statement, The throws clause, Finally clause), Creating your own exception classes, Input stream, Output stream.

**Thread Basics** –Creating and running a thread, the thread control methods, the threadslife cycle, The thread groups

**Advance multi-threading** –Thread synchronization, inter thread communication, Prioritiesand scheduling, Thread local variable, Daemon thread.

(13 Hrs)

**UNIT III**

**Animation and images**: Java Basic Drawing tools, Drawing lines and rectangles, DrawingPolygons, ovals, Arcs, Rendering text, Animation Basics, Java images, Image processing – Color Models, Algorithmic image generation, Image filtering Event driven programming, Java event types, item events, Key events, Mouse events, Pop-up menu events, Text events, Window events.

(11 Hrs)

**UNIT IV**

**Introduction to Swing, awt, util, lang API**: Java Networking Protocols–TCP/IP, InternetAddressing, Communication in the remote system – UDP, TCP/IP, SMTP, HTTP, Client – server model. Implementing sockets , semaphores. Java Beans, creating the component. Creating a sample been & attaching it with the main program, RMI accessing remote methods, creating a sample application based on RMI. JDBC, accessing a database and implementing the queries in the program.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Mastering Java | John Zukowski | BPB |
| The Complete Reference | Patrick Naughton | TMH |
| **Reference Books** |  |  |
| Java Programming | Balagurusamy |  |
| Java 2 Programming Bible | Aaron Walsh & Daniel Steinberg | IDG Books |

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-5251 Subject Title: Data Structures Lab**

**Class: GIT Semester: 2nd**

**L T P Credits: 1**

**0 0 2**

**Objectives**

1. Know about the basic concepts of Function, Array and Link-list.
2. Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.
3. Design new algorithms or modify existing ones for new applications and able to analyze the space & time efficiency of most algorithms.

**LIST OF PRACTICALS**

1. W.A.P to generate Fibonacci Series using recursion.
2. W.A.P to interchange the first element with last element, second element with second last element and so on.
3. W.A.P to print Diagonal Matrix (n x n) and “n” is entered by user.
4. W.A.P to multiply two Matrices.
5. W.A.P to remove all duplicate elements from an Array.
6. W.A.P to remove all duplicate elements from a Linear Link List.
7. W.A.P that insert an element in beginning of Linear Link List.
8. W.A.P to insert an element in the end of Linear Link List.
9. W.A.P to delete an element from the beginning of the Linear Link List.
10. W.A.P to delete an element from the end of the Linear Link List.
11. W.A.P to delete an element after a given element of the given Linear Link List.
12. W.A.P to reverse the element of the Linear Link List.
13. W.A.P to concatenate two Linear Linked List.
14. W.A.P to remove the Top element of Stack.
15. W.A.P to insert (or push) an element at the Top of Stack.
16. W.A.P to demonstrate the use of Stack in checking whether the arithmetic expression is properly parenthesized.
17. W.A.P to demonstrate the use of Stack in converting arithmetic expression from in fix notation to post fox notation.
18. W.A.P to insert an element at the end of queue.
19. W.A.P to remove the first element of the queue.
20. W.A.P to illustrate the implementation of Binary Search Tree.
21. W.A.P to illustrate the BFS on a non weighted graph.
22. W.A.P to illustrate the DFS on a non weighted graph.
23. W.A.P to sort an array of integer in Ascending Order using Bubble Sort.
24. W.A.P to sort an array of integer in Ascending Order using Insertion Sort.
25. W.A.P to sort an array of integer in Ascending Order using Quick Sort.
26. W.A.P to search an element using Linear Search Method.
27. W.A.P to search an element using Binary Search Method.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-5252 Subject Title: Microprocessor & Interfacing Lab**

**Class: GIT Semester: 2nd**

**L T P Credits: 1**

**0 0 2**

**Objectives**

1. Provide practical hands-on experience with microprocessor applications and interfacing techniques.
2. Understand 8085 microprocessor kit, knowledge of 8085 instruction set and ability to utilize it in assembly language programming.
3. Understand real mode Memory addressing and ability to interface various devices to the microprocessor.

**LIST OF PRACTICALS**

1. Experiment to study pin diagram and all basic parts of 8085 microprocessor kit.
2. Experiment to study addressing modes and Instruction set of 8085 microprocessor.

**Using 8085 and 8086 microprocessor kit perform the following practicals:**

1. Assembly Language program to add two 8-bit and 16-bit numbers.
2. W.A.P to find 1’s and 2’s complement of 8-bit and 16 bit numbers.
3. W.A.P to find larger of two numbers.
4. W.A.P to find largest number in an array.
5. W.A.P to find smallest number in an array.
6. W.A.P to perform multi byte addition.
7. W.A.P to perform multi byte subtraction.
8. W.A.P to arrange data array in ascending order.
9. W.A.P to arrange data array in descending order.
10. W.A.P to find sum of a series of 8-bit numbers that finds the result in 8-bit form.
11. W.A.P to find sum of a series of 8-bit numbers that finds the result in 16-bit form.
12. W.A.P to perform multiplication of two 8-bits numbers and store result in 16-bit form.
13. W.A.P to perform division of two 8-bits numbers and store result in 16-bit form.
14. W.A.P to find out the square root of a number.
15. W.A.P to transfer a block of data from one section of memory to another section of memory.
16. W.A.P to perform 8-bit subtraction to consider positive as well as negative results.
17. W.A.P to perform 8-bit addition to consider positive as well as negative results.
18. W.A.P to illustrate the use of interrupts.
19. W.A.P to design hexadecimal and modulo 10 counter.
20. W.A.P to convert a BCD number to binary.
21. W.A.P to convert a binary number to BCD.
22. W.A.P to convert an ASCII character to hexadecimal number.
23. W.A.P to convert a hexadecimal number to ASCII character.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-5253 Subject Title: Internet Programming Lab**

**Class: GIT Semester: 2nd**

**L T P Credits:1**

**0 0 2**

**Objectives**

1. Write programs based upon java concepts.
2. Create animation & events based upon advanced java concepts.
3. Connect an application with database.
4. Develop programs using java collection API as well as java Standard Library.
5. Write, debug & document well structured java application.

**LIST OF PRACTICALS**

1. Write a Program to create the variables of basic types and also show the effect of type

conversions.

1. Write a program to illustrate the behaviour of print () and println () methods.
2. Write a program to convert the given temperature in Fahrenheit to Celsius.
3. Write a program to find all the numbers of and sum of all the integers greater than 100 and less than 200 that are divisible by 7.
4. Write a program to print Floyd’s triangle

1

2 3

4 5 6

8 9 10

11…….15

79……………91

1. Write a program to print multiplication table using does-while loop.
2. Write a program to reverse the digits of a number using while loop.
3. Write a program to print the Fibonacci series.
4. Write a program to compute the area of triangle defined by the class.
5. Write a program to illustrate the concept of constructors.
6. Write a program to illustrate the concept of single inheritance.
7. Write a program to illustrate the use of an array for sorting a list of numbers.
8. Write a program to illustrate the use of some commonly used wrapper class methods.
9. Write a program to illustrate the concept of multiple inheritance using interfaces.
10. Write a program to illustrate the use of Thread class for creating and running threads in an application.
11. Write a program to illustrate the use of yield (), sleep (), stop () methods in Thread class.
12. Write a program to show a simple Hellojava Applet.
13. Write an applet which takes two numbers from the user into each text field box displayed in the applet area and computes the sum of these two numbers and displays the result.
14. Write an applet code that draws three lines, a rectangle, a filled rectangle, a rounded rectangle.

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| **Semester III** |
| **S No** | **Sub Code** | **Subject Title** | **L\*** | **T\*** | **P\*** | **Total Hours** | **Credits** |
| 1 | EV | 6101 | Environmental Science & Engineering | 3 | - | - | 3 | 3 |
| 2 | HU | 6101 | Entrepreneurship & Business Management | 3 | - | - | 3 | 3 |
| 3 | IT | 6101 | Operating System Concepts | 3 | 1 | - | 4 | 4 |
| 4 | IT | 6102 | Data Communication Systems | 3 | 2 | - | 5 | 5 |
| 5 | IT | 6103 | Interactive Computer Graphics | 3 | 2 | - | 5 | 5 |
| 6 | IT | 6104 | Computer Architecture & Organization | 3 | 1 | - | 4 | 4 |
| 7 | IT | 6151 | Operating System Concepts lab | - | - | 4 | 4 | 2 |
| 8 | IT | 6152 | Data Communication Systems lab | - | - | 2 | 2 | 1 |
| 9 | IT | 6153 | Interactive Computer Graphics lab | - | - | 2 | 2 | 1 |
|  |  |  | Total | 18 | 6 | 8 | 32 | 28 |
| 10 | GP | 6151 | General Proficiency | - | - | - |  | 1 |

**EV-6101 ENVIRONMENT SCIENCE & ENGINEERING**

**L T P Credits:3**

**3 0 0**

**Unit –I**

**Introduction:** Definition, scope and importance: Concept of a neat clean environment,Ecology and Environment, Concept of an ecosystem, Its components and their interrelationships, autotrophs and heterotrophs, food chains, food webs and ecological pyramids, energy flow in the ecosystem, biogeochemical cycles, Brief study of, forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystems, The concept of biosphere, ecosystem diversity and biodiversity, Global and national concerns, threats to biodiversity and conservation efforts.

(12 Hrs)

**Unit –II**

**Sustainable development:** The apparent conflict between economic development andsanctity of the environment, Judicious use of resources for their long term viability; forest resources, water resources, mineral resources; food resources, energy resources and land resources, Renewable sources, the practice of 3Rs, Human population growth and its impact on natural resources.

(08 Hrs)

**Unit –III**

**Environmental pollution:** Air pollution, attributes of air environment; major pollutants, theirnatural and anthropogenic sources, effects and mitigation measures

**Water pollution**: attributes of water environment, major categories of pollutants; effects andmitigation measures.

**Land pollution**: Urban and industrial solid wastes and their management.

**Noise pollution**: Measurement, effects and control of noise pollution.

(12 Hrs)

**Unit –IV**

**Sociopolitical issues**: Global concerns, international endeavors and intergovernmentalefforts: climate change, global warming, acid rain, ozone layer depletion, international bodies and protocols, Environmental laws and regulations in India, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

(08 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Fundamentals of Ecology | Odum, E.P. | W.B. Saunders |
| Environmental Engineering | Peary, Rowe, Tchobanoglous | McGraw Hill |
| **Reference Books** |  |  |
| Global Biodiversity Assessment | Heywood and Waston | Cambridge |
| Pollution Control Acts, Rules and Notifications |  | CPCB |

**HU-6101/6201 ENTREPRENEURSHIP & BUSINESS**

**MANAGEMENT**

**L T P Credits-3**

**3 0 0**

**UNIT-I**

**Entrepreneurship:** Definition, Concept, Qualities of an entrepreneur, Need and importanceof small scale industry, Problems of small scale industries, Role of banks and financial Institutions, forms of organizations- sole proprietorship, partnership, private limited & public limited companies.

(11 Hrs)

**UNIT-II**

Generation and screening of project ideas, Project report-Market and demand analysis, Technical Analysis, Financial analysis.

(09 Hrs)

**UNIT-III**

A brief introduction of marketing management, product life cycle, marketing mix, Functions of personnel management, concept of industrial relations, need and scope of financial management, materials management ,tools and techniques of inventory control. Stores and purchase procedure.

(12 Hrs)

**UNIT-IV**

Managerial communication, channels of communication, barriers and making communication effective. Motivation, XY theory, Maslow‘s theory and Herzburg‘s theory, Mc Clelland Theory, leadership styles. Managerial grid, Tasks & responsibilities of professional manager. Management process.

(10 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| Entrepreneurship Development | Vasant Desai | PHI |
| Marketing Management | Philip Kotler | PHI |
| Organizational Behavior | Fred Luthans | TMH |
| Entrepreneurial Development | S.S. Khanka | S. Chand & Company |
| Personnel Management | C.B.Memoria | Himalayas Pub. |
| Entrepreneurship theory, Process, Practice | Kuratko/ Hodgetts | Thomson- South western Singapore |

**IT-6101** **OPERATING SYSTEM CONCEPTS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To make students able to learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system.
2. To provide students knowledge of memory management and deadlock handling algorithms.
3. At the end of the course, students will be able to implement various algorithms required for management, scheduling, allocation and communication used in operating system

**UNIT I**

**Introduction:** What is an Operating System, Simple Monitor, Performance,Multiprogramming, time-sharing, Real time systems, Protection.

**Operating System Services:** Types of services, The User view, The Operating systemView.

(10 Hrs)

**UNIT II**

**File Systems:** File Concept and support, Access and allocation methods, directory systems,File protection.

**CPU Scheduling:** Scheduling concepts and algorithms, Algorithms evaluation and multipleprocessor scheduling.

(12 Hrs)

**UNIT III**

**Memory Management:** Preliminaries, Bare Machine, Resident Monitor, Swapping, Multiplepartitions, Paging, Segmentation, Combined systems.

**Virtual Memory:** Overlays, Demand paging, Performance of demand paging, Pagereplacement, Virtual memory concepts, Page replacement algorithms, Allocation algorithms, and Thrashing.

(13 Hrs)

**UNIT IV**

**Disk Scheduling:** Physical characterization, FCFS scheduling, and Shortest-Seek-Time-First.

**Deadlocks:** The deadlock problem, Deadlock characterization, Deadlock prevention,Deadlock avoidance; Deadlock detection, Recovery from deadlock, and Combined approach to deadlock handling.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Operating System Concepts | Silber Schatz & Galvin | Jonh Wiley |
| An Introduction to Operating System | Deitel H.M. | Addison Wesley |
| **Reference books** |  |  |
| Operating System | Mandinck S.E. | McGraw Hill |
| Operating Systems | Dhamdhere | TMH |

**IT-6102** **DATA COMMUNICATION SYSTEMS**

**L T P Credits-5**

**3 2 0**

**Objectives**

1. To understand the fundamental concepts of computer networking and provide the knowledge of different protocols at different layers of models.
2. To understand the techniques used to share network bandwidth among the multiple users and provide the depth knowledge of DLL fundamentals.
3. Learn how the data is transferred between the computers over the network.

**UNIT I**

**Concepts & Terminology:** Data communication : data representation, Analog versus digitalsignals; Direction of Data flow Analog and digital data transmission, data rate limits, Transmission impairments random & non random, Transmission Media- Guided and unguided media, Line configuration, Topology, Categories of networks, Network Architecture– layered protocol TCP/IP and OSI model.

(12 Hrs)

**UNIT II**

**Data Encoding and Modulation:** Encoding of digital Data: Line coding schemes, Blockcoding, Encoding Analog data into digital signal: Pulse code modulation, sampling rate, Modulation of Digital data: ASK, FSK, PSK, QAM, Bit/baud comparison Modulation of Analog data: AM, FM and PM

(12 Hrs)

**UNIT III**

**Transmission of digital data:** Asynchronous and Synchronous transmission, DTE-DCEinterface, Multiplexing Techniques – FDM: Multiplexing and de-multiplexing process, Applications of FDM, Analog hierarchy, TDM: Time slots and frames, Synchronizing and Bit padding, Statistical TDM, Digital signal service, T lines.

(11 Hrs)

**UNIT IV**

**Data link Control**: Factor Contributing Errors, , Error Control: Stop & wait ARQ, Go back N& Selective ARQ., Error Detection Methods – parity checking, checksum error detection & CRC, Forward Error Correction Method – block parity, Hamming code, Burst Error Correction Method, Flow control : Stop and wait flow control, Sliding window flow control, Data Link protocols – HDLC, CSMA/CD, token bus, token ring & FDDI.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Data Communications Networking | Behrouz A Forouzan | PHI |
| Data and Computer Communication  | William Stalling | Pearson Education |
| **Reference Books** |  |  |
| Data Communication | Prakash C-Gupta | PHI |
| Computer Networks | A. S. Tanenbaum | PHI |

**IT-6103** **INTERACTIVE COMPUTER GRAPHICS**

**L T P Credits-5**

**3 2 0**

**Objectives**

1. To provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations.
2. To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.
3. The computer graphics course prepares students for activities involving in design, development and testing of modeling, rendering, shading and animation.

**UNIT I**

**Overview of graphics systems:** Display devices, physical input and output devices:storage tube graphic displays, Raster Refresh, Plasma Panel Displays, Liquid Crystals.

**Output Primitives:** Point plotting, Line Drawing algorithms–DDA algorithms, Bresenham‘sLine algorithm, Areafilling – Scan Line algorithm, flood-fill algorithm, Circle-Generating algorithms. .

(11 Hrs)

**UNIT II**

**Two-dimensional Transformations** : Basic transformations-translation, scaling, rotation,Matrix representation and homogenous coordinates, composite transformations-scaling relative to a fixed pivot, rotation about a pivot point, general transformation equations, other transformation-reflection, shear.

**Windowing and Clipping Techniques:** Windowing concepts, Clipping algorithms-Lineclipping – Cohen-Sutherland algorithm, Area clipping, Text clipping, Blanking, Windows-to-View port transformation.

(13 Hrs)

**UNIT III**

**Three Dimensional Graphics and Transformations:** Coordinate systems and Displaytechniques, Representations-Polygon surfaces, Curved surfaces-Bezier and B-spline curves, Transformation – translation, scaling rotation, rotation about an arbitrary axis, other transformations-reflections, shear and 3-D viewing projections.

(11 Hrs)

**UNIT IV**

**Hidden-Surface and Hidden-Line Removal:** Back-face removal, Depth-buffer method,Scan-line method, Depth-Sorting method i.e. Painter‘s algorithm, Hidden-Line elimination.

**Shading (Overview):** Modeling Light intestines diffuse reflections; diffuse reflectors,Specular reflectors, refracted light & reture surface patterns.

**Half toning, Surface Shading methods (overview):** Constant Intensity method, GouraudShading, Phong – Shading.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Computer Graphics | Hearn. D & MP Baker | Prentice Hall |
| Principle of Interactive Computer Graphics | Newman W.M | McGraw Hill |
| **Reference Books** |  |  |
| Computer Graphics - A Programming Approach | Harrington. S. | McGraw Hill |
| Fundamentals of Computer Graphics | Foley J.D et al. | Addison Wesley |

**IT-6104** **COMPUTER ARCHITECTURE AND ORGANIZATION**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Study basic computer organization, design and micro-operations.
2. Understanding of CPU functioning and computer arithmetic.
3. Learning various methods and techniques of memory organization.

**UNIT I**

**Design Methodology:** System design, Design levels- Gate level, Register level, Processorlevel.

**Register Transfer and Micro-operations:** Register transfer language, bus and memorytransfers, arithmetic, logic and shift micro-operations. Case study of 8085 instruction set, Design of arithmetic logic shift unit.

(10 Hrs)

**UNIT II**

**Basic Computer Organization & Design:** Instruction codes, common bus system, timingand control, instruction cycle, memory reference instructions, I/O instructions, Design of basic computer, Design of accumulator logic.

