B.TECH COMPUTER ENGINEERING 2016

B. TECH. I SEMESTER

CODE: HAS-101

SUBJECT NAME: Physics- I

NO. OF CREDITS: 4

			SESSIONAL	: 40
L	T	P	THEORY EXAM	: 60
4	0	0	TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

COURSE OBJECTIVE

An introduction to general optical physics with topics to include interference, diffraction, polarization, fiber optics, lasers. The second part consists of theory of relativity, electrostatics and superconductivity.

SYLLABUS

Part –A

INTERFERENCE

Coherent sources, conditions for sustained interference. Division of Wave-Front - Fresnel's Biprism, Division of Amplitude- Wedge-shaped film, Newton's Rings, Michelson Interferometer, applications (Resolution of closely spaced spectral lines, determination of wavelengths), Elastic property of glass by Newton rings method

DIFFRACTION

Difference between interference and diffraction Fraunhofer and Fresnel diffraction. Fraunhofer diffraction through a single slit, Plane transmission diffraction grating, application of grating as a device, absent spectra, dispersive power, resolving power and Rayleigh criterion of resolution.

Part- B

POLARISATION

Polarised and unpolarised light, Uniaxial crystals double refraction, Nicol prism, quarter and half wave plates, Detection and Production of different types of polarized light, Polarimetry; Optical and specific rotation, Biquartz and Laurent's half shade polarimeter.

LASER AND FIBRE OPTICS

Spontaneous and Stimulated emission, Laser action, characteristics of laser beam-concept of coherence, spatial and temporal coherence , He-Ne and semiconductor lasers (simple ideas), applications

Propagation of light in optical fibres, numerical aperture, V-number, single and multimode fibres, attenuation, dispersion, applications

Part -C

ELECTROSTATICS AND ELECTRODYNAMICS

Dielectric polarization, dielectric relaxation process, types of polarization, relation between E,P and D, Gauss's law in the presence of a dielectric, Energy stored in a uniform electric field, dielectric losses and variation with frequency.

Part-D

SPECIAL THEORY OF RELATIVITY

Galilean transformations, Michelson's Morley Experiment, Postulates of Special Theory of Relativity, Lorentz transformations, Consequences of LT (length contraction and time dilation), addition of velocities, variation of mass with velocity, mass energy equivalence.

SUPERCONDUCTIVITY

Introduction (Experimental survey), Meissner effect, London equations, Hard and Soft superconductors, Elements of BCS Theory, Applications of superconductors

COURSE OUTCOMES

- Knowledge of the Fundamentals of optical Physics
- Explain wave propagation of light, interference, diffraction, and polarization of light waves, and the electromagnetic nature of light.
- Proficiency in solving problems in Special theory of Relativity.
- Developing interest in the field of superconductivity.
- Understand the Utilization of laser technology in various disciplines and also understand the concept of optical fiber and its applications.

TEXT BOOKS

- Perspectives of Modern Physics - Arthur Beiser (TMH)
- Optics - AjoyGhatak (TMH)
- Modern Physics for Engineers – S.P.Taneja (R. Chand)
- Engineering Physics – SatyaPrakash (PragatiPrakashan)

- Modern Engineering Physics – A.S.Vasudeva (S. Chand)
- Engineering Physics (vol-1)- S.L. Gupta

REFERENCES

- Fundamentals of Physics – Resnick & Halliday (Asian Book)
- Introduction to Electrodynamics – D.J. Griffith (Prentice Hall)

B. TECH. I SEMESTER

CODE: HAS-103

SUBJECT NAME: MATHEMATICS-I

NO. OF CREDITS: 4

L	T	P
4	0	0

SESSIONAL	: 40
THEORY EXAM	: 60
TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

COURSE OBJECTIVES

To gain knowledge about: Laplace Transform, Vector Calculus, Double Integral, Triple Integral, Infinite series and partial differential equation.

SYLLABUS

PART-A

MATRICES AND ITS APPLICATIONS

Rank of Matrix, Normal form, Inverse using Gauss-Jordon method, Consistancy of linear system of equations using Rank method, Linear and Orthogonal transformation, Linear-dependence and Linear- Independence of Vectors, Eigen-Values and its properties, Eigen-Vectors, Cayley-Hamilton theorem & its applications, Diagonalisation of Matrices, Similar Matrices ,Quadratic Forms.

PART-B

APPLICATIONS OF DERIVATIVES

Taylor's & Maclaurin's Series for one variable, Asymptotes, Curvature, Radius of Curvature for Cartesian, Parametric and Polar-curves, Radius of curvature at the Origin (by using Newton's method, by method of Expansion), Center of curvature.

PARTIAL DIFFERENTIATION AND ITS APPLICATIONS

Functions of two or more variables, Partial derivatives of Ist and higher order, Total differential and differentiability, Euler's theorem for Homogeneous functions, Derivatives of Composite and Implicit functions, Jacobians, Taylor's series for functions of two variables, Maxima-Minima of functions of two variables. Lagrange's Method of undetermined multipliers, Differentiation under the integral sign (Leibnitz rule).

PART-C

DOUBLE AND TRIPLE INTEGRATIONS

Double integral, Change of Order of Integration, Double integral in Polar co-ordinates, Applications of double integral to find (i) Area enclosed by plane curves (ii) Volume of solids of revolution, Triple Integral, Change of variables, Volume of solids, Beta & Gamma functions and relation between them.

VECTOR CALCULUS

Differentiation of vectors, Scalar and Vector-point functions, Gradient of a scalar field and directional derivatives, Divergence and Curl of a vector field and their physical interpretations, Integration of vectors, line integral, Surface integral, Volume integral, Green's theorem, Stoke's theorem, Gauss-Divergence theorem with their simple applications.

COURSE OUTCOMES:

- Apply the knowledge of Mathematics in Physical sciences and Engineering.
- Identify, formulate and solve Engineering problems.
- Modeling of Physical Problems to Mathematical problems.
- Acquire knowledge of Matrix Algebra, Determinants and their applications in engineering subjects.
- Acquire knowledge about Advance Calculus.
- Acquire knowledge about Series solution of Differential equations.
- Acquire knowledge about orthogonal polynomials and their Properties.
- Acquire knowledge about Gamma and Beta function, error function.

TEXT BOOKS

- B.S.Grewal, Higher Engg. Mathematics, Khanna Publications.
- Reena Garg,R S Goel, Deepankar Sharma,Engg. Mathematics-I, Khanna Publications

REFERENCES

- Advanced Engineering Mathematics, Erwin Kreyzig
- Advanced Engineering Mathematics, Dr. Babu Ram, Pearsons publications

B. TECH. I SEMESTER

CODE: HAS-105

SUBJECT NAME: CHEMISTRY

NO. OF CREDITS: 4

L	T	P
4	0	0

SESSIONAL	: 40
THEORY EXAM	: 60
TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

L T P
4 0 0

Sessional: 40 Marks
Theory : 60 Marks
Total : 100 Marks

To apply the fundamental knowledge of Chemistry in engineering and technology and to analyze it with experiments.

UNIT-1- POLYMERS AND POLYMERIZATION:
Introduction & Classification of polymers. effect of structure on properties of polymers, Bio degradable polymers, preparation, properties and technical application of thermo–plastics (PVC, PE, Teflon) & thermosets (PF,UF), elastomers (SBR,BUNA-N), Silicones, Introduction to polymeric composites.

UNIT-2-PHASE RULE:
Terminology, Derivation of Gibb's phase rule. One component system (H_2O system, Sulphur system), two components systems: Simple eutectic system (Pb – Ag), system with congruent melting point (Zn – Mg), Cooling curves.

UNIT-3-WATER AND ITS TREATMENT Part – I:

Sources of water, impurities in water, hardness of water and its determination, (EDTA method) units of hardness, alkalinity of water and its determination, Related numerical problems, Problems associated with boiler feed water: scale and sludge formation, Priming and foaming, Boiler corrosion & Caustic embrittlement.

UNIT-4-WATER AND ITS TREATMENT Part – II:

Treatment of water for domestic use: coagulation, sedimentation, filteration and disinfection. Water softening : Lime-Soda treatment, Zeolite, Ion – exchange process, Mixed bed demineralization, Eutrophication, Desalination (Reverse Osmosis, Electrodialysis).

UNIT-5-CORROSION AND ITS PREVENTION:
Mechanism of Dry and wet corrosion (rusting of iron), types of corrosion, galvanic corrosion,

differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, Protective coatings), Soil corrosion, Microbiological Corrosion.

UNIT-6-LUBRICATION AND LUBRICANTS:
Introduction, mechanism of lubrication, classification of lubricants. Additives for lubricants. Properties of lubricants (Flash & Fire point, Saponification number, Iodine value, Acid value, Viscosity and Viscosity index Aniline point, Cloud point and pour point).

UNIT-7-: FUELS
Definition and characteristics of a good fuel, Classification of fuels with suitable examples, Definition and determination of calorific value of a fuel with the help of bomb calorimeter, Proximate and Ultimate analysis of a fuel and its importance, Merits and demerits of gaseous fuel over other varieties of fuel, Composition properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas (iv) LPG (v) CNG

UNIT-8-INSTRUMENTAL METHODS OF ANALYSIS :

Principle and application of Thermal methods of Analysis. (TGA, DTA, DSC), Basic concepts of spectroscopy, Absorption and Emission spectroscopy Different spectroscopic Techniques (UV-Visible and IR spectroscopy) elementary discussion on Flame photometry.

Course Outcomes:
After successful completion of this course, the student would be able to :

- Illustrate the basic parameters of water, different water softening processes and effect of hard water in industries.
- Describe the basic properties and application of various polymers as an engineering material.
- Demonstrate the mechanism, physical and chemical properties of lubricants and their applications.
- Apply instrumental techniques of chemical analysis.

Books recommended

1. Engineering Chemistry , P.C. Jain, Monica Jain (Dhanpat Rai & Co)
2. Chemistry in Engineering & Tech , Vol. I & II , Kuriacose (TMH)
3. Instrumental methods of Chemical analysis, MERITT & WILLARD(EAST -WEST press)
4. Physical Chemistry , P.W Atkin (ELBS, OXFORD Press)
5. Physical Chemistry W.J.Moore (Orient Longman)

B. TECH. I SEM

CODE: MGMT-101

SUBJECT NAME: FUNDAMENTALS OF MANAGEMENT

NO. OF CREDITS: 4

			SESSIONAL	: 40
L	T	P	THEORY EXAM	: 60
4	0	0	TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

The course takes a general management perspective, with emphasis on skills and concepts essential to successful management careers. The course seeks to explain basic concepts, principles and processes in HR/Marketing/Finance/Operations, with an idea to acquaint the students with these disciplines, to suit the industry needs. To improve the their communication skills; help them examine the complexity of business scenario in the changing global context; and give exposure to several models of leadership. Prepare assignments on case-study to understand the dynamics of the corporate world- the past history or present practices of a company.

SYLLABUS

Unit I

Concept and significance of Management, Functions of management and their interrelationship, levels of Management and skills required at various levels, Management vs. Administration, Management as art, science or profession.

Unit II

Human Resource Management- Functions of HRM; Source of recruitment and selection process, Training needs and types, Motivation Theories – Maslow's need Hierarchy theory, Mc Gregor's Theory X and Y, Herzberg Theory.

Unit III

Marketing- Evolution of modern marketing concept, Functions of marketing management, Advertisement- Importance, choice of Media and criticism, Marketing mix, Marketing Research Process.

Unit IV

Production Management- Functions and scope of production management, Production Planning and Control- Stages of PPC, Meaning and methods of inventory control, Concept of TQM (In brief)

Unit V

Financial Management- Functions of Financial Management, Sources of finance, Factors effecting Capital Structure of a company.

Unit VI

Case Study (For Assignment Only)

Course Outcomes:

- The students will develop a knowledge framework with diverse perspectives and disciplines within management.
- They will have capacity to go beyond theoretical knowledge, demonstrate an ability to apply general management knowhow in practical business situations.
- They will be expected to develop an understanding of concepts in a rapidly changing global business context.
- Develop skills in time management and planning work assignments. The soft skills will be help gain confidence and develop personality.

Books

- Gupta R. S., Sharma B.D., Bhalla N. S., Principle and Practices of Management, Kalyani Publishers
- Chhabra T. N., Principles and Practices of Management, Dhanpat Rai & Co.
- Prasad L. M., Principles and Practices of Management, Sultan Chand & Sons
- Gupta C. B., Management (Theory and Practice), Sultan Chand & Sons

B. TECH. I SEMESTER

CODE: HAS-107

SUBJECT NAME: ENVIRONMENTAL STUDIES

NO. OF CREDITS: 4

			SESSIONAL	: 40
L	T	P	THEORY EXAM	: 60
4	0	0	TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

COURSE OBJECTIVES:

The prime objective of the course is to provide the students a detailed knowledge on the threats and challenges to the environment due to developmental activities. The students will be able to identify the natural resources and suitable methods for their conservation and sustainable development. The focus will be on awareness of the students about the importance of ecosystem and biodiversity for maintaining ecological balance. The students will learn about various attributes of pollution management and waste management practices. The course will also describe the social issues both rural and urban environment and environmental legislation.

SYLLABUS

UNIT 1: THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, scope and importance. Need for public awareness.

UNIT 2: NATURAL RESOURCES

Renewable and non-renewable resources:

Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and mineral resources, case studies.
  Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

- Energy resources: Growing energy needs, renewable and non- renewable energy sources, use of alternate energy sources. Case studies.
- Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT 3: ECOSYSTEMS

- Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers.
- Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:
  a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT 4: BIODIVERSITY AND ITS CONSERVATION

- Introduction – Definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels.
- India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT 5: ENVIRONMENTAL POLLUTION

Definition

- Causes, effects and control measures of :

  Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT 6: SOCIAL ISSUES AND THE ENVIRONMENT

- From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products.
- Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act
- Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation
- Public awareness.

UNIT 7: HUMAN POPULATION AND THE ENVIRONMENT

- Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies.

UNIT 8: FIELD WORK

- Visit to a local area to document environmental assets-river / forest / grassland / hill / mountain.
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc.

COURSE OUTCOMES

Upon completion of this course, a fully-engaged student will be able to:

- Understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development.
- Introduce the thinking about environmental issues from an interdisciplinary perspective.
- Identify and relate about the renewable and non-renewable resources, their importance and ways of conservation to sustain human life on earth.
- Know about the concepts of ecosystem and its function in the environment, the need for protecting the producers and consumers in various ecosystems and their role in the food web.
- Recognize, relate and become sensitive to the effects of pollution and will be able to contribute his learning's towards their prevention or mitigation.
- Describe the social issues along with the trends of human population growth and the possible means to combat the challenges.

TEXT BOOKS:

- Perspectives in Environmental Studies by A. Kaushik and C. P. Kaushik, New age international publishers.
- Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi

REFERENCE BOOKS:

- Enviromental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
- Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela . 2008 PHI Learning Pvt Ltd.
- Environmental Science by Daniel B. Botkin& Edwards A. Keller, Wiley INDIA edition.
- Fundamentals of Ecology by Odum, E.P., Barrick, M. and Barret, G.W.Thomson Brooks/Cole Publisher, California, 2005.

B. TECH. I SEM

CODE: MU-101

BASICS OF MECHANICAL ENGINEERING

NO. OF CREDITS: 4

L	T	P		
4	0	0	SESSIONAL	: 40
			THEORY EXAM	: 60
			TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objective

To study various concepts of thermodynamics, refrigeration and IC engines. To study principles and application of manufacturing processes. To study the power transmission devices such as belt, gears, clutches and brakes.

Unit I

Basic Concepts of Thermodynamics and Refrigeration: Introduction, Systems, Work, Heat, Temperature, Zeroth, 1^{st}, 2^{nd} laws of Thermodynamics, Concept of internal energy, Problems. Introduction to Refrigeration & Air conditioning, units of refrigeration, Coefficient of performance, Difference between a Heat engine refrigerator and heat pump, simple refrigeration vapour compression cycle, simple problems on Coefficient of performance

Unit II

I.C.Engines: Introduction, classification, Constructional details and working of 2 stroke & 4 stroke petrol engine & diesel engine, Otto, diesel and dual cycles, simple problems on Otto & diesel cycles.

Unit III

Power Transmission Methods and Devices: Introduction to Power transmission, Belt drive, Rope drive, Chain drive, Gear drive, Types of gears, Clutches, Types and function of clutches, Types and function of brakes.

Unit IV

Simple Lifting Machines: Definition of machine, velocity ratio, Mechanical advantage, Efficiency, Laws of machines, Reversibility of machine, Wheel and axle, Differential pulley block, Single, Double and Triple start worm and worm wheel, single and double purchase winch crabs, Simple and differential screw jacks, Problems.

Unit V

Stresses and Strains: Introduction, Concept & types of Stresses and Strains, Poisons ratio, stresses and Strains in simple and compound bars under axial loading, Stress– Strain diagrams, Hook's law, Elastic constants and Mechanical Properties of metals like mild steel and cast iron.

Unit VI

Manufacturing Processes: Brief introduction to classification of different manufacturing processes: Primary shaping processes, metal cutting processes, joining processes, finishing processes and processes bringing change in properties , Welding: Introduction to EAW, Gas welding, Soldering and Brazing.

Unit VII

Manufacturing Systems and Machine Tools: Introduction to Manufacturing Systems, Principal and parts of commonly used machine tools in Workshop such as Lathe, Shaper and Milling. Fundamentals of Numerical Control (NC), Advantage of NC systems, Classification of NC and CNC.

Course Outcomes:

- At the end of the course, the student shall be able to:
- Understand the basic principles of internal combustion engines.
- Understand the principles and applications of various manufacturing processes.
- Understand the concept of strain and strain for the strength of materials.
- Grasp the concepts of power transmission devices.
- Understand methods of thermodynamics, refrigeration & air conditioning in mechanical system.

Text Books

1. Basics of Mechanical Engineering- R.K Rajput Laxmi Pub, Delhi.
2. Elements of Mechanical Engineering- D.S Kumar, S.K Kataria and Sons.
3. Engineering Thermodynamics- P.K Nag TMH, New Delhi.
4. Refrigeration & Air conditioning- Arora & Domkundwar, Dhanpat Rai & Co. Pvt. Ltd.
5. Workshop Technology Vol I &II –Hazra & Chaudhary, Asian Book Comp., New Delhi.

Reference Books

1. Strength of Materials– Popov, Pub. - PHI, New Delhi.
2. Strength of Materials– G.H Ryder, Pub-ELBS.
3. Engineering Thermodynamics- C.P Arora, Pub- TMH, New Delhi.
4. Refrigeration & Air conditioning- C.P Arora, Pub- TMH, New Delhi.
5. Manufacturing Science- Amitabha Ghosh & Ashok Kumar Malik, - East- West Press.
6. Manufacturing Process & Systems- Oswald, Munoz, John Wiley.
7. Workshop Technology Vol I, II & III- Chapman, WAJ, Edward Arnold.
8. Basics of Mechanical Engineering – Vineet Jain, Dhanpat Rai Publications

B. TECH. II SEMESTER

CODE: HAS 102

SUBJECT NAME: PHYSICS II

NO. OF CREDITS: 4

			SESSIONAL	: 40
L	T	P	THEORY EXAM	: 60
4	0	0	TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

CRYSTAL STRUCTURE

Space lattice, unit cell and translation vector, Miller indices, simple crystal structure, Laue's treatment to Bragg's law, powder method, Point defects in solids – Schottky and Frenkel defects. Bonding in solids- Ionic and covalent bonds, Introduction to liquid crystals and applications.

COURSE OBJECTIVE:

This course introduces basic principles of crystal structure along with the defects. Emphasis is placed on the shortcoming of classical physics at the turn of the century leading to the discoveries of the modern era. The concepts of quantum mechanics and solid state serve as the foundation stone for the course. Extensions of these topics will include the modern view of the atom, wave particle duality of light, distribution of atoms, magnetism, and conductivity. Through this course students will able to know the overview about Nanotechnology

SYLLABUS

PART A

QUANTUM PHYSICS

Difficulties with Classical physics, Introduction to quantum mechanics-simple concepts. Black Body radiations Discovery of Planck's constant, phase velocity and group velocity. Schrodinger wave equations-time dependent and time independent, Expectation value, Ehrnfest Theorem, particle in a one-dimensional box. Quantum Statistics (Bose-Einstein and Fermi-Dirac Statistics).

PART B

NANOMATERIALS AND APPLICATIONS

Nanomaterials: Introduction , synthesis of nanoparticles,, properties of nanoparticles-Mechanical, optical, magnetic and electronic; Carbon nanotubes-types of nanotubes , synthesis and uses of nanotubes; Applications of nanotechnology.

FREE ELECTRON THEORY

Elements of classical free electron theory and its limitations. Drude's theory of conduction, quantum theory of free electrons. Fermi level, density of states. Fermi-Dirac distribution function. Concept of thermionic emission.