**Control Design:** Basic concepts, Hardwired control, Micro programmed control: Controlmemory, address sequencing. Design of control unit: Microprogram sequencer.

(13 Hrs)

**UNIT III**

**Central Processing Unit**: Introduction, General register organization, stack organization,Instruction formats Addressing modes, Data transfer & manipulation, Program Control, RISC & CISC Characteristics.

**Computer Arithmetic:** Unsigned notation, signed notation, BCD, addition, subtraction,multiplication and division, Floating point numbers.

(13 Hrs)

**UNIT IV**

**Memory Organization:** Memory hierarchy, Main memory, Auxiliary memory, Associativememory, Cache memory, Virtual memory, Input-Output Organization, I/O interface, Modes of transfer, Priority interrupts, DMA, I/O processor.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Computer System organization and J.D. Architecture | Carpinelli | Pearson Edu. |
| Computer System Architecture | Morris Mano | PHI |
| **Reference Books** |  |  |
| Advanced Computer Architecture | Kai Hwang | TMH |
| Computer Architecture & Organization | J.P Hayes | TMH |
| Computer Organization and Architecture | William Stallings | PHI |

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-6151 Subject Title: Operating System Concepts Lab**

**Class: GIT Semester: 3rd**

**L T P Credits: 2**

**0 0 4**

**Objectives**

1. To make students able to implement CPU scheduling algorithms and Bankers algorithm used for deadlock avoidance and prevention.
2. Students will also be able to implement page replacement and memory management algorithms.

**LIST OF PRACTICALS**

1. WAP to implement following CPU scheduling algorithms:
* FCFS
* SJF
* Priority
* Round Robin
1. WAP to implement MVT and MFT.
2. WAP to implement Bankers algorithm for deadlock avoidance.
3. WAP to implement Bankers algorithm for deadlock prevention.
4. WAP to implement following page replacement algorithms:
* FIFO
* LRU
1. WAP to implement paging technique of memory management.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-6152 Subject Title: Data Communication Systems Lab**

**Class: GIT Semester: 3rd**

**L T P Credits: 1**

**0 0 2**

**Objectives**

1. To study transmission media and to realize and compare different LAN topologies.
2. To implement and compare the performance of Data Link Layer protocols.
3. The objective of this Lab is to understand the use of transmission media, network topologies and data link layer protocols.

**LIST OF PRACTICALS**

1. Study of transmission media’s e.g. wired, wireless etc.
2. Realization and overview of different LAN topologies.
3. To connect two personnel computer with straight thru and cross over twisted pair.
4. Overview and comparison of different LAN technologies e.g. Ethernet, token ring, wifi, wiMax.
5. Implementation of data link layer protocols:
6. Stop & Wait,
7. Go back by N,
8. Selective Repeat.
9. Comparison of performance of all data link layer protocols.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-6153 Subject Title: Interactive Computer Graphics Lab**

**Class: GIT Semester: 3rd**

**L T P Credits: 1**

**0 0 2**

**Objectives**

1. To implement various graphics drawing algorithms, 2D-3D transformations and clipping techniques

**LIST OF PRACTICALS**

1. Introduction to computer Graphics.
2. W.A.P to draw a Line,circle,ellipse using Bresenham Line Drawing Algorithm
3. W.A.P to draw a line using DDA Algorithm
4. W.A.P to draw circle using general formula.
5. W.A.P to draw a circle using the midpoint circle Algorithm
6. W.A.P to fill a circle with any colour using “Boundary Fill” Algorithm.
7. W.A.P to fill a square with multiple colour edges using any colour using “Flood Fill” Algorithm.
8. W.A.P to implement Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
9. W.A.P to implement Composite 2D Transformations.
10. W.A.P to implement Cohen Sutherland 2D line clipping.
11. W.A.P to implement Sutherland – Hodgeman Polygon clipping Algorithm
12. W.A.P to implement three dimensional transformations - Translation, Rotation, Scaling, Shearing.
13. W.A.P to implement Composite 3D transformations

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| **Semester IV** |
| **S No** | **Sub Code** | **Subject Title** | **L\*** | **T\*** | **P\*** | **Total Hours** | **Credits** |
| 1 | AM | 6201 | Numerical Methods | 3 | - | - | 3 | 3 |
| 2 | IT | 6201 | Relational Database Management System | 3 | 2 | - | 5 | 5 |
| 3 | MS | 6201 | Material Science & Engineering | 3 | - | - | 3 | 3 |
| 4 | IT | 6202 | Computer Networks & Security | 3 | 2 | - | 5 | 5 |
| 5 | IT | 6203 | Multimedia Technology | 3 | 2 | - | 5 | 5 |
| 6 | OP | \*\*P62\*\* | Open Elective | 3 | - | - | 3 | 3 |
| 7 | AM | 6251 | Numerical Methods lab | - | - | 2 | 2 | 1 |
| 8 | IT | 6251 | Relational Database Management System lab | - | - | 2 | 2 | 1 |
| 9 | MS | 6251 | Material Science & Engineering Lab | - | - | 2 | 2 | 1 |
| 10 | IT | 6252 | Computer Networks & Security lab | - | - | 2 | 2 | 1 |
|  |  |  | Total | 18 | 6 | 8 | 32 | 28 |
| 11 | GP | 6251 | General Proficiency | - | - | - |  | 1 |

**AM-6101/6201 NUMERICAL METHODS**

**L T P Credits-3**

**3 0 0**

**UNIT-I**

Errors in arithmetic operations and functions, Round-off error, truncation error, Absolute error, Relative error, Percentage error, Principles of equal effect, Significant digits, Intermediate value property, Bisection method, Method of false position, Secant Method, Newton-Raphson method, Iterative method, Convergence of these methods.

(13 hrs)

**UNIT-II**

Gauss Elimination method (with and without partial pivoting), Gauss-Seidel, Jacobi‘s methods, Triangularization method, Eigen value problem, Rayleigh‘s power method, Finite differences- forward, backward and central differences, Shift and averaging operators.

(11 hrs)

**UNIT-III**

Newton‘s forward, backward and divided difference interpolation formulae, Lagrange‘s formula, Gauss forward and backward difference interpolation formulae, Spline interpolation

– quadratic and cubic, Numerical differentiation using Newton‘s forward and backward difference formulae.

(12 hrs)

**UNIT-IV**

Numerical integration – Trapezoidal rule, Simpson‘s one third and three-eighth rules, Romberg‘s integration, Error in integration, Taylor series method, Picard‘s method, Euler method, Modified Euler‘s method, Runge-Kutta methods (upto fourth order) for solution of ODE of first order.

(12 hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Introductory Method of Numerical Analysis | S.S. Sastry |  PHI |
| Applied Numerical Analysis | Gerald Wheatley | Pearsons Education |
| **Reference Books** |  |  |
| Numerical Methods for Sc. and Engg. Computation | M.K. Jain, S.R.K. Iyengar and R.K. Jain |  |
| Numerical Computational Mathematics | P.B Patial & U P Verma | Narosa |
| J.H. Mathew | Numerical Methods for Maths., Science and Engg | PHI |

**IT-6201 RELATIONAL DATABASE MANAGEMENT SYSTEM**

**L T P Credits-5**

**3 2 0**

**Objectives**

1. Gain a good understanding of the architecture and functioning of database management systems as well as associated tools and techniques, principles of data modeling using entity relationship and develop a good database design and normalization techniques to normalize a database.
2. Understand the use of structured query language and its syntax, transactions, database recovery and techniques for query optimization.
3. Acquire a good understanding of database systems concepts and to be in a position to use and design databases for different applications.

**UNIT-I**

**Introduction to Database Concepts:** Difference between database and non databaseSystem, data independence, 3 level architecture, components of a database system, example of database transaction, processing, advantages and disadvantages of Database system.

**Data Modeling:** Data associations and Data relationships, ER Model; Design, issues,Mapping constraints, keys, ER diagram, weak entity sets, extended ER features, Design of an ER Database schema, Reduction of an ER Schema to tables.

(11 Hrs)

**UNIT-II**

**Database Design:** Integrity Constraints: Domain constraints, Referential integrity, entityintegrity, functional dependencies, pitfully in Relational database design, Decomposition,

Normalization using FD‘s MVD‘s and JD‘s Domain key normal form, Denormalization, Approaches to database design.

(12 Hrs)

**UNIT-III**

**Relation Algebra, SQL, Relational Calculus & Query Optimization:** Relational Algebra,Relational Calculus, Query by Example, SQL, Introduction, overview of optimization process, expression transformation, Database statistics, A divide and conquer strategy, Implementing the relational operators.

(12 Hrs)

**UNIT-IV**

**Transaction processing:** Transaction Concept, Transaction state, Implementation ofAtomicity, and durability, concurrent execution, serializability, Recoverability, implementation of isolation, transaction definition in SQL.

**Advanced Topics in DBMS:** Object Oriented Databases, Deductive Databases, Internetand DBMS, Multimedia Databases, Digital libraries, Mobile Databases.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Database system concepts | Korth & Silberchatz, | McGraw Hill |
| Introduction to Database system | Date, C.J. | Addison Wesley |
| **Reference Books** |  |  |
| Fourth Generation Languages | Martin, James | Prentice Hall |
| Introduction to Database Management Systems | Atul Kahate | Pearson Education |

**MS-6101/6201 MATERIALS SCIENCE AND ENGINEERING**

**L T P Credits:3**

**3 0 0**

**UNIT - I**

**Introduction:** A brief Introduction to material science, classification of engineering materials(metals, alloys, ceramics, composites and polymers), Properties and characteristics of materials, Material structure.

(04 Hrs)

**Crystal Structure:** Space lattices, Unit cell, primitive cell, Bravais lattice, Atomic packingfactor, Miller Indices, directions and planes in crystal lattice (cubic and hexagonal only), distribution of atoms in lattice planes (in cubic crystal only), Important structures (NaCl, CsCl, Diamond and ZnS), structure determination; X-ray diffraction, Neutron and electron diffraction.

(06 Hrs)

**UNIT - II**

**Imperfections in Crystals:** Point imperfections, Frenkel, and Schottky defects and theirequilibrium concentration determination, Color centres, types of color centres, generation of color centres, Edge and screw dislocation, Burger vector, Surface defects.

(04 Hrs)

**Equilibrium diagrams and phase transformations:** Phase rule, Hume-Rothery rules forsolid solutions, cooling curves for solidification of pure metals and alloys, unary system, binary system, Invariant reactions in binary system, iron-carbon equilibrium diagram, Nucleation and growth of crystal. (Homogeneous case only), application of phase diagrams.

(06 Hrs)

**UNIT - III**

**Band Theory of solids:** Concept of energy bands, Bloch theorem, Electron in a periodicfield of crystal (The Kronig – Penny Model) and its applications in metals, Construction of Brillouin Zones, reciprocal lattice, effective mass of an electron, Free electron model, overlapping of energy bands, Hall effect.

(06 Hrs)

**Dielectric materials:** Introduction of dielectric materials, Polarization, Different types ofpolarization, Electronic, ionic, orientational and space charge polarization, polarizability, Clausius-Mossotti relation, temperature and frequency dependence of polarizability, dielectric breakdown, measurement of dielectric properties, Dielectric constant, Dielectric loss, ferroelectric and piezoelectric materials, examples of materials and their applications.

(06 Hrs)

**UNIT - IV**

**Magnetic Materials:** Terminology and classification of engineering materials, Type ofmagnetism (dia, para, ferro, ferri and anti ferromagnetisms), Theories of para dia and ferromagnetic materials, magnetic anisotropy and magnetrostriction, magnetic domains, hard and soft magnetic materials, ferrites and their applications, magnetic recording materials, magnetic memories, Ferrite core memories.

(06 Hrs)

**Nano-materials:** Fundamentals of nanomaterials and nanotechnology, nano particles,properties of nanomaterials, applications of nanomaterials

(04 Hrs)

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| **RECOMMENDED BOOKS:** |  |
| **Title** | **Author** |
| **Text Books** |  |
| Materials Science | Raghvan |
| Science of Engineering Materials | Srinivasan & Srivastava |
| Materials Science and Engg.: An Introduction | Callister JR |
| The Science and Engineering of Material | Askeland & Phule |

**IT-6202 COMPUTER NETWORKS AND SECURITY**

**L T P Credits-5**

**3 2 0**

**Objectives**

1. To explain how communication works in computer networks and to understand the basic terminology of computer networks
2. To explain the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.
3. To understand design issues in Network Security and to understand security threats, security services and mechanisms to counter them.

**UNIT-I**

**Basics of Computer Networks:** Need & Evolution of Computer Networks, Description ofLAN, MAN, WAN and Wireless Networks, OSI and TCP/IP Models with Description of Data Encapsulation & Peer to Peer Communication, Comparison of OSI and TCP/IP. Basic Terminology of Computer Networks - bandwidth, physical and logical topologies, media – 10base 2, 10base 5, 10base T, 100baseTX, 100base FX, 1000baseLX and wireless, LAN & WAN Devices – Router, Bridge, Ethernet Switch, HUB, Modem CSU/DSU, Representation of one Bit on Physical Media i.e. in wired network, optical network and wireless N/W

(11 Hrs)

**UNIT-II**

**Data Link Layer:** LLC and MAC Sub Layer, MAC Addressing Layer 2 Devices, Framing,Error Control and Flow Control, Error Detection & Correction - CRC code block parity & checksum, Elementary Data Link Protocol, Sliding Window Protocol, Channel Allocation Problem – static and dynamic, Multiple Access Protocol – ALOHA, CSMA/CD, token bus, token ring, FDDI.

(12 Hrs)

**UNIT-III**

**Network Layer:** Segmentation and Autonomous system, Path Determination, NetworkLayer Addressing, Network Layer Data Gram, IP Address Classes, Subneting – sub network, subnet mask, Routing Algorithm – optimality principle, shortest path routing, hierarchical routing, broadcast routing, multicast routing, routing for mobile host, Concatenated Visual Circuits, Tunneling, Fragmentation, Firewall, Internet Control Protocol

– ICMP, ARP, RARP, Internet Multicasting, Mobile IP, IPv6, Routing Protocol – RIP, IGRP, USPF and EGRP, Network layer in ATM Networks.

(13 Hrs)

**UNIT-IV**

**User Support Layers:** Design Issues, Layer 4 Protocol - TCP & UDP, Three-wayHandshake Open Connection, ATM AAL Layer Protocol, Application layer Protocol - TELNET, FTP, HTTP, SNMP. Introduction to security issues – cryptography, message security, digital signature, firewalls, VPN, and security protocols: IPSEC

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Computer Networks | Tanenbaum | PHI |
| Data communication and networking B. A. | Forouzan | Tata Mcgraw-Hil. |
| **Reference Books** |  |  |
| Computer Networks and Their Protocols | Darix | DLA Labs |
| Computer Communication & Networks | Freer | East-West-Press |

**IT-6203 MULTIMEDIA TECHNOLOGY**

**L T P Credits-5**

**3 2 0**

**Objectives**

1. To understand about various latest interactive multimedia devices, the basic concepts about images and image formats.
2. To understand about data compression techniques, image compression techniques like JPEG, video compression techniques like MPEG, and the basic concepts about animation.
3. To develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology..

**UNIT-I**

**Introduction:** Motivation Overview, Evolution of Multimedia, Structure and components ofMultimedia. Application Domains, Internet and Multimedia, Multimedia and Interactivity, multimedia devices CD- Audio, CD-ROM, CD-I, LANs and multimedia; internet, Primary User-Interface Hardware: Mouse. Keyboard, Joystick. Primary Visual Interface Items: Window, Buttons, Textbox, Icons. Hypertext, Hypermedia, Multimedia

(10 Hrs)

**UNIT-II**

**Image & Graphics:** Principles of raster graphics, Computer Visual Display concepts,Resolution, Computer color models, Digital image Representation and formats, overview of other image file formats as GIF, TIFF, BMP, PNG etc

**Data Compression & Standards:** Text compression, image compression, various methodsof compressions, Run Length coding, Huffman Coding, LZW Encoding, JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance.

(13 Hrs)

**UNIT-III**

**Audio & Video:** Digital representation of sound; method of encoding the analog signals;transmission of digital sound; Principles Broadcast standards , IDTV and HDTV principles, MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; musical instrument digital interface(MIDI); MPEG motion video compression standard;

**Animation:** Animation principles, Survey of animation tools, various animation effects.

(12 Hrs)

**UNIT-IV**

**Synchronization:** Temporal Dependence in Multimedia presentation, Inter-object and Intra-object Synchronization, Time Abstraction for authoring and visualization, Reference Model and Specification.

**Application Development:** Product development overview, Life cycle Models, HumanRoles and Teamwork, Product Planning, Basic Authoring Paradigms: Story Scripts, Authoring Metaphors and authoring languages, Content Analysis: Message, platform, Metaphor and Navigation, cost-quality tradeoffs, Intellectual Property Right and Copyright issues.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Multimedia Systems Design | P.K. Andleigh and K. Thakrar | Prentice Hall PTR |
| Multimedia Computing, Communications and Applications | Ralf Steinmetz | Prentice Hall |
| **Reference Books** |  |  |
| Multimedia Systems | John .F. Koegel | Buford |
| An introduction to Multimedia | Villamil & Molina | Mc Milan |
| Multimedia: Sound & Video | Lozano | PHI |
| Multimedia on the PC | Sinclair | BPB |
| Multimedia: Making it work | Tay Vaughan | TMH. |
| Multimedia in Practice | Jeff Coate Judith | PHI. |
| Multimedia Systems | Koegel | AWL |
| Multimedia Communications | Halsall & Fred | AWL. |

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-6251 Subject Title: RDMS Lab**

**Class: GIT Semester: 4th**

**L T P Credits: 1**

**0 0 2**

**Objectives**

1. Understand, analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.
2. Design different views of tables for different users and to apply embedded and nested queries.
3. Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.

**LIST OF PRACTICALS**

1. Introduction to SQL along with various data types.
2. Introduction to Data Definition commands: Create, Alter, Drop, Rename, Truncate
3. Introduction to various constraints: Primary key, Foreign Key, Check, Unique, Null, Not null, Default
4. Introduction to Data Manipulation Commands: Insert, Update, Delete
5. Introduction to Data Control Commands: Grant, Revoke
6. Introduction to Transaction Control Commands: Commit, Rollback
7. Introduction to nested & join queries: Nested queries, Inner join, Left join, Right join, Full join, Outer join
8. Introduction to views.
9. Given the relations. Solve the following queries:

Employee (person-name, street, city)

Works (person-name, company-name, salary)

Company (company-name, city)

Manages (person-name, manager-name)

* 1. Find the names of all employees who work for First Bank Corporation.
	2. Find the names and cities of residence of all employees who work for First Bank Corporation.
	3. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000 per annum.
	4. Find the names of all employees in this database who live in the same city as the company for which they work.
	5. Find the names of all employees who live in the same city and on the same street as do their managers.
	6. Find the names of all employees in this database who do not work for First Bank Corporation.
	7. Find the names of all employees who earn more than every employee of Small Bank Corporation.
	8. Assume the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: MS-6251 Subject Title: Material Science Lab**

**Class: GIT Semester: 4th**

**L T P Credits: 1**

**0 0 2**

**LIST OF PRACTICALS**

1. To study the B-H curves of different materials using B-H curve tracer.
2. To determine the stefan’s Constant using Stefan’s Constant kit.
3. To find the resistivity of a given semiconductor material using Four Probe Method.
4. To find the Curie temperature of the given Ferroelectric Material.
5. To study the creep nature in metallic wires at room temperature.
6. To calculate the Dielectric constant of the given Dielectric Material.
7. To find the mobility and carrier concentration in a semiconductor sample using Hall effect experiment.
8. To find the Curie temperature of the given Ferrite Material.
9. To find the Capacitance and permittivity of the given material.
10. To study the equilibrium phase diagram of Pb-Sn alloy by direct cooling curves methods
11. To prepare a metallic sample and measure the grain size using the metallurgical Microscope.
12. To study the elastic behaviour of solids using composite Piezoelectric Oscillator.
13. To obtain dispersion relation in case of mono atomic and diatomic lattice.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-6252 Subject Title: Computer Networks and Security lab**

**Class: Semester: 4th**

**L T P Credits: 1**

**0 0 2**

**Objectives**

1. To make students aware about various types of cables used in guided media like coaxial cable, optical fiber cable, twisted pair cables and its categories.
2. To understand the working of LAN Card, Hub, TELNET and to understand the working difference between straight cable and cross over cable.
3. To be able to analyze different protocols used for packet communication like ALOHA Protocol.

**LIST OF PRACTICALS**

1. Introduction to LAN with its cables, connectors and topologies.
2. To connect two personnel computer with straight thru and cross over twisted pair.
3. Introduction to motherboard and installation of LAN card.
4. Case study of Ethernet (10 base 5,10 base 2,10 base T).
5. Create a simple network with two PCs using a hub

 a) Identify the proper cable to connect the PCs to the hub .

 b)Configure workstation IP address information .

 c) Test connectivity using the Ping command

1. Installation and working of Telnet.
2. Implement the ALOHA protocol for packet communication between a number of nodes connected to a common bus.
3. Implement the ALOHA protocol for packet communication between a number ofb Nodes connected to a star topologies.

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| **Semester V** |
| **S No** | **Sub Code** | **Subject Title** | **L\*** | **T\*** | **P\*** | **Total Hours** | **Credits** |
| 1 | IT | 7101 | Software Project Management | 3 | 1 | - | 4 | 4 |
| 2 | IT | 7102 | Web Application Engineering | 3 | 1 | - | 4 | 4 |
| 3 | IT | 7103 | Enterprise Resource Planning | 3 | 1 | - | 4 | 4 |
| 4 | IT | 7104\* | Elective-I | 3 | 1 | - | 4 | 4 |
| 5 | IT | 7105\* | Elective-II | 3 | 1 | - | 4 | 4 |
| 6 | IT | 7151 | Software Project Management lab | - | - | 2 | 2 | 1 |
| 7 | IT | 7152 | Web Application Engineering lab | - | - | 2 | 2 | 1 |
| 8 | IT | 7160 | Seminar & Group Discussion | - | - | 2 | 2 | 1 |
| 9 | IT | 7170 | Minor Project | - | - | 4 | 4 | 2 |
|  |  |  | Total | 15 | 5 | 10 | 30 | 25 |
| 10 | GP | 7151 | General Proficiency | - | - | - |  | 1 |
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| **ELECTIVE-I** |
|  | **Sub Code** | **(any one of the following)** | **L** | **T** | **P** | **Credits** |
| 1 | CS | 7104A | Advance Database Management Systems | 3 | 1 | - | 4 |
| 2 | CS | 7104B | Cryptography | 3 | 1 | - | 4 |
| 3 | IT | 7104A | Object Oriented Modeling and Design | 3 | 1 | - | 4 |
| 4 | CS | 7104D | Embedded Systems | 3 | 1 | - | 4 |
| 5 | CS | 7104E | Natural Language Processing | 3 | 1 | - | 4 |
|  |
| **ELECTIVE-II** |
|  | **Sub Code** | **(any one of the following)** | **L** | **T** | **P** | **Credits** |
| 1 | CS | 7105A | Operating System Internals | 3 | 1 | - | 4 |
| 2 | IT | 7105A | Distributed Computing | 3 | 1 | - | 4 |
| 3 | CS | 7105B | Real Time Systems | 3 | 1 | - | 4 |
| 4 | IT | 7105B | Client Server Architecture | 3 | 1 | - | 4 |
| 5 | CS | 7105C | Fault Tolerant Computing | 3 | 1 | - | 4 |
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**IT-7101 SOFTWARE PROJECT MANAGEMENT**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Carry out an evaluation and selection of projects against strategic, technical and economic criteria and use a variety of cost benefit evaluation techniques for choosing among competing project proposals. Approach project planning in an organized step by step manner and select an appropriate process model produce an activity plan for a project.
2. Identify project risks, monitor and track project deadlines and produce a work plan and resource schedule.
3. Plan the evaluation of a proposal or a product and manage people in software environments. Understand the importance of teamwork and quality management in software project management. Apply these project management tools and techniques in a diversity of fields such as new product and process development, construction, information technology, health care, and applied research.

**UNIT-I**

**Introduction to Software Project Management (SPM):** Definition of a Software Project (SP), SPVs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

**Stepwise Project Planning:** Introduction, selecting a project, identifying project scope andobjectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

(10 Hrs)

**UNIT-II**

**Project Evaluation & Estimation:** Cost benefit analysis, cash flow forecasting, cost benefitevaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, water fall-, V-process-, spiral- models, Prototyping, delivery, Albrecht function point analysis.

**Activity Planning & Risk Management:** Objectives of activity planning, project schedule, projectsand activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project, precedence networks.

(13 Hrs)

**UNIT-III**

**Risk Management:** Introduction, the nature of risk, managing risk, risk identification, risk analysis,reducing the risks, evaluating risks to the schedule, calculating the z values.

**Resource allocation &Monitoring the control:** Introduction, the nature of resources, identifyingresource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

**Monitoring the control:** Introduction, creating the frame work, collecting the data, visualizingprogress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

(13 Hrs)

**UNIT-IV**

**Managing contracts and people:** Introduction, types of contract, stages in contract, placement,typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises..

**Software quality:** Introduction, the place of software quality in project planning, the importance ofsoftware quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.

(12 Hrs)

Study of Any Software Project Management software viz Project 2000 or equivalent

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Software Project Management | Bob Hughes and Mike Cotterell | TMH |
| Software Project Management | Pankaj Jalote | Pearson Edu. |
| **Reference Books** |  |  |
| Software Project Management | Walker Royce | Addison Wesley. |

**IT-7102 WEB APPLICATION ENGINEERING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand, analyze and apply the role languages like HTML, CSS, XML, JavaScript and protocols in the workings of web and web applications.
2. To understand about network and security programming using Java and know about the application of dynamic page functionality in web pages using CGI, Servlets, JSP, ASP.
3. To create and communicate between client and server using Java and create a good, effective and dynamic website.

**UNIT-I**

**The Internet:** Basics of Internet, Addresses and names for the Internet, Web Objects, andSites, E-mail, World Wide Web, File Transfer, Telnet and Use net, Gopher, Wais, Archie and Veronica, Internet Chat.

**Web Servers Browsers, and Security:** Web and Proxy Servers The fast ready connectionson the Web, Web browsers Netscape Communication Suite, Microsoft Internet explorer, the Virus menace in the Internet , Firewalls, Data Security.

(10 Hrs)

**UNIT-II**

**Creating a Website and the Markup languages:** The Art of creating a Website, Hypertextand HTML , HTML document features, Document Structuring Tags in HTML, Special Tags in HTML, Dynamic HTML, XML and Microsoft front page.

(13 Hrs)

**UNIT-III**

**Searching and Web – Casting Technologies:** Introduction, Search Engine, Search Tools,Getting found or hidden data, Channels and Channels Push Technology.

**Network and Security programming:** Network Programming, URL classes, Socketclasses, Programming for security.

(12 Hrs)

**UNIT-IV**

**The Dynamic Functionality in Web Pages:** CGI, CGI Script Communication CGI scriptlanguages, A Scripting, Language , Java Script, Dynamic Page Functionality Using servlets and JSPs, ASPS, COMs , DCOMSs.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Internet and Web Technology | S. Raj Kamal | TMH |
| Web Technology | A.S. Godbole & Kahate | TMH |
| **Reference Books** |  |  |
| The Complete Reference | Patrick Naughton | TMH |
| Java Programming | Balagurusamy | BPB. |
| Java 2 Swing, Servlets, JDBC and Java Beans Programming | Steven Holzner | Black book, IDG Books |

**IT-7103 ENTERPRISE RESOURCE PLANNING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To make students able to learn fundamental concepts of ERP system and ERP related technologies.
2. To provide students knowledge of different ERP modules and manufacturing perspectives of ERP.
3. At the end of the course, students will be able to use ERP system in different business organizations by having knowledge of latest scenario of ERP market in e-business.

**UNIT-I**

**Introduction to ERP:** Evolution of ERP, What is ERP, Reasons for the growth of the ERPmarket, Advantages of ERP, Reasons of Failure.

**Enterprise- An overview:** Integrated Management information, Business Modeling,Integrated Data Model.

(11 Hrs)

**UNIT-II**

**ERP and Related Technologies:** BRP (Business Process Reengineering), MIS(Management Information System), DSS (Decision Support System), EIS (Executive Information system), OLAP, Supply Chain Management.

(12 Hrs)

**UNIT-III**

**A Manufacturing Perspective:** ERP, CAD/CAM, MRP (Material Requirement Planning),Bill of Material, Closed loop MRP, MRP-II, DRP (Distributed Requirement Planning), Product Data Management, Data Management.

(12 Hrs)

**UNIT-IV**

**Benefits of PDM:** ERP Modules, Finance, Plant Maintenance, Quality Management,Material Management.

**ERP Market:** Benefits of ERP, SAP, BAAN, Oracle Corporation, People Soft, ERPImplementation Life Cycle

**Vendors, Consultants & Users**: In-house Implementation–pros & cons, Vendors,Consultants, End-users.

Future Directions in ERP and ERP Case Studies

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Enterprise Resource Planning | Alexis Leon | TMH. |

**CS-7104A ADVANCE DATABASE MANAGEMENT SYSTEMS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery.
2. To understand the introductory concepts of some advanced topics in data management like distributed databases, data warehousing, deductive databases and be aware of some advanced databases like partial multimedia and mobile databases.
3. To understand the difference between DBMS and advanced DBMS and use of advanced database concepts and become proficient in creating database queries.

**UNIT-I**

**Introduction of DBMS**: Types of DBMS and their advantages and disadvantages, Introduction of RDBMS, Types of relational query language, Normalization, Query optimization.

(12 Hrs)

**UNIT-II**

**Database protection in RDBMS:** Integrity, Concurrency control, Recovery.

**Distributed Database:** Concepts, structure, trade-offs.

**Methods of data distribution:** Fragmentation, replication, design & advance concepts of DDBMS.

(12 Hrs)

**UNIT-III**

**Introduction to object oriented databases**, Deductive databases.

**Data warehousing Concepts:** Architecture, Data-flows, Tools & Technologies, Data Marts.

(12 Hrs)

**UNIT-IV**

Data Mining & Online Analytical Processing, Spatial & Multimedia databases, Mobile Computing & Mobile Databases.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Fundamentals of Database Systems | Elmasri, Navathe | Pearson Education |
| Database Concepts | Henry F. Korth, A Silberschatz | Tata Mc Graw Hill |
| **Reference Books** |  |  |
| Database Systems | Thomas Conolly, Carolyn Begg | Pearson Education |

**CS-7104B CRYPTOGRAPHY**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. This course builds on the overview about information security, which includes an overview of public and secret key cryptosystems.
2. Comprehend and apply authentication services and mechanisms.
3. On completion of this course students will be able to apply the knowledge and skills obtained to study further concepts in information security.

**UNIT-I**

**Introduction**: Terminology: Security, Security Attacks, Security Services, Security Mechanisms, OSI Security Architecture, A Model for Inter-network Security, Internet Standards.

(12 Hrs)

**UNIT-II**

**Symmetric Ciphers:** Symmetric Cipher model, substitution techniques, Transposition techniques, Rotor machines, Steganography, Block Cipher principles, Data Encryption standard, Strength of DES, Differential and Linear Crypto-analysis, Block Cipher Design principles

**Advanced Encryption Standard:** Evaluation Criteria for AES, The AES Cipher, Multiple Encryption, Triple DES, Block Cipher modes of Operation.

(12 Hrs)

**UNIT-III**

**Key Encryption and Hash functions:** Public Key Cryptography Principles, Public-Key Cryptography Algorithms, Key Management, Diffie-Hellman Key exchange, Digital Signatures, Digital signature standard, Authentication protocols, Cryptography and Message Authentication, Approaches to Message Authentication, Secure Hash Functions and HMAC.

(12 Hrs)

**UNIT-IV**

**Network Security Applications:** Authentication Applications, Kerberos, X.509 Directory Authentication Service, Public Key Infrastructure, Kerberos Encryption Techniques Electronic Mail Security, Pretty Good Privacy (PGP), S/MIME, Introduction to Firewalls.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Cryptography and Principles and practices, Network Security | William Stallings | PHI. |
| Network Security Essentials | William Stallings | PHI. |
| **Reference Books** |  |  |
| Computer Networks | A.S. Tanenbaum | PHI |

**IT-7104A OBJECT ORIENTED MODELING AND DESIGN**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the concept of object-oriented development, and create a static object model and a dynamic behavioral model and a functional model of the system.
2. To understand the approaches to system design and object design, and the techniques of translating design to implementation.
3. To implement the object-oriented modeling and design patterns to provide solutions to the real-world software design problems.

**UNIT I**

**Object oriented concept:** Object Oriented Concept- Object Oriented Development and Themes, Object Oriented Modeling Techniques – object model, dynamic model, functional model, and relationship among model.

**Object Modeling**: Objects & Classes, Object Diagram, Attributes, Operation and Methods, Link and Association, Advanced Link Association Concepts - roll names, ordering, qualification, aggregation, generalization and inheritance, overriding features, Advance Object Modeling – aggregation vs. association, aggregation vs. generalization, propagation of operation, abstract classes, overriding operation, multiple inheritance, metadata, candidate keys, constraints.

(13 Hrs)

**UNIT II**

**Dynamic Modeling:** Events and States, Operations, Nested State Diagram, Advance Dynamic Modeling Concepts, Relation of Object and Dynamic Model.

**Functional Modeling** – Functional Model, Data Flow Diagrams, Specifying Operation, Constraints, Relation of Functional to Object and Dynamic Models.

(10 Hrs)

**UNIT III**

**System Design –** Overview of System Design, Breaking System into Subsystem, Identifying Concurrency, Allocating Subsystem to Processors and Tasks, Management of Data Stores, Handling Global Resources, Handling Boundary Conditions, Common Architecture Frameworks.

**Object Design –** Designing Algorithms, Design Optimization, Implementation of Control, Adjustment of Inheritance, Design of Association, Object Representation & Comparison of Design Methodologies – SA/SD, OMT and JSD.

(13 Hrs)

**UNIT IV**

From Design to Implementation, Object oriented programming style – reusability, extensibility, robustness, Translating Design to Implementation – class definition, creating objects, calling operation, using inheritance, implementing associations, Object Oriented Language Features.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Object Oriented Modeling & Design | James Rumbaugh  | PHI |
| Object Oriented Software construction | Bertrand Meyer | PHI |
| **Reference Books** |  |  |
| Object Oriented Programming | Brad J.CoX,  | Addison Wesley |

**CS-7104D EMBEDDED SYSTEMS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To introduce the embedded Hardware and Interfacing.
2. To make the students familiar with software development & tools for embedded systems.
3. The objective of the course is to cover the Hardware Design, Software Development & RTOS for the Embedded Systems.

**UNIT-I**

**Introduction Review of Embedded Hardware:** Terminology, Gates, Timing Diagram, Memory, Microprocessor Buses, Direct Memory Access, Interrupts, Built instructions on the Microprocessor. Conventions used on Schematic, Interrupts, Microprocessor Architecture, Interrupt Basic, Shared Data Problem,Interrupt Latency.

(12 Hrs)

**UNIT-II**

**PIC Micro controller & Interfacing:** Introduction, CPU Architecture, Registers, Instruction Sets, Addressing Modes, Programs, Interfacing Methods, Parallel I/O Interface, Parallel Port Interface, Memory Interfacing, High Speed I/O Interfacing, Interrupts – Interrupt Service Routine – features of Interrupts – Interrupt vector & Priority, Timing Generation & Measurements, Input Capture, Output Compare, Frequency Measurement, Serial I/O Device RS232, RS845, Analog Interfacing, Applications.

(12 Hrs)

**UNIT-III**

**Software Development & Tools:** Embedded System Evolution Trends, Round – Robin, Robin with Interrupts, Function Scheduling architecture, Algorithms, Introduction to assembler, Compiler and Cross compilers and Integrated Development Environment IDE, Object Oriented Interfacing, Recursion, Debugging Strategies, Simulators.

(12 Hrs)

**UNIT-IV**

**Real Time Operating Systems:** Task And Task States, Tasks and Data, Semaphores and shared data, operating system services, Message queues, Timer Function, Events, Memory Management, Interrupt Routines in an RTOS Environment, Basic Design Using RTOS.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Specification and Design of Embedded Systems | D. D. Gajski, F. Vahid J. Gong, S. Narayan | Prentice Hall. |
| Embedded systems Design | Steve Heath, Newnes |  |
| **Reference Books** |  |  |
| Hardware Software Co-design of EmbeddedSystems | F. Balarin, Chiodo, | Academic Publishers |

**CS-7104E NATURAL LANGUAGE PROCESSING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the approaches to syntax and semantics in Natural Language Processing, the various types of language processors, the elements of formal language theory, the types of grammar, and the computational morphology.
2. To understand the basic parsing strategies for context-free grammars, the data structures and algorithms for parsing, and the approaches to ambiguity resolution, generation and dialogue.
3. To explain and apply the fundamental algorithms and techniques in the area of Natural Language Processing.

**UNIT-I**

**Goals of NLP:** Survey of applications, Levels of linguistic processing: morphology, syntax, semantics, Language processors: recognizers, transducers, parsers, generators, Language as a rule-based system, Language understanding as an inferential activity.

(12 Hrs)

**UNIT-II**

**Resources for NLP:** lexicons and knowledge bases, Elements of formal language theory: alphabet, string, language, grammar, productions, symbol vocabulary, generator, recognizer, procedure, Types of grammar, the Chomsky Hierarchy.