PART C

BAND THEORY OF SOLIDS

Origin of energy bands, Kronig-Penny model (qualitative), E-K diagrams, Brillouin Zones, concept of effective mass and holes. Classification of solids into metals, semiconductors and insulators, Fermi energy and its variation with temperature, Hall Effect and its applications

PHOTOCONDUCTIVITY&PHOTOVOLTAICS

Photoconductivity in insulating crystal, variation with illumination, effect of traps, application of photoconductivity, photovoltaics cells, solar cell and its characteristics, storage of solar energy

PART D

ELEMENTARY REACTOR TECHNIQUES

Radiation detectors: cloud chamber, bubble chamber, Operation and working of nuclear reactor, Reactor safety measures, nuclear cross-section, fission, fusion, impact parameter, reactor fuels

Program Outcomes:

At the completion of this course, students will be able to:

- describe the behavior of and make predictions regarding the phenomena of the physical world.
- apply fundamental principles of physics to solve problems related to quantum mechanics, solid state, magnetism and photoconductivity.
- be able to know about the fundamental concepts of nano technology and its applications in various field.

Text Books:

1. Perspectives of Modern Physics - Arthur Beiser (TMH)
2. Optics - Ajoy Ghatak (TMH)
3. Modern Physics for Engineers – S.P.Taneja (R. Chand)

4. Engineering Physics – SatyaPrakash (Pragati Prakashan)
5. Modern Engineering Physics – A.S.Vasudeva (S. Chand)
6. Engineering Physics (vol-1)- S.L. Gupta

Reference Books:

1. Fundamentals of Physics – Resnick & Halliday (Asian Book)
2. Introduction to Electrodynamics – D.J. Griffith (Prentice Hall)
3. Nuclear Physics- D.C. Tayal(Himalaya Publishing House)

B. TECH. II SEMESTER

CODE: HAS 104

SUBJECT NAME: MATHEMATICS II

NO. OF CREDITS: 4

			SESSIONAL	: 40
L	T	P	THEORY EXAM	: 60
4	0	0	TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

COURSE OBJECTIVES:

To gain knowledge about: Ordinary Differential Equations, Laplace Transform, Partial Differential Equations, and Vector Calculus

SYLLABUS

PART-A

ORDINARY DIFFERENTIAL EQUATION AND ITS APPLICATIONS

Exact differential Equation of first order, Equations reducible to exact differential eqn., differential equation of second and higher order Complete solutions =C.F. + P.I, Method of variation of parameter to find P.I., Cauchy's and Legendre's linear Eqn., Simultaneous linear equations with constant co-efficient, Application of linear differential eqns.to Electric circuits.

PART-B

LAPLACE-TRANSFORMS AND ITS APPLICATIONS

Laplace-transforms of elementary functions ,Properties of Laplace transforms, Existence conditions, transforms of derivatives, Transforms of Integrals, Multiplications by t^n ,division by t^n , Evaluation of integrals by Laplace – transforms, Laplace-transforms of Unit-step function ,unit-impulse function and periodic function,Inverse transforms, Convolution theorem,App. to linear differential eqn. and simultaneous linear differential eqns with constant co-efficient.

PARTIAL DIFFERENTIAL EQUATION AND ITS APPLICATIONS

Formation of partial-differential eqns. Lagrange's linear partial –differential eqns.,First order non-linear partial diff. Eqns., Charpit's method. Homogeneous Partial-diff eqn. of second and higher order.

PART-C

VECTOR CALCULUS

Differentiation of vectors,scalar and Vector-point functions,Gradient of a scalar field and directional derivatives,divergence and curl of a vector field and their physical interpretations, Integration of vectors, line integral, Surface integral, Volume integral, Green's theorem, Stoke's theorem, Guass theorem and their simple applications.

Text Books:

- B.S.Grewal - Engg. Mathematics
- H.C.Taneja - Engg. Mathematics
- R.S. Goyal - Engg. Mathematics
- Babu Ram -Engg. Mathematics

Course Outcome:

- Acquire knowledge about Differential Equations(Ordinary and Partial)
- Acquire knowledge about solving Differential Equations.
- Acquire knowledge Vector Calculus.
- Acquire knowledge about Laplace Transform.

B. TECH. II SEMESTER

CODE: HAS-111

SUBJECT NAME: Essentials of Communication

NO. OF CREDITS: 4

			SESSIONAL	: 40
L	T	P	THEORY EXAM	: 60
4	0	0	TOTAL	: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Objective:

It aims to inculcate interest towards literary pursuits and creative writing in students. Their imaginative faculties will be harnessed for the purpose of originality and ability to think independently. Furthermore, the aim is to enhance their critical thinking and develop aptitude for formal writing and oral discussions. They are guided and given exercises to improve their vocabulary during the course, simultaneously through classroom and lab exercises the students gain confidence in their own ability to express their thoughts and articulate ideas.

Unit –I- COMPREHENSION & COMPOSITION

Excerpt from John Updike's *Cosmic Gall*; Paragraphs/Essays; Unseen Passage & Comprehension exercises derived from features, articles and editorials; exercises in creative writing and impromptu/extempore speech; Anecdotes/stories; Deconstructing & Re-framing Quotes; Verse composition;Dialogue-writing; Story-building and storyboards; travelogue

Unit-II-TECHNICAL WRITING

Format of Long Reports, Interoffice Memorandum, Format and layout of a typical business letter; Covering letter and Resume; Analytical and Descriptive writing.

Unit –III- SEMANTICS & SYNTAX

One-word substitutes, Idioms & Proverbs, Vocabulary building; Crosswords, Sentence Correction/Editing.

COURSE OUTCOMES:

- Students are equipped with a better vocabulary, confidence to express themselves and must show remarkable interest in conveying their ideas by the end of the course.
- Students will learn creative writing.
- Students will learn basic formal writing.
- 'Student-centric' exercises with the emphasis on interpersonnel communication skills will give the students greater confidence in their ability to communicate and persuade.

References:

- National dailies like *Hindu, HT, TOI, Tribune* (e-versions available)
- Magazines like *NatGeo, Outlook, India Today*
- Raman, Meenakshi and Sangeeta Sharma. *Technical Communication*. Oxford: 2011
- Wehmeier, Sally .*Oxford Advanced Learner's Dictionary*. Oxford UP.8 th edition.
- Ghosh, BN. *Managing Soft Skills for Personality Development*.Tata McGraw-Hill 2012
- Rizvi, M Ashraf. *Effective Technical Communication*. Tata Mc Graw-Hill.2005
- Bretag, Crossman and Bordia.Communication Skills. Tata Mc Graw-Hill.2009
- Blogs: Eng_lessons_dj.blogspot.com
- Renaissanceymcaust.blogspot.com

B. TECH. II SEM

CODE: E-105

ELECTRICAL TECHNOLOGY (ET)

NO. OF CREDITS: 4

L	T	P		
4	*0*	*0*	SESSIONAL	: 40
			THEORY EXAM	: 60
			TOTAL	*: 100*

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

UNIT-I-

DC CIRCUITS Introduction of electric circuit, ohm‘s law, limitations of ohm‘s law, ideal, Practical and dependent sources and their characteristics, Source transformation, Voltage and Current division, Kirchhoff‘s Voltage law and Kirchhoff‘s Current law; Mesh and Nodal analysis

UNIT-II-

AC FUNDAMENTAL Production of alternating voltage or current, phasor representation of alternating quantity, Instantaneous, Peak, Average and RMS values of periodic waveforms; Peak factor, Form factor; pure R,L & C in AC circuit, j notation and concept of phasor, active, reactive and apparent power, Power factor

UNIT-III-

MAGNETIC CIRCUITS Magnetic Circuits, Magnetic Materials and their properties, static and dynamic emfs and force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses.

UNIT-IV

NETWORK THEOREMS Superposition, Thevenin‘s and Norton‘s, Reciprocity, Compensation, Maximum Power transfer, Tellegan‘s and Millman‘s theorems, Application of theorems to dc and ac circuits

UNIT-V-

AC CIRCUITS AC series circuit RL, RC, and RLC, AC parallel circuits, combination of series and parallel circuits, Series and Parallel resonance, selectivity, bandwidth and Q factor, earthing

UNIT-VI

POLYPHASE SYSTEMS Advantages of 3-phase systems, generation of 3-phase voltages; phase sequence; star & delta connections; interconnection of 3-phase sources and loads; voltage, current & power in star & delta connected systems, analysis of 3-phase balanced circuits, measurement of 3-phase power- 2 wattmeter method, effect of power factor on wattmeter reading

UNIT-VII

ELECTRICAL MACHINES Introduction to transformer, DC machines, induction motor, synchronous machines; Principle, construction and working

COURSE OUTCOMES:

1 Analyze and solve AC & DC electric networks using different techniques.
2 An understanding of the construction and working principle of DC & AC machines.
3 Identify the type of electrical machines for a given application
4 An understanding of various types of measuring instruments.
5 An understanding of single phase and 3 phase systems.

Text Book:

1. Basic Electrical Engineering by Kothari & Nagrath TMH 2. Principle of electrical Engg. By V. Del Toro Printice Hall 3. Electrical Technology by B L Thereja S.Chand

B.TECH 2016

CODE: CE-101

SUBJECT NAME: Fundamentals of Computer and Programming with C

NO OF CREDITS: 4	SESSIONAL: 40
L P	THEORY EXAM: 60
4 0	TOTAL:100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks.It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To understand the major components of computer system.
2. To learn about different Number Systems and their conversion.
3. To understand the types and functions of OS.
4. To learn about different programming languages and their corresponding Translators.
5. To learn about the basic concepts of Networking.
6. To understand the building blocks of C language like variables, data types, managing I/O etc.
7. To understand the different statements like sequential, decision making, iterative such as if-else, loops.
8. To understand derived data types like arrays and structures.
9. To learn about the concept of Pointers and understand functions also.
10. To understand file handling and dynamic memory allocation schemes.

UNIT-I

An Overview Of Computer System And Operating Systems

Fundamentals: Evolution of computers, Hardware organization of a computer. Introduction to microprocessors, generation of microprocessors, commonly used CPUs.
Input/Output Devices, Input/output ports and connectors.
Different Number Systems:- Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, and their inter- conversions.
Operating System Basics: Introduction to Operating system, Functions of an Operating Systems, Classification of Operating Systems, Basic introduction to DOS, UNIX/LINUX OS, Windows XP, working with Windows.Introduction to computer viruses.

UNIT-II

Basic Introduction To Programming Languages

Machine Language, Assembly Languages, High level Languages, Types of high level languages, Complier, Interpreter, Assembler, Loader, Linker, Relationship between Compiler, Loader and Linker.

UNIT-III

Basic Introduction To Computer Networks

Data Communication, modulation, Network devices, LAN, LAN topologies, WAN, OSI Reference model Introduction to Internet and protocols: TCP/IP ref. model, Backbone network, Network connecting devices. Hypertext documents, HTTP, DNS, Network Security.

UNIT-IV

An Overview Of C

Constants, Variables and Data types, operators and Expressions, managing I/O operations, Decision Making and branching, Decision Making and looping, Arrays, Character Arrays and Strings, User Defined Functions

UNIT-V

Structure And Union In C

Defining structure, declaring variables, Accessing structure members, structure initialization, copying and comparing structures variables, operations on individual members, Array of structure, structure with structure, unions, size of structure.

UNIT-VI

Pointers In C

Introduction, Understanding Pointers, Accessing the address of a variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a variable through its pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factors, pointers and Arrays, Pointer and Character Strings, Arrays of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers to Functions

UNIT-VII

Dynamic Memory Allocation And File Management In C

Introduction, Dynamic memory allocation, allocating a block of memory: Malloc, allocating multiple blocks of memory: Calloc. Releasing the used space: Free, Altering the size of block: Realloc, Defining and opening file, closing file, I/O operation on files, error handling during I/O operations, Random Access to files and command line arguments.

Course Outcomes:

a. The students will understand computer system components in detail.
b. The students will know the types of format in which data can be stored in computer system's memory.
c. The students will be familiar with various types of OS and also compare them.
d. The students will be able understand various functions of OS
e. The students will be able to understand how with the help of translators computer understand human language.
f. The students will be able to understand and use the concept of networking in labs.

g. The students will be able to solve problems by writing instructions in C language and provided it to computer system.
h. The students will also solve complex problems where heterogeneous data is used with the help of arrays and structures.
i. The students will be able to create their own modules with the help of functions and also solve recursive problems.
j. The students will be learn how to allocate memory at run time with the help of malloc() and calloc() C inbuilt functions
k. The students will be able to understand file handling concepts

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	b	c	d	e	f	g	H	i	j	k
1	√										
2		√									
3			√	√							
4					√						
5						√					
6							√				
7							√				
8								√			
9									√		
10										√	√

TEXT BOOKS

1. Fundamental of Information Technology by A.Leon&M.Leon.
2. UNIX Concepts and Application(4/e) by Sumitabha Das
3. Programming Languages (4th Edition) by Pratt IW

REFERENCE BOOKS

1. Fundamentals of Computers and Programming with C by A. K. Sharma Dhanpat Rai publications
2. Computer Networks (4th Edition) by Andrew S. Tanenbaum
3. Digital Principles and Application by Donald Peach, Albert Paul Malvino
4. Operating System Concepts, (6th Edition) by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne.

B. TECH. II SEM

CODE: MU-103

ENGINEERING DRAWING

NO. OF CREDITS: 4

L	T	P
4	0	0

SESSIONAL	: 40
THEORY EXAM	: 60
TOTAL	: 100

Course Objective

To study various concepts of orthographic and isometric projection. To study projection of points, planes, lines, solids and development of surfaced. To study lettering, dimensioning , first angle and third angle projection methods.

Unit 1

Introduction: Importance and scope of Engineering Drawing, Instruments, Lettering, Types of lines, Dimensioning, Scales, Different methods of projections, B.I.S Specifications.

Unit 2

Projection of Points : Introduction to plane of projection, reference & auxiliary planes, projection of points in different quadrants, traces, true inclinations & true lengths of the lines, projections on auxiliary plane.

Unit 3

Projection of Lines: Projection of lines parallel to reference planes, perpendicular to reference planes, inclined to one reference plane and parallel to the other, inclined to both the reference planes, traces, true inclinations & true lengths of the lines.

Unit 4

Projection of Planes: Parallel to one reference plane, inclined to one plane but perpendicular to the other, inclined to both reference planes.

Unit 5

Projection of Solids: Projection of Polyhedra, solids of revolution-in simple positions with axis perpendicular to a plane, with axis parallel to both planes, with axis parallel to one plane and inclined to the other.

Unit 6

Projection of Section of Solids: Projection of section of prisms, pyramids, cylinders and cones with axis perpendicular to one reference plane and parallel to the other reference plane.

Unit 7

Development of Surfaces: Development of simple object with and without sectioning.

Unit 8

Isometric Projection: Introduction, Isometric scale, Isometric projections/ view of plane figures like prisms, pyramids, cylinders and cones.

Unit 9

Orthographic Projections: Orthographic projections of machines components and Nuts, Bolted Joints, Screw threads, Screw joints

Course Outcomes (CO's): At the end of the course, the student shall be able to:

- Understand the basic principles of projections.
- Understand and draw orthographic and isometric view of an object.
- Grasp the concepts of development of surfaces.
- Understand methods of drawing nuts, bolts and screw threads.
- Understand projection of points, lines, planes and solids.

Reference Books

1. Machine Drawing - N D Bhatt and V M Panchal, Charotar Publishing House.
2. A Text Book of Machine Drawing - P S Gill Pub.: S K Kataria & Sons.
3. Engineering Graphics with Auto CAD 2002 - James D.Bethune, Pearson Education.

4. A Text Book of Machine Drawing Laxmi Narayana and Mathur, M/s. Jain Brothers, New Delhi.
5. Machine drawing by N Sidheshwar, Kannaieh, V S Sastry, TMH., New Delhi.
6. Fundamentals of Engineering Drawing by Luzaddder: PHI.
7. Fundamentals of Engineering Drawing by French and Vierk; Mc Graw H

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-201

SUBJECT NAME: DATA STRUCTURES USING C

NO OF CREDITS: 4

B.TECH	SEMESTER III		SESSIONAL:	40
L	P	T	THEORY EXAM:	60
3	0	1	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. Demonstrate familiarity with major algorithms and data structures.
2. Analyze performance of algorithms.
3. Choose the appropriate data structure and algorithm design method for a specified application.
4. Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs.
5. Use various data structures effectively in application programs.
6. Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, merge sort, quick sort and heap sort.
7. Understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals, and shortest paths.
8. Demonstrate understanding of various searching algorithms.
9. Compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.

Unit I

Overview of 'C': Introduction, Flow of Control, Input output functions, Arrays and Structures, Functions.

Data structures and Algorithms: an overview: concept of data structure, choice of right data structures, types of data structures, basic terminology Algorithms, how to design and develop an algorithm: stepwise refinement, use of accumulators and counters; algorithm analysis, complexity of algorithms Big-oh notation.

Arrays: Searching Sorting: Introduction, One Dimensional Arrays, Operations Defined: traversal, selection, searching, insertion, deletion, and sorting. Multidimensional arrays, address calculation of a location in arrays.

Searching: Linear search, Recursive and Non recursive binary Search.

Sorting: Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Shell sort, Heap sort
Stacks and queues: Stacks, array representation of stack, Applications of stacks. Queues, Circular queues, array representation of Queues, Deque, priority queues, Applications of Queues.

Unit II- Pointers and Linked Lists
Pointers: Pointer variables, Pointer and arrays, array of pointers, pointers and structures, Dynamic allocation.
Linked Lists: Concept of a linked list,. Circular linked list, doubly linked list, operations on linked lists. Concepts of header linked lists. Applications of linked lists, linked stacks linked Queues.

Unit III-Trees and Graphs
Trees: Introduction to trees, binary trees, representation and traversal of trees, operations on binary trees, types of binary trees, threaded binary trees, B Trees, Application of trees.
Graphs: Introduction, terminology, 'set, linked and matrix' representation, Graph traversal techniques: BFS, DFS, operations on graphs, Minimum spanning trees, Applications of graphs.

Unit IV-File Handling and Advanced data Structure
Introduction to file handling, Data and Information, File concepts, File organization, files and streams, working with files. AVL trees, Sets, list representation of sets, applications of sets, skip lists

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

i. Understand the concepts of data structure, data type and array data structure.
ii. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
iii. Analyze algorithms and determine their time complexity.
iv. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.
v. Implement and know when to apply standard algorithms for sorting.
vi. Implement and know when to apply standard algorithms for searching.
vii. Effectively choose the data structure that efficiently models the information in a problem.
viii. Compare alternative implementations of data structures with respect to performance.
ix. Compare and contrast the benefits of dynamic and static data structures implementations.
x. Understand the linked implementation, and its uses both in linear and non-linear data structure.
xi. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
xii. Implement the various sorting algorithms, including bubble sort, insertion sort, selection sort, merge sort, quick sort and heap sort.

xiii. Apply fundamental algorithmic problems including Tree traversals, Graph traversals, and shortest paths.

Mapping of Course Objectives and Course Outcomes:

Course Outcomes ------->

Course Objectives --->	**i**	**Ii**	**iii**	**Iv**	**v**	**Vi**	**vii**	**viii**	**Ix**	**X**	**xi**	**xii**	**xiii**
1	√	√							√				
2			√										
3							√	√	√				
4		√		√						√			√
5							√						
6					√						√	√	
7													√
8						√					√		
9										√			

REFERENCES

1. Data Structures using C by **A. M. Tenenbaum, Langsam**, **Moshe J. Augentem**, PHI Pub.
2. Data Structures using C by **A. K. Sharma**, Pearson
3. Data Structures and Algorithms by **A.V. Aho**, **J.E. Hopcroft and T.D. Ullman**, Original edition, Addison-Wesley, 1999, Low Priced Edition.
4. Fundamentals of Data structures by **Ellis Horowitz & Sartaj Sahni**, Pub, 1983,AW
5. Fundamentals of computer algorithms by **Horowitz Sahni and Rajasekaran**.
6. Data Structures and Program Design in C By **Robert Kruse**, PHI,
7. Theory & Problems of Data Structures by **Jr. Symour Lipschetz**, Schaum's outline by TMH
8. Introduction to Computers Science -An algorithms approach , **Jean Paul Tremblay**, Richard B. Bunt, 2002, T.M.H.
9. Data Structure and the Standard Template library – **Willam J. Collins**, 20

B.TECH COMPUTER ENGINEERING 2016
CODE: CE-16-203

SUBJECT NAME: DISCRETE STRUCTURES

NO OF CREDITS: 4

B.TECH	SEMESTER III	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students familiar with Set theory, Set operations, types of Sets.
2. To make the students familiar with Relations and their types.
3. To discuss Partial Order relations and Lattice.
4. To give knowledge about Propositions, basic operations in propositions, Finding tautologies and contradictions.
5. To give knowledge about CNF,DNF,PCNF and PDNF.
6. To enable students understand the concept Permutations and Combinations.
7. To make the student familiar with Recursion and various Recurrence Relation.
8. To discuss the concept of Algebraic Structures.
9. To make student familiar of Cosets and Lagrange's theorem.
10. To make the students understand Graphs, their types and different algorithms based on Graph Theory.
11. To make the students familiar with Tress and their traversals.