**Computational morphology:** lemmatization, Part-of-Speech Tagging, Finite-State Analysis.

(12 Hrs)

**UNIT-III**

**Parsing:** Definition of a parser; derivations, basic parsing strategies for context free grammars, determinism and non-determinism; decidability, data structures and algorithms for parsing ,unification based grammar formalisms.

(12 Hrs)

**UNIT-IV**

**Ambiguity and its resolution:** Syntactic ambiguities and heuristics, lexical ambiguities and selectional restrictions, indeterminacy of reference.

**Generation and Dialogue:** Syntactic generation algorithms and reversibility, text planning, modeling dialogue agents.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Natural language understanding | Allen, J. | Redwood City |
| Readings in natural language processing | Grosz, B.J., Sparck Jones | B.L. (eds) |
| **Reference Books** |  |  |
| Speech and Language Processing : An Introduction to Natural Language Processing | Jurafsky, D. & J. Martin | Prentice Hall |

**CS-7105A OPERATING SYSTEMS INTERNALS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To make the students familiar with architecture of UNIX and windows operating system along with internal representation of files.
2. To provide the students knowledge of process control and memory management policies.
3. At the end of the course, students will be able to implement different algorithms used for representation, scheduling, allocation and management in operating system.

**UNIT-I**

**Overview of the Operating System:** Operating system, purpose and basics, services, assumptions about hardware, introduction to the kernel, system concepts, kernel data structures, system administration, architecture of the unix and windows NT operating systems.

(12 Hrs)

**UNIT-II**

**Internal representation of files:** Buffer headers, structures of the buffer pool, reading and writing disk blocks, advantages & disadvantages of buffer cache, structure of regular files, directories, i-nodes, conversion of pathnames to an in order superblock, allocation of disk blocks, open read & write file, file creation, change directory & root, change owner & mode, pipes, dup, link, unlink, mounting & unmounting file systems, file system abstractions & maintenance.

(12 Hrs)

**UNIT-III**

**The structure of processes & process control:** The process states & transitions, layout of system memory, context of a process, saving the context of a process, manipulation of process address space, process creation, signals, process termination, user id of a process, changing the size of a process, the shell, process scheduling, system calls, Intercrosses communications, process tracing, network communications, sockets.

(12 Hrs)

**UNIT-IV**

**Memory management policies:** Swapping and paging, demand paging, a hybrid system with swapping and demand paging, memory management in multi user operating systems. **Multiprocessor systems:** Driver interfaces, disk drivers, terminal drivers, streams, problems of multiprocess systems, semaphores, solutions with master and slave processors, solutions with semaphores.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| The design of the Unix O/S | Marrice J Back | PHI |

**IT-7105A DISTRIBUTED COMPUTING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Study software components of distributed computing systems. Know about the communication and interconnection architecture of multiple computer systems.
2. Recognize the inherent difficulties that arise due to distributed-ness of computing esources. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.
3. At the end students will be familiar with the design, implementation and security issues of distributed system.

**Unit I**

**Introduction to Distributed Systems**: Definition of distributed systems, their objectives, types, hardware and software concepts, architecture, introduction to XML, SOAP, Web and Grid services concepts.

(12 Hrs)

**Unit II**

**Communication:** Interprocess communication, Remote Procedure Call (RPC), Remote Method Invocation (RMI), Remote Object Invocation, Message Oriented Communication. Processes: Introduction to threads, Threads in distributed and non distributed systems, Client side software, Design issues for Servers, Software agents.

(12 Hrs)

**Unit III**

**Naming:** General issues with respect to naming, Name resolution, implementation of a name space, Domain name Systems, X.500 name space.

**Security:** Introduction to security in distributed systems, General issues in authentication and access control, Security management: Key management, secure group management, authorization management; examples: Kerberos, x.509 certificates.

(12 Hrs)

**Unit IV**

**Distributed Object- based Systems:** Introduction to distributed object based systems, Overview of CORBA and DCOM and their comparison.

**Distribute File System and Document-based Systems:** Introduction to distributed file system, distributed document-based systems, their examples.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Distributed Systems, Principles and Paradigms | Andrew S Tanenbaum, and Maarten van Steen | Pearson Education |
| Distributed Systems Concepts and Design | George Coulouris, Jean Dollimore, TIM Kindberg | Addison Wesley |

**CS-7105B REAL TIME SYSTEMS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the basic concepts and characteristics of real-time systems, assess the difference between hard and soft real-time systems, task models, and common approaches to real-time scheduling.
2. To understand the practical considerations, implementation, pros and cons of clock-driven scheduling, priority scheduling and multiprocessor scheduling, resource access control and synchronization, and models of real-time communication.
3. To understand the principles behind the implementation of real-time systems and the importance of time to computing systems.

**Unit I**

**Typical Real Time Applications:** Digital Control, High level Controls, signal Processingother Real Time Application.

**Hard v/s Soft real Time Systems:** Jobs & Processors (Release time, Deadlines andtiming Constraints, Hard and Soft timing Constraints, Hard and Soft Real time Systems.

(12 Hrs)

**Unit II**

**A reference Model of Real Time System:** Processors and Resources, TemporalParameters of real time workload, Periodic Task Model, Precedence constraints and Data Dependency, other type of dependencies Functional Parameters, Resource Parameters of jobs and Parameters of Resources, Scheduling Hierarchy.

**Commonly Used Approaches to Real – Time Scheduling:** Clock driven approaches,weighted Round – Robin Approach, Priority – Driven Approach Dynamic Vs Static System, Effective release times and deadlines, Optimality of the EDF and LST Algorithms, Challenges in Validating timings Constraints in priority Driver system, Off line Vs online Scheduling.

(12 Hrs)

**Unit III**

**Clock Driven Scheduling:** Notations and assumptions, static, Timer – Driven Scheduler,General Structure of cyclic Schedules, Cyclic executives, Improving the average Response Time of Aperiodic Jobs, Scheduling Sporadic Job’s, Practical considerations and generalisation, Algorithms for constructing static schedules, Pros & Cons of clock driven scheduling.

**Priority – Driven Scheduling of Periodic Tasks:** Static Assumptions, Fixed – priority VsDynamic Priority Algorithms, Maximum Schedulable Utilization, Optimality of the RM and DM Algorithms.

(12 Hrs)

**Unit IV**

**Multiprocessor Scheduling, Resource Access Control and Synchronization:** Modelof Multi processor & distributed Systems, Task Assignment, Multiprocessor Priority – Ceiling Protocol, Element of Scheduling Algorithms for End- to – End Periodic Tasks, Schedulability of Fixed – Priority End – to – End Periodic Tasks in Heterogeneous systems, Predictability and validation of Dynamic Multiprocessor systems.

**Real-Time Communication:** Model of Real Time Communication, Priority-based serviceDisciplines for switched networks, Weighted Round Robin Service Disciplines, Medium Access – Control Protocols of Broadcast networks, Internet and Resource Reservation protocols, Real – Time Protocols, Communication in Multicomputer Systems.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Real Time Systems | Jane W.S. Liu | Pearson Education |
| Real Time Systems | C.M. Krishna, Kang G. Shin | McGraw Hill, |

**IT-7105B CLIENT SERVER ARCHITECTURE**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To introduce the client server architecture and fundamentals of distributed systems.
2. To make students familiar with Distributed computing environment, RMI and DCOM architecture.
3. The objective of the course is to understand Distributed Systems, distributed computing environment, RMI, DCOM architecture and CORBA architecture.

**Unit I**

**Fundamental of Distributed Systems:** Client/Server technology an introduction,Classification – Mainframe, File sharing, Client/Server, Distributed/Collaborative architecture, Distributed Computing Environment–DCE architecture, Type of Client/Server Architecture – Two- tier architecture, Three-tier architecture, Distributed/Collaborative enterprise architecture, Complementary Technologies to 3-tier – Object – oriented Design, Database Two Phase Commit Processing, Remote Procedure Call, Message Oriented Middleware.

(12 Hrs)

**Unit II**

**Distributed Computing Environment:** Structure – Client/Server Model, Definingdistributed Environment, Motivation for Distributed Computing, Developing the Distributed Computing Architecture Framework, Fundamental Technologies & Design Mechanism.

**Remote Method Invocation:** Distributed Object Model, RMI System Overview, Clientinterfaces, Registry interfaces, Remote object interface, Stub interface, Exception in RMI.

(12 Hrs)

**Unit III**

**Distributed Component Object Model:** The DCOM Architecture, Component & Reuse,Location Independence, Language Neutrality, Connection Management, Scalability, Performance, Bandwidth & Latency, Security, Local Balancing, Fault Tolerance, Ease of Deployment, Protocol Neutrality, Platform Neutrality, Seamless Integration with other Internet Protocols.

(12 Hrs)

**Unit IV**

**The Common Object Request Broker:** Overview of CORBA, The object request Broker,OMG Interface Definition Language, Language Mapping, Interface Repository, Stubs & Skelations, Dynamic Invocation & Dispatch, Object Adapters, and Introduction about Java IDL (Interface Deference Language).

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Object-oriented Design, Architecture and Implementation. | P.M. Heinchieus | Addison Wesley |
| **Referrence Books** |  |  |
| An Advance Course | Fingerlakes | ACM Press Publication. |

**CS-7105C FAULT TOLERANT COMPUTING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To the widely applicable area of reliable and fault tolerant computing.
2. To understand the techniques to model faults and know how to generate tests and evaluate effectiveness.
3. To evaluate reliability of systems with permanent and temporary faults. Assess the relation between software testing and residual defects and security vulnerabilities.

**Unit-I**

**Introduction:** Fundamentals of fault tolerance: safety critical systems, dependability,maintainability, fault error failure, redundancy and dependability evaluation techniques.

(12 Hrs)

**Unit-II**

**Hardware Architectures for Fault Tolerance:** Fault tolerant Architectures –highavailability systems, long-life systems and critical computations, fault tolerant multiprocessors and distributed architectures-forward recovery schemes. Fault tolerance in interconnection networks. Case studies of fault tolerant multiprocessors and distributed systems.

(12 Hrs)

**Unit-III**

**Analysis of dependability of computer systems:** Application of various statisticaltechniques to design, prototype and operational phases, reliability estimation techniques.

(12 Hrs)

**Unit-IV**

**Fault Tolerant Software:** Design diversity, Software reliability modes, acceptance tests,exception handling System level diagnostic techniques: bounded and probabilistic models.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Fault Tolerant Computer system design | D.K. Pradhan, | Prentice Hall |
| Hardware and Software Architectures for Fault and Perspectives Tolerance: Experiences | Michel Banatre, | Springer |
| **Referrence Books** |  |  |
| Coding Approaches to Fault Springer Tolerance in combinational and Dynamic Systems | C N Hadjicostis |  |

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-7151 Subject Title: Software Project Management Lab**

**Class: GIT Semester: 5th**

**L T P Credit:1**

 **0 0 2**

**Objective**

1. Learn the software life cycle phases (project management, requirements engineering, software design, prototyping and testing). Create and specify a software design based on the requirement specification that the software can be implemented based on the design.
2. Get familiar with UML (modeling language for analysis and design).
3. Make a testing plan for the software.

**LIST OF PRACTICALS**

1) To study the phases in software development project

**Assign the project and perform following practicals**

2) To perform the system analysis: Requirement analysis, SRS.

3) To perform the function oriented diagram: DFD and Structured chart.

4) To perform the user’s view analysis: Use case diagram.

5) To draw the structural view diagram: Class diagram, object diagram.

6) To draw the behavioral view diagram: Sequence diagram, Collaboration diagram.

7) To draw the behavioral view diagram: State-chart diagram, Activity diagram.

8) To draw the implementation view diagram: Component diagram.

9) To draw the environmental view diagram: Deployment diagram.

10) To perform various testing using the testing tool unit testing, integration testing.

11) To draw UML diagrams using any software.

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT- Subject Title: Web Application Engineering Lab**

**Class: GIT Semester: 5th**

**L T P Credits:1**

**0 0 2**

**Objectives**

1. Create a static website using HTML and add dynamic functionality to it by using java Script.
2. Implement the advanced concepts of java such as servelets & jsp to create dynamic web pages & add functionality to the WebPages by using XML.
3. Gain confidence to create dynamic website on real world problems.

**LIST OF PRACTICALS**

1. Develop static pages (using Only HTML) of an online Book store. The pages should resemble: www.amazon.com.The website should consist the following pages.
* Home page
* Registration
* User Login
* Books catalog
* Shopping cart
* Payment by credit card
* Order Conformation
1. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript
2. Create and save an XML document at 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 from the XML document.
3. Convert the static WebPages of practical 2 into dynamic WebPages 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.
4. Redo the previous task using JSP by converting the static web pages of practical 2 into dynamic web pages. Create a database with user information and books information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.
5. Implement the "Hello World!" program using JSP Struts Framework

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| **Semester VI** |
| **S No** | **Sub Code** | **Subject Title** | **L\*** | **T\*** | **P\*** | **Total Hours** | **Credits** |
| 1 | IT | 7201 | Intelligent Information System | 3 | 1 | - | 4 | 4 |
| 2 | IT | 7202 | Cyber Laws & IPR | 3 | 1 | - | 4 | 4 |
| 3 | IT | 7203\* | Elective-III | 3 | 1 | - | 4 | 4 |
| 4 | IT | 7204\* | Elective-IV | 3 | 1 | - | 4 | 4 |
| 5 | IT | 7251 | Intelligent Information System lab | - | - | 4 | 4 | 4 |
| 6 | IT | 7260 | Seminar | - | - | 2 | 2 | 2 |
| 7 | IT | 7270 | Major Project | - | - | 8 | 8 | 1 |
|  |  |  | Total | 12 | 4 | 14 | 30 | 23 |
| 8 | GP | 7251 | General Proficiency | - | - | - |  | 1 |
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| **ELECTIVE-III** |
| **S No** | **Sub Code** | **(any one of the following)** | **L** | **T** | **P** | **Credits** |
| 1 | CS | 7203A | Digital Image Processing | 3 | 1 | - | 4 |
| 2 | CS | 7203B | Software Reliability & Testing | 3 | 1 | - | 4 |
| 3 | IT | 7203A | Data Mining & Warehousing | 3 | 1 | - | 4 |
| 4 | IT | 7203B | Visual Programming | 3 | 1 | - | 4 |
| 5 | CS | 7203C | Network Programming | 3 | 1 | - | 4 |
|  |
| **ELECTIVE-IV** |
| **S No** | **Sub Code** | **(any one of the following)** | **L** | **T** | **P** | **Credits** |
| 1 | CS | 7204A | Mobile and Cellular Technologies | 3 | 1 | - | 4 |
| 2 | CS | 7204B | Simulation & Modeling | 3 | 1 | - | 4 |
| 3 | CS | 7204C | Operations Research | 3 | 1 | - | 4 |
| 4 | CS | 7204D | Distributed Operating Systems | 3 | 1 | - | 4 |
| 5 | CS | 7204E | Soft Computing | 3 | 1 | - | 4 |
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**IT-7201 INTELLIGENT INFORMATION SYSTEMS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Understand the framework of MIS organization and approaches in development of MIS. Understand the basics of data representation and the computer hardware required in information system. Apply the criteria for Investment in hardware and software to solve practical problems.
2. Know the role of software in problem solving and applications of expert system and neural networks. Design the important components to support the decision making processes in an Executive Support system. Apply the latest techniques in artificial and computational intelligence that can be used to facilitate decision making processes. Understand office automation.
3. Possess the knowledge to evaluate the different commercially available or public domain tools that can be used to tackle specific problems related to business decision making. Possess the ability to understand and decide if future new techniques in artificial and computational intelligence can be used to solve different practical business problems.

**UNIT-I**

**Information Systems for decision making:** Introduction–Transaction Processing System–Management Information Systems- Intelligent Support System-Office Automation Systems. **Management Information System**: An Overview, Introduction–Management InformationSystem-Definition of MIS –Framework of MIS organization and management triangle-Information needs and its economics –System Approach –Meaning and objectives of MIS – Disadvantages of Information Systems –Approaches of MIS Development –Constraints in Developing an MIS-MIS and use of computer –Limitations of MIS.

(10 Hrs)

**UNIT-II**

**Computer Hardware for Information System:** Introduction–basics of dataRepresentation –Types of computers – Basic Components of computer System –Factors to buy a Personal Computer.

**Computer Software for Information System:** Introduction–Programming Languages–Classification of software –Role of software in problem solving– Criteria for Investment in Hardware and Software.

(11 Hrs)

**UNIT-III**

**Decision Support System:** Introduction-Definitions- Evolution of DSS- Objectives of DSS-Classification of DSS – Characteristics of DSS – Components of FSS- Functions of DSS – Development of DSS- Group Decision Support System – Executive Information System – Relationship between MIS and DSS – DSS measures of success in organizations – Applications of a DSS-TPS, MIS, DSS and EIS. Future developments in DSS.

**Artificial Intelligence :** Introduction–Definition–History of AI-Expert System–Componentsof Expert System –Advantages and Disadvantages of Expert System –Business Applications of Expert System – Criteria for adopting Expert System-Neural Networks – Applications of Neural Networks.

(14 Hrs)

**UNIT-IV**

**Office Information System:** Introduction–Office Automation–Offices and Office systems-Types of Office Automation Systems – Integrated Office.

**Information System in Business:** Introduction- Functional Areas of Business-Manufacturing Information Systems – Marketing Information Systems-Quality Information Systems-Financial and accounting Information systems – Research and Development Information Systems – Human Resource Information System – Geographical Information Systems – Cross Functional Systems.

**Strategic Management Information System:** Introduction–Characteristics of SMIS-Strategic Planning for MIS – Development of SMIS- MIS Strategy Implementation – Barriers to development of SMIS.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Artificial Intelligence | Elaine Rich and Kevin Knight 2nd Ed | TMH IV th Ed |
| Artificial Intelligence Reference | Patrick Winston |  |
| Artificial Intelligence | Luger |  |
| MIS | A.K.Gupta | S.Chand |

**IT-7202 CYBER LAWS AND IPR**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the concept of cyber space, netizens and various types of cyber crimes.
2. To study Legal aspects of E-Commerce, IPR and Domain Name resolution.
3. Discuss scope and limitations of IT Act of India

**UNIT-I**

**Basics of Computer & Internet Technology:** Internet, ISP & domain name; NetworkSecurity; Encryption Techniques and Algorithms; Digital Signatures.

**Introduction to Cyber World:** Introduction to Cyberspace and Cyber Law; DifferentComponents of cyber Laws; Cyber Law and Netizens.

(11 Hrs)

**UNIT-II**

**E-Commerce:** Introduction to E-Commerce; Different E-Commerce Models; E-CommerceTrends and Prospects; E-Commerce and Taxation; Legal Aspects of E-Commerce.

(11 Hrs)

**UNIT-III**

**Intellectual Property Rights (IPR)**: IPR Regime in the Digital Society; Copyright andPatents; International Treaties and Conventions; Business Software Patents; Domain Name Disputes and Resolution.

(13 Hrs)

**UNIT-IV**

**IT Act, 2000:** Aims and Objectives; Overview of the Act; Jurisdiction; Role of CertifyingAuthority; Regulators under IT Act; Cyber Crimes-Offences and Contraventions; Grey Areas of IT Act.

**Project Work:** Candidates will be required to work on a project. At the end of the coursestudents will make a presentation and submit the project report.

(13 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| A Guide to Cyber Laws & IT Act 2000 |  |  |
| with Rules & Notification | Nandan Kamath. |  |
| Cyber Cops, Cyber Criminals & Internet | Keith Merill & Deepti Chopra |  |
| **Reference Books** |  |  |
| Information Technology Law | Diane Row Land |  |
| Handbook of Cyber Laws | Vakul Sharma | Mc Millian |

**CS-7203A DIGITAL IMAGE PROCESSING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the mathematical foundations for digital image representation, image acquisition, image transformation, and image enhancement.
2. To understand the mathematical principles of image restoration, image compression, and image segmentation.
3. To develop a theoretical foundation of fundamental concepts of digital image processing.

**Unit-I**

Image model, human vision, digital images representation, image acquisition, storage, processing, communication and display, Image Geometry, Image transformations, Discrete Fourier transformation, Fast Fourier Transformation, other represent able image transformation.

(12 Hrs)

**Unit-II**

Image enhancement, special domain and frequency domain methods, enhancement by point frequency, special filtering, enhancement in frequency domain, color image frequency.

(12 Hrs)

**Unit-III**

Image restoration, degradation model, algebraic approval to restoration, constrained least square restoration, Interactive restoration, restoration in special domain.

(12 Hrs)

**Unit-IV**

Image compression, image compression models, loss less and glossy image compressions methods. Image segmentation, detection of discontinuities, edge detection and boundary detection, shareholding, Region oriented segmentation.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Digital image processing, | Rafacl C. Gonzalez, | Addison Wesley |
| Digital Image Processing Introductory Computer | Jain Tenber, | PHI |
|  |  |  |
| **Reference Books** |  |  |
| Vision and Image Processing, | Adrian Low, | MCGraw Hill |
| Digital Processing, | Rasenfeld P Kak, | Academic Press |

**CS-7203B SOFTWARE RELIABILITY & TESTING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Understand the concept of reliability and access the difference between H/W & S/W reliability and evaluate different S/W engineering technologies.
2. Understand and anticipate the possible causes of failure and knowledge of how to prevent them.
3. Analyze and test a S/W system, when it is evolved to accommodate a set of change requirements such as adding new functionalities, bug fixing etc.

**Unit-I**

**Introduction:** Software Reliability & Hardware Reliability, Basic Concepts, Availability,Modeling.

**Selected Models:** Execution Time Component, Calendar Time Component, ModelChoice.

(12 Hrs)

**Unit-II**

**Applications:** System Engineering, Project Management, Management of OperationalPhase, Evaluation of S/W Engg Technologies.

(12 Hrs)

**Unit-III**

**System Definition:** Failure definition, System Configuration, Text Run Selection. **Parameter Determination:** Execution Time Component, Calendar Time Component.

(12 Hrs)

**Unit-IV**

**Project Specific Techniques:** Unobserved Failures, Failure Time Measurement, EvolvingPrograms, Changes in Environment, Other Consideration.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Software Engineering concepts | Pressman | TMH |

**IT-7203A DATA MINING & WAREHOUSING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the basic principles, concepts and applications of data warehousing and data mining,
2. Ability to do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
3. Have a   good knowledge of the fundamental concepts that provide the foundation of data mining

**Unit-I**

**Data Mining:** Introduction, Relational Databases, Data Warehouses, Transactionaldatabases, Advanced database Systems and Application, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.

(12 Hrs)

**Unit-II**

**Data Warehouse:** Introduction, A Multidimensional data Model, Data WarehouseArchitecture, Data Warehouse Implementation, Data Cube Technology, From Data warehousing to Data Mining.

**Data Processing:** Data Cleaning, Data Integration and Transformation, Data Reduction,Discretization and concept Hierarchy Generation, Data Mining Primitives, Languages and System Architecture: Data Mining Primitives, DMQL, Architectures of Data Mining Systems.

(12 Hrs)

**Unit-III**

**Concept Description:** Data Generalization & Summarization – Based Characterization,Analytical Characterization, Mining class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

**Mining Association Rules in Large Databases:** Association Rule Mining, Single –Dimensional Boolean Association Rules, Multilevel Association Rules from Transaction Databases, Multi Dimensional Association Rules from Relational Databases, From Association Mining to Correlation Analysis, Constraint – Based Association Mining.

(12 Hrs)

**Unit-IV**

**Classification and Prediction:** Classification & Prediction, Issues RegardingClassification & Prediction, Classification by decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification based on concepts & Association Rule, Other Classification, Prediction, Classification Accuracy.

**Cluster Analysis:** Types of Data in Cluster Analysis, Partitioning methods, Hierarchicalmethods, Density – Based Methods, Grid – Based Methods, Model – Based Clustering Methods, Outlier Analysis.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Data Mining Concepts & Techniques | Jiawei Han & Micheline Kamber, | Harcout India, |
| Data Mining | I.H. Witten E. Frank | Morgan Kaufman |
| **Reference Books** |  |  |
| Mastering Data Mining | Michael J.A. Berry, Gorgon S Linoff | Wiley Publication |

**IT-7203B VISUAL PROGRAMMING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Students will be able to learn visual programming basics and its components.
2. To make the students familiar with Socket Programming and Window Programming.
3. The objective of the course is to cover visual programming skills needed for modern software development.

**UNIT-I**

**Introduction:** Visual programming basics, Application framework fundamental, windowsprogramming (Win32 programming), and visual c++.memory management, DLLs,Win32 API.

(12 Hrs)

**UNIT-II**

**Visual C++ components**: Resource compiler, MFC, modal Dialog, Windows CommonControl, the Modeless Dialog and Windows Common Dialogs, ActiveX Control, Bitmap, Reading and Writing Documents, SDI,MDI applications.

(12 Hrs)

**UNIT-III**

Socket Programming using Win Sock, TCP/IP, Document-View Structure, MFC Libraries viz Cview, Cfile, Cpoint, Cdialog.

(12 Hrs)

**UNIT-IV**

**WIN32 Programming**: WIN32 programming, Difference between a Windows program anda typical DOS program, Windows Programming modal, Windows Memory management, A skeletal Windows Application: WinMain function, Window Function, Componants of a Skeletal Application, Windows style, Device context, Creation of LISTBOX class, Dialog Boxes and SCROLLBAR class.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| VISUAL C++ programming | David J. Kruglenski | Microsoft Press |
| WIN32 Programming | Newcomer | Addison – Wesley |
| **Reference Books** |  |  |
| Programming Windows 3.1 | Charles Petzold | Microsoft press. |

**CS-7203C NETWORK PROGRAMMING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the use of client/server architecture, inter process communication and to explain the basic communication protocols.
2. To understand elementary socket system calls, advanced socket system calls and Java Socket API and to explain the basic concepts relating to TCP and UDP based sockets.
3. To understand File transfer protocol, remote login using pseudo terminal and RPC.

**UNIT-I**

**Introduction:** OSI model, processes, client server model, signals, process control,daemon processes Interprocess Communication, File and record locking, pipes, streames and messages, name spaces, message queues, semaphores, shared memory.

(12 Hrs)

**UNIT-II**

**Communication Protocols:** Formats of the TCP/IP,XNS, SNA ,NetBIOS, OSI Protocolsand UUCP, Protocols comparison.

(12 Hrs)

**UNIT-III**

**Berkley Sockets:** Unix Domain Protocols, socket addresses, reserved ports, streampipes, Asynchronous I.O, Input /Output Multiplexing, socket system calls, socket implementation.

**Transport Layer Interfaces:** Transport End point addresses, streams, and TLIimplementation.

(12 Hrs)

**UNIT-IV**

**Trivial File Transfer Protocol:** Data formats, connection, client user interface, UDPimplementation, TCP implementation.

**Remote Login:** Terminal Line disciplines, Pseudo Terminals, Terminal modes, Windowingenvironment, rlogin client/server

**Remote Procedure Calls**: Transparency issues, Sun RPC, Xerox Courier.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Unix Network Programming | Richard Stevens | PHI |

**CS-7204A MOBILE & CELLULAR TECHNOLOGIES**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the use of client/server architecture, inter process communication and to explain the basic communication protocols.
2. To understand elementary socket system calls, advanced socket system calls and Java Socket API and to explain the basic concepts relating to TCP and UDP based sockets.
3. To understand File transfer protocol, remote login using pseudo terminal and RPC.

**UNIT I**

**The Mobile Radio Environment:** Representation of a mobile radio signal, Causes ofpropagation path loss and fading, Classification of channels, Definitions of necessary terms (averages, pdf, CPD etc.), Delay spread and coherence bandwidth, Diversity schemes, Combining techniques.

(11 Hrs)

**UNIT II**

**Mobile Radio Interference:** Co-channel and adjacent-channel interference, Near-and-to-far end ratio, Inter symbol and Simulcast interference.

**Frequency Plans & Cellular Concept:** Channelized schemes and frequency reuse, FDM,TDM, Spread Spectrum & Frequency hopping, Cellular concept, Frequency reuse and cell separation, HO, Spectral efficiency and cellular schemes, Separation between co-channel cells.

(13 Hrs)

**UNIT III**

**Design Parameters:** At the Base Station: Antenna locations, Antenna spacing and height,Noise environment. At the Mobile Unit: Antenna spacing and height, Mobile unit standing still and in motion.

**Signaling & Channel Access:** False alarm & Word-error rates (Gaussian environment),Channel assignment, Frequency assignment, Under Lay and Overlay Configurations.

(13 Hrs)

**UNIT IV**

**Cellular CDMA:** Narrowband & Wideband wave propagations, Key elements in designingcellular, Spread Spectrum techniques in modulation, Capacities of multiple-access schemes, DS-CDMA, FH-DCMA, TH-CDMA.

**Microcell:** Design of a conventional cellular system, Description of new micro cell systemdesign.

(11 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Mobile Communications | W.C.Y. Lee | John Wiley & Sons |
| Design Fundamentals Mobile Cellular Telecommunication Systems | W.C.Y. Lee |  |
| **Reference Books** |  |  |
| Wireless and Cellular Communications | William C. Y. Lee | McGraw-Hill |

**CS-7204B SIMULATION & MODELLING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To build simple models and understand the critical modeling assumptions.
2. Apply statistic, testing and probability knowledge to simulation application.
3. Learn the simulation methods and tools for modeling & simulation of continuous, discrete and combined systems using simulation language.

**UNIT-I**

**System Models:** Introduction to systems; scientific and nonscientific systems; discrete &continuous systems; characteristics of systems; different views of systems; odeling of systems; physical and smbolic models; examples of models from various disciplines, Computer systems; electrical systems, economic system & inventory system.

(12 Hrs)

**UNIT-II**

**System Simulation:** Continuous system simulation; analog versus digital simulation;basic operation & notation for analog simulation; linear systems & simultaneous equation representation; digital computer simulation; simulation of a real life time-dependent system via a programming language such as Fortran/Pascal.

(12 Hrs)

**UNIT-III**

Discrete system simulation-event, activity & process; representation of time; fixed stem vs. event-to-event model; analysis of a discrete system; generation of random number generation for microcomputers; testing of pseudo-random numbers; monte-carlo computation; simulation of a real life discrete system.

(12 Hrs)

**UNIT-IV**

Computer language for simulation of continuous & discrete systems; characteristics of a simulation language; introductory discussion of CSMP, GPSS and SIMSCRIPT.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Simulation and Modeling | Liffick | TMH |
| Sytem Simulation with Digital Computer | Deo | PHI |
| **Reference Books** |  |  |
| Computer Simulation and Modeling | Neelamkavil,John | Wiley |
| System Simulation | Gorden | PHI |

**CS-7204C OPERATIONS RESEARCH**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Use the knowledge of operations research to solve problems like linear programming problem (LPP), transportation problem and assignment problem.
2. Understand different application areas of operations research like maximum flow problem, shortest path problem, game theory and queuing theory.
3. Succeed in stating whether a problem can be solved using operations research and solving problems using techniques of operations research.

**UNIT I**

**Linear Programming:** Basic concepts and notations. Mathematical formulation of linearprogramming problem(L.P.P.), Graphical solution, Fundamental theorem, Standard format, Simplex method, Two phase method, Big M method, Degeneracy, Primal and Dual, Solution of primal and Dual and vice versa, Complementary slackness condition.

(13 Hrs)

**UNIT II**

**Transportation and Assignment Problem:** Basic concepts and notations. Balanced andunbalanced transportation problems. Initial BFS of TP using North West corner rule, Matrix Minima method and Vogel’s approximation method, Improving an initial BFS to optimum BFS, Transshipment problem, Definition of assignment problem, Hungarian method to solve assignment problem.

(11 Hrs)

**UNIT III**

**Network Analysis and Models:** Notations and definitions, Arrow diagram, CPM (CriticalPath Method) and PERT (program evaluation and Review Technique), Crashing, Maximum Flow Problem (MFP) and Shortest Path Problem (SPP).

**Game Theory:** Introduction, Maximum and Minimum criterion, Saddle point, Gameswithout a saddle point, 2\*2 games with and without saddle point (Mixed strategies), Two persons zero sum 2\*n or n\*2 games, Dominance rule, Graphical method solution.

(13 Hrs)

**UNIT IV**

**Queuing Theory**: Notation and basic concepts, Analysis of M/M/1/FCFS andM/M/1/C/FCFS with poisson pattern of arrivals and exponentially distributed service time).

(11 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Operation Research | A.H. Taha | PHI Pvt. Ltd. |
| Operation Research | S.D. Sharma, Kedar Nath, Om Prakash |  |
| **Reference Books** |  |  |
| Operation Research | D.S. Hira, P.K. Gupta, | S. Chand & Co. |

**CS-7204D DISTRIBUTED OPERATING SYSTEMS**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. To understand the hardware and software concepts of distributed operating systems, various design issues like transparency, flexibility etc., and communication and synchronization in distributed operating systems.
2. To understand scheduling in distributed operating systems, fault tolerance, real-time distributed systems, and designing of distributed file systems.
3. To understand the concept of design and implementation in the context of distributed operating systems.

**UNIT-I**

**Introduction to Distributed Systems:** Advantages of distributed systems overcentralized systems, hardware concepts, bus based and switched multi-processors, based and switched multi-computers, software concepts- network operating system, true distributed systems, design issues: transparency, flexibility, reliability, performance and scalability.

(13 Hrs)

**UNIT-II**

**Communication in distributed systems:** Layered protocols, asynchronous transfermode, networks, client server models, remote procedure calls, introduction to group communication, Synchronization in distributed systems, Clock synchronization, mutual exclusion algorithms, election algorithms, atomic transactions, deadlocks in distributed systems.

(13 Hrs)

**UNIT-III**

**Processes and processors in distributed systems:** Threads, system models, processorallocation models, scheduling in distributed systems, fault tolerance, real time distributed systems.

(11 Hrs)

**UNIT-IV**

**Distributed file systems**: Design, implementation, trends in distributed file systems,Distributed shared memory concepts, consistency models, page based shared variables and object based distributed shared memory.

(11 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Distributed Operating Systems | Andrew S. Tanenbaum | Pearson Education |
| Distributed Operating Systems | Pradeep K. Sinha | PHI |
| **Reference Books** |  |  |
| Distributed Operating Systems and Algorithm Analysis | R. Chow, T. Johnson | Pearsaon |

**CS-7204E SOFT COMPUTING**

**L T P Credits-4**

**3 1 0**

**Objectives**

1. Understand basics of fuzzy system, genetic algorithms & their relations.
2. Learn artificial neural n/ws, models 7 their functions.
3. Apply genetic algorithms & artificial neural N/ws as computation tools to solve a variety of problems in various areas of interest ranging from optimization problems to text analytics.

**Unit-I**

**Fuzzy Set Theory:** Introduction to Fuzzy Sets, Operation on Fuzzy Arithmetic and FuzzyRelations.

**Fuzzy Rules and Fuzzy Reasoning:** Multi-valued logics, Fuzzy propositions, FuzzyQuantifiers, Linguistic Hedges, Fuzzy Inference and Reasoning, Rules Composition and Defuzzification, Examples of use of Fuzzy logic in control of real world systems.

(12 Hrs)

**Unit-II**

**Genetic Algorithms:** Biological background of Genetic Algorithms; Simple GeneticAlgorithm, Chromosome representations; crossover operations; Mutation operations, Operational Rates; concept of exploration and exploitation , Selection Schemes; Fitness function design; Population size; Replacement Schemes; Parameter tuning and control, Convergence of algorithm, Application of Genetic Algorithms.

(12 Hrs)

**Unit-III**

**Artificial Neural Networks:** Introduction to Biological Neuron, Architecture, Learning:Supervised and Unsupervised, Back-propagation and Feed-forward Networks, Perceptron, Adaline, Back-propagation Multilayer Perceptrons, Back- propgation Learning Rule, Methods of Speeding, Radial Basis Function Networks, Support Vector Machine. Competitive Learning Networks, Kohonen self-organizing networks, The Hopfield Network.

(12 Hrs)

**Unit-IV**

**Neuro- Fuzzy Modeling:** Neural Networks and Fuzzy Logic, Fuzzy Neuron, FuzzyPerceptron, Fuzzy classification Networks using Backpropogation, Fuzzy Neural Inference System, Fuzzy Adaptive Resonance Theory, Fuzzy Associative Memory, Neural-Fuzzy Systems, Neuro Fuzzy Evolutionary Integration.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Title** | **Author** | **Publisher** |
| **Text Books** |  |  |
| Neural Networks, Fuzzy Sets and Fuzzy Logic | Satish Kumar, | TMH |
| Fuzzy Logic: Theory and Appliccations  | George J, Bo Yuan, | PHI |
| **Reference Books** |  |  |
| Genetic Algorithms: Concepts and Designs | Man and Kwong , | Springer Verlag |

**SANT LONGOWAL INSTITIUTE OF ENGINEERING AND TECHNOLOGY LONGOWAL**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Subject Code: IT-7251 Subject Title: Intelligent Information System Lab**

**Class: GIT Semester: 6th**

**L T P Credits:2**

**0 0 4**

**Objectives**

1. Get familiar with different types of information systems and methodologies of developing information systems (eg MIS).
2. Work in the fields of decision support systems, executive information systems, neural networks and expert systems.
3. Perform performance measurement, multi-criteria decision making, knowledge management, data analysis and data mining. Evaluate information systems and the social and security issues involved.