Unit-1: Set Theory: Introduction to set theory, Set operations, Algebra of sets, Finite and Infinite sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Equivalence relations and partitions , Partial ordering relations and lattices.

Unit-2: Propositional Calculus: Basic operations: AND (^), OR (v), NOT (~), Implication and bi-implication, Truth value of a compound statement, propositions, tautologies, contradictions, Universal and Existential quantifiers, methods of proof, Mathematical Induction, Propositional logic, Hypothesis and Inference, CNF, DNF, PCNF, PDNF.

Unit–3: Techniques of Counting: Permutations with and without repetition, Combination.

Unit-4: Recursion And Recurrence Relation: Linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

Unit-5: Algebric Structures: Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Integral domain and fields, Cosets, Lagrange's theorem

Unit-6: Graphs And Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eurelian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula, Trees, Spanning trees, Binary trees and its traversals, Coloring graph problem, bipartite graphs, Travelling salesman problem,

Course Outcomes:

a. The students will be able to understand basics of sets, operations on sets and their types.
b. The students will be able to explain Relations, Type of Relations and Representation of relations using different methods
c. The students would be able to define Partial Order relations, Hasse Diagram, Lattice and also will be able to solve problems based on the same.
d. The students will be able to understand Propositions, basic operations in propositions and will be able to solve problems on tautologies and contradictions.
e. The students will be able to analyze difference between CNF,DNF,PCNF and PDNF and will be able to convert simple propositions into normal forms.
f. The students will be able to calculate Permutations and Combinations,
g. The students will be able to find the various solutions of Recurrence relations.
h. The students would be able to learn Algebraic Structures and their types.
i. The students would be able to define Cosets and Lagrange's theorem.
j. The students will be able to explain Graphs, their types and will able to solve different problems based on algorithms of Graph Theory.
k. The students will be able to understand Tress and their traversals.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	A	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
1	√										
2		√									
3		√	√								
4				√	√						
5					√						

6						√					
7							√				
8								√	√		
9									√		
10										√	
11										√	√

REFERENCES

1. Elements of Discrete Mathematics C.L Liu, 1985, McGraw Hill
2. Discrete Mathematical Structures, B. Kolman and R.C. Busby, 1996, PHI
3. Discrete Mathematical Structures with Applications to Computers by Tembley & Manohar, 1995, Mc Graw Hill.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-205

SUBJECT NAME: COMPUTER NETWORKS

NO OF CREDITS: 4

B.TECH	SEMESTER III	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To build an understanding of the fundamental concepts of computer networking
2. To familiarize students with the basic taxonomy and terminology of the computer networking
3. To understand network architecture, TCP/IP and OSI reference models.
4. To identify and understand various techniques and modes of transmission
5. To introduce data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
6. To understand routing and congestion in network layer with routing algorithms, IP Addressing (Classful and classless)
7. To learn the elements and protocols of transport layer
8. To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS.

Unit-1: OSI Reference Model and Network Architecture: Introduction to Computer Networks, Overview of Data Communication and Networking - Analog / Digital transmission, Internet, Private Networks, Network Topologies: Bus-, Star-, Ring-, Hybrid -, Tree -, Complete - , Irregular –Topology; Types of Networks: Local Area Networks, Metropolitan Area Networks, Wide Area Networks; Layering architecture of networks, OSI model, Functions of each layer, Services and Protocols of each layer.

Unit-2: Data Link Layer: Error detection and correction, Data link control - Flow and Error control - Sliding window protocol - ARQ schemes, HDLC protocol - Point to Point Protocol, Multiple Access Techniques - Random Access, Controlled Access, Logical Link Control (LLC) and Medium Access Sub-layer functions - LAN standards - IEEE 802.3 (CSMA/CD) - Fast Ethernet - Giga Bit Ethernet, IEEE 802.4 (Token Bus), IEEE 802.5 (Token Ring), IEEE 802.11 (Wireless LAN).

Unit-3: Network Layer: Inter-networking - Addressing - Routing - Link state and Distance

Vector Routing - Congestion control algorithms - Network Layer Protocols - ARP, RARP, IPv4, ICMP, IPv6 and ICMPv6 - Unicast Routing - RIP, OSPF, BGP and Multicast Routing - IGMP, DVMRP, MOSPF, CBT, PIM.

Unit-4: Transport Layer: Processes to Processes Delivery - Transmission Control Protocol (TCP) - User Datagram Protocol, Stream Control Transmission Protocol (SCTP) - Data Traffic - Congestion Control and Quality of Service - Techniques to improve QOS - Integrated Services - Differentiated Services, QoS in switched networks.

Unit-5: Session, Presentation and Application Layers: Services, Network security - security Cryptography, Message confidentiality, message integrity, message authentication, Digital Signature, Entity Authentication, Key Management, Application layer- DNS, E-mail (SMTP), FTP, HTTP, Voice over IP. ATM, ISDN,SONET

Course Outcomes:

a) The students will be able to understand basic computer network technology and Data Communications System and its components.
b) The students will be able to identify the different types of network topologies and protocols.
c) The students will be able to enumerate the layers of the OSI model and TCP/IP and Analyze the services and features of the various layers of data networks.
d) The students will be able to understand IEEE 802 standards.
e) The students will be able to understand and building the skills of subnetting and routing mechanisms. Design, calculate, and apply subnet masks and addresses to fulfill networking requirements.
f) The students will be able to understand routing and congestion in network layer with routing algorithms
g) The students will be able to understand Unicast routing, multicast routing and their protocols.
h) The students will be able to connectionless and connection oriented services and their protocols.
i) The students will be able to recognize the different internetworking devices and their functions.
j) The students will be able to analyze the features and operations of various application layer protocols such as Http, FTP, DNSs
k) The students will be able to understand the need of security in networks with basics of encryption and cryptography.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	B	c	D	E	F	G	H	I	j	K
1	√										
2		√									
3			√								
4		√							√		
5				√							
6					√	√	√				
7								√	√		
8										√	√

REFEREENCES

1. Computer Networks (3rd edition), Tanenbaum Andrew S., International edition, 1996.
2. Forouzan, Data Communications and Networking, TMH, 4 th Edition, 2006.
3. William Stallings, Data and Computer Communications, PHI, 7 th Edition, 2003
4. Data Communications, Computer Networks and Open Systems (4th edition), Halsall Fred,2000, Addison Wesley, Low Price Edition.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-207

SUBJECT NAME: DIGITAL ELECTRONICS & COMPUTER ORGANIZATION

NO OF CREDITS: 4

B.TECH	SEMESTER III	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To understand the fundamental concepts of Communication Systems.
2. To understand and analyze the signal flow in a digital communication system.
3. To acquire knowledge about various types of transmission media and communication modes.
4. To understand the fundamental logic gates of Digital systems
5. To understand various codes, conversions and to represent numbers and perform arithmetic in bases 2, 8, 10, and 16.
6. To design digital circuits by simplifying the Boolean expression using Boolean Algebra, Karnaugh Maps (K-maps) and Quine-Mcluskey method.
7. To represent logical functions in Canonical form and with AND, OR, NOT, XOR, NAND, NOR logic gates.
8. To implement functions with NAND and NOR logic.
9. To design combinational and sequential digital circuits.
10. To use the functionality of flip-flops for analysis and design of Registers and Counters
11. To have a through understanding of the basic structure and operation of a digital computer.
12. To identify functional units, bus structure and addressing modes.
13. To discuss in detail the operation of the arithmetic unit
14. To design the hardwired and micro-programmed control units.
15. To study the different ways of communicating with I/O devices and standard I/O interfaces.
16. To study the hierarchical memory system including cache memories and virtual memory.

Unit 1 Communication system components: Introduction to Communication: Definition & means of communications; Digital and analog signals: sign waves, square waves; Properties of signals: amplitude, frequency, phase, modulation: types of modulation amplitude-modulation, frequency-modulation, phase- modulation.

Unit 2 Transmission Media and Communication Modes: Twisted pair-, co-axial, fiber optic-cables, wireless media Transmission impairments: attenuation, limited bandwidth of the channels, delay distortion, noise, and data rate of the channels (Nyquist theorem, Shannon limit), Communication modes: simplex, half duplex, full duplex.

Unit 3 Fundamentals of Digital Techniques: Digital signal, logic gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Boolean algebra, Binary codes: BCD, Excess-3, Gray, EBCDIC, ASCII, Error detection and correction codes, Design using gates, Karnaugh map and Quine Mcluskey methods of simplification.

Unit 4 Combinational Design and Sequential Using Gates: Combinational circuits: Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders/Subtractors, BCD arithmetic circuits, Encoders, Decoders/Drivers for display devices. Sequential circuits : Flip Flops; S-R, J-K, T, D, master-slave, edge triggered, shift registers, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

Unit 5 Computer Organization and Design: Instruction cycle, Fetch-Decode-Execute cycle(typically 3 to 5 stages), Instruction code, computer registers, computer instructions, type of instructions, memory reference, register reference, I/O reference, Hardwired controlled unit.

Unit 6 Micro programmed Control & Central Processing Unit: Micro programmed controlled unit, Control memory and address sequencing, Design of Control Unit, General Register Organization, Stack Organization, Addressing Modes: register, immediate, direct, indirect, indexed, Operations in the instruction set: Arithmetic and Logical, Data Transfer and Manipulation, Program Control, RISC Vs. CISC architectures.

Unit 7 Memory Hierarchy & I/O techniques: The need for memory hierarchy(Locality of reference) Main Memory, Associative Memory, Cache Memory, Auxiliary Memory, memory parameters (access/ cycle time, cost per bit) Virtual Memory.

Course Outcomes:

a. Able to acquire knowledge about Communication System.
b. Able to understand the difference between digital and analog signals.
c. Able to understand the properties of signals.
d. Able to know about transmission media and communication modes.
e. Ability to design digital logic circuit by using logic gates or by using universal gates only.
f. Able to represent numbers and perform arithmetic in bases 2, 8, 10, and 16.
g. Able to covert function in sum of product (SOP) and product of sum (POS) forms.
h. Able to simplify Boolean expression.
i. Able to analyze and design combinational and sequential circuits.
j. Able to use the functionality of flip-flops for analysis and design of sequential circuits.
k. Able to understand organization of a digital computer and its principal components, viz., ALU, Control, Memory and Input/output.
l. Ability to identify and compare different methods for computer I/O
m. Able to identify functional units, bus structure and addressing modes.
n. Able to design the hardwired and micro-programmed control units.
o. Ability to identify memory hierarchy and performance

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	B	C	d	e	f	G	h	i	j	k	l	m	n	o
1	√														
2		√	√												
3				√											
4					√										
5						√									
6							√	√							
7					√		√	√							
8					√										
9									√						
10										√					
11											√				
12													√		
13											√				
14														√	
15												√			
16															√

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3. Digital Design : Morris Mano; PHI.
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5. Business Data Communications, Fitzgerald Jerry, 7 th Ed. New York, 2001, JW&S, Communication Systems, 4th Edition, by A. Bruce Carlson, Paul B. Crilly, Janet C. Rutledge, 2002, TMH.
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8. Digital Integrated Electronics : Taub & Schilling; MGH
9. Digital Principles and Applications : Malvino & Leach; McGraw Hill.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-209

SUBJECT NAME: THEORY OF AUTOMATA & COMPUTATION

NO OF CREDITS: 4

B.TECH	SEMESTER III		SESSIONAL:	40
L	P	T	THEORY EXAM:	60
3	0	1	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To understand the fundamental concepts of Finite state Systems and Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA) .
2. To understand and analyze Chomsky hierarchy of grammars.
3. To acquire knowledge about Regular Grammar and Regular Sets.
4. To understand Context Free and Context Sensitive Grammars: Definition, Context free and Context sensitive grammar.
5. To implement push down automata and turing machines.
6. To understand the concept of Undecidability and Computability.

Unit-1: Finite State Automata: Finite State Systems, Properties and limitations of Finite State machines, Basic Definitions, Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA, Equivalence of two DFA's, Finite automata with null moves: removal of null moves, Myhill-Nerode Theorem and minimization of finite Automata, finite Automata with outputs: Moore and mealy Machines, Equivalence of Moore and Mealy machines.

Unit-2: Chomsky Classification: Chomsky hierarchy of grammars, Unrestricted languages, Context sensitive languages, Context free and regular languages, Relation between classes of languages.

Unit-3: Regular Grammar and Regular Sets: Regular Expressions, Identities, Regular languages and finite automata, Arden theorem: Equivalence of finite automata and Regular Expressions, The Pumping Lemma for Regular Sets, Applications of the pumping lemma, Closure properties of regular sets.

Unit-4: Context Free and Context Sensitive Grammars: Definition, Context free and Context sensitive grammar, Parse trees, Ambiguity in CFG, Reduced forms, Removal of useless Symbols and unit production, Chomsky Normal Form (CNF), Griebach Normal Form (GNF).

Unit-5: Pushdown Automata: Introduction to Pushdown Machines, Two types of acceptance by PDA, Design of PDA corresponding to a language.

Unit-6: Turing Machines: Basic structure and working, Deterministic and Non-Deterministic Turing Machines, Design of TM, Universal TM, Halting problem of TM.

Unit-7: Undecidability and Computability: Recursive and non-recursive languages, PCP problem, Basic concepts, Primitive Recursive Functions.

Course Outcomes:

a. The students will be able to understand Finite State Systems, Properties and limitations of Finite State machines, Basic Definitions, Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA) .
b. The students will be able to explain Chomsky hierarchy of grammars.
c. The students would be able to define Regular Expressions, Identities, Regular languages and finite automata, Arden theorem: Equivalence of finite automata and Regular Expressions.
d. The students will be able to understand Context free and Context sensitive grammar, Parse trees, Ambiguity in CFG.
e. The students will be able to analyze Design of PDA.
f. The students will become familiar with Deterministic and Non-Deterministic Turing Machines, Design of TM, Universal TM, Halting problem of TM. Permutations and Combinations,
g. The students will be able to find the various solutions of Recursive and non-recursive languages.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives ---->

	A	**b**	**c**	**d**	**E**	**F**	**g**
1	√						
2		√					
3			√				
4				√	√		
5					√		

6						√	
7							√

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2. Theory of Computer Sc.(Automata, Languages and computation): K. L. P. Mishra & N. Chandrasekaran, PHI.
3. Introduction to automata theory, language & computations- Hopcroaft & D. Ullman, R Mothwani, 2001, AW
4. Introduction to formal Languages & Automata- Peter Linz, Narosa Publications.
5. Fundamentals of the Theory of Computation- Principles and Practice by Ramond Greenlaw and H. James Hoover, 1998, Harcourt India Pvt. Ltd..
6. Elements of theory of Computation by H.R. Lewis & C.H. Papaditriou, PHI.
7. Introduction to languages and the Theory of Computation by John C. Martin, T.M.H.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-211

SUBJECT NAME: INTRODUCTION TO E-COMMERCE AND ERP

NO OF CREDITS: 4

B.TECH	SEMESTER III	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To understand the basic concept of electronic transactions, types of business models and about customer relationship management.
2. To study various types of business strategies and marketing strategies.
3. To study about various legal and ethical issues related to electronic transactions and also understating the concepts of IPR.
4. To study in detail about various business processes, ERP implementations, various types of information systems, business intelligence and knowledge management.

Unit-1

Introduction to e-commerce: Need, importance, Business models, revenue models and business processes, economic forces & e-commerce, identifying e-commerce opportunities, international nature of e-commerce, technology infrastructure-internet & WWW; Business strategies for e-commerce: Revenue models in transaction, revenue strategic issues, creating an effective web presence, Marketing on the web: Web marketing strategies, communicating with different market segments, customer behavior and relationship intensity, advertising on the web, e-mail marketing, technology enabled CRM.

Unit-2

Business to business strategies: (Overview strategic methods for Developing E-Commerce) Purchasing, logistics and supply activities, electronic data interchange (EDI), electronic data interchange on the internet, supply chain management using internet technologies, electronic market place & portals (Home shopping, E-marketing, Tele marketing), auctions, online auctions, virtual communicative & web portals; legal, and ethical issues in e-commerce — use and protection of intellectual property in online business, online crime, terrorism & warfare, ethical issues.

Unit-3

Enterprise resource planning: Business functions, processes & data requirements, development of ERP systems, marketing information systems & sales order process, production & supply

chain management information systems, accounting in ERP systems, human resource processes with ERP, process modeling, process improvement and ERP implementations, Relationship between ecommerce and ERP.

Unit-4

ERP-Information System perspective: Evolution of Application Software Technology Management,EDP,MIS,DSS,OLAP,TPS,KBS,BPR,CRM,Business process re-engineering,Data ware house and Data mining, Business Intelligence and knowledge management.

Course Outcomes:

a. The students will be able to understand the basic concepts of electronic transactions.
b. Study of various types of business models and customer relationship management.
c. Students will be able to understand about various business strategies and marketing strategies.
d. Study of various legal and ethical issues related to electronic transactions.
e. Study of intellectual property rights and its importance.
f. Study of various business process and ERP implementation.
g. Study of various types of management information systems.
h. Study of business intelligence and knowledge management tools.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ----

^

	a	B	c	d	e	f	g	H					
1	√	√											
2			√										
3				√	√								
4						√	√	√					

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3. P.T. Joseph, “E-Commerce An Indian Perspective”, PHI Publication, NewDelhi.
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B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-202

SUBJECT NAME: DATABASE MANAGEMENT SYSTEM

NO OF CREDITS: 4

B.TECH	SEMESTER IV		SESSIONAL:	40
L	P	T	THEORY EXAM:	60
3	0	1	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students familiar with Database, Database Management System.
2. To make students understand disadvantages of traditional file system
3. To introduce basics terminology used in Database and Applications of Databases. Identify the various functions of Database Administrator.
4. To introduce the advantages and disadvantages of the different data models.
5. To introduce E-R diagram concept. What is the need of E-R diagram? How it is built?
6. To introduce various keys and mapping constraints.
7. To introduce relational model and structured Query Language (SQL). Introduce various relational operations on relational table.
8. To introduce normalization concept.
9. To introduce file organization and its various methods like sequential file, indexing, direct files, Hashing. Also introduce various indexing techniques like B- tree indexing files.
10. To introduce the rules guiding transaction (ACID). Concurrency control, need of concurrency control and also introduce serializability and its various protocols to maintain serializability.
11. To introduce recovery management.

UNIT 1: Introduction: Overview of database Management System; characteristics of database, database users, Advantages of DBMS over file processing systems, Responsibility of Database Administrator, components of DBMS, Introduction to Database Languages, Three schema architecture, Introduction to Client/Server architecture.

UNIT 2: ER Modeling: Basic concepts, mapping Constraints, Keys, Design of E-R Diagram, Reduction of E-R diagram into tables.

UNIT 3: Data Models: Network data model, Hierarchical data model, Relational data model, Respective Advantages and Disadvantages.

UNIT 4: Introduction to Query Languages: Relational Algebra, Structured query language, Relational constraints- Domain Constraint, Key Constraint, Integrity Constraints.

UNIT 5: Functional dependencies & Normalization: Introduction to functional dependency, Inference rules, minimal cover, closure, Types of keys, desirable properties of decompositions, Normalization & de-normalization process.

UNIT 6: Transactions, Concurrency Management and recovery: Transactions, desirable properties, Concurrent Transactions, Serializable Schedules, Locks, Two Phase Locking (2PL), Timestamp based protocols, Deadlock and its Prevention, What is Recovery, Kinds of failures, Failure controlling methods(Log base recovery, shadow copy scheme, checkpoints)

Unit-7: Distributed Data processing, parallel Databases: Architecture for Parallel databases, Parallel query evaluation, Data Partitioning, Types of distributed databases, Architecture of distributed databases, Fragmentation, Replication, catalog management.

Course Outcomes:

l. The students will be able to understand basic terminology used in database systems.
m. The students will be familiar with the basic concepts and the applications of database systems.
n. The students will be able to understand role of Database administrator in DBMS.
o. The students will be able to understand the origin of database system.
p. The students will be able to understand various data model like Hierarchical model, Network Model, Relational model, E-R model.
q. The students will be familiar with relational database theory and be able to write relational algebra expressions for query.
r. The students will be able to understand the logical design guidelines for databases, including the E-R method and normalization approach.
s. The students will be able to make E-R diagram from data given by user and table from E-R diagram.
t. The students will be able to understand primary key, superkey, foreign key concepts.
u. The students will be familiar with database storage structure and access techniques like file and page organization, indexing methods like B-tree and hashing.
v. The students will be familiar with basic issues of transaction processing and concurrency control.
w. The students will be able to understand serializability and also its various protocols to maintain it.
x. The students will be able to choose the database management system suitable for a specific project and knows its structure and functions.
y. The students will be able to know the SQL language clauses and functions and can write optimal queries as well as nested queries in SQL.
z. The students will be able to understand various storage mechanisms.
aa. The students will be also understand how to retrieve data manipulate data using SQL.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	A	B	c	D	e	f	g	H	I	J	K	l	m	n	o	p
1	√	√														
2				√												
3	√	√	√													
4					√											
5					√			√								
6									√			√				
7														√		√
8							√						√			
9										√					√	
10											√	√				
11											√					

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2. An Introduction to Database Systems by C.J. Date, 7th edition, Addison-Wesley, Low Priced Edition, 2000.
3. Database Management and Design by G.W. Hansen and J.V. Hansen, 2nd edition, 1999, Prentice-Hall of India, Eastern Economy Edition.
4. Database Management Systems by A.K. Majumdar and P. Bhattacharyya, 5th edition, 1999, Tata McGraw-Hill Publishing.
5. A Guide to the SQL Standard, Date, C. and Darwen,H. 3rd edition, Reading, MA: 1994, Addison-Wesley.
6. Data Management & file Structure by Loomis, 1989, PHI

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-204

SUBJECT NAME: ANALYSIS AND DESIGN OF ALGORITHMS

NO OF CREDITS: 4

B.TECH	SEMESTER IV		SESSIONAL:	40
L	P	T	THEORY EXAM:	60
3	0	1	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. Introducing students with mathematical preliminaries required to analyze and design computer algorithms.
2. Introducing to the student advanced data structures required to design efficient computer algorithms
3. Familiarizing students with specific algorithms for a number of important computational problems like sorting, searching, and graphs, etc.
4. Use various techniques for efficient algorithm design (divide-and-conquer, greedy, dynamic programming, backtracking and branch and bound algorithms) and are able to apply them while designing algorithms.
5. Introducing the concept of NP-complete problems and different techniques to deal with them. Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Unit I

Brief Review of Graphs, Sets and disjoint sets, union, sorting and searching algorithms and their analysis in terms of space and time complexity.

Unit II-Divide and Conquer

General method, binary search, merge sort, quick sort, selection sort, Strassen's matrix multiplication algorithms and analysis of algorithms for these problems.

Unit III-Greedy Method

General method, knapsack problem, job sequencing with dead lines, minimum spanning trees, single source paths and analysis of these problems.

Unit IV-Dynamic Programming

General method, optimal binary search trees, O/I knapsack, the traveling salesman problem.

Unit V-Back Tracking
General method, 8 queen's problem, graph coloring, Hamiltonian cycles, analysis of these problems.

Unit VI-Branch and Bound
Method, O/I knapsack and traveling salesman problem, efficiency considerations. Techniques for algebraic problems, some lower bounds on parallel computations,NP hard ,NP complete

Course Outcomes:

a. Able to analyze and compare complexity for different types of algorithms for different types of problems.
b. Apply mathematical preliminaries to the analyses and design stages of different types of algorithms.
c. Choose among different types of data structures the best one for different types of problems.
d. Recognize the general principles and good algorithm design techniques for developing efficient computer algorithms.
e. Familiarizing students with specific algorithms for a number of important computational problems like sorting, searching, and graphs, etc.
f. Decide on the suitability of a specific algorithm design technique for a given problem.
g. Design efficient algorithms for new situations, using as building blocks the techniques learned.
h. Apply algorithm design techniques to solve certain NP-complete problems.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ⟶

Course Objectives ---->

	a	B	c	d	e	F	g	h
1	√	√						
2			√					
3				√	√			
4						√	√	
5								√

REFERENCES

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2. Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson And Ronald L Rivest: 1990, TMH
3. The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., 1974, Addison Wesley.
4. Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., 1986.
5. Johan Wiley & Sons,
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7. Introduction to Design and Analysis of Algorithm, Goodman, S.E. & Hedetnieni, 1997, MGH.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-206

SUBJECT NAME: SYSTEM SOFTWARE DESIGN

NO OF CREDITS: 4

B.TECH	SEMESTER IV	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students familiar with components of system programming and its applications.
2. To introduce basics terminology used in system program, Roles of various software tools such as Assembler, Compiler, Loader, Linker, Macros, Debugger, Monitor, Text Editor , Interpreters during program execution.
3. Compare and contrast of various system programming tools.
4. To introduce Compiler and Compiler writing tools. Also introduced context free grammar and its advantages among various phases of compiler..
5. To introduce basics terminology used in Lexical Analysis of program and various methods like finite automata , LEX etc. to implement Lexical analyzer
6. To introduce Parsers and its various techniques like top down and bottom up parsers , their implementation , advantages and disadvantages.
7. To introduce various systems directed translation schemes, generation of intermediate code. Also describe various data structures for symbol tables.
8. To introduce principle source of optimization, various issues in code optimization and code generation.

Unit-I

Evolution of the Components of Systems Programming: Assemblers, Loaders, Linkers, Macros, Compilers. Software Tools: Variety of Software tools, Text editors, Interpreters and program generators, Debug Monitor, Programming environment. Loader Schemes, compile and go loader, general loader schemes, absolute loader, Subroutine linkage, Reallocating loader, Direct Linkage Loader, Binders, Linkage loader, overlays.

Unit-II

Compiler : Phases of Compiler, Compiler writing tools, Lexical Analysis, Finite Automata, Regular Expression, From a Regular expression to an NFA, NFA to DFA, Design of Lexical Analyzer. Syntax Analyzer, CFG, Role of the Parser, CFG, Top Down Parsing, Recursive

descent parsing, predictive parsers, Bottom up Parsing, Shift reduce, operator precedence parsers, LR Parsers.

Unit-III

Syntax directed definition: Construction of Syntax trees, Intermediate code generation, Intermediate Languages, Syntax trees, post fix form. Symbol table: contents of Symbol table, Data Structures for Symbol table; Runtime storage Administration.

Unit-IV

Code optimization and code generation: Principles sources of optimization, loop optimization, Dag Representation of Basic blocks, Code generation – problems in code generation, a simple code generator, Register allocation and Assignment, Peephole optimization.

Course Outcomes:

a. The students will be able to understand basic terminology used in system programming.
b. The students will be familiar with the basic concepts and the applications of system programs.
c. The students will be able to understand role of Assembler, compiler, linker, loader, text editor and debugger during program execution.
d. The students will be able to understand various phases of compiler like lexical analysis, parsing, intermediate code generation and code optimization etc.
e. The students will be familiar with context free grammar and able to write programs accepting strings for various grammars.
f. The students will be able to identify the problems of top down and bottom up parsing and learn how to resolve them.
g. The students will be familiar with symbol table storage structure and runtime storage administration.
h. The students will be familiar with basic issues of code optimization and code generation.
i. The students will be able to understand register allocation and assignment methods their limitations and benefits.
j. The students will be able to write programs for DFA.
k. the implement shift reduce parser, operator precedence, LL(1) and LR parsers.
l. The students will be able to write intermediate codes for program segments.
m. The students will be able to understand various storage mechanisms.
n. The students will be also understand how to optimize and generate code in assembly language.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Objectives --->

	a	B	c	d	e	F	G	H	I	j	k	l	m	n
1		√												
2	√		√											

3			√											
4				√	√									
5				√						√				
6					√	√					√			
7						√	√					√	√	
8								√	√					√

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B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-208

SUBJECT NAME: OBJECT-ORIENTED PROGRAMMING USING C++

NO OF CREDITS: 4

B.TECH	SEMESTER IV	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

Understand object oriented programming and advanced C++ concepts.

1. Be able to explain the difference between object oriented programming and procedural programming.
2. To make familiar with the syntax of the language.
3. Be able to program using more advanced C++ features such as composition of objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, templates etc.
4. Be able to build C++ classes using appropriate encapsulation and design principles.
5. Improve the problem solving skills.
6. Be able to apply object oriented or non-object oriented techniques to solve bigger Real World Computing problems.

Introduction to C++

Introduction; Characters used in C++; Basic data types, Data type modifiers; C++ Tokens – identifiers, keywords, constants, variables; Input – Output statements, structure of a C++ program;**Escape Sequence (Backslash Character Constants);**Operators and Expressions – arithmetic, relational, logical, and conditional operator; special operators – sizeof(), comma, assignment operators; Flow of control – compound statement, the if and if-else, and switch statements, the while, do-while, and for loops, break and continue statements, exit() function; Arrays – one dimensional and multi-dimensional arrays, array initialization; Structures – referencing structure elements, arrays of structures, initializing structures, assigning structures,

nested structures; Functions – prototypes, calling a function, parameter passing , call by value, call by reference, array parameters, returning values from functions.

POINTERS

Introduction to pointers- the '&' and '*'operators; pointer variables; dangling pointers; pointers and arrays; array of pointers; pointers and structures; dynamic allocation; self-referential structures, introduction to linked structures and lists;

Programming Techniques- A Survey

Introduction to programming paradigms – unstructured programming, structured , procedural, and modular programming; drawbacks of structured programming; Object Oriented programming.

Classes and Objects

Introduction to objects; classes – declaration in C++, abstraction and encapsulation, creating objects; array of objects; objects as function arguments, scope resolution operator, static data members; properties of classes and objects.

Functions: advanced concepts

Polymorphism, Function overloading; inline functions; friend functions- Member functions of a class as friends of another class, Friend Function as a bridge between two classes; friend classes; recursion – types of recursion: linear, binary, tail recursion

Constructors and Destructors

Constructors – types of constructors: default, user defined, parameterized, copy constructors, and constructors with default arguments; rules for constructor definition and usage; destructors -rules for destructor definition and usage.

Inheritance: Extending classes

Introduction to code reuse; containership-aggregation; inheritance – visibility modes, 'Open Close Principle'(OCP) types of inheritance: multilevel, multiple inheritance; function overriding – virtual functions, 'Liskov's Substitution Principle' (LSP), pure virtual functions; roles of constructors and destructors in inheritance; virtual base class – graph inheritance.

Templates: code sharing (Genericity):

Introduction to code sharing; templates; generic classes; templates with more than one generic parameter;

Operator overloading

Introduction to operator overloading, Overloading of binary operators, arithmetic assignment operators; overloading of unary operators; overloading of input-output operators; rules of operator overloading.

File handling in C++

File concepts; files and streams; opening and closing of files – functions get(), getline(), put() etc., opening files using function open(); reading and writing blocks and objects into the files; detecting 'end of file' (eof)

Exception handling

Introduction – traditional error handling; exception handling in C++ - 'try, throw, and catch blocks', multiple throw and multiple catch blocks, throwing objects; situations of usage of exception handling.

Course Outcomes:

a. Able to differentiate between Procedure-Oriented programming and Object-Oriented programming.
b. Able to understand the syntax of the language.
c. Able to understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language.
d. Able to apply concepts of operator overloading, constructors and destructors.
e. Able to apply exception handling.
f. To be able to apply object oriented concepts in real world programs

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOME

Course Objectives-→	Course Outcomes----→						
		a	**B**	**C**	**D**	**e**	**f**
	1	√					
	2		√				
	3			√	√		
	4			√	√	√	
	5						√

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2. Object Oriented Programming in Turbo C++ by Robert Lafore ,1994, The WAITE Group Press.
3. Programming with C++ By D Ravichandran, 2003, T.M.H
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B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-210

SUBJECT NAME: MICROPROCESSOR & INTERFACING

NO OF CREDITS: 4

B.TECH	SEMESTER IV	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. Identify the basic elements and functions of contemporary microprocessors (8085, 8086)
2. Understanding the architecture and operation of microprocessors.
3. Analyze timing sequence of different instruction and applying programming in the instruction sets of microprocessors.(Basically Intel family). .
4. To introduced the students with instruction format and addressing modes.
5. Identify and explain the operations of peripherals and memories typically interfaced with microprocessors.
6. The students should be able to understand DMA, 8255 PPI and Programmable interrupt controller 8259
7. To introduce the students with basic architecture of 32-bit microprocessors (80386/80486), Pentium processor architecture and microcontroller

Unit-1: **8085 PROCESSOR:** Introduction to microprocessor, 8085 microprocessor: Architecture, instruction set, interrupt structure, and assembly language programming.

Unit-2 : 8086 MICROPROCESSOR ARCHITECTURE : Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

Unit-3 : INSTRUCTION SET OF 8086 : Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

Unit-4: INTERFACING DEVICE: Basic interfacing concepts, handshaking, 8255 PPI chip: Architecture, control words, modes and examples. Interfacing D/A and A/D converters. DMA: Introduction to DMA process, 8237 DMA controller, Programmable interrupt controller 8259, Programmable interval timer chips 8253/8254

Unit- 5: Advance Microprocessors: Overview of basic architecture of 32-bit microprocessors (80386/80486), Overview of Pentium processor architecture. Introduction to microcontroller, UART

COURSE OUTCOMES:

a) The students will be able to understand the microprocessors working and their functions.
b) Able to understand the architecture i.e register sets , address bus, data bus and signals.
c) The students will be familiar with the timing diagram of various read and write cycles.
d)Able to apply the programming techniques in designing simple assembly language programs for solving simple problems by using instruction sets of microprocessors.
e) Gain hands-on experience in doing experiments on microprocessors (8085 and 8086) by using hardware kit in the laboratory and present the report.
f) Able to understand the various addressing formats and instruction formats.
g) Analyze the reason behind the cost of executing instructions in terms of time and space in simple programs.
h) Able to understand the operations of peripherals and memories typically interfaced with microprocessors.
i) The students will be able to familiar with the working of DMA, Programmable interrupt controller (8259) and programmable interval timer chips (8253/8254)
j) The students will be able to understand the concept of virtual mode and protected mode operations of the advanced microprocessors (80286,80386 and 80486).
k) Able to understand the architecture of Pentium microprocessors and microcontrollers.
l) Students should be able to use an Integrated Development Environment (IDE) as a modern software tool for embedded system development.
m) Students should understand the hardware/software tradeoffs involved in the design of microprocessor based systems.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	B	c	d	e	F	g	H	I	j	k	l	m
1	√												
2		√											
3			√	√	√								
4			√			√	√						
5								√	√				√
6										√			√
7											√	√	

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1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.
2. Microprocessors and interfacing : D V Hall TMH
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing: Badri Ram; Danpat Rai Publicatins
5. The Intel MIcroproceesors 8086-Pentium processor:Brey; PHI

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-212

SUBJECT NAME: WIRELESS COMMUNICATION

NO OF CREDITS: 4

B.TECH	SEMESTER IV	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To provide an overview of Wireless Communication networks area and its applications and examples of wireless communication devices.
2. To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
3. distinguish the major cellular communication standards (1G/2G/3G systems) and Introduce various wireless systems and standards such as GSM and their basic operation cases. It also deals with second generation and third generation wireless networks.
4. Able to understand the characteristics of different multiple access techniques such as TDMA, FDMA and CDMA in mobile/wireless communication
5. It deals with the fundamental cellular radio concepts such as frequency reuse and handoff and It provides an overview for the need of Cell splitting and Cell sectoring in cellular networks.
6. It provides idea about the different spectrum allocation techniques
7. It provides the need of Intelligent cell concept, applications of intelligent micro cell systems and how this is applied in in-building communication.

Unit-1: Introduction to Wireless Communication System: Evolution of mobile radio communications, examples of wireless communication systems, paging systems, Cordless telephone systems, comparison of various wireless systems.

Unit-2: Modern Wireless Communication System: Second generation cellular networks: GSM, third generation wireless networks: CDMA, Introduction to 4G wireless networks wireless in local loop, wireless local area networks, Blue tooth and Personal Area Networks.

Unit-3: Introduction to Cellular Mobile Systems: Spectrum Allocation, Basic cellular Systems, performance criteria, Operation of Cellular systems, Analog cellular systems, Digital cellular systems.

Unit-4: Cellular System Design Fundamentals: Frequency Reuse, channel assignment strategies, hand off strategies(MAHO, MCHO, NCHO), Interference and system capacity,

tracking and grade off service, improving coverage and capacity :Cell splitting, Cell sectoring, Zone concepts.

Unit-5: Multiple Access Techniques for Wireless Communication: Introduction to Multiple Access, FDMA, TDMA, spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.

Unit-6: Wireless Networking: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless network, wireless data services, common channel signaling, ISDN (Integrated Service Digital Networks), Advanced Intelligent Networks.

Unit-7: Intelligent Cell Concept and Application: Intelligent cell concept, applications of intelligent micro cell systems, in-building communication, CDMA cellular radio networks.

Course Learning Outcomes:

A student who successfully completes Wireless Communications will

a) Understand the basics of wireless communication networks.

b) Knowledge about overall GSM cellular concept along with Cellular systems from 1G to 3G, Wireless 4G systems

c) Fundamentals of cellular communications as Hexagonal cell geometry, Co-channel interference, Cellular system design, Sectoring using directional antennas

d) Knowledge of different spread spectrum techniques.

e) Have an understanding of design considerations for how to effectively share spectrum through multiple access

f) Have an understanding of the basic principles channel allocation and handoffs.

g) Gain knowledge and awareness of the technologies used in Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA)

h) Have an understanding about how intelligent cell concept is useful in in-building-communication.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	B	c	d	e	F	G	H
1	√	√						
2	√	√						
3		√						
4							√	
5			√			√		

6					**√**			
7								**√**

REFERENCES

1. Wireless Communications: Theodore S Rappaport; Pearsons
2. Mobile Cellular Telecommunication: W.C.Y. Lee; McGraw Hill
3. Mobile Communications: Jochen Schiller; Pearson

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-301

SUBJECT NAME: PRINCIPLES OF OPERATING SYSTEM

NO OF CREDITS: 4

B.TECH SEMESTER V	SESSIONAL: 40
L P T	THEORY EXAM: 60
3 0 1	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To understand evolution and types of OS.
2. To understand the structure, components and functions of OS.
3. To learn about Processes, threads and various Scheduling policies.
4. To understand process concurrency and synchronization.
5. To understand the principles of concurrency and Deadlocks.
6. To understand various memory management schemes.
7. To understand virtual memory management and Disk management.
8. To understand I/O management and File systems.

Unit-1: Introduction: Need of OS, Evolution of OS, OS Concepts (Multiprogramming & Multitasking, multiprocessing, multi user), Types of Operating Systems: Batch operating system, Time-sharing systems, Distributed OS, Network OS, Real Time OS, Embedded system, Mobile OS.

OS functions, Interrupt-driven operations for OS, Hardware protection to implement multiprogramming/multitaksing, Various Operating system services, architecture, System programs and system calls.

Unit–2: Process Management: Process concept, process lifecycle, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), Priority Scheduling, Round Robin(RR), Multilevel Queue Scheduling, Introduction to Multithreading.

Unit–3: Process-Synchronization: Critical Section Problems, Hardware support for process synchronization, semaphores.

Methods for handling Deadlocks-deadlock prevention, avoidance & detection, deadlock recovery.

Unit–4: Memory Management: Logical & Physical Address Space, swapping, relocation, fixed & variable memory partitioning, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, page table structure, segmentation with paging.

Virtual memory management - Principal of Locality, Demand Paging & Page-Replacement Algorithms, Demand Segmentation, Thrashing.

Unit–5: File System: Different types of files and their access methods, directory structures, various allocation methods, free space management.
Disk management: need of disk scheduling, disk scheduling criteria, disk scheduling algorithm.

Unit-6: I/O Systems: I/O Hardware, I/O software, types of I/O, kernel I/O subsystems.

Course Outcomes:

a. The students will be familiar with various types of OS and also compare them.
b. The students will be able understand various functions of OS
c. The students will be able to understand how the operating system shares hardware resources between processes, tasks, threads, and users
d. The students will be able to learn that minimization of turnaround time, waiting time and response time and also maximization of throughput with keeping CPU as busy as possible.
e. The students will be able to solve critical section problem such as producer consumer problem, dining philosopher problem.
f. The students will be familiar with different deadlock handling algorithms.
g. The students will be able to compare and contrast various memory management schemes.
h. The students will be able to understand the concept of demand paging and segmentation.
i. The students will be able to implement different disk scheduling algorithms.
j. The students will be able to understand various I/O types.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	**b**	**c**	**d**	**E**	**F**	**g**	**h**	**i**	**j**
1	√									
2		√								
3			√	√						
4					√					
5						√				
6							√			
7								√	√	
8										√

REFERENCES

1. Principles of Operating System,Dr. Naresh chauahn
2. Operating System By Peterson , 1985, AW.
3. Operating System By Milankovic, 1990, TMH.
4. Operating Systems by Mandrik & Donovan, TMH
5. Operating Systems By Deitel, 1990, AWL.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-303

SUBJECT NAME: INTERNET FUNDAMENTALS & WEB TECHNOLOGY

NO OF CREDITS: 4

B.TECH	SEMESTER V	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

1. To familiarize the students with the basic concepts of internet, its history and ways to connect to internet
2. To explain the basics of world wide web.
3. To provide a detailed understanding of search engines
4. To familiarize the student with the fundamental language of internet i.e. HTML
5. To teach the student aware of the concepts of cascading style sheets
6. To teach the student the students the basics of client side JavaScript
7. To teach the students the basics of server side programming constructs
8. To familiarize the student with the basics of delivering multimedia over web pages.

Unit-1: Introduction to Networks : Introduction to internet, history, Working of Internet, Modes of Connecting to Internet, Internet Address, standard address, classful and classless ip addressing, subnetting, supernetting.