**LIST OF PRACTICALS**

1. Discuss various merits & demerits of MIS.
2. Introduction to framework of MIS organization.
3. Discuss the hardware & software used in MIS.
4. To study structure & components of DSS.
5. To study various levels of management.
6. Differentiate between MIS, DSS, and EIS.
7. To study various components of Expert System.
8. To study various applications of neural networks.
9. To study various types of Office Automation Systems.
10. To study information system in Business along with its types.

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| **LIST OF OPEN ELECTIVES** |
| S No | Sub Code | Subject Title | L\* | T\* | P\* | Credits |
| 1 | EC | P6201 | Introduction to Digital Signal Processing | 3 | - | - | 3 |
| 2 | EC | P6202 | Principles of Digital Communications | 3 | - | - | 3 |
| 3 | EC | P6203 | Analog and Digital Electronics | 3 | - | - | 3 |
| 4 | EC | P6204 | Microprocessors Principles | 3 | - | - | 3 |
| 5 | FT | P6201 | Separation Technology | 3 | - | - | 3 |
| 6 | FT | P6202 | Bioinstrumentation | 3 | - | - | 3 |
| 7 | IE | P6201 | Fundamentals of Measurements and Instrumentation | 3 | - | - | 3 |
| 8 | IE | P6202 | Sensors and signal processing | 3 | - | - | 3 |
| 9 | IE | P6203 | Elements of power systems | 3 | - | - | 3 |
| 10 | IE | P6204 | Biosensors and MEMS | 3 | - | - | 3 |
| 11 | ME | P6201 | Industrial Engineering | 3 | - | - | 3 |
| 12 | ME | P6202 | Production planning and control | 3 | - | - | 3 |
| 13 | ME | P6203 | Plant layout and material Handling | 3 | - | - | 3 |
| 14 | ME | P6204 | Non Destructive resting& Failure Analysis | 3 | - | - | 3 |
| 15 | CS | P6201 | Interactive Computer Graphics | 3 | - | - | 3 |
| 16 | CS | P6202 | Computer Network | 3 | - | - | 3 |
| 17 | CS | P6203 | Simulation & Modelling | 3 | - | - | 3 |
| 18 | CS  | P6204 | Software Engineering | 3 | - | - | 3 |
| 19 | AP | P6201 | Laser and its Applications | 3 | - | - | 3 |
| 20 | AP | P6202 | Semiconductor Physics and Devices | 3 | - | - | 3 |
| 21 | AP | P6203 | Plasma and its Applications | 3 | - | - | 3 |
| 22 | AM | P6201 | Advanced Mathematics | 3 | - | - | 3 |
| 23 | AM  | P6202 | Statistical & Optimization Techniques | 3 | - | - | 3 |
| 24 | AM | P6203 | Fourier & Wavelet Methods | 3 | - | - | 3 |
| 25 | AM | P6204 | Industrial Mathematics | 3 | - | - | 3 |
| 26 | CH | P6201 | Environmental impact & Assessment | 3 | - | - | 3 |
| 27 | Ch | P6202 | Non Conventional Energy & Systems | 3 | - | - | 3 |

**EC-P6201 INTRODUCTION TO DIGITAL SIGNAL ROCESSING**

**L T P** **Credits:3**

**3 0 0**

**Unit I**

**Introduction:** Limitations of analog signal processing, Advantages of digital signalprocessing. Discrete time characteristics of Signals & Systems Some elementary discrete time sequences and systems; Concepts of stability, causality, linearity, time invariance and memory; Linear time invariant systems and their properties; Linear constant coefficient difference equations.

(12 Hrs)

**Unit II**

**Z-Transform:** The Z Transform Z-Transform, Region of convergence; Properties of the Z-transform; Convolution theorem; Parseval's relation; Unilatera; Z-transfform and its application to difference equations with non-zero initial conditions.

(12 Hrs)

**Unit III**

**DFT:** Discrete Fourier Transform DFT and its properties; Linear, Periodic and Circularconvolution; Fast Fourier Transform algorithm using decimation in time and decimation in frequency techniques; Linear filtering approaches to computation of DFT. Structure for Discrete Time Systems Signal flow graph representation, Transposed forms, Lattice structures.

(12 Hrs)

**Unit IV**

**Filter design:** Design of Digital Filters Linear Phase FIR filters; Design methods for FIRfilters; IIR filter design by impulse Invariance, Bilinear Transformation, Matched Z-Transformation, Frequency Transformation in the Analog and Digital Domain.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Text Books** |  |  |
| **Title** | **Author** | **Publisher** |
| Digital Signal Processing - | J. G. Proakis & D.G. Manolakis, | Prentice Hall, 1992 |
| **Reference Books** |  |  |
| **Title** | **Author** | **Publisher** |
| Discrete Time Signal | - A. V. Oppenheim & R W. | Prentice Hall |
| Processing | Schafer, |  |

**EC-P6202 PRINCIPLES OF DIGITAL COMMUNICATIONS**

**L T P** **Credits:3**

**3 0 0**

**Unit I**

**Review to Random Variables and processes:** Random variables: commutativedistribution function, probability density function (pdf), average value and variance of random variables.Tchebycheff’s inequality, Gaussian pdf, Rayleigh pdf of sum of random variables, Correlation between two random variables. Random processes: Introduction classification, correlation, auto correlation, Power spectral density (PSD) of a sequence of random pulses, PSD of digital data.

(12 Hrs)

**Unit II**

**Formatting and source coding:** Introduction, concept of amount of information, entropyand information rate. Shannon’s theorem, channel capacity, capacity of a Gaussian channel, BW -S/N trade off, sampling, quantization, quantization error, quantization noise, companding, PCM, delta modulation, adaptive delta modulation.

(12 Hrs)

**Unit III**

**Line coding schemes:** Introduction, properties, general method for derivation of powerspectral density of a broad class of digital signals, ON-OFF signaling, polar signaling, bipolar and split phase (or Manchester) signaling and comparison among them pulse shaping: Nyquist’s first, second and third criterions for zero ISI, introduction to equalizer and eye diagram, Derivation of error probability for signaling in AWGN.

(12 Hrs)

**Unit IV**

**Modulation schemes:** Introduction, generation, reception, spectrum and geometricalrepresentation and error probability (in AWGN) of BPSK, binary differential phase shift keying (BDPSK), QPSK, MPSK, QAM, BFSK, and MSK.

(12 Hrs)

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| **RECOMMENDED BOOKS** |  |  |
| **Text Books** |  |  |
| **Title** | **Author** | **Publisher** |
| Modern analog and digital business and | B.P Lathi | Wiliy |
| promotion communication beauro |  |  |
| **Reference Books** |  |  |
| **Title** | **Author** | **Publisher** |
| Communication systems | Bruce Carlson | Mc Graw Hill |
| Digital Communications | S .Haykins | Wiliy |

**EC-P6203 ANALOG AND DIGITAL ELECTRONICS**

**L T P** **Credits:3**

**3 0 0**

**Unit I**

**Semiconductor Diodes:** PN junction Diode - VI characteristics, qualitative analysis of itsbehavior, Rectifiers-half wave and full wave, clippers, clampers, clamping circuit theorem, Voltage multipliers, Special purpose diodes - Zener diode, Tunnel diode, Varactor diode.

**Bipolar Junction Transistor:** Transistors-construction, operation, characteristics,parameters, Transistor as an amplifier at low frequency Amplifier types-CE, CB, CC.

(12 Hrs)

**Unit II**

**Transistor Biasing and Stabilization:** DC operating point, DC Biasing circuits-fixed bias,emitter bias, voltage divider bias, voltage feedback, Bias stability, Stabilization against variation in Ico, VBE and β, Bias compensation.

**Field-Effect Transistor:** The junction FET - construction, operation, characteristics,parameters, Biasing of JFET, Small signal analysis of JFET as an amplifier.

(12 Hrs)

**Unit III**

Number Systems And Boolean Algebra: Review of Number systems, Radix conversion, Complements 9’s &10’s, Subtraction using 1’s & 2’s complements, Binary codes, Error detecting and Correcting codes, Theorems of Boolean algebra, Canonical forms, Logic gates.

(12 Hrs)

**Unit IV**

**Combinational Logic:** Representation of logic functions, Simplification using Karnaughmap, Tabulation method, Implementation of combinational logic using standard logic gates, Multiplexers and Demultiplexers, Encoders and Decoders, Code Converters, Adders, Sub tractors, Parity Checker and Magnitude Comparator.

**Sequential Logic Concepts And Components:** Flip flops: SR, JK, D and T flip flops -Level triggering and edge triggering, Excitation tables - Counters - Asynchronous and synchronous type, Shift registers.

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|  |  | (12 Hrs) |
| **RECOMMENDED BOOKS:** |  |  |
| **Text Books** |  |  |
| **Title** | **Author** | **Publisher** |
| Electronics Circuits and devices | JB Gupta | Dhanpat Rai |
| Modern Digital Electronics | R P Jain | Tata McGraw-Hill, |
| **Reference Books** |  |  |
| **Title** | **Author** | **Publisher** |
| Electronic Devices and Circuit Theory | Boylestad Nashelsky, | 8th Ed., Pearson Education, |

**EC-P6204 MICROPROCESSORS PRINCIPLES**

**L T P** **Credits:3**

**3 0 0**

**Unit I**

**Introduction:** Microprocessors, its evolution, function and impact on modern society,Microcomputer systems, Microprocessor architecture and its operations, Memory, Inputs and output devices.

**Architecture of a microprocessor (with reference to 8085 microprocessor):** Conceptof Bus, Bus organization of 8085, Functional block diagram of 8085, and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus (Ado-AD7), Generation of read write control signals.

(12 Hrs)

**Unit II**

**Memories and I/O Interfacing:** Memory organization, memory map, portioning of totalmemory space, address decoding, and concept of I/O mapped I/O and memory mapped I/O. Interfacing of memory and I/O devices.

(12 Hrs)

**Unit III**

**Programming using 8085 microprocessors:** The 8085 programming model, instructionclassification, instruction format, how to write assemble and execute a simple program introduction to 8085 instruction data transfer (copy) operations, Arithmetic operations, Logic operations Branch operations Writing assembly language programs, programming techniques with additional instruction programming techniques: looping counting and indexing additional data transfer and 16 bit arithmetic instruction arithmetic and logical operations related to memory, Stack and Sub Routines, Stack, Subroutine, Conditional call and return instructions.

(12 Hrs)

**Unit IV**

**Programming:** Counters and time delays, Illustrative program hexa decimal counter,Illustrative program: zero to nine (Modulo 10) counter, Illustrative program: Generating pulse waveform.

Comparative study of 8 bit microprocessors i.e. 8085, Z80, 6800.

(12 Hrs)

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| **RECOMMENDED BOOKS:** |  |  |
| **Text Books** |  |  |
| **Title** | **Author** | **Publisher** |
| Microprocessor and micro | Dr B P Singh | Galgiria Publications |
| Controllers |  |  |
| Microprocessor Architecture | Ramesh S Gaonker | Willey Eastern Ltd New Delhi |
| ,programming and application with |  |  |
| 8080/8085 |  |  |
| **Reference Books** |  |  |
| An introduction to microprocessors | A P Mathur | Tata McGraw hill, new Delhi |
| Microprocessor and microcomputer | Refiquzzaman | Universal Book |
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| **FT-P6201** | **SEPARATION TECHNOLOGY** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**UNIT-I**

**Introduction to various separation processes:** Gas -Liquid, Gas–Solid, Liquid-Liquid, Liquid-Solid separation; Concept of phase equilibrium, Stage equilibrium, Stage efficiency, Equilibrium concentration; Single stage contact equilibrium, counter-current multiple contact stages, Concept of equilibrium line and operating line, Determination of optimum number of contact stages by analytical and graphical method; Rate of extraction, Rate of gas absorption, Individual and over all mass transfer coefficient; Calculation of tower height for gas absorption for both dilute and concentrated solution. Construction and working mechanism of different extraction equipments like single stage extraction, Multiple stage static bed system, Bollmann extractor, Hildebrandt extractor, Rotocell extractor.

(12 Hrs)

**UNIT-II**

**Solid Separation Process:** Introduction, Concept of size, Shape, Cut-size, Sieving, Magneticseparation, Eddy-current separation, Wet separation, Ballistic separation, Color separation.

(03 Hrs)

**Wet separation process:** Liquid-solid and liquid- liquid separation by hydroclones, Surfacevelocity classifier, Elutriators, Impingement separator, Electrostatic precipitation.

(04Hrs) **Distillation:** Introduction, boiling point diagram, differential or simple distillation, Flash orequilibrium distillation, Continuous rectification with and without reflux, Reflux ratio, Optimum reflux ratio, Batch distillation, Application of distillation in food processing.

(05 Hrs)

**UNIT-III**

**Membrane Separation Technology:** Introduction to microfiltration, Ultrafiltration, Reverseosmosis, Electro dialyses, dialyses, physical characteristics of membrane separation, Factors affecting reverse osmosis process, Concentration polarization, Design of reverse osmosis and ultra filtration systems, Operation layout of the modules, Electrodialysis, pervaporisation, Fabrication of membranes, Application of membrane technology in food industry.

(12 Hrs)

**UNIT-IV**

**Powder Technology:** Classification off powder, Separation of powder, Sieving, Airclassification, Factors affecting air classification, Cyclone application, Air separation, Particle size distribution**.** (06 Hrs)

**Super Critical Fluid Extraction:** Introduction, Properties of SCF, Food application,

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| Application of SCFE in analytical technique, Pharmaceutical application. | (06 Hrs) |
| **Recommended Books:** |  |  |  |  |  |  |
|  | **Author** |  |  | **Title** |  |  | **Publisher** |
| 1 | Grandison A S & Lewis | Separation Process in The Food & | Woodhead Pub Ltd |
|  | M J |  |  | Biotechnology Industries |  |  |  |
| 2 | Narayanan | CM | & | Mechanical | Operations | For | Khanna Pub |
|  | Bhattacharyya BC |  | Chemical Engineers |  |  |  |
| 3 | Dutta B K |  |  | Mass Transfer & Separation Process | PHI |  |
| 4 | Anantharaman | N | & | Elements of Mass Transfer |  | PHI |  |
|  | Begum KMMS |  |  |  |  |  |  |  |

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| **FT- P6202** | **BIOINSTRUMENTATION** |
| L T P | Credits: 3 |
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**INTRODUCTION:**

Sensors, biological materials in sensors, difficulties in ordinary chemical sensors, problems associated with sensors and different transducers used in instrumentation.

**BIOSENSORS:**

Basic principle of operation types of biosensors accuracy and precision, industrial application and future trends.

**BIOINSTRUMENTS:**

Principles, functions and application of bioinstruments i.e. Gene gun, ELISA probe, Biochips, molecular switches, PCR Bioprocess control Control algorithm, types working principles and their applications

**Author** **References Books**

**Title**

Mittal, G.S Computerized control system in Food Engg.

Gabriele Wagner Food Biosensor analysis

and J.G. Guilbault

Mukhopadhyay, S.N. Process Biotechnology Fundamentals

**IE-P6201- Fundamentals of Measurement and Instrumentation**

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| L T P | Credits: 3 |  |
| 3 0 0 | **Unit-I** |  |
|  |  |
| 1. **Measurement System** | **6 hrs** |  |

Necessity & scope of instrumentation, important process variables & their Units, applications of measurement system, elements of generalized measurement system, input-output configuration, methods for correction for interfering & modifying inputs

2. **Errors** **6 hrs**

Error Sources, types of errors, statistical treatment of data, analysis, Probability of errors, rejection of data based upon confidence level, method of least squares, graphical presentation of data

**Unit-II**

3. **Static Characteristics** **12 hrs**

Various static characteristics, static calibration, calibration curve, static correction, scale range, scale span, reproducibility, drift, repeatability, hysteresis; accuracy & precision, significant figures, static sensitivity, threshold, dead time, dead zone, input & output impedances, loading effects due to shunt series connected instruments, generalized impedance & stiffness concepts, impedance matching & maximum power transfer

**Unit-III**

4. **Dynamic Characteristics** **12 hrs**

Dynamic response, measuring lag, fidelity, dynamic error, transfer function , order of the system, types of test inputs, step response of 1st & 2nd order systems & study of characteristic indices

**Unit-IV**

5. **Display & Recording Methods** **6 hrs**

Indicating methods, analogue & digital comparison, LED, LCD as display units, 7 segment, 14 segment & dot matrix display, Nixie tube display, difference between integrating & recording methods, recording requirements, various methods of strip chart recording, potentiometer & null balance type of recorders

6. **Cathode Ray Oscilloscope** **6 hrs**

CRT, its main parts, electrostatic focusing & deflection, deflection sensitivity, post deflection acceleration, types of screens for CRT, aquadag color, CRTs, various time base & amplifiers oscilloscope circuits, method of synchronization, various controls on CRO.

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|  | **RECOMMENDED BOOKS** |  |  |
|  | **Title** | **Author** | **Publisher** |
| 1. | Electrical & Electronic Measurement and Instt. | A K Sawhney | Dhanpat Rai |
| 2. | Measurement Systems Applications & Design | EO Doebelin | TMH |
| 3. | Mechanical Measurements | T G Beckwith | PHI |
| 4. | Transducers and instrumentation | DVS Murthy | Dhanpat Rai |

**IE – P6202 Sensors & Signal Processing**

L T P Credits: 3

3 0 0

**Unit I**

1. **Introduction** **12hrs**

General Concept of Measurement: Basic block diagram stages of generalized measurement system state characteristics; accuracy, precision, resolution, reproducability, sensitivity, zero drift, linearity, Dynamic characteristics, zero order instrument first order instrument, time delay.

**Unit II**

2. **Sensors** **12 hrs**

Sensors and Principles: Resistive sensors, Potentiometer and strain gauges,

Inductive sensors: Self inductance type, mutual inductance type, LVDT, Capacitive sensors, piezoelectric sensors thermocouples, thermistors, radiation pyrometry, Fibre optic sensors, temperature sensor, photo electric sensors, pressure and flow sensors.

**Unit III**

3. **Signal Conditioning** **12 hrs**

Signal conditioning: Amplification, Filtering, Level conversion, Linearisation,

Buffering, sample and hold circuit, quantization, multiplexer/ demultiplexer, analog to digital converters, digital to analog converters.

**Unit IV**

4. **Data Acquisition** **06 hrs**

Data acquisition and conversion: General configuration, single channel and multichannel data acquisition system, Digital Filtering, data logging data conversion, introduction to digital transmission systems, PC based data acquisition system.

5. **Interfacing** **06 hrs**

Interface systems and standards: Block diagram of a typical interface IEE 488 standard bus British Standard interface (BS 4421) CAMAC Interface MEDIA interface RS232C standard.