Unit-2: World Wide Web: w3c consortium, web 2.0, web 3.0, searching the www: Directories search engines and Meta search engines, search fundamentals, search strategies, Architecture of the search engines, Crawlers and its types, Telnet and FTP.

Unit-3: Hypertext markup language: The anatomy of an HTML document: Marking up for structure and style: basic page markup, absolute and relative links, ordered and unordered lists, embedding images and controlling appearance, table creation and use, frames, nesting and targeting.

Unit 4: Separating style from structure with style sheets: Internal style specifications within HTML, External linked style specification using CSS, page and site design considerations.

Unit 5: Client side and Server Side programming: Client Side Programming: Introduction to the Java Script syntax, the Document object model, Event handling, Output in JavaScript, Forms handling, cookies, Introduction to VBScript, Form Handling.
Server Side Programming: Introduction to ASP, JSP.

Unit 6: **Other dynamic content technologies**: Delivering multimedia over web pages, VRML.

Course Outcomes

At the end of the course/session the student would be

a. Acquainted with the basics of internet, its applications and ways to connect to it
b. Learned the basics and types of search engines
c. Have a hands on HTML
d. Learned the need and basics of CSS
e. Learned the concepts of client side Javascript
f. Acquainted with the difference between client side and server side scripting
g. Familiar with the basics of multimedia over web

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ⟶

	a	b	c	D	E	f	g
1	✓						
2	✓		✓				
3		✓					
4			✓	✓			
5				✓	✓		
6					✓		
7						✓	
8							✓

REFERENCES

1. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp – 2001, TMH
2. Internet & World Wide Programming, Deitel,Deitel & Nieto, 2000, Pearson Education
3. Complete idiots guide to java script,. Aron Weiss, QUE, 1997.
4. Network firewalls, Kironjeet syan -New Rider Pub.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-305

SUBJECT NAME: COMPUTER GRAPHICS AND MULTIMEDIA TECHNOLOGY

NO OF CREDITS: 4

B.TECH SEMESTER V	SESSIONAL: 40
L P T	THEORY EXAM: 60
3 0 1	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

On completing this course students will be able to

1. Analyze where to apply computer graphics.
2. Analyze different display systems and their techniques.
3. Design the algorithms for generating geometric shapes.
4. Design and analyze the 2D&3D geometric transformations and viewing.
5. Design the clipping.
6. Know the projection and Animation of Graphics
7. Design and understand surface removal techniques
8. Understand different Multimedia applications
9. Design and analyze the compression techniques

Unit I- Introduction to Computer Graphics

What is Computer Graphics, Computer Graphics Applications, Computer Graphics Hardware and software, Two dimensional Graphics Primitives: Points and Lines, Line drawing algorithms: DDA, Bresenham's; Circle drawing algorithms: Using polar coordinates, Bresenham's circle drawing, mid point circle drawing algorithm; Filled area algorithms: Scanline: Polygon filling algorithm, boundary filled algorithm.

Unit II-Two/Three Dimensional Viewing

The 2-D viewing pipeline, windows, viewports, window to view port mapping; Clipping: point, clipping line (algorithms):- 4 bit code algorithm, Sutherland-cohen algorithm, parametric line clipping algorithm (Cyrus Beck).

Polygon clipping algorithm: Sutherland-Hodgeman polygon clipping algorithm. Two-dimensional transformations: transformations, translation, scaling, rotation, reflection, and composite transformation.

Three-dimensional transformations: Three-dimensional graphics concept, Matrix representation of 3-D Transformations, Composition of 3-D transformation.

Unit III-Viewing in 3D

Projections, types of projections, the mathematics of planner geometric projections, coordinate systems.

Unit IV-Hidden surface removal

Introduction to hidden surface removal. The Z- buffer algorithm, scan line algorithm, area sub-division algorithm.

Unit V-Image Compression & Standard

Making still images; editing and capturing images; scanning images; computer color models; color palettes; vector drawing; 3D drawing and rendering; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive loss less coding; JPEG performance; overview of other image file formats as GIF, TIFF, BMP, PNG etc.

Course Outcomes:

On completing this course students will

a. Have the clear idea regarding the applications of the computer graphics.
b. Design algorithms for different geometric shapes line, circle, ellipse...etc.
c. Perform scan line polygon filling, boundary filling.
d. Perform transformations (rotation, scaling, translation,shearing) on geometric objects.
e. Perform line clipping and polygon clipping by different techniques against viewing window.
f. Perform different types of projection on different objects
g. Able to develop interactive animations withhh and without using multimedia tools
h. Apply surface and line removal procedures for effective display of an image.
i. Apply compression on images.
j. Design and implement a number of multimedia applications.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives ---->

	a	B	C	d	e	F	G	h	I	j
1	√									
2	√									
3		√	√							
4				√			√			
5					√					
6						√	√			
7								√		
8							√			√

9									√	

REFERENCES

1. Computer Graphics Principles and Practices second edition by James D. Foley, Andeies van Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
2. Computer Graphics by Donald Hearn and M.Pauline Baker, 2nd Edition, 1999, PHI
3. Procedural Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition
4. Fundamentals of 3Dimensional Computer Graphics by Alan Watt, 1999, Addision Wesley.
5. Computer Graphics: Secrets and Solutions by Corrign John, BPB
6. Graphics, GUI, Games & Multimedia Projects in C by Pilania & Mahendra, Standard Publ.
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8. Introduction to Computer Graphics By N. Krishanmurthy T.M.H 2002

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-307

SUBJECT NAME: CORE JAVA

NO OF CREDITS: 4

B.TECH	SEMESTER V	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. Study the software and Hardware requirement of java
2. To introduce fundamentals of object oriented programming using Java
3. Compare C++ and Java and study the various features provide by java.
4. To introduce the java programming constructs
5. To introduce the use of class, object, method, constructors , abstract class, nested class, method overriding , inheritance in java programming
6. For Study the interface, multiple inheritance using interface, abstract class and polymorphism
7. To introduce the number, strings & Collections.
8. For study the various file handling operations
9. To introduce the Exception handling and concurrency in Java.
10. For study the AWT and java API Packages

UNIT I: FUNDAMENTALS OF JAVA

Origin of JAVA, features of JAVA, JAVA Environment, Hardware and Software Requirements, ByteCode , Installing JDK,Difference between C++ and JAVA, The Platform Environment, Command-Line Arguments, Environment Variables, System Utilities, PATH and CLASSPATH

UNIT II: JAVA PROGRAMMING CONSTRUCTS

JAVA program structure ,Variables, Primitive Data Types, Identifiers, Literals, Operators, Expressions, Precedence Rules and Associativity, Primitive type Conversion and Casting, Flow of Control(Conditional Statements, Loops, Branching Mechanism) Command Line Arguments.

UNIT III: CLASSES AND OBJECTS

Defining a class, creating objects, methods(declaration, invocation, overloading) , constructors ,garbage collection, static keyword, this keyword, arrays, inheritance and its types, method overriding, super keyword, final keyword, abstract class. Nested Classes, Inner Class, Local Classes, Anonymous Classes, When to Use Nested Classes

UNIT IV: INTERFACES AND INHERITANCE

Defining Interface, Extending and implementing interface, interface vs. abstract classes. , Using an Interface as a Type, Evolving Interfaces, Default Methods, Inheritance, Multiple Inheritance of State, Implementation, and Type, Overriding and Hiding Methods, Polymorphism, Hiding Fields, Using the Keyword super, Writing Final Classes and Methods, Abstract Methods and Classes

UNIT V: NUMBERS, STRINGS & COLLECTIONS

The Numbers Classes, Formatting Numeric Print Output, Strings, Converting Between Numbers and Strings, Manipulating Characters in a String, The StringBuilder Class, Autoboxing and Unboxing

UNIT VI: I/O IN JAVA

I/O Streams, Byte Streams, Character Streams, Buffered Streams, Scanning, Formatting, I/O from the Command Line, Data Streams, Object Streams, File I/O, The Path Class, Path Operations, File Operations, Checking a File or Directory, Deleting a File or Directory, Copying a File or Directory, Moving a File or Directory,, Managing Metadata (File and File Store Attributes), Reading, Writing, and Creating Files, Random Access Files

UNIT VII: EXCEPTIONS AND CONCURRENCY

What Is an Exception?, The Catch or Specify Requirement, Catching and Handling Exceptions, The try Block, The catch Blocks, The finally Block, The try-with-resources Statement, Specifying the Exceptions Thrown by a Method, How to Throw Exceptions, Creating Exception Classes, Unchecked Exceptions, Advantages of Exceptions, Types of errors, exception handling techniques, user defined exceptions, multiple catch statement, finally statement.

UNIT VIII: AWT & PACKAGES

JAVA API packages, using system packages, naming conventions, creating packages, accessing a package, use package, adding class to a package. Basics of AWT, Components and Containers

Course Outcomes:

a. The students will be aware about the software and hardware requirement and installing the java.
b. The students will be familiar with the basic concepts of the java.
c. The Students will be able to understand platform independency of the software.
d. The students will be familiar with java programming constructs like variable, primitive data types, operators, type conversion, type casting etc.
e. The students will be able to develop the program by using classes, object, nested classes, constructors, abstract class etc.
f. The students will be familiar with the implementation of interface, inheritance of classes, polymorphism.
g. The students will be familiar with conversion of numbers and Strings, manipulations of strings,Unboxing and autoboxing.
h. The students will be able to work with file like creating file, deleting file, copying the content in files, reading and Writing in files, managing Metadata etc.
i. The students will be able to handle the checked and unchecked exception.
j. The students will be familiar with the Basics of AWT, components and containers.
k. The Students will be able to create package, use of packages, adding a class to a package.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives ---->

	a	B	c	d	e	F	g	H	I	j	k
1	√										
2		√	√								
3		√	√								
4				√							
5					√						
6						√					
7							√				
8								√			
9									√		
10										√	√

REFERENCES

1. Sachin Malhotra and Saurabh Chaudhary , “Programming in JAVA”, Oxford University Press, ISBN : 0-19-806358
2. E-Balagurusamy, “Programming with JAVA- A Primer” Tata McGraw-Hill Publishers, ISBN 0-07-463542-5.
3. Dietel and Dietel “CORE JAVA”P. Naughton,Herbert Shield “ The complete reference-JAVA2” , TMH, http://java.sun.com/docs/books/tutorial

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-309

SUBJECT NAME: DATA WAREHOUSING AND DATA MINING

NO OF CREDITS: 4

B.TECH	SEMESTER V	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

1. To understand the basic principles, concepts and applications of data warehousing and data mining.
2. Differentiate OnLine Transaction Processing and OnLine Analytical processing
3. Describe the designing of Data Warehousing so that it can be able to solve the problems.
4. Learn Multidimensional schemas suitable for data warehousing along with DMQL
5. To understand various tools of Data Mining and their techniques to solve the real time problems.
6. To understand the task of data mining as an important phrase of knowledge discovery process.
7. To develop further interest in research and design of new Data Mining techniques.

Unit-1: **Introduction to Data Warehouse:** Data warehousing Definition, usage and trends, DBMS Vs data warehouse, Data marts, Metadata repository, concept hierarchies, Multidimensional data model, OLAP operations for multidimensional data model, Data cubes, Various Schemas: star, snowflake and fact constellation, Defining schemas.

Unit-2: **Data Warehouse Design**: The design process, 3-Tier data warehouse architecture, types of OLAP servers: ROLAP, MOLAP, HOLAP; distributed and virtual data warehouses, data warehouse process managers: Load manager, warehouse manger and query manager.

Unit-3: **Data Warehouse Implementation:** Computation of data cubes, modeling OLAP data, indexing, data warehouse back-end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse.

Unit-4: Data Mining: Definition & task, Data mining system architecture, KDD process, KDD versus data mining, data mining tools and applications, data mining task primitives.

Unit-5: Data mining query language: Basic concepts, task-relevant data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification using DMQL, data mining languages and standardization.

Unit-6: Data Mining Techniques: Association rule mining: a-priori algorithm, generating rules; Clustering techniques: partitioning methods, hierarchical methods, density based methods; Classification techniques: Decision tree knowledge discovery, back-propagation through Neural Networks, Genetic Algorithm, Rough Sets, Support Vector Machines and Fuzzy techniques; Prediction techniques: linear and non-linear regression.

Course outcomes: After undergoing the course, Students will be able to understand

a. Design a data mart or data warehouse for any organization along with OTAP and OLAP
b. Develop skills to write queries using DMQL
c. Extract knowledge using data mining techniques
d. Explore recent trends in data mining such as web mining, spatial-temporal mining
e. How Data Mining is one step in the whole KDD process.
f. The use of tools and techniques of data mining
g. The design of new data mining techniques.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives ---->

	a	B	c	D	e	F	G
1	√						
2	√		√				
3				√	√		
4		√					
5			√			√	
6					√		
7							√

REFERENCES

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2. Data Warehousing, Data Miniing and OLTP; Alex Berson, 1997, Mc Graw Hill.
3. Data warehousing System; Mallach; 2000, Mc Graw Hill.
4. Building the Data Warehouse; W.H. Inman, 1996, John Wiley & Sons.
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7. Data Mining Techniques; Arun Pujar; 2001, University Press; Hyderbad.
8. Managing the Data Warehouses; W.H.Inman, C.L.Gassey, John Wiley & Sons.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-319

SUBJECT NAME: DISTRIBUTED OPERATING SYSTEM (Elective-I)

NO OF CREDITS: 3

B.TECH	SEMESTER V	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To address hardware, software and communication in distributed systems in a broader sense and also the issues in designing the distributed operating systems.
2. Emphasis will be placed on communication, process, naming, synchronization, consistency and replication, and fault tolerance.
3. To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols.
4. To gain insight on to the distributed resource management components.
5. To know the components and management aspects of Real time, Mobile operating Systems.
6. To gain insight on to the algorithms for implementation of distributed shared memory, recovery and commit protocols.
7. To address MACH and UNIX operating system in a broader sense.

Unit-1: Introduction: Introduction to Distributed System, Goals of Distributed system, Hardware and Software concepts, Design issues. Communication in distributed system: Layered protocols, ATM networks, Client – Server model ,Remote Procedure Calls and Group Communication. Middleware and Distributed Operating Systems.

Unit-2: Synchronization in Distributed System: Clock synchronization, Mutual Exclusion, Election algorithm, the Bully algorithm, a Ring algorithm, Atomic Transactions, Deadlock in Distributed Systems, Distributed Deadlock Prevention, Distributed Deadlock Detection .

Unit-3: Processes and Processors in distributed systems: Threads, System models, Processors Allocation, Scheduling in Distributed System, Real Time Distributed Systems.

Unit-4: Distributed file systems: Distributed file system Design, Distributed file system Implementation, Trends in Distributed file systems.

Distributed Shared Memory: What is shared memory, Consistency models, Page based distributed shared memory, shared variables distributed shared memory.

Unit-5: Case study MACH: Introduction to MACH, process management in MACH, communication in MACH, UNIX emulation in MACH.

Course Outcomes:

a. Students will learn about distributed systems design and implementation. They will be exposed to various areas of research in distributed systems and mobile computing systems.
b. Modify existing open source kernels in terms of functionality or features used. They will learn about designing and implementing fault tolerant distributed systems.
c. The students should be able to demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system.
d. Identify the different features of real time and mobile operating systems.
e. Learn the various resource management techniques like the use of distributed shared memory and other resources for distributed systems.
f. This course successfully will be able to pursue independent research in distributed systems like MACH, UNIX etc.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes

	a	B	c	D	E	f	G
1	√	√					
2		√					
3		√	√				
4		√			√		
5		√		√			
6		√				√	
7		√					√

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-321

SUBJECT NAME: DATA COMPRESSION TECHNIQUES (Elective-I)

NO OF CREDITS: 3

B.TECH SEMESTER V	SESSIONAL: 40
L P	THEORY EXAM: 60
3 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To introduce the concept of data compression techniques and Mathematical Preliminaries for compression
2. To make the student familiar with The Huffman coding algorithm: Minimum variance Huffman codes.
3. To make the student familiar with Coding sequence and dictionary techniques.
4. The students can identify the characteristics and issues file compression and image compression.
5. To make the student able to understand Distortion criteria , Models , Scalar Quantization: The Quantization problem
6. Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm

Unit - I:

Compression Techniques: Loss less compression , Lossy Compression ,Measures of prefonnance , Modeling and coding.

Mathematical Preliminaries for Lossless compression: A brief introduction to information theory.
Models: Physical models, Probability models, Markov models, composite source model,
Coding: uniquely decodable codes, Prefix codes.

Unit – II:

The Huffman coding algorithm: Minimum variance Huffman codes.
Adaptive Huffman coding: Update procedure, Encoding procedure , Decoding procedure.
Golomb codes, Rice codes, Tunstall codes.

Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.

Unit-III:

Coding a sequence , Generating a binary code , Comparison of Binary and Huffman cding , Applications: Bi-level image compression-The JBIG standard , JBIG2 , Image compression. Dictionary Techniques: Introduction , Static Dictionary: Diagram Coding , Adaptive Dictionary. The LZ77 Approach , The LZ78 Approach , Applications: File Compression-UNIX compress , Image Compression: The Graphics Interchange Format (GIF) , Compression over Modems: V.42 bits , Predictive Coding: Prediction with Partial match (ppm): The basic algorithm , The ESCAPE SYMBOL , length of context , The Exclusion Principle , The Burrows-Wheeler Transform: Moveto-front coding , CALIC , JPEG-LS , Multi-resolution Approaches , Facsimile Encoding , Dynamic Markoy Compression.

Unit – IV:

Distortion criteria , Models , Scalar Quantization: The Quantization problem , Uniform Quantizer, AdaptiveQuantization,NonuniformQuantization.

Unit-V:

Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers, Structured Vector Quantizers.

Course Outcomes

Upon successful completion of the course, the student will be:

a. The student will be able to understand the concept of data compression techniques and various models associated with compression.
b. The student will be able to perform compression using Huffmann coding algorithm.
c. The students will become familiar Coding sequence and dictionary techniques Static Dictionary: DiagramCoding, AdaptiveDictionary. The LZ77 Approach , The LZ78 Approach.
d. The students will be able to differentiate between various types of quanitization techniques.
e. The students will be able to understand the concept of vector Quantization over Scalar Quantization

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course outcomes⟶

Course Objectives ---->

	A	B	c	d	E
1	√				
2		√			
3			√		
4				√	
5					√

REFERENCES

1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-323

SUBJECT NAME: FUZZY LOGIC (Elective-I)

NO OF CREDITS: 3

B.TECH	SEMESTER V	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

Students will learn about

1. Fundamentals of fuzzy sets and logic
2. Fuzzy logic based control/ expert systems.
3. Introduction to fuzzy arithmetic.
4. Fuzzy relationships and Projections and Cylindric Extensions.
5. Applying Fuzzy logic in soft computing.

Unit - 1

Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, cuts, Properties of a-cuts, Decomposition, Theorems, Extension Principle,

Unit - 2

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations

Unit - 3

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit - 4

Fuzzy Relations: Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Unit – 5

Possibility Theory: Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.

Unit – 6
Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Unit – 7
Uncertainty based Information: Information & Uncertainity, Nonspecificity of Fuzzy & Crisp sets, Fuzziness of Fuzzy Sets.

Unit – 8
Applications of Fuzzy Logic in soft computing.

Course Outcomes
Students will be able to

a. Design and use fuzzy sets and numbers in the context of various domains.
b. Design fuzzy rule based system for a control application like washing machine.
c. Design soft computing models to solve real life problems

Text books :

1. Fuzzy Sets, Uncertainty & Information by G.J.Klir & T.A. Folyger, PHI, 1988.
2. Fuzzy sets & Fuzzy logic by G.J.Klir & B.Yuan, PHI, 1995.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-325

SUBJECT NAME: REAL TIME SYSTEMS ELECTIVE 1

NO OF CREDITS: 3

B.TECH SEMESTER V	SESSIONAL: 40
L P	THEORY EXAM: 60
3 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. The student has an understanding and practical experience with real-time systems.
2. To introduce the students the basic understanding and design of embedded systems.
3. The student has an understanding of embedded software development tools.
4. The students can identify the characteristics and issued in real-time systems design.
5. The student should be able to understand the basic concepts of real time operating systems.
6. The students should be able to choose suitable real time hardware and test algorithms.
7. To introduce the students with fault tolerant systems and issues in real time languages

Unit I Embedded Systems

What is an embedded system? Categories: Stand-alone, Real-time, Networked appliances, mobile devices. Requirements of Embedded systems, Challenges and issues in Embedded software development. Embedded Software Development Tools: Host and Target machines, Linker/ locators for embedded software, Getting embedded software into target system.

Unit II Real Time Embedded systems

Definition, characteristics, classification, release times, deadlines and timing constraints, temporal parameters of real-time workload, periodic task model, issues involved in real time system design.

Unit III Real Time Operating Systems

Typical structure of an RTOS, Scheduling strategies, priority structures, task management, memory management, code sharing, task co-operation and communication, interrupt routines in an RTOS environment, mutual exclusion, Liveness, Minimum operating system Kernel, capabilities of commercial RTOS: VxWorks, pSoS, Micro C/OS II.

Unit IV Task assignment and Scheduling

Allocation / Scheduling problem, offline scheduling, online scheduling, pre-emptive / non-pre-emptive scheduling, static / dynamic scheduling, Rate-monotonic scheduling algorithm, problem of priority inversion, priority inheritance protocol, priority ceiling protocol, earliest-deadline-first scheduling algorithm

Unit V Real-Time Language Issues

Real-time language requirements, data typing, control structures, facilitating hierarchical decomposition, synchronization, packages, exception handling, overloading and generics, multitasking, low-level facilities,

Unit VI Fault-Tolerance Techniques

Fault types, fault detection measures, fault detection mechanisms, fault and error containment, Redundancy: Hardware and software redundancy, time redundancy.

Unit VII Case Study of RTLinux and VxWorks RTOS

COURSE OUTCOME

a) The students will be able to understand the basics and importance of real-time systems
b)The students will be familiar with the issues and challenges in the embedded system design
c) The students should be able to understand the recent trends in embedded systems design.
d) The students will be able to familiar with the host and target machine.
e) Able to understand the release time, deadline and timing constraints.
f) Understand the issues involved in real time system design.
g) Able to understand the structure of RTOS together with task and memory management.
h) Understand the liveness property of RTOS and minimum operating system kernel.
i) Understand basic multi-task scheduling algorithms for periodic, aperiodic, and sporadic tasks as well as understand the impact of the latter two on scheduling.
j) Able to familiar with the fault types and error containment zone.
k) The students will be able to understand the concepts of h/w and s/w redundancy.
l) The students will be able to familiar with the characteristics of real time languages.
m)Able to understand the capabilities of commercially available RTOS like VxWorks etc.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	B	c	D	e	F	G	h	I	j	K	l	m
1	√												
2		√	√										
3			√	√									
4					√	√							
5							√	√					√

6									**√**				
7										**√**	**√**	**√**	

REFERENCES

1. Programming for Embedded systems by Dreamtech software team, Wiley Dreamtech India Pvt. Ltd.
2. Embedded Realtime systems programming, by Sriram V. Iyer and Pankaj Gupta, TMH
3. Realtime computer control by Stuart Bennett, Pearson Education
4. Real time systems by C. M. Krishna, McGraw-Hill
5. Embedded Systems by RajKamal, TMI

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-302

SUBJECT NAME: PRINCIPLES OF SOFTWARE ENGINEERING

NO OF CREDITS: 4

B.TECH SEMESTER VI	SESSIONAL: 40
L P	THEORY EXAM: 60
4 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.
2. To make the students understand different phases to make a software & study them in detail.
3. To make the students understand project management concepts & their metrics.
4. To make the students understand the calculation of staffing for a particular project, its cost & schedule.
5. To make the students understand requirement engineering and its models (Information, functional, behavioural).
6. To make the students aware about the design models & its principles (data design, component design, interface design & architectural design).
7. To make the students understand different testing techniques for different projects.
8. Making the students understand to develop quality software ,its maintenance & introduce about software reliability.

Unit-1: Introduction: Evolving role of software, Software Characteristics, Software crisis, Silver bullet, Software myths, Software process, Personal Software Process (PSP), Team Software Process (TSP), emergence of software engineering, Software process, project and product, Software Process Models: Waterfall Model, Prototype Model, Spiral, Model ,RAD Model, Iterative Model, Incremental Model, Aspect-oriented Model, Agile Model.

Unit 2: Software project management: Project management concepts, Planning the software project, Estimation—LOC based, FP based, Use-case based, empirical estimation COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management.

Unit 3: Requirements, Analysis and specification: Software Requirements engineering, Requirement engineering process, Requirement Engineering Tasks, Types of requirements, SRS.
Unit-4: **System modeling:** Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling, The mechanics of structured analysis: Creating entity/ relationship diagram, data flow model, control flow model, the data dictionary.
Unit-5: System Design: Design principles, the design process; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling; Design Heuristics for effective modularity, Data Design, Architecture Design, Interface Design
Unit-6 : Software Testing and maintenance: Testing terminology—error, bug/defect/fault, failure, Verification and validation, Test case design, Static testing ,Dynamic testing--- Black box testing—Boundary value analysis, White box testing-- basis path testing, Unit testing, Integration testing, Acceptance Testing, debugging, debugging process debugging approaches. Software maintenance categories, Models
Unit-7: Software Quality Models and Standards: Quality concepts, Software quality assurance, SQA activities, Formal approaches to SQA; Statistical software quality assurance; CMM, The ISO 9126 Standard
Unit-8: Advanced topics in software Engineering: Configuration Management, Software re-engineering, reverse engineering, restructuring, forward engineering, Clean Room software engineering.

Case Study: To develop SRS and SDD for a Software Project.
Course Outcomes:

a. Students will be able to understand basic concepts of software engineering.
b. Students will be able to implement Software life cycle models and have a knowledge of different phases of Software life cycle.
c. Students will be able to calculate the cost & staff for a particular project at the start.
d. Students will be able to schedule their software in an appropriate way & make it track.
e. Students will be able to make an unambiguous SRS (software requirement specification) after collecting requirements of any client.
f. Students will be able to make a good design of software's.
g. Students will be able to manage risk in software if persist any.

h. Students will be able to Test a given software from the beginning.
i.Students will be able to give quality software by making systematic approach i.e. Software engineering

Objectives ---->

	A	B	C	D	e	F	g	h	i
1	√								
2		√							

3			**√**						
4				**√**					
5					**√**				
6						**√**			
7							**√**		
8							**√**		

REFERENCES

1. Software Engineering – A Practitioner's Approach, Roger S. Pressman, 1996, MGH.
2. Fundamentals of software Engineering,Rajib Mall, PHI
3. Software Engineering by Ian sommerville, Pearson Edu, 5th edition, 1999, AW,
4. Software Engineering – David Gustafson, 2002, T.M.H
5. Software Engineering Fundamentals Oxford University, Ali Behforooz and Frederick J. Hudson 1995,JW&S,
6. An Integrated Approach to software engineering by Pankaj jalote , 1991 Narosa,

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-304

SUBJECT NAME: UNIX AND SHELL PROGRAMMING

NO OF CREDITS: 4

B.TECH	SEMESTER VI	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To familiarize the students with the basic concepts of single & multiuser Operating System, basic structure of UNIX kernel and its subsystems.
2. To introduce the concept of file subsystem, inodes and how files are managed by inodes & to introduce process control subsystem, process scheduling paradigms and different types of scheduling employed in UNIX.
3. To introduce basic memory management subsystems viz. swapping and demand paging.
4. To acquaint students with command structure of UNIX, various types of shells and types of commands and familiarize students with some general commands, directory and file related commands, process related and user communication related commands in UNIX.
5. To understand the concept of filters and piping, system administration and some system administration related commands.
6. To introduce various editors available in UNIX and the detailed working on the most prevalent editor: Vi editor.
7. To understand basics of shell programming, wild cards and how to write simple shell programs, introduce concepts of decision control, looping, nested looping and control flow clauses in shell programming. Also make them write the related shell programs.

Unit 1: Theoretical Concepts of UNIX Operating system:

Evolution of UNIX, Basic features of UNIX, Architecture of UNIX kernel: File subsystem and process control subsystem, UNIX Vs LINUX, Various flavors of UNIX and LINUX.

Unit 2: File system of the UNIX OS:

Hierarchical structure of UNIX File system, Types of files, data structures of the file subsystem, File system layout, internal representation of files: inodes, accessing and releasing inodes, structure of regular files and directories, superblock, inode and disk block assignment to a new file.

Unit 3: Process control system:

Concept of a process, state transitions, data structures used by process control system, Context of a process, Layout of the system memory, process scheduler, scheduling parameters, Fair share scheduler.

Unit 4: Memory management policies:

Swapping: Data structures, implementation of swapping processes in and swapping out; Demand Paging: Data structures, page stealer process, fault handler.

Unit 5: UNIX Commands:

Structure of UNIX command, Internal and external commands, Basic utilities, logging in and out, changing passwords, File and directory related Commands: Absolute and relative path names, Creation and deletion of files and directories, Compression of files, file permissions, basic operations on files, printer commands, simple filters and advanced filters, Process related commands, Communication related commands, I/O redirection: standard input, output and error, piping; Vi editor and related commands, TCP/IP networking commands.

Unit 6: UNIX Shells and Shell Programming:

Types of shells and their features, shell's interpretive cycle, Shell wild cards, Shell variables, shell keywords, positional parameters, using shift on positional parameters, passing command line arguments, arithmetic operations, interactive shell scripts, taking decisions, loop control structures.

Unit 7: System Administration:

The administrator privileges, maintaining security, user and group management, startup and shut down, Disk related commands, Backup and recovery, password aging, advanced administration commands.

Course Outcomes:

a. The students will be able to understand basic concepts of Operating Systems, UNIX development, concept of kernel and shell, different subsystems of kernel, types of shells.
b. The students will be able to understand File subsystem in detail: Types of files, hierarchical structure, data structures and index nodes.
c. The students will be able to understand Process Control subsystem in detail: State diagram, data structures and various types of scheduling.
d. The students will be able to understand the basic difference between swapping and demand paging memory management policies.

e. The students will be able to understand and execute various types of commands on the standard shell viz. basic commands, directory and file related, pipe and filter related, process related, user communication related and the system administration related commands.
f. The students will be able to understand how to work on the standard editor of UNIX i.e. Vi editor and write shell scripts using this editor.
g. The students will be able to understand basics of shell, wild cards, redirection, positional and command line parameters.
h. Students will be able to write shell scripts involving decision control, looping and control flow statements.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	**b**	**c**	**d**	**e**	**f**	**g**	**H**
1	√							
2		√	√					
3				√				
4	√				√			
5					√			
6						√		
7							√	√

REFERENCES

1. The Design of the UNIX Operating System: Maurice J Bach, PHI
2. UNIX: Concepts and Applications: Sumitabha Das, Tata McGraw Hill.
3. UNIX Shell Programming: Yashwant Kanetkar, BPB publications.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-306

SUBJECT NAME: DIGITAL SYSTEM DESIGN

NO OF CREDITS: 4

B.TECH	SEMESTER VI	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

1. To develop skills in digital systems design using Computer-Aided-Design (CAD).
2. To understand the concepts of HDL, Structural, Data flow and Behavioral and Mixed models.
3. To understand fundamentals of digital circuit simulation.
4. To learn various combinational and sequential digital circuits.
5. To write test benches in VHDL for combinational and sequential digital circuits and acquire knowledge by simulating it, using commercial CAD tools.
6. To study architectural components of microcomputer (by structure modelling).
7. To code digital circuits using predefined and user defined packages, subprograms, functions and generics.
8. To acquire knowledge about various programmable logic devices such as PLAs, PALs, FPGA, CPLD, ROM.

Unit-1 : Introduction: Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Types of delays, Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

Unit-2 : VHDL Statements : Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, Packages and Libraries, concurrent statements, Functions and Procedures, resolution functions, Overloading, Structural Modelling, component declaration, structural layout and generics.

Unit-3 : Combinational Circuit Design: VHDL Models and Simulation of combinational circuits such as Adders, Subtractors, multiplexers, demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

Unit-4: Sequential Circuits Design: VHDL Models and Simulation of Sequential Circuits such as SR Flip Flop, JK Flip Flop, T Flip Flop, D Flip Flop, Shift Registers, Counters etc.
Unit-5: Design of Microcomputer: Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL
Unit-6 : Design with CPLDs and FPGAs : Programmable logic devices : ROM, PLAs, PALs, CPLDs and FPGA. Design implementation using CPLDs and FPGAs
Course Outcomes:

a. To able to understand hardware description language for digital system design.
b. To develop skills in digital systems design using Computer-Aided-Design (CAD).
c. Able to know the need of using CAD tools for designing digital systems.
d. Able to acquire knowledge about combinational and sequential circuits.
e. Ability to identify and code the module using different modelling styles.
f. Able to understand the advantage of using packages in coding.
g. Able to understand the use of generics in VHDL programming.
h. To be able to code using subprograms and functions.
i. To able to simulate VHDL code using commercial CAD tools.
j. Able to acquire knowledge about various programmable logic devices.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOME

Course Objectives----→	Course Outcomes----→									
		a	**b**	**c**	**D**	**E**	**F**	**g**	**h**	**i**	**J**
	1		√	√							
	2	√				√					
	3		√							√	
	4				√						
	5					√				√	
	6					√					
	7						√	√	√		
	8										√

REFERENCES

1. "A VHDL Primmer" : Bhasker; Prentice Hall 1995.
2. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
3. "VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
4. IEEE Standard VHDL Language Reference Manual (1993).
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7. "Introduction to Digital Systems" : Ercegovac. Lang & Moreno; John Wiley (1999).
8. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
9. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-308

SUBJECT NAME: CLOUD COMPUTING

NO OF CREDITS: 4

B.TECH SEMESTER VI	SESSIONAL: 40
L P	THEORY EXAM: 60
4 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To introduce the basic concepts of Cloud Computing, service layers involved, deploy applications over cloud computing platform, Utility Computing and Elastic Computing .
2. To discuss the various Cloud Technologies: AJAX , web services and software for enterprise applications.
3. To discuss the cloud data in Relational databases and various filesystems: GFS, HDFS, BigTable, HBase and Dynamo in cloud.
4. To discuss in detail the Map-Reduce concept, Map-Reduce model in parallel computing and its application.
5. To introduce the fundamentals of cloud security, its tool and cloud computing security architecture.
6. To familiarize the students with challenges involved in cloud computing security: Virtualization security management.
7. To discuss the issues involved in cloud computing while implementing real time application over cloud.
8. To discuss the issues regarding intercloud environments, QOS, Dependability, data migration, streaming.
9. To make students understand the basics of cloud middleware, Mobile Computing, Grid Computing, Sky Computing.
10. To discuss research issues to be explored regarding load balancing, resource optimization, dynamic resource provisioning in cloud computing.

UNIT 1: PRINCIPLES OF PARALLEL AND DISTRIBUTED COMPUTING:

Eras of Computing , Parallel vs. Distributed Computing , Elements of Parallel Computing , Hardware Architectures for Parallel Processing , Levels of Parallelism, Elements of Distributed Computing, Architectural Styles for Distributed Computing, Technologies for Distributed Computing , Distributed Object Frameworks , Service Oriented Computing

UNIT II - CLOUD COMPUTING FUNDAMENTALS

Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS,PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture, Application availability, performance, security and disaster recovery; next generation Cloud Applications.

UNIT III – DESIGN OF CLOUD COMPUTING PLATFORMS

Cloud Computing and Service Models, Datacenter Design and Interconnection Networks, Architecture Design of Compute and Storage Clouds, Public Cloud Platforms: GAE, AWS and Windows Azure, Cloud Resource Management and Exchanges, Cloud Security and Trust Management, Service Oriented Architectures, Services and Service Oriented Architectures, Message-Oriented Middleware, Portals and Science Gateways, Discovery, Registries, Metadata, and Databases, Workflow in Service-Oriented Architectures

UNIT IV - CLOUD PROGRAMMING AND SOFTWARE ENVIRONMENTS

Features of Cloud and Grid Platforms, Parallel and Distributed Programming Paradigms, Programming Support of Google App Engine, Amazon Web Services (AWS) Programming, Microsoft Azure Programming Support, Emerging Cloud Software Environments, Cloud Computing and Resource Management, Cloud Architecture and Service Modeling, Middleware Support for Cloud Resource Management

UNIT V - ADVANCED TOPICS IN CLOUD COMPUTING

Energy Efficiency in Clouds, Energy-Efficient and Green Cloud Computing Architecture, Market Based Management of Clouds, Market-Oriented Cloud Computing, A Reference Model for MOCC, Technologies and Initiatives Supporting MOCC, Federated Clouds / InterCloud, Cloud Federation Stack, Technologies for Cloud Federations, MetaCDN, SpotCloud

Course Outcomes:

a. The students will understand the concept of cloud computing with its service layers and Utility Computing and Elastic Computing .
b. The students will understand deployment of applications over cloud computing platform.
c. The students will be able to understand various Cloud Technologies, web services and software involved in cloud computing to design enterprise applications.
d. The students will be able to manage cloud data in relational databases and file systems in cloud computing.
e. The students will understand the concept of Map-Reduce and how Map-Reduce works in analysis of data in parallel computing .
f. The students will be able to design cloud based applications using map/reduce paradigm for handing distributed file system based data.
g. The students will be able to understand concept of cloud security, its tool and architecture of cloud computing security.
h. The students will be able to understand the challenges involved in cloud computing security and how VMs can be secured in Virtualization security management
i. The students will be able to understand how real time applications can be implemented over cloud platform.
j. The students will understand how the various issues arise due to Intercloud environments, QOS, Dependability, data migration and streaming in cloud

k. The student will be able to understand on-demand utility computing phenomenon known as cloud computing. How this paradigm is different from Mobile cloud computing, grid computing, sky computing.
l. The students will be able to understand how computation could be taken to data i.e. in-situ rather than moving volume of data around.
m. The students will be able to understand many issues involve in cloud computing and would be able to take up some topics for research activity.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	b	c	d	e	f	g	h	i	j	k	L	m
1	√	√										√	
2			√										
3				√									
4					√	√							
5							√						
6								√					
7									√				√
8										√			√
9											√	√	
10													√

REFERENCES

1. Gautam Shroff, "*Enterprise Cloud Computing Technology Architecture Applications"*, Cambridge University Press; 1 edition, [ISBN: 978-0521137355], 2010.

2. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, "*Distributed and Cloud Computing: From parallel processing to IOT"* Morgan Kaufmann Publishers; 1 edition [ISBN: 978-0-12-385880], 2012.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-316

SUBJECT NAME: EXPERT SYSTEMS (Elective - II)

NO OF CREDITS: 3

B.TECH SEMESTER VI	SESSIONAL: 40
L P	THEORY EXAM: 60
3 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:-

1. To make the students familiar with Expert system and their features.
2. To introduce applications of Expert Systems and their relation with AI.
3. To introduce the Problem areas addressed by ES, and their success factors.
4. To tell the importance of human expert in the design of expert system. Also to introduce the organization of Expert Systems.
5. To make acquainted with development life cycle of expert system.
6. To make introduce with some useful representation schemes like frames and tools used to develop the Expert System.
7. To introduce Task and stages in building Expert Systems by taking some real life examples. Also to make student able to analyse of some classic expert systems and their limitations.
8. To introduce the design and architectures of Expert Systems like Deep expert systems, Co-operating expert system, Neural Expert System, Fuzzy Expert System and Real Time Expert Systems

Unit I Introduction to Expert System
What are Expert Systems, Features of Expert System, features of good Expert System, Types of applications of Expert Systems; relationship of Expert Systems to Artificial Intelligence and to Knowledge-Based Systems. Problem areas addressed by ES, ES success factors. Role of human in Expert System, Expert System organization.

Unit II Expert system development life cycle
Difference between expert system and conventional program, Basic activities of expert system and the areas in which they solve problems. Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Evaluation.

Unit III Expert System Tools
Knowledge representation in expert systems-using rules semantic nets, frames, Types of tools available for expert system building and how they are used, Stages in the development of expert system tools, Examples of knowledge engineering.

Unit IV Building an Expert Systems
Necessary requirements for expert systems development, Task in building expert systems, Stages of expert system development, Examples of the expert system building process, Examples of expert system used in different areas, Architecture of Rule based Expert system, Non Rule based Expert system.

Unit V Types of Expert System
An analysis of some classic expert systems, Limitations of first generation expert systems, Deep expert systems, Co-operating expert system, Neural Expert System, Fuzzy Expert System, Real Time Expert Systems, Applications of Expert System.

Course Outcomes:

a. The students will be acquainted with the applications of Expert Systems and their relation with AI.
b. The students will be familiar with Expert system and their features.
c. The students will be known to Problem areas addressed by ES, and their success factors.
d. The students will be able to understand the importance of human expert in the design of expert system. The students will be familiar with organization of Expert Systems.
e. The students will be able to understand the development life cycle of Expert system.
f. The students will be skilled to design the representation schemes like frames and they will also be able to use tools to develop the expert system.
g. The students will be familiar to Task and stages in building Expert Systems with help of some real life examples.
h. The students will be familiar to some classic expert systems and their limitations.
i. The students will be familiar with the design and the architectures of Expert Systems like Deep expert systems, Co-operating expert system, Neural Expert System, Fuzzy Expert System and Real Time Expert Systems

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives --->	Course Outcomes--------->								
	a	B	c	d	e	f	g	h	I
1		√							
2	√								
3			√						
4				√					
5					√				
6						√			
7							√	√	
8									√

REFERENCES

1. David W. Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill Book Company.
2. Peter Jackson: Introduction To Expert Systems, Addison Wesley Elaine Rich and Kevin Knight: Artificial Intelligence and Expert Systems, McGraw Hill Book Company.
3. Elias M. Awad : Building Expert Systems, principles, procedures, and applications, west publishing co.1996.
4. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems, Prentice Hall (April 1, 1990)

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-318

SUBJECT NAME: ADVANCE CLIENT/SERVER TECHNOLOGY (Elective-II)

NO OF CREDITS: 3

B.TECH SEMESTER VI	SESSIONAL: 40
L P	THEORY EXAM: 60
3 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. Introduce to client server models,
2. To make the student familiar with Network programming
3. For study the JDBC driver, JDBC process and transaction management.
4. To make the student familiar with development of distributed application using RMI.
5. To introduce the fundamentals of enterprise java beans.
6. To Introduce the student with the working of servlet Programming.