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|  | **RECOMMENDED BOOKS** |  |
|  | **Title** | **Author** | **Publisher** |
| 1. | Instrumentation -Devices and Systems | Rangam, Sarma & | TMH |
|  |  | Mani |  |
| 2. | A Course in Electrical and Electronic | A.K. Sawhney | Dhanpat Rai & |
|  | Measurements and Instrumentation |  | Sons |
| 3. | Measurement Systems | E.O. Doeblin | McGraw Hill |
| 4. | Instrument Measurement & Analysis | Nakara | PHI |

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|  | **IE-P6203- Elements of Power Systems** |  |
| L T P | Credits: 3 |  |
| 3 0 0 | **Unit-I** |  |
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| 1. **Supply System** | **06 Hrs** |  |

Introduction to Transmission and Distribution systems, Comparison between DC and AC systems for Transmission and Distribution, comparison of cost of conductors, choice of working voltage for transmission & distribution, economic size of conductors - Kelvin's law, Radial & mesh distribution networks, Voltage regulation

2. **General** **06 Hrs**

Conductor materials; solid, stranded, ACSR, hollow and bundle conductors. Different types of supporting structures for overhead lines. Elementary ideas about transmission line construction and erection. Stringing of conductors, spacing, sag and clearance from ground, overhead line insulators, concept of string efficiency

**Unit-II**

3. **Transmission Line Parameters** **05 Hrs**

Introduction to line parameters, Resistance of transmission line, inductance of single phase two wire line, concept of G.M.D., Inductance of three phase line, Use of bundled conductor, transposition of power lines, capacitance of 1-phase and 3-phase lines. effect of earth on capacitance of conductors

4. **Performance Of Transmission Lines** **07 Hrs**

Representation of short transmission line, medium length line (nominal T & II circuits). long length line by hyperbolic equations and equivalent T & II circuits. Power flow through transmission lines, ABCD constants, Voltage regulation

**Unit-III**

5. **Circle Diagram And Line Compensation** **12 Hrs**

Receiving end circle diagram for long transmission lines based on ABCD constants, equivalent T circuits , power loss, surge impedance loading, reactive power requirement of system series and shunt compensation, Synchronous phase modifiers , rating of phase modifiers

**Unit-IV**

6. **Underground Cables** **12 Hrs**

Classification of cables based upon voltage and dielectric material, insulation resistance and capacitance of single core cable, dielectric stress, Capacitance of 3 core cables, methods of laying, heating effect, Maximum current carrying capacity, cause of failure, comparison with overhead transmission lines

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|  | **RECOMMENDED BOOKS** |  |  |  |
|  | **Title** | **Author** | **Publis her** |  |
|  | **Text books** |  |  |  |
| 1. | Course in Electrical Power | C.L. Wadhwa | New Age |  |
| 2. | Power System Analysis | Nagrath and Kothari | TMH |  |
|  | **Reference Books** |  |  |  |
| 3. | Electrical Energy System Theory- An introduction | O.L. Elgerd | TMH |  |
| 4. | Elements of Power System Analysis | W.D. Stevenson Jr | TMH |  |
| 5. | Power System Analysis & Design | B.R. Gupta | Wheel er |  |

**IE-P6204- Bio-Sensors & MEMS**

L T P Credits: 3

3 0 0

**Unit-I**

1. **Overview** **12 hrs**

Overview of biosensors and their electrochemistry: Molecular reorganization: enzymes, Antibodies and DNA, Modification of bio recognition molecules for Selectivity and sensitivity Fundamentals of surfaces and interfaces

**Unit-II**

2. **Bioinstrumentation** **12 hrs**

Bioinstrumentation and bioelectronics devices: Principles of potentiometry and potentiometric biosensors, principles of amperometry and amperometric biosensors, Optical Biosensors based on Fiber optics, FETs and Bio-MEMS, Introduction to Chemometrics, biosensor arrays; electronic nose and electronic tongue

**Unit-III**

3. **MEMS Technology** **12 hrs**

MEMS Technology: Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology, Lithography, Etching, MEMS material, bulk micromachining, Surface micromachining, Microactuator, electrostatic actuation , Micro-fluidics

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|  | **Unit-IV** |  |  |
| 4. | **Applications** |  | **12 hrs** |
|  | MEMS types and their applications : Mechanical MEMS strain and pressure |
|  | sensors, accelerometers etc., Electromagnetic MEMS, micromotors, wireless and |
|  | GPS MEMS etc Magnetic MEMS, all effect sensors, SQUID magnetometers, Optical |
|  | MEMS, micromachined fiber optic component, optical sensors, Thermal MEMS, |
|  | thermo-mechanical and thermo-electrical actuators, Peltier heat pumps |
|  | **RECOMMENDED BOOKS** |  |
|  | **Title** | **Author** | **Publisher** |
| 1. | Foundation of MEMS | Chang | Illinois Ece |
|  |  |  | Series |
| 2. | Microsensors, MEMS and Smart | Julian W. Gardner, Vijay | Wiley |
|  | Devices | Varadan & Osama O. |  |
|  |  | Awadelkarim |  |
| 3. | Biosensors: Theory and Applications | Donald G. Buerk | CRC |
| 4. | Electrochemical Sensors, | Xueji Zhang, Huangxian Ju | Academic |
|  | Biosensors and their Biomedical | & Joseph Wang | Press |
|  | Applications |  |  |
| **ME-P6201** | **INDUSTRIAL ENGINEERING** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**Unit - I**

**Introduction:** Industrial Engineering. Definition and Evolution, Understanding IndustrialSystem Focus: Production/Service System. Performance measures of a Production System -Production, Productivity, Efficiency, Effectiveness, Quality, Flexibility, Agility etc. **Classical Industrial Engineering:** Classical Industrial Engineering -Work Study: MethodStudy and Time Study, Human Factors, Ergonomics, Motivation Recent and Emerging Applications of IE –Role of IT in Systems– MIS, FMS etc.

(12 Hrs)

**Unit - II**

**Value Engineering**: Concept of value analysis, Aim and objectives, Phases in valueanalysis, Test for value analysis advantages.

**Product Design & Development**: Product Development life cycle, Productstandardization, simplification, specialization, Diversification, Break-even analysis, BEP. **Production and Process Planning**: Objectives of PPC, Component of PPC, Phases ofPPC, Process planning, steps in process planning for flow shop scheduling, types of scheduling systems, master scheduling, order scheduling.

(12 Hrs)

**Unit - III**

**Sales Forecasting Techniques**: Types of forecasting, importance of demand planning,methods of sales forecasting, Qualitative and Quantitative methods of demand planning. **Inventory Control & Management** : Introduction, Inventory, Deterministic model of EOQ,EOQ, Selective Inventory Control, Japanese Influences: Just in Time (JIT), Kanban etc.; Increasing Integration in Industrial Enterprises: From MRP to ERP to Supply Chain Management.

(12 Hrs)

**Unit – IV**

**Recent Development in Manufacturing Systems**: Performance improvement by ITskills - Decision Support System (DSS), Intelligent Systems. Engineering Managers, System and Process (ERP) Specialists, Change Managers, study the concept of SCM, TQM, TPM, CRM, and QFD etc.

(12 Hrs)

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| **Recommended Books:** |  |  |
| **Title** | **Author(s)** | **Publisher** |
| Industrial Engineering | Ravi Shankar | Galgotia |
| Industrial Engineering & Management | O.P.Khanna | Khanna |
| Production Management | Ronald Mayer | TMH |
| Industrial Engineering & Management | Telesang | S.Chand |

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| **ME-P6202** | **PRODUCTION PLANNING & CONTROL** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**Unit – I**

**Introduction and Planning Phase of PPC:** Components of PPC, Planning, routing,loading, scheduling and despatching, objectives and principles of PPC, Phases of PPC, factors affecting PPC, organization set up of PPC, types of production, Job Production, Batch production and Continuous production, Introduction to value analysis.

(12 Hrs)

**Unit - II**

**Planning Phase of PPC:** Definition and concept of forecasting, objectives and types offorecasting, Routing, function of routing, routing procedure, documents of routing, factors affecting routing procedure, its advantages and limitations.

(12 Hrs)

**Unit - III**

**Process Planning:** Sequencing: Johnson’ rule for sequencing, types of sequencing,Scheduling, objectives of scheduling, functions, types of scheduling: Master scheduling, order scheduling, Index method of scheduling, Gnatt chart.

(12 Hrs)

**Unit - IV**

**Action Phase of PPC and Control Phase of PPC:** Despatching, duties of despatcher,despatch procedure, centralized and decentralized dispatching, Inventory control, objectives of inventory control, Economic Order Quantity, Progress reporting, Corrective action, Expediting and Replanning.

(12 Hrs)

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| **Recommended Books** |  |  |
| **Title** | **Author(s)** | **Publisher** |
| Industrial Engineering and | M. S Mahajan | Dhanpat Rai |
| Management |  |  |
| Industrial Engineering and | O. P Khanna | Dhanpat Rai |
| Management |  |  |
| Production Planning & inventory | Narisimtan Mcleavy Billington | PHI |
| Control |  |  |
| Production and Operation | B.S. Goel | Pragati |
| Management |  | Prakashan |
| Production Planning & Inventory | P. S. Eilon | Rivermead |
| Control |  | Books. |

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| **ME-P6203** | **PLANT LAYOUT AND MATERIAL HANDLING** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**Unit - I**

**PLANT LAYOUT:** Definition, Principle of plant layout, objectives, Classification of layout-static & mixed layout,

**Advantages & limitations of layout:** Analytical tools/procedures of layout ie operationprocess charts, flow process charts, flow diagrams, templates, scale model.

(12 Hrs)

**Unit - II**

**Facility Location:** Introduction, importance of plant location, factors affecting plant layout& location ,break even analysis, single & multi facility location problem, model for multifacility location problem, Minimax location problem

(12 Hrs)

**Unit – III**

**Layout design:** Production line techniques, prerequisites factors influencing layoutdesign, storage space requirement, flow pattern, layout design procedure, SLP, ALDEP,CORELAP, CRAFT, Line balancing, assembly operations, numerical problems.

(12 Hrs)

**Unit – IV**

**Material handling:** Introduction, functions of material handling, engineering & economicconsiderations, principle of material handling, selection of material handling devices, classification of material handling equipments, material handling in process layout, & line layout.

(12 Hrs)

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| **Recommended Books:** |  |  |
| **Title** | **Author(s)** | **Publisher** |
| Facility Layout & Location | Francis, R.L | Prentice hall Inc |
| Plant layout & material handling | Moore | John Wiley |
| Industrial Engineering Handbook | H.B Maynard | Mc Graw Hill |
| Industrial Engineering & production Management | M. Mahajan | Dhanpat Rai |
| Industrial Engineering & management | S. Dalela | Standard |
|  |  | Publisher |

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| **ME-P6204** | **NON DESTRUCTIVE TESTING & FAILURE** |
|  | **ANALYSIS** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**Unit - I**

**Introduction:** Weld quality, Introduction to NDT, industrial importance of NDT,comparison between destructive and non-destructive testing.

**Quality Concept and NDT:** NDT as a quality tool, benefits from NDT, visualexamination, liquid penetration and magnetic particle tests

(12 Hrs)

**Unit - II**

**Ultrasonic Examination:** Principles of wave propagation, ultrasonic fields andtheir characteristics, generation of US waves, piezoelectric and magnetostrictive effects, calibration and control of ultrasonic testing equipment, ultrasonic testing of materials, pulse echoes, through-transmission and resonance methods of testing. **Radiography:** X-ray and Gamma ray sources, equipments and accessories,radiography techniques, image quality indicators and screens, X-ray films, film processing and interpretation, radiation safety, fluoroscopy, Xero-radiography.

(12 Hrs)

**Unit – III**

**Recent Methods used in the NDT:** Principles of acoustics emission,instrumentation and application, optical and acoustical holography, neutron radiography, thermography, and real time imaging.

(12 Hrs)

**Unit - IV**

**Failure Analysis:** Material failure and failure due to the environmental effects,common causes of failure in metals and alloys, failure due to the improper heat treatment (e.g. overheating, burning, improper quenching, decarburizing etc.), embrittlement of metals, residual stresses in metals and their effects, defects in production/manufacturing e.g. segregation, blow holes etc., fundamentals of crack propagation.

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|  |  | (12 Hrs) |
| **Recommended Books:** |  |  |
| **Title** | **Author(s)** | **Publisher** |
| Metallurgy of Failure Analysis’ | Das A.K | Tata Mc Graw |
|  |  | Hill |
| Analysis of Metallurgical Failures’ | Colangelo V.A. Heisler F.A. | John Wiley |
|  |  | and Sons |
| Practical Non Destructive Testing’ | Baldev Raj Jayakumar T | Narosa |
|  |  | Publishing |
|  |  | House |

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|  | **CS-P6201 Interactive Computer Graphics** |  |
| **L T P** | **Credits:3** |  |
| **3 0 0** | **UNIT I** |  |

**Overview of graphics systems**

Display devices, physical input and output devices: storage tube graphic displays, Raster Refresh, Plasma Panel Displays, Liquid Crystals

**Output Primitives**

Point plotting, Line Drawing algorithms – DDA algorithms, Bresenham’s Line algorithm, Areafilling – Scan Line algorithm, flood-fill algorithm, Circle-Generating algorithms.

**(11 Hrs)**

**UNIT II**

**Two-dimensional Transformations**

Basic transformations-translation, scaling, rotation, Matrix representation and homogenous coordinates, composite transformations-scaling relative to a fixed pivot, rotation about a pivot point, general transformation equations, other transformation-reflection, shear.

**Windowing and Clipping Techniques**

Windowing concepts, Clipping algorithms- Line clipping – Cohen-Sutherland algorithm, Area clipping, Text clipping, Blanking, Windows-to-View port

transformation.

**(13Hrs)**

**UNIT III**

**Three Dimensional Graphics and Transformations**

Coordinate systems and Display techniques, Representations-Polygon surfaces, Curved surfaces-Bezier and B-spline curves, Transformation – translation, scaling rotation, rotation about an arbitrary axis, other transformations-reflections, shear and 3-D viewing projections.

 **(11 Hrs)**

**UNIT IV**

**Hidden-Surface and Hidden-Line Removal**

Back-face removal, Depth-buffer method, Scan-line method, Depth-Sorting method i.e. Painter’s algorithm, Hidden-Line elimination.

**Shading (Overview)**

Modeling Light intestines diffuse reflections; diffuse reflectors, Specular reflectors, refracted light & reture surface patterns.

**Half toning, Surface Shading methods (overview)**

Constant Intensity method, Gouraud Shading, Phong – Shading

**(13 Hrs)**

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| **Recommended books** |  |  |  |  |
| Title |  | Author(s) | Publisher |  |
|  |  | **Text** |  |  |
| Computer Graphics |  | BakerPrentice Hall |  |
| Principle of Interactive Computer Graphics |  | Newman W.M | McGraw Hill |  |
| **Reference** |  |
| Computer Graphics - A Programming Approach | Harrington. S. | McGraw Hill |  |
| Fundamentals of Computer Graphics  | Foley J.D et al. | Addison Wesley |  |

**CS-P6202 COMPUTER NETWORKS**

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| **L T P** | **Credits:3** |
| **3 0 0** |  |

**UNIT-I**

**Basic & Computer Networks 12 Hrs**

Need & Evolution of Computer Networks, Description of LAN, MAN, WAN and wireless Networks, OSI and TCP/IP models with description of Data Encapsulation & peer to peer communication, Comparison of OSI and TCP/IP. Basic terminology of computer networks - bandwidth, physical and logical topologies, Media – 10 base Z, 10base S, 10base T, 100baseTX, 100base FX, 1000baseLX and wireless. LAN & WAN devices – Router, bridge, Ethernet switch HUB, Modem CSU/DSU etc.

**UNIT-II**

**Physical Layer 12 Hrs**

Representation, one bit on physical modem i.e. in wired network, optical Network and wireless N/W, Encoding / Modulation – Manchester Encoding, AM, FM and PM. Dispersion, Jitter, Latency and collision. Different types of Media – Shielded twisted pair, Unshielded twisted pair, Coaxial cable, Optical Fiber cable and wireless.

**UNIT-III**

**Data Link Layer 12 Hrs**

LLC and MAC sub layer, MAC addressing Layer 2 devices, Framing Error control and flow control. Error detection & correction CRC code block parity & checksum. Elementary data link protocol sliding window protocol, Channel allocation problem – static and dynamic. Multiple Access protocol – ALOHA, CSMA/CD Token bus Token ring, FDDI.

**UNIT-IV**

**Network Layer 12 Hrs**

Segmentation and autonomous system path determination, Network layer addressing, Network-layer data gram, IP addressed classes. Subnetting – Sub network, Subnet mark. Routing algorithm – optimality Principle, Shortest path routing, Hierarchical routing, Broadcast routing, Multicast routing, Routing for mobile host – Concatenated Visual circuits, tunneling Fragmentation and DHCP. Routing Protocol – RIP, IGRP, OSPF and EIGRP. Network layer in ATM Networks.

**Transport Layer**

Layer 4 Protocol TCP & UDP. Three -way hand shakes open connection. ATM AAL Layer protocol, Session Layer design issue, Presentation layer design issue, and Application layer design issue. Application layer Protocol, TELNET, FTP, HTTP, SNMP.

**Recommended Books**

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| --- | --- | --- | --- |
| Title | Author(s) | Publisher |  |
|  | **Text** |  |  |
| Computer Networks | Tanenbaum | PHI |  |
| Computer Networks and Their Protocols | Darix | DLA Labs |  |
|  | **Reference** |  |  |
| Comp. Communication & Networks | Freer | East-West-Press |  |
| Data Communication and Networking | Forouzen | Tata McGraw Hill |  |
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**CS-P6203 Simulation & Modelling**

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| **L T P** | **Credits:3** |  |
| **3 0 0** | **UNIT-I** |  |
| **System Models** |  |
| 12 |  |
| Introduction to systems; | scientific and nonscientific systems; discrete & |  |

continous systems; characteristics of systems; different views of systems; odeling of systems; physical and smbolic models; examples of models from various disciplines. Computer systems; electrical systems, economic system & inventory system.



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| **System Simulation** | **UNIT-II** |  |
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Continous system simulation; analog versus digital simulation; basic operation & notation for analog simulation; linear systems & simulatianeous equation representation; digital computer simulation; simulation of a real life time-dependent system via a programming lanuage such as Fortran/Pascal.

**UNIT-III**

Discrete system simulation-event, activity & process; representation of time; fixed stem vs. event-to-event model; analysis of a discrete system; generation of random number generation for microcomputers; testing of pseudo-random numbers; monte-carlo computation; simulation of a real life

discrete system. 12

**UNIT-IV**

Computer language for simulation of continous & discrete systems; characteristics of a simulation language; introductory discussion of CSMP,

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| GPSS and SIMSCRIPT | **Recommended Books** | **12** |  |
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| Title | Author(s) | Publisher |  |
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|  | **Text** |  |  |
| Simulation and Modeling | Liffick | TMH |  |
| System Simulation with | Deo | PHI |  |
| Digital Computer | **Reference** |  |  |
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| Computer Simulation | Neelamkavil,John-Wiley |  |  |
| and Modeling |  |  |  |
| System Simulation | Gorden | PHI |  |

**CS-P6204 SOFTWARE ENGINEERING**

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| **L T P** | **Credits:3** |  |
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| **Evolving role of Software** | **UNIT-I** |  |
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characteristics, components, applications of S/W. A layered technology, S/W process Linear Sequential, Prototyping, RAD, Incremental, Spiral, Component assembly & S/W process & Project metrics.