UNIT1
Introduction to Client-server computing, Evolution of Corporate computing models from centralized to Distributed computing, Client –Server Models, Benefits & pitfalls of client-server computing.

UNIT 2

NETWORKING : Connecting to a Server, Implementing Servers, Sending E-Mail, Making URL Connections, Advanced Socket Programming

UNIT 3

DATABASE NETWORKING: The Design of JDBC. The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Matadata, Row Sets, Transactions, Advanced Connection Management, Introduction of LDAP

UNIT 4

DISTRIBUTED OBJECTS: The Roles of Client and Server, Remote Method Invocations, Setup for Remote Method Invocation, Parameter Passing in Remote Methods Server Object Activation, CORBA, Designing Client-server using RMI

UNIT 5

COMPONENT MODELS: Beans , Introduction to Enterprise Java Beans , session & entity beans , EJB Deployment , EJB transactional issues, Distributed Component models.

UNIT 6

SERVLETS: Overview, Servlet Lifecycle: init(), service(), destroy(), GenericServlet, ServletRequest and ServletResponse, HttpServlet, HttpServletRequest and HttpServletResponse : GET, POST, accessing parameters

Course Outcomes:

a. The students will be aware about the client server computing, Evolution of corporate computing models.
b. The student will be familiar with networking programming in java using java.net package, socket .
c. The student will be able to implement the two way communication between a client and server.
d. The students will be familiar with JDBC driver, concepts basic JDBC Programming, result sets, transaction management, and advance connection management.
e. The student will be familiar with RMI architecture, concept of RMI registry and Corba
f. The student will be able to create distributed application using RMI.
g. The student will be familiar with session and entity beans, deployment of EJB and EJB transactional issues.
h. The student will be familiar with life cycle of servlet, creating a servlet, generic servlet, HTTP servlet request and HTTP servlet request.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives ---->

	a	B	c	d	e	F	G	h
1	√							
2		√	√					
3				√				
4					√	√		
5							√	
6								√

REFERENCES

1. Core JavaTM 2, Volume II-Advanced Features, 7th Edition by Cay Horetmann, Gary Cornelll Pearson Publisher, 2004

2. Professional Java Programming by Brett Spell, WROX Publicatio

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-320

SUBJECT NAME: NEURAL NETWORKS (Elective - II)

NO OF CREDITS: 3

B.TECH SEMESTER VI	SESSIONAL: 40
L P	THEORY EXAM: 60
3 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

Students will be able to lean about

1. Neuron models relating to supervised and unsupervised learning.
2. Training the neurons on given input/output class information.
3. Combining neural and fuzzy paradigms
4. Genetic modeling of a problem
5. Solving a problem with huge state space using genetic modeling and operators
6. Applying soft computing in common domains like IR, Drug design etc.

Unit I-Overview of biological neurons
Structure of biological neurons relevant to ANNs.

Unit II- Fundamental concepts of Artificial Neural Networks
Models of ANNs; Feed forward & feed back networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner –lake all learning rule, etc.

Unit III-Single layer Perception Classifier
Classification model, Features & Decision regions; training & classification using discrete perception, algorithm, single layer continuous perception networks for linearly separable classifications.

Unit IV-Multi-layer Feed forward Networks
Linearly non-separable pattern classification, Delta learning rule for multi-perceptron layer, generalized delta learning rule, Error back-propagation training, learning factors, Examples.

Unit V- Single layer feed back Networks

Basic Concepts, Hopfield networks, Training & Examples.

Unit VI-Associative memories

Linear Association, Basic Concepts of recurrent Auto associative memory: retrieval algorithm, storage algorithm; By directional associative memory, Architecture, Association encoding & decoding, Stability.

Unit VII-Self organizing networks

UN supervised learning of clusters, winner-take-all learning, recall mode, Initialization of weights, separability limitations

Course Outcomes

Students will be able to

a. Identify the problems suitable for solution using neural networks
b. Train a perceptron network over a given input/output pattern information.
c. Design a genetic model for a given problem with huge state space.
d. Apply GA tools and solution to a problem to find an amicable solution for the same.
e. Design soft computing models to solve real life problems

Text Books

1. Introduction to artificial Neural systems by Jacek M. Zurada, 1994, Jaico Publ. House.
2. "Neural Networks :A Comprehensive formulation", Simon Haykin, 1998, AW
3. "Neural Networks", Kosko, 1992, PHI.
4. "Neural Network Fundamentals" – N.K. Bose , P. Liang, 2002, T.M.H

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-322

SUBJECT NAME: NATURAL LANGUAGE PROCESSING (Elective-II)

NO OF CREDITS: 3

B.TECH	SEMESTER VI	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students familiar with difference levels/stages of natural language processing.
2. To introduce concept of Formal languages and grammars: Chomsky hierarchy and problems associated (like Left-Associative grammars, ambiguous grammars) with them.
3. To introduce the top down and the bottom up parsing approaches and their respective types of parsers.
4. To make the students familiar with grammar types like ATN & RTN.
5. To make the students familiar with the basic techniques of parsing like CKY, Earley & Tomita's algorithms.
6. To introduce the students with Morphology of natural languages by taking examples from Hindi, English.
7. To make the students familiar with Semantics-knowledge and its utilization.
8. To make the students familiar with different kind of applications of NLP like Man-machine interface.

Unit-1: Components of natural language processing: lexicography, syntax, semantics, pragmatics: word level representation of natural languages prosody & natural languages.

Unit-2: Formal languages and grammars: Chomsky hierarchy, Left-Associative grammars, ambiguous grammars, resolution of ambiguities. **Introduction of top down and bottom up parsers.**

Unit-3: Computation linguistics: **Morphology of natural languages like Hindi, English etc.**, recognition and parsing of natural language structures: ATN & RTN, General techniques of parsing: CKY, Earley & Tomita's algorithms.

Unit-4: Semantics-knowledge representation semantic networks logic and inference pragmatics, graph models and optimization, Prolog for natural language semantic **(e.g. DCG)**.

Unit-5: Application of NLP: intelligent work processors: Machine translation, user interfaces, Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

Course Outcomes:

a. The student will be familiar with difference levels/stages of natural language processing.
b. The student will be able to understand the concept of Formal languages and grammars: Chomsky hierarchy and problems associated (like Left-Associative grammars, ambiguous grammars) with them. They will also be able to resolve such problems.
c. The student will be familiar with the top down and the bottom up parsing approaches and their respective types of parsers.
d. The student will be able to write small ATN & RTN grammars for simple English sentences.
e. The student will be familiar with parser like CKY, Earley & Tomita's.
f. The student will be able to do Morphology of words from natural languages like Hindi, English.
g. The student will be familiar with Semantics-knowledge and its important to understand the documents.
h. The student will be familiar with Semantics-knowledge and will be able to write some simple semantic structures and will be able to use them.
i. The student will be familiar with different kind of applications of NLP.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives ---->	Course Outcomes--------->								
	A	**b**	**c**	**D**	**E**	**f**	**G**	**h**	**i**
1	√								
2		√							
3			√						
4				√					
5					√				
6						√			
7							√	√	

8									√

REFERENCES

1. "Natural Language Understanding" James Allen, -1995Benjamin/cummings Pub. Comp. Ltd
2. "Language as a cognitive process", Terry Winograd 1983, AW
3. "Natural Language processing in prolog", G. Gazder, 1989, Addison Wesley.
4. " Introduction of Formal Language Theory", Mdlj Arbib & Kfaury, 1988, Springer Verlog

B.TECH COMPUTER ENGINEERING 2016(OPEN ELECTIVE)

CODE-OEC-1

SUBJECT NAME: INTELLIGENT SYSTEMS

NO OF CREDITS: 3

B.TECH	SEMESTER VI	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course objectives:

Students undergoing this course are expected to:

1. To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.
2. Searching as a problem-solving technique: a review of "conventional" searching methods including breadth-first, depth-first, best-first search any many more heuristic techniques. Heuristic functions and their effect on performance of search algorithms..
3. Represent the knowledge in different forms as well as an understanding of other topics such as minimax, resolution, etc.
4. Know the different ways of planning and natural language understanding.
5. Realize the different methods of learning.
6. Introduction to genetic algorithms.

Unit 1: Fundamental Issues in IS : Defi of AI , History ,Domains AI ,AI problems & State space ,Some examples problems representations like Travelling Salespersons ,Syntax analysis Problem .Basic issues to solve AI problems ,Underlying assumptions ,AI techniques ,Level of model ,Criteria for success ,Control strategies ,DFS,BFS

Unit 2:Heuristic search techniques :Generate & Test ,HillClimbing(simple & stipest),Best first search ,A*, AO*, Constraint satisfaction.

Unit 3: Knowledge representation issues :Systax & Semantic for Propositional logic

,Syntax & Semantic for FOPL, Properties for WFF's, Resolution Basics :conversion to

clausal form ,Resolution of proposition logic ,Resolution algorithms for predicates ,Problems with FOPL ,Semantic nets ,Frames ,Scripts

Unit 4:Reasoning under uncertainity :An introduction ,Default reasoning & Closed world

assumptions ,Model & Temporal logic ,Fuzzy logic ,Basian Probabilstic inference ,Dempster Shafer theory ,Heuristic reasoning methods

Unit 5: Planning & Learning :Planning ,Planning in Situational calculus ,Representation for planning ,Partial order palnning, Partial order palnning algorithm ,Learning by Examples ,Learning by Analogy ,Explanation based learning ,Neurals nets ,Genetics algorithms

Unit 6:MINIMAX Game playing strategy ,Natural language processing ,Overview of

linguistics ,Grammer & Language ,Transformation Grammer ,Basic Parsing Techniques,

Expert System ,Architecture of Rule based Expert system ,Non Rule based Expert system.

Course outcomes:

After undergoing the course, Students will be able to:

a) Students will able to learn the use of AI in different real life problems.
b) Use the heuristic search techniques for AI related problems.
c) Students will develop an ability to analyze and formalize the problem (as a state space, graph, etc.) and select the appropriate search method.
d) Students will be able to choose an appropriate problem-solving method
e) Students will be able to know how knowledge is represented in computer system and different knowledge-representation scheme.
f) Apply the natural language processing techniques to computer.
g) Can apply the learning techniques to computer.
h) Can apply genetic algorithm to solve the complex problems.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	b	C	D	E	F	g	H
1	√							
2		√	√	√				
3					√			
4						√		
5							√	
6								√

REFERENCES

1. Artificial Intelligence by Elain Rich & Kevin Knight, Tata McGraw Hills Pub.
2. Principals of AI by Nills .J.Nilsson, Pearson Education Pub.
3. Artificial Intelligence by DAN. W.Petterson. Printice Hall of India
4. Artificial Intelligence by Petrick Henry Winston,
5. Artificial Intelligence by Russel and Norvig, Pearson Education Pub.

B.TECH COMPUTER ENGINEERING 2016(OPEN ELECTIVE)

CODE:OEC-2

SUBJECT NAME: CYBER LAWS AND SECURITY

NO OF CREDITS: 3

B.TECH	SEMESTER VI	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

1. The objective of the course is to make students familiar about security, its related terms like threat, attack, control etc.
2. To introduce various security challenges in different application domains
3. To introduce Security threats in the internet based applications.
4. To make students familiar with various physical security methods
5. To make students familiar about various forensic tools and various laws for cyber crime and policy designed by the government for cyber security.

UNIT-I

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

UNIT-II

Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges

UNIT-III

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

UNIT-IV

Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mIning Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes

Course Outcome

a. By the end of the course, students should be able to understand the concept of security and its differentiation with its related terms.
b. By the end of the course, students should be able to understand why security is important for internet based applications and various security threats in these areas.
c. By the end of the course, students should be able to understand various methods to provide physical security.
d. By the end of the course, students should be able to know laws, policies initiated by the government against cyber crime.

Mapping of Corse Objectives with Course Outcomes

Course Objective	a	B	C	d
1	✓	✓	✓	✓
2		✓		✓
3			✓	✓
4				✓

REFERENCES

1. Godbole,“ Information Systems Security”, Willey
2. Merkov, Breithaupt, “ Information Security”, Pearson Education
3. Yadav, “Foundations of Information Technology”, New Age, Delhi
4. Schou, Shoemaker, “ Information Assurance for the Enterprise”, Tata McGraw Hill
5. Sood,“Cyber Laws Simplified”, Mc Graw Hill

6. Furnell, “Computer Insecurity”, Springer 7. IT Act 2000

B.TECH COMPUTER ENGINEERING (OPEN ELECTIVE)

CODE:OEC-3

SUBJECT NAME: SOFT COMPUTING

NO OF CREDITS: 3

B.TECH	SEMESTER VI	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

Students will learn about

1. Need of soft computing in the context of real life scenarios.
2. Various constituent methodologies underlying in the domain of soft computing.
3. Fundamentals of fuzzy sets and logic
4. Fuzzy logic based control/ expert systems.
5. Inductive logic and need for training in the context of machine learning.
6. Neuron models relating to supervised and unsupervised learning.
7. Training the neurons on given input/output class information.
8. Combining neural and fuzzy paradigms
9. Genetic modeling of a problem
10. Solving a problem with huge state space using genetic modeling and operators
11. Applying soft computing in common domains like IR, Drug design etc.

Unit-I

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit-II

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Unit-III

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Unit-IV

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit-V

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers,

Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Genetic Algorithms, Scope & application areas, solution of 0-1Knapsack problem using GA

Course Outcomes

a) Discuss the various aspects of uncertainty in real life and inability of conventional computing to handle them.
b) Relate real life problem contexts to soft computing paradigms tools
c) Design and use fuzzy sets and numbers in the context of various domains.
d) Design fuzzy rule based system for a control application like washing machine.
e) Identify the problems suitable for solution using neural networks
f) Train a perceptron network over a given input/output pattern information.
g) Design a genetic model for a given problem with huge state space.
h) Apply GA tools and solution to a problem to find an amicable solution for the same.
i) Design soft computing models to solve real life problems

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES

	Course Outcomes									
Course Objectives		a	B	C	D	e	F	g	H	i
	1	√	√							
	2	√	√							
	3			√						
	4			√	√					
	5					√	√			
	6						√			
	7						√			

	8			√	√	√	√			
	9							√	√	
	10							√	√	
	11									√

REFERENCES

1. "Fuzzy sets and Fuzzy Logic: Theory and applications",G.J. Klir,B.Yuan, PHI
2. "Introduction to Fuzzy sets and Fuzzy Logic", M.Ganesh , PHI
3. "An Introduction to Fuzzy Control", D Driankov, H Hellendoorn, M Reinfrank, Narosa Publishing Company
4. " Neural Networks: A classroom approach", Satish Kumar , Tata McGraw Hill
5. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
6.Anderson J.A., "An Introduction to Neural Networks", PHI, 1999

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-401

SUBJECT NAME: ADVANCED COMPUTER ARCHITECTURE

NO OF CREDITS: 4

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1) To learn the design of the basic aspects of computer architecture. The student is exposed to the major differences of RISC and CISC architecture.
2) Understanding of how computer stores floating point numbers in IEEE 754 standard.
3) To understand the memory hierarchy, the caches, virtual memory, storage systems.
4) Architectures exploiting instruction-level parallelism (ILP), data-level parallelism (DLP), thread-level and task-level parallelisms are treated. Furthermore new code generation techniques needed for exploiting ILP will be treated.
5) Identify the crosscutting issues in memory hierarchy design and in the storage devices.
6) Describe the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors.
7) Describe VLIW (very large instruction word), and multi-core and multi-CPU systems.

Unit 1: Introduction: Some definition and terms, interpretation and microprogramming. Basic data types, Instructions set, Computer Architectural Classification schemes, Flynn's Classification, System attributes to performance.

Unit 2: Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms.

Unit-3: Cache Memory Notion: Basic Notion, Cache Organization, Concept, Performance and design issues, address mapping and replacement, other types of Cache, Split I and D-Caches, on chip caches, Two level Caches.

Unit–4: Memory System Design: The physical memory; 2D & 2 1/2D RAM memory organization, memory hierarchy Technology: inclusion, coherence and locality; models of simple processor memory interaction; Virtual memory technology: models, TLB, paging and segmentation, memory replacement policies.

Unit–5: Advanced processors: Vector Processors, multiprocessors and multicomputers, introduction to multi-vector and SIMD computers, Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors.

Course Outcomes

By the end of the course, a student should be able to:

a) Discuss the organization of computer-based systems and the advanced concepts of computer architecture. How a range of design choices are influenced by applications
b) The student will be able to expose the major differences of RISC and CISC architecture. Also analyze the L/S, R/M and R+M architectures
c) They will be able to understand the design of a MIPS ALU. And how Floating point arithmetic unit can be designed for efficiency.
d) Understand the components and operation of a memory hierarchy and the range of performance issues influencing its design.
e) Understand the organization and operation of current generation parallel computer systems, including multiprocessor and multicore systems.
f) Understand the principles of I/O in computer systems and secondary storage organization.
g) Develop systems programming skills in the content of computer system design and organisation.
h) Understand different processor architectures and system-level design processes.
i) Be able to and understand an existing software& hardware system and extend the system to meet evolving requirements.
j) Will know about computer performance, instruction set architecture design and implementation

Course Outcomes ----->

Course Objectives ---->

	A	**B**	**C**	**d**	**e**	**F**	**g**	**H**	**I**	**J**
1	√	√					√			
2			√						√	
3				√		√				
4					√	√	√			
5				√				√		√
6	√				√			√	√	

7	√				√	√			√	√

REFERENCES

1. Advance computer architecture by Kai Hwang , TMH, ed 2001.
2. Pipelined and Parallel processor design by Michael J. Fiynn – 1995, Narosa.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-403

SUBJECT NAME: SECURITY OF INFORMATION SYSTEMS

NO OF CREDITS: 4

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:
To impart the knowledge of:

1. Information security.
2. Tradeoffs inherent in security.
3. Application of each of security goals: confidentiality, integrity, and availability.
4. Issues for creating security policy for a large organization.
5. Defense for protection and security, and the role of ethical considerations in computer use.
6. Efficient basic number-theoretic algorithms, including greatest common divisor, multiplicative inverse mod n, and raising to powers mod n.
7. Public-key cryptosystems, including a necessary complexity-theoretic assumption for their security.
8. Simple extensions of cryptographic protocols, using known protocols and Cryptographic primitives.
9. The basic categories of threats to networks and protocols for network security.
10. Risks and vulnerabilities in operating systems and operating system security models.
11. Good password policies and techniques to secure passwords in an organization.
12. Various database security models and their advantages or disadvantages.

Unit-1 Basic Encryption and Decryption: introduction to Ciphers, Monoalphabetic Substitutions such as the Caesar Cipher, Cryptanalysis of Monoalphabetic Ciphers, Polyalphabetic Ciphers such as Vigenere Tableaux, Cryptanalysis of Polyalphabetic Ciphers, Perfect Substitution Cipher such as the Vernam Cipher, Stream and Block Ciphers..

Unit-2 Properties of Arithmetic Operations: Inverses, Primes, Greatest Common Divisor, Euclidean Algorithm, Modular Arithmetic, Properties of Modular Arithmetic, Computing the inverse, Fermat's Theorem, Algorithm for Computing Inverses, Random number generation.
Secure Secret Key (Symmetric) Systems: Data Encryption Standard (DES), Analyzing and Strengthening of DES, Advance Encryption Standard (AES)

Public Key (Asymmetric key) Encryption Systems: Concept of Public key Encryption System, Introduction to Merkle-Hellman Knapsacks, Rivest-Shamir-Adelman (RSA) Encryption, Digital Signature Algorithms (DSA)
Hash Algorithms: Hash Concept, Description of Hash Algorithms , Message Digest Algorithms such as MD4 and MD5 , Secure Hash Algorithms(SHA) .

Unit–3 Applied Cryptography, Protocols and Practice: Key Management Protocols: Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography.
Public Key Infrastructure (PKI): Concept of Digital Certificate, Certificate Authorities and it's roles, X509 Structure of Digital Certificate.

Unit-4 Network Security Practice: Authentication Applications- Kerberos, X.509 Authentication Service; Electronic Mail Security- Pretty Good Privacy, S/MIME;
IP Security: IP Security Overview,IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations;
Web Security: Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Unit–5 Operating System, Database and Program Security: Operating Systems Security: Security Policies, Models of Security, Security Features of Ordinary and trusted Operating System.
Database Security: Security Requirements of Databases, Reliability and Integrity, Protection of Sensitive Data.
Program Security: Kinds of Malicious Code, Virus Signatures, Preventing Virus Infection, Trapdoors, Convert Channels, Control Against Program Threats.