**UNIT-II**

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| **S/W scope** | 12 |

resources, estimation, decomposition techniques, empirical estimation models. Project scheduling, refinement of major tasks, scheduling project plan, Software reliability, S/W equality assurance plan, software quality standards (ISO/CMM). The system engineering hierarchy information engineering, information strategy planning, requirement analysis, analysis principles, Data modeling information flow structured analysis

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| **Data Dictionary** | **UNIT-III** |  |
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Software testing Fundamentals, Test Case design, White box testing, Basis path testing, Control structure testing, Black box testing. Activity network for conversion. Combating resistance to change.

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| **Post implementation review** | **UNIT-IV** |  |
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review plan. S/W maintenance and enhancement procedure. System security, Threats & control measures, disaster/recovery planning, ethics in system development, ethics codes & standard of behavior

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|  | **Recommended Books** |  |
| Title | Author(s) | Publisher |
|  | **Text** |  |
| Software Engineering | Ian Somer Ville | Addison Wesley |
| Software Engineering | ROGER S.PRESSM | TMH |
|  | **Reference** |  |
| An Integrated Approach | Pankaj Jalote |  |
| to Software Engineering |  |  |
| System Analysis & Design | ELIAS M AWAD, |  |
| Software Engineering | Richard Fairley |  |
| Principles |  |  |

**AP-P6201 LASER AND ITS APPLICATIONS**

**L T P** **Credits:3**

**3 0 0**

**UNIT- I**

**LASER**

Introduction, Einstein coefficient and light Applications, Laser rate equations, Optical resonators, The laser output, Q-switching, mode locking properties, Ruby, helium-neon, Solid state, carbon di-oxide, Dye and semiconductor lasers, free

electron Lasers and cyclotron resonance masters. (10 hrs)

**UNIT- II**

**HOLOGRAPHY**

Introduction, Recording and reconstruction of Holograms, Type of Holograms, Holographic recording materials, holographic storage of information and Data processing, Holographic Interferometry and its application. (10hrs)

**UNIT-III**

**OPTICAL FIBER COMMUNICATION**

Introduction, Optical fibre Numerical Aperture, coherent bundle, fibre-optic communication system, Losses in optical fibres (Attenuation & Dispersion) Pulse dispersion in step index fibres, Graded index fibres, some general consideration: First and Second generation fibre optic communication system, Single mode fibres and the third Generation Optical communication system operation at 1.5 um wavelength, Fourth Generation optical fibres, applications fibre optic system,

Advantage of fibre optic system. (12hrs)

**UNIT- IV**

**APPLICATIONS OF LASERS & OPTICAL FIBRES**

Introduction, Material processing, Welding, Cutting, Drilling, Hardening, Micro machining and other application, Metrology, Non-destructive testing, Pollution Detection, Laser tracking LIDAR, Precision length measurement, Velocity measurement, Recent advances, optical interconnections for integrated circuits,

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| optical computing, Star war. | (10hrs) |
| **RECOMMENDED BOOKS** |  |
| Lasers – Theory & applications | K Thyagarajan & A K Ghatak MacMilllan India |
|  | Ltd |

**AP-P6202 SEMICONDUCTOR PHYSICS AND DEVICES**

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| **L T P** | **Credit:3** |  |
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**THE SEMICONDUCTOR**

Introduction**,** Charge carrier in Semiconductor; Equilibrium distribution of electrons and holes, the n0 and p0 equations, intrinsic carrier concentration, intrinsic Fermi level; Dopant Atoms and energy Levels; qualitative description, ionization energy, Group III – IV semiconductors; The Extrinsic Semiconductor, Statistics of Donor and acceptors, Charge Neutrality, Position of Fermi Energy Level

**4 Hrs**

**CARRIER TRANSPORT PHENOMENA**

Carrier Drift; Drift current density, mobility effects, conductivity, velocity saturation; Carrier Diffusion; Diffusion current density, total current density; Graded Impurity Distribution; Induced electric field, Einstein relation; Hall Effect **6 Hrs**

**UNIT - II**

**PN JUNCTION DIODE AND BIPOLAR TRANSISTOR**

Introduction of PN junction, PN Junction current, Generation – Recombination currents, Junction breakdown, Charge storage and diode Transients, Tunnel Diode,Bipolar transistor action; Basic principle of operation, The modes of operation, amplification with Bipolar Transistors.

**4 Hrs FUNDAMENTALS OF THE METAL-OXIDE- SEMICONDUCTOR FIELD EFFECT TRANSISTOR**

Two Terminal MOS structure; Energy band diagrams, depletion layer thickness, work function differences, Flat band voltage, threshold voltage, charge distribution; Capacitance – voltage characteristics, Basic Operation of MOSFET, CMOS technology, radiation and Hot electron effects **6 Hrs**

**UNIT - III**

**JUNCTION FIELD – EFFECT TRANSISTOR**

JFET concepts; Basic PN JFET and MESFET operations, Device Characteristics; Internal pinchoff voltage and Drain to source saturation voltage, Transconductance, MESFET, Nonideal effects, High electron mobility transistor

**6 Hrs**

**SEMICONDUCTOR POWER DEVICES**

Power Bipolar Transistors; vertical power transistor structure, Power transistor characteristics, Darlington pair configuration, Power MOSFETs; Power transistor structure, power MOSFET characteristics, Parasitic BJT; Heat Sinks and Junction Temperature, Thyristors and varistors

**6 Hrs**

**UNIT - IV**

**OPTICAL DEVICES**

Optical Absorption; Photon absorption coefficient, electron hole pair generation rate Solar Cells; PN junction solar cell, hetero-junction solar cell, amorphous solar cell Photo-detectors; Photoconductor, photodiode, PIN photodiode, Avalanche photodiode, phototransistor; Photoluminescence and Electroluminescence: Basic transitions, luminescent efficiency, materials; Light Emitting Diodes: Generation of light, internal and external quantum efficiencies; LED devices; Laser Diodes; Stimulation emission and population inversion, optical cavity, threshold current, Device structure and characteristics

**10 Hrs**

**Recommended Book**

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| Donald A. Neamen: | Semiconductor Physics and Devices, | Tata McGraw-Hill |
| S.M.Sze: | Physics of semiconductor Devices | (Wiley) |

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|  |  |  | ***AP-P6203 PLASMA AND ITS APPLICATIONS*** |  |
| **L T P** | **Credit:3** |  |
| **3** | **0** | **0** | **UNIT-I** |  |
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**Introduction to Plasma:**

Excitation and ionization in a gas (different methods), Definition of plasma, Basic parameters of plasma, Bulk properties, Quasi-neutrality, Electrostatic Boltzman’s equation, Plasma sheaths, The plasma frequency, Saha equation, Debye shielding and skin depth, Diffusive transport in plasma, Electron collision frequency, Cold and hot plasma, Magnetized plasmas, Plasma confinement, Radiation plasma, Arc Plasma, Fully ionized plasma

**(12hrs)**

**UNIT-II**

**Charged particle motion:**

Particle description of plasma, Motion of charged particles in electrostatic field, Motion of charged particles in uniform magnetic field, Motion of charged particles in electric and magnetic fields, Motion of charged particles in inhomogeneous magnetic field, Motion in a torrodial magnetic field, Magnetic mirror confinement, Motion of an electron in a time varying electric field, Motion in a crossed radio frequency and magnetic field, Theory of simple oscillations, Electron oscillations in a plasma, Electronic oscillation along with motion of ions, Derivation of plasma oscillations using Maxwell’s equations, Ion oscillations and waves, Landau damping, Propagation of e.m. waves in plasma containing a magnetic field, Instabilities in plasma

**(12hrs)**

**UNIT-III**

**Plasma Diagnostic Techniques:**

Single probe method, Double probe method, Use of probe technique for measurement of plasma parameters, Microwave method, Spectroscopic method, Laser as a tool for plasma diagnostics, X-ray diagnostics, Acoustic method

**(10hrs)**

**UNIT-IV**

**Plasma applications:**

Source of power (MHD generator and Controlled thermonuclear fusion), Generation of microwaves utilizinghigh density plasma, plasma propulsion, materials processing with plasma arcs, plasma processing and fabrication (ion implantation in solids, plasma deposition and etching, paint spraying), Plasma diode and plasma lighting devices/torches, insulating dielectrics and breakdown, Plasma chemistry and Pollution control (thermal,

non-thermal, electrostatic precipitation, corona)

**(12hrs)**

**Recommended Books:**

1. F.F. Chen: *Introduction to Plasma Physics and Controlled Fusion*, Vol.1, Plasma Physics. 2nd Edition, Plenum Press 1984.
2. J. R. Roth : *Industrial Plasma Engineering*, Vol.1, Principles. IOP Publishing, Ltd 1995.
3. S.N.Sen: *Plasma Physics, Plasma state of matter*, Pragati Prakashan, Meerut, second

edition, 1996.

4. Brian Chapman, *Glow Discharge Processes,* John Wiley & Sons, 1980.

**AM-P6201 ADVANCED MATHEMATICS**

**L T P 3 0 0**

Review of analytic function and (proof using Green’s Theorem) Cauchy’s inequality, Poisson’s Laurent’s series,

**Credits:3**

**UNIT-I**

its properties, Line integral, Cauchy’s theorem Cauchy’s integral formula. Morera’s theorem, integral formulae. Power series. Taylor’s and

(10 Hrs)

**UNIT-II**

Singularities. Zeros. Residues. Cauchy’s residue theorem. Integration around unit circle. Integration over semi-circular contours (with and without real poles). Integration over rectangular contours. Engineering applications: analysing AC circuits and using Harmonic functions.

(12 Hrs)

**UNIT-III**

Integral transforms. Fourier integral theorem. Fourier sine and cosine integrals. Fourier sine and cosine integrals. Fourier transforms. Properties of Fourier transforms. Convolution theorem for Fourier transforms. Applications of Fourier transforms to heat conduction, vibrations of a string, transmission lines etc.

12 Hrs)

**UNIT-IV**

Z transforms and its properties. Z transform of polynomial functions, trigonometric functions and hyperbolic functions. Convolution theorem. Inverse Z-transform. Formation of difference equations and solution of first and second order difference equations with constant coefficients using Z-transform.

(12 Hrs

**RECOMMENDED BOOKS**

**Text Book**

R.K. Jain & S.R.K. lyengar, Advanced Engg. Mathematics, Narosa Glyn James, Advanced Modern Engg. Mathematics,Pearson

**Reference Books**

H.S. Kasana, Complex Variables (Theory & Applications), PHI

R.V. Churchill& I.W. Brown, Complex Variables and applications, McGraw Michael D Greenberg, Advanced Engg. Mathematics, Pearson

**AM-P6202 STATISTICAL AND OPTIMIZATION TECHNIQUES**

**L T P** **Credits:3**

**3 0 0**

**UNIT-I**

Axiomatic definition of probability. Baye’s theorem, Random variables. Probability mass function and probability density function. Mathematical Expectation. Probability distributions-Binomial, Poisson and Normal distributions and their applications.

(12 Hrs)

**UNIT-II**

Sampling distributions. Small and large sample tests (Z test, t test and F test). Chi-square test for independence and goodness of fit.

(11 Hrs.)

**UNIT-III**

Introduction to Optimization Techniques. Basic concept and notations. Formulation of Linear Programming Problem (LPP). Graphical Solution. Standard Form of an LPP. Simplex method. Big M method. Two phase method. Duality Theory.

(14 Hrs.)

**UNIT-IV**

Basic concept & notations. Balanced & unbalanced TP. Initial BFS of TP by using North-West corner rule, Matrix minima method & Vogel’s Approximation Method. Improving an initial BFS to optimal solution. Introduction to Assignment Problem. Hungarian method to solve Assignment Problem.

(10 Hrs.)

**RECOMMENDED BOOKS**

**Text Book**

S.P. Gupta, Statistical Method, Sultan Chand & co.

H.A. Taha, Operations Research

**Reference Books**

Hira & Gupta , Operations Research, S. Chand & co.

S.C. Gupta, Fundamentals of Mathematical Statistics, S. Chand & Co. Snedecor & Cocharan, Statistical Methods

**AM-P6203 FOURIER AND WAVELET METHODS**

**L T P** **Credits:3**

**3 0 0**

**UNIT-I**

L2 (R) and approximate identities. Fourier transform, Basic properties. Fourier inversion.

(10)

**UNIT-II**

Continuous wavelets. Examples of wavelets . Continuous wavelet transform (CWT) as a correlation. Constant Q- factor filtering interpretation and time frequency resolution. CWT as an operator. Inverse CWT. Discrete wavelet transform.

(12)

**UNIT-III**

Multiresolution analysis(MRA). Construction of a general orthonormal MRA. Wavelet basis for MRA. Decomposition filters and reconstructing the signal. Continuous MRA interpretation for the discrete wavelet transform and discrete MRA.

(12)

**UNIT-IV**

Condition number of a matrix. Wavelet-Galerkin methods for differential equations. Fourier and wavelet solutions of sideways heat equations.

(12)

**RECOMMENDED BOOKS**

**Text Book**

M.W. Frazier, An Introduction to Wavelets Through Linear Algebra, Springer. K.P. Soman and KI Ramachandran, Insight into Wavelets from Theory to Practice, PHI.

**Reference Books**

R.M. Rao and A.S. Bopardikar, Wavelet Transforms: Introduction to Theory and Applications, Pearson Education

Brani Vidakovic , Statistical Modeling by Wavelets, John Wiley & Sons. A.I. Zayed, Function and Generalized Function Transforms, CRS Press.

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| **AM-P6204** | **INDUSTRIAL MATHEMATICS** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**UNIT-I**

Background about model and modeling methodology. Some basic facts about differential equations & Industry based simple differential-equation models. Industrial problems modelled with differential equations including, desalination, casting of sheet steel, and solar heating; problems include drug adoption and delivery.

**UNIT-II**

Basic structure of queuing models, examples of queuing systems drawn from real life situations, role of exponential distribution.

**UNIT-III**

Fuzzy Sets – Basic definitions. a-level sets. Convex fuzzy sets, Basic operations on fuzzy sets. Types of fuzzy sets. Cartesian products. Algebraic products. Bounded sum and difference. t – conorms. The Extension Principle – The Zadeh’s extension principle. Image and inverse image of fuzzy sets. Fuzzy numbers. Elements of fuzzy arithmetic.

**UNIT-IV**

Introduction, modeling random variables, Generating random numbers, Simulations, using simulation models, data collection, empirical models, estimating parameters, Error and accuracy

**RECOMMENDED BOOKS**

**Text Book**

J.N.Kapoor, Mathematical Modeling

H.A. Taha, Introduction to Operation Research, PHI.

**Reference Books**

H.J. Zimmermann, Fuzzy Set Theory and Its Applications, Allied Publishers Ltd.,New Delhi,

G.J. Klir and B. Yuan, Fuzzy Sets and Fuzzy Logic, Prentice-Hall of India, New Delhi.

Palgrave, Mathematical Modeling, Second Edition.

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| **CH-P6201** | **ENVIRONMENT IMPACT & ASSESSMENT** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**Unit-I**

**Scope and Significance:** Objective od EIA, comparative study of different assessmentmethodology, Adhoc procedures, overlay techniques, checklist, matrices and networks, Essential elements of abn environmental impact analysis, Details content of EIA/Environmental Impact Assessment.

(13 Hrs)

**Unit-II**

**Impact Assessment for Air Environment:** Evaluation of the possible impacts of aproposed action on the air environment at meso scale and micro scale level, Methodological, adopted and step evolved.

(09 Hrs)

**Unit-III**

**Impact Assessment for Biological and Socio-cultural Environment:** Possible impactof a proposed action on specific diversity and functional balance of the ecosystem, Possible impact on the existing socio-cultural and economic patterns of the surrounding population, Assessment of noise pollution.

(07 Hrs)

**Unit-IV**

**Environmental Regulations and Standards**: Study of different Govt. regulations, Actsand specified emission standards, Constitution and working of Pollution Control Boards, International Treaties and Protocols.

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| **RECOMMENDED BOOKS:** |  |  |  |  |  |
| **Author** |  | **Title** |  |  |  | **Publishers** |  |
| Harrson R.M. | & | Introductory | Chemistry | for | the | -- |  |
| Mora, S.J. |  | Environmental Sciences |  |  |  |  |
| Rai, G.D. |  | Non-conventional Energy Sources |  | Khanna Publishers |
| Witte Schmidt | & | Industrial | Energy Management | & | Hemisphere Pub. Corp. |
| Brown |  | Utilization |  |  |  |  |  |
| -- |  | Energy Auditing Manuals |  |  | National | Productivity |
|  |  |  |  |  |  | Council, New Delhi. |

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| **CH-P6202** | **NON-CONVENTIONAL ENERGY SYSTEMS** |
| **L T P** | **Credits:3** |
| **3 0 0** |  |

**Unit-I**

**Introduction:** Introduction to Energy Science & Technology, Law of conservation ofenergy, Energy calculations, energy demand, various resources of non-conventional energy.

**Solar Energy:** Historical review and future prospects, fundamentals and applications,Solar thermal energy conversion systems: Solar Collectors, Solar thermal power plants, solar photovoltaic systems: Prospects of solar PV systems, principles of a photo voltaic cell, V-I characteristics of a solar cell, efficiency of a solar cell.

(13 Hrs)

**Unit-II**

**Geo-Thermal Energy:** History resources and applications, Hydrothermal (convertive)resources, geo-thermal electric power plants, vapor dominated (stream) geothermal electrical power plant, liquid dominated (hot- water) geo-thermal electrical power plant, Liquid dominated lashed steam geothermal electric power plant, Binary cycle liquid dominated geothermal power plants, Comparison of various liquid dominated geo-thermal systems.

(09 Hrs)

**Unit-III**

**Liquid Energy:** Introduction, History and applications, Pipes of wind turbine generatorunits, Horizontal axis propeller type wind turbine generator units, Three blends, Horizontal axis wind turbine (WAWT), vertical axis wind turbines, introduction to wind energy forms and energy conversion systems.

(07 Hrs)

**Unit-IV**

**Bio-mass Energy:** Introduction, various resources and applications, processes,combustion, thermo-chemical, bio-chemical, hybrid bio-gas plants, Introduction and brief idea about ocean energy, tidal energy and nuclear energy systems etc.

(07 Hrs)

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| **RECOMMENDED BOOKS:** |  |
| **Author** | **Title** | **Publishers** |
| Saha, S.N. | Food Combustion Energy Technology | Dhanpat Rai Pub. |
| Rao, G.D. | Non-Conventional Energy Sources | Khanna Publications |