Course Outcomes:

After the completion of this course the students will be able to:

a. Understand theory of fundamental cryptography, encryption and decryption algorithms,
b. Show the ability to encrypt “Plain Text” into “Cipher Text” and vice versa, using different encryption algorithms.
c. Choose a suitable ciphering algorithm according to the required security level
d. Build secure authentication systems by use of message authentication techniques.
e. Understand a given ciphering algorithm and to analyze it.
f. Learn program and apply the encryption algorithms.
g. Build cryptosystems by applying encryption algorithms.
h. Apply the crypto systems so far learned to building of information and network security mechanisms.
i. Learn various operating system security models.
j. Understand various database security models and multilevel databases security.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes →

Course Objectives

	A	b	c	D	e	f	g	h	i	j
1	√									
2		√								
3			√	√						
4			√							
5						√				
6							√			
7				√						
8					√					
9								√		
10									√	
11						√				
12										√

REFERENCES

1. William Stalling, Cryptography and Network Security, 3rd Edition. PHI New Delhi
2. William Stalling, Network Security Essentials, 2nd Edition. PHI New Delhi
3. Charlie Kaufman, Network Security: Private Communication in Public World, 2nd Edition PHI, New Delhi

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-405

SUBJECT NAME: SOFTWARE TESTING

NO OF CREDITS: 4

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
4	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To get familiar the students about basic concepts of software testing and its techniques.
2. To study the concepts of Verification and validation activities.
3. To study in detail the process of performing the black box and white box testing approaches with examples.
4. To get familiar the students the concept of regression testing.
5. To study about the various testing automation and debugging tools and case studies.
6. To study the basic and advanced concepts of object oriented testing.

Unit 1 Testing terminology and Methodology

Definition of testing, goals, psychology, model for testing, effective testing, limitations of testing, Importance of Testing, Definition of Failure, faults or bug, error, incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test strategy, verification, validation, Static testing: Inspection ,Review and Walkthrough, dynamic testing, testing life cycle model, testing techniques, testing principles, Testing Metrices.

Unit 2 Verification and validation

Verification activities, verification of requirements, verification of HL design, verification of data design, verification of architectural design, verification of UI design, verification of LL design, introduction to validation activities

Unit 3 Dynamic testing

White Box testing: Boundary value analysis, equivalence class portioning, state table based testing, decision table based, error guessing.

Black Box Testing: Logic coverage criteria, basic path testing, graph matrices.

Unit 4 Validation Testing

Unit testing, drivers , stubs, integration testing, methods, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing

Unit 5 Regression Testing

Objective of regression testing, Regression test process, Regression testing techniques.

Unit 6 Test Automation and debugging

S/w measurement and testing, testing metrics and tools

Case Study: Testing for Object-oriented and web-based systems

Unit 7 Object-Oriented Testing

Use-case based testing; Class testing, Testing Exception handling

Course Outcomes:

a. The students will be able to understand the concepts of software testing and its techniques.
b. Knowledge of verification and validation activities.
c. Study of black box and white box testing techniques.
d. Study the concept of regression testing and its techniques.
e. Study of object oriented testing techniques.
f. Study of case studies and various testing automation and debugging tools.
g. Study of various testing metrics.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	B	c	d	e	F	g						
1	√												
2		√											
3			√										
4				√									
5					√								
6					√	√	√						

REFERENCES

1. G.J Myers, The Art of Software Testing, John Wiley & Sons, 1979
2. Naresh Chauhan, Software Testing Principles and Practices,OXFORD University Press.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-411

SUBJECT NAME: OBJECT-ORIENTED SYSTEM DEVELOPMENT(ELECTIVE-III)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course objectives

1) To gain knowledge in introducing students to the concepts and terms used in the object-oriented approach to systems analysis and design
2) To highlight the importance of object-oriented analysis and design and its limitations.
3) To show how we apply the process of object-oriented analysis and design to software development
4) To understand the problem definitions, requirements specification and the relationship between the specification and the real-world
5) To understand how the structure and behaviour of a system can be modeled
6) To understand the importance and function of each UML model throughout the process of object-oriented analysis and design and explaining the notation of various elements in these models.
7) To provide students with the necessary knowledge and skills in using object-oriented CASE tools.

Unit-1: Introduction to object oriented methodology: Review of the Traditional Methodologies, Classes, Objects, Encapsulation, Association, Aggregation, Inheritance, Polymorphism, States and Transitions.
Object Oriented Modeling: visual modeling and its importance , – UML Approach, conceptual model of the UML, Architecture, Software Development Life Cycle.
Object Oriented Design: Trends in software design, Design principles, Responsibility driven design, Separation of Responsibilities, Design phases and tools

Unit-2 Introduction to Objectory Software Development Process: Introduction, Benefits, Phases and Iterations, Elaboration Stage, Construction Stage, Transition Stage.

Unit-3 Structural modeling : Objects, classes: Names, attributes, operations, responsibilities; Stereotypes and Classes Relationships: Dependencies, Generalization, Association, Structural Diagrams: Class diagram, object diagrams.

Unit-4 Behavioral Modeling: Interaction diagrams, types of Interaction diagrams , Activity Diagrams Activities, Transitions, Decision Points, Swimlanes
Actors & Use cases, use case diagram, Use Case Relationships, Types of Relationships,

Unit-5 Architectural Modeling: Designing the System Architecture : The need for Architecture, The "4+1" view of Architecture, The Logical view, The Component View, The Process View, The Deployment View, The Use Case view. Checking the Model: Making the Model Homogeneous, Combining Classes, Splitting Classes, Eliminating Classes, Consistency Checking, Scenario Walk-through, Event Tracing, Documentation Review

Unit-6 The Iteration Planning Process: Benefits, Goals, Design the User Interface, Adding Design Classes, The Emergence of Patterns, Designing Relationships, Designing Attributes and Operations, Designing for Inheritance, Coding, Testing, and Documenting the Iteration.

Course Outcomes

After completing this course the student must demonstrate the knowledge and ability to:

1) Show the importance of systems analysis and design in solving complex problems.
2) Show how the object-oriented approach differs from the traditional approach to systems analysis and design.
3) Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.
4) Create Use-Cases to document requirements.
5) Create a static conceptual model of the system.
6) Create a dynamic behavioral model of the system.
7) Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, statechart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation.
8) Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships.
9) Show the role and function of each UML model in developing object-oriented software.
10) Apply the Rational Software Suite for the construction of UML models and expressing the appropriate notation associated with each model.

Course Outcomes ----->

Course Objectives ---->

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1		√			√			√		
2	√					√				
3		√	√					√		
4			√	√	√			√		
5				√	√	√				√

6			√		√	√	√		√	
7							√		√	√

REFERENCES

1. "UML User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 2000, Addison Wesley.
2. Visual Modeling with Rational Rose 2000 and UMLBy Terry Quatrani Foreword by Grady Booch, 2000.
3. "UML Reference Guide", James Rumbaugh, Ivar Jacobson, Grady Booch, 2000, Addison Wesley.
4. "The Objectory Software Development Process", Ivar Jacobson, Grady Booch, James Rumbaugh, 1999, Addison Wesley.
5. UML Distiled by Maxtin Fowler with Kendall Scott,2000 ,Second Edition
6. Sams Teach Yourself "UML" In 24 Hours By Joseph Schmuller ,2000

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-413

SUBJECT NAME: SOFTWARE PROJECT MANAGEMENT (Elective-III)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
2. Understand the project planning process.
3. Be familiar with the different methods and techniques used for project management.
4. Be familiar with the techniques of project reporting, defect analysis and prevention.
5. To make the students understand the various quality techniques.

Unit-1: Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Unit-2: Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, estimation techniques,COCOMO model, identifying activity risk, allocate resources, review/ publicize plan.

Unit-3: Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation 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.

Unit-4: Activity planning & Risk Management: Objectives of activity planning, project schedule, projects and 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.

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.

Unit-5: Resource allocation &Monitoring the control: Introduction, the nature of resources, identifying resource 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, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

Unit-6: 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.

Unit-7: Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, quality factors,ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality, software quality metrices.

Unit 8: Study of any Software Project Management software, Viz. Project 2000 or equivalent

Course Outcomes:

1. The students will have good knowledge of the issues and challenges faced while doing the Software project Management.
2. Students will also be able to understand why majority of the software projects fails and how that failure probability can be reduced effectively. They will completely understand the complete software project planning process.
3. Students will be able to calculate the cost & staff for a particular project at the start.
4. Students will be able to do the project Scheduling, tracking, risk analysis, quality management and Project Cost estimation using different techniques
5. Students will be able to give quality software by making systematic approach i.e. Software engineering

Course outcomes →

Course Objectives ↑

	A	b	c	D	E
1	√				
2		√			
3			√		
4				√	
5					√

REFERENCES

1. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
2. Software Project Management, Walker Royce, 1998, Addison Wesley.
3. Project Management 2/c. Maylor
4. Managing Global software Projects, Ramesh, 2001, TMH.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-415

SUBJECT NAME: WIRELESS SENSOR NETWORKS (Elective-III)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

1. To make the student understand the basic concepts of WSN and its distinguishing features from its successor networks
2. To understand the application domain of WSN
3. To understand the protocol stack of WSN and the hardware of a sensor node
4. To discuss the challenges in designing various MAC and routing protocols for WSN
5. To understand the taxonomy of routing protocols of WSN
6. To discuss the data dissemination and data aggregation techniques in WSN
7. To discuss the security mechanism and attacks in WSN
8. To discuss IEEE 802.15.4 and Zigbee Security

Unit-I OVERVIEW OF WIRELESS NETWORKS

Basic Concepts of Wireless Networks, Infrastructure & Infrastructure-less Wireless Networks,basic concepts of Mobile Adhoc Networks (MANETs), Design principles for MANETS, comparison of MANET & WSN

Unit-II ARCHITECTURE OF WIRELESS SENSOR NETWORKS

Unique constraints and challenges of WSN, Design principles for WSNs, Service interfaces of WSNs ,Sensor Node Hardware, Applications of WSNs, Enabling Technologies for Wireless Sensor Networks, mobility in WSN.

Unit-III PROTOCOLS OF WSN

Network Protocols: Issues in designing MAC protocol for WSNs, Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and Zig Bee, Dissemination protocol for large sensor network.

Routing Protocols:Issues in designing routing protocols, A Taxonomy of routing protocols (data centric, hierarchical, location based)

Unit-IV DATA DISSEMINATION IN WSN

Data Storage and Manipulation: Data centric and content based routing, storage and retrieval in network, compression technologies for WSN, Data aggregation technique. Applications: HealthCare, Underground Mining,WSN for Habitat Monitoring.

Unit-V SECURITY IN WSN

Challenges of Security in WSN, Security Attacks in WSN, Protocols and Mechanisms for Security, IEEE 802.15.4 and ZigBee Security

Course Outcomes: At the end of the course/session the student would be

a. Acquainted with the basic concept of WSN
b. Learned the application domain of WSN
c. Become familiar with the protocol stack of WSN
d. Have a detailed knowledge of the MAC protocols of WSN
e. Acquainted with the various categories of routing protocols and techniques of WSN
f. Become familiar with the various data dissemination techniques available in WSN
g. Able to apply the various data aggregation techniques of WSN for efficient data dissemination
h. Become familiar with the various types of attacks in WSN and their security mechanisms

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes →

↑ Course Objectives

	A	b	c	D	e	F	G	H
1	✓							
2		✓						
3			✓					
4				✓				
5					✓	✓		
6						✓		
7						✓	✓	
8								✓

REFERENCES

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor
2. Networks" , John Wiley, 2005, ISBN : 0-470-09510-5
3. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information
4. Processing Approach", Elsevier, 2007.
5. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-
6. Technology, Protocols, And Applications”, John Wiley, 2007, ISBN :978-0-471-74300-2

Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003, ISBN : 0-470-86736-1

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-417

SUBJECT NAME: LOGIC AND FUNCTIONAL PROGRAMMING (Elective-III)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students familiar with difference between Procedural and non-procedural language and also between Prolog and LISP
2. To introduce applications of LISP & PROLOG in designing expert system.
3. To make the students familiar with the Syntax of PROLOG, Operators, Arithmetic, Structures and Controlling Back Tracking.
4. To introduce the Input and Output, built-in predicates, Operation on Data Structures and Advanced Tree Representation..
5. To make the students familiar with writing programs for search techniques, Constraint logic programming, Expert System Shell.

Unit-1: Procedural and non-procedural language, Prolog vs LISP, Applications of LISP & PROLOG in designing expert system.

Unit-2: Syntax of PROLOG, Lists, Operators, Arithmetic, Structures, Controlling Back Tracking.

Unit-3: Input and Output, built-in predicates, Operation on Data Structures, Advanced Tree Representation.

Unit-4: Prolog in Artificial Intelligence: writing programs for search techniques, Constraint logic programming, Knowledge representation and expert system, Expert System Shell.

Unit-5: Planning, Machine Learning, Inductive Logic Programming, Qualitative Reasoning, Language Processing, Game Playing, Meta Programming.

Course Outcomes:

a. The students will be able familiar to the difference between Procedural and non-

procedural language and also between Prolog and LISP

b. The students will be able to understand how LISP & PROLOG can be used to design expert system.
c. The students will be able to understand the Syntax of PROLOG, Operators, Arithmetic, Structures and Controlling Back Tracking.
d. The students will be able to understand the Input and Output and built-in predicates
e. The students will be able to apply Operations on Data Structures and Advanced Tree Representation.
f. The students will be able to write programs for search techniques, Constraint logic programming, Expert System Shell.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Objectives ---->	Course Outcomes--------->					
	A	**b**	**c**	**d**	**E**	**F**
1	√					
2		√				
3			√			
4				√	√	
5						√

REFERENCES

1. Prolog Programming for Artificial Intelligence by Ivan Bratko, 2001, Pearson Edu.
2. Symbolic Computing with Lisp & PROLOG - by Mueller, JW, 1998
3. Programming in turbo PROLOG by Lee Teft - PHI.

B.TECH INFORMATION TECHNOLOGY 2016

CODE: CE-16-419

SUBJECT NAME: ANDROID APPLICATION DEVELOPMENT (Elective-3)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make students aware of Java concepts like OOPs, inheritance, exception handling, packages and interfaces.
2. To make students aware about JVM, multithreading, SQL- DML and DDL queries.
3. To make students aware about Android development environment, DVM and .apk file.
4. How to create Activities, Broadcast receivers and content providers.
5. How to create various types of views and notifications.
6. How to make use of intent and intent filters.
7. To make students aware of AndroidManifest.xml, Resources and R.java file.
8. To make students aware of Assets, Layout & Drawable Resources.
9. To make students aware of Activities and its life cycle.
10. To make students aware of emulator settings and various windows like LogCat and SharedPreferences.
11. To make students aware of SQLite programming.
12. To make students aware about various types of adapters.
13. To make students aware about Threads in Android.

Unit I

JAVA Concepts, OOPs Concepts, Inheritance in detail, Exception handling, Packages & interfaces, JVM & .jar file extension, Multi threading (Thread class & Runnable Interface), SQL DML & DDL Queries in brief.

Unit 2

What is Android?, Setting up development environment, Dalvik Virtual Machine & .apk file extension, Fundamentals: Basic Building blocks - Activities,Services,Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication - Intents & Intent Filters, Android API levels (versions & version names), Application Structure (in detail), AndroidManifest.xml, uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Drawable Resources, Activities and Activity lifecycle

Unit 3

Emulator-Android Virtual Device, Launching emulator, Editing emulator settings, Emulator shortcuts, Logcat usage, Introduction to DDMS, Second App:- (switching between activities) , Develop an app for demonstrating the communication between Intents, Basic UI design, Form widgets, Text Fields, Layouts, [dip, dp, sip, sp] versus px, Preferences, SharedPreferences, Preferences from xml, Examples, Menu, Option menu, Context menu, Sub menu, menu from xml, menu via code, Examples, Intents (in detail), Explicit Intents, Implicit intents, Examples, Content Providers.

Unit 4

SQLite Programming, SQLiteOpenHelper, SQLiteDatabse, Cursor, Reading and updating Contacts, Reading bookmarks, Example: Develop an App to demonstrate database usage.

Adapters:- ArrayAdapters, BaseAdapters, ListView and ListActivity, Custom listview, GridView using adapters, Gallery using adapters, Broadcast Receivers, Services and notifications, Toast, Alarms, Examples, Threads,Threads running on UI thread (runOnUiThread), Worker thread, Handlers & Runnable, AsynTask (in detail), Examples

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

a. understand Java concepts like OOPs, inheritance, exception handling, packages and interfaces.
b. understand about JVM, multithreading, SQL- DML and DDL queries.
c. explore Android development environment, DVM and .apk file.
d. to create Activities, Broadcast receivers and content providers.
e. create various types of views and notifications.
f. to make use of intent and intent filters.
g. to make use of AndroidManifest.xml, Resources and R.java file.
h. will be aware of Assets, Layout & Drawable Resources.
i. create Activities and its life cycle function manipulation.

j. understand emulator settings and various windows like LogCat and SharedPreferences.
k. create SQLite programming code development.
l. to make use of various types of adapters.
m. to make use of Threads in Android.

Mapping of Course Objectives and Course Outcomes:

Course Outcomes ------->

Course Objectives ---->

	a	b	c	d	e	f	g	h	i	J	k	l	m
1	√												
2		√											
3			√										
4				√									
5					√								
6						√							
7							√						
8								√					
9									√				
10										√			
11											√		
12												√	
13													√

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2. Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) by Bill Philips & Brian Hardy.

3. Android Design Patterns: Interaction Design Solutions for Developers by Greg Nudelman.
4. Programming Android by **Zigurd Mednieks, Laird Dornin, G. Blake Meike & Masumi Nakamura.**

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-421

SUBJECT NAME: NETWORK PROGRAMMING & ADMINISTRATION (Elective-IV)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To understand TCP/IP Protocol Suite
2. To understand transport layer protocols.
3. To understand various networking commands
4. To understand how to do socket programming.
5. To understand how to communicate among networks.
6. To understand the issues in server software design.
7. To develop the network programming skills.
8. To understand Administrative issues for efficient working of the network.
9. To give overview of Remote Procedure Call (RPC) that helps make distributed programs easy to design and understand.
10. To understand network debugging techniques

Unit-1: Introduction to networking: TCP/IP Protocol architecture, Classful internet addresses, subnets, super netting, address resolution Protocol (RAP) and RARP, IP datagram format, UDP and TCP/data grams , TCP connection establishment and Format, Buffer sizes and limitation, ICMP its purpose , FINGER, NET STAT details & IP config, Ping, TRACERT, ROUTE.

Unit-2: Sockets : Socket introduction, Address structures, value – result arguments, Byte ordering and manipulation function and related functions, elementary TCP sockets, TCP client sever, I/O functions, select& poll functions, socket options elementary UDP sockets, elementary node and address conversions, DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information, echo service (TCP and UDP).

Unit-3: Algorithm and issues in server software design: iterative connectionless servers, (UDP), Iterative, connection oriented servers (TCP), single process, concurrent servers multiprotocol servers (TCP,UDP), multi service servers (TCP,UDP).

Unit-4: Remote procedure call concept (RPC) :RPC models, analogy between RPC of client and server, remote programs and procedures, their multiple versions and mutual exclusion communication semantics, RPC retransmits, dynamic port mapping ,authentication.

Unit-5: Network file system, NFS Procedure & File mount, concept of data link access, debugging techniques ,Routing sockets.

Course Outcomes:

a. The students will be familiar with different protocols used in network communication of TCP/IP.
b. The students will be able to understand TCP/IP troubleshooting.
c. The students will be able to understand the concepts of socket and how it is useful for communication between client and server.
d. The students will be able to understand how to implements socket programming.
e. The students will be able to understand familiar with the client server process.
f. The students will be able to understand algorithm and issues in designing server software.
g. The students will be able to understand how RPC is helpful for making distributed program instead of conventional procedures.
h. The students will be able to understand the difference between connection oriented and connectionless servers.
i. The students will be able to mount File Systems over distributed networks
j. The students will be able to implement privileged commands using Routing Sockets
k. The students will be able to understand network debugging commands.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcome ----→

Course Objective ↓

	A	B	C	D	E	F	G	h	I	J	K
1	*										
2	*	*									
3		*									
4		*	*								
5			*	*	*						
6						*		*			
7				*	*						
8			*						*	*	*
9							*				
10											*

REFERENCES

1. Unix Network programming Vol -2nd edition, W.Richard Stevens
2. Internet working with TCP/IP Vol-1, Dougles E commer.

3. Internetworking TCP/IP Vol III Dougles E comer, David L.Stevens
4. Internetworking with TCP/IP, Vol II

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-423

SUBJECT NAME: MOBILE AD-HOC NETWORKS (Elective-IV)

NO OF CREDITS: 3

B.TECH SEMESTER VII	SESSIONAL: 40
L P	THEORY EXAM: 60
3 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students familiar with wireless network and adhoc network.
2. To introduce the advantages and issues related to mobile adhoc network routing.
3. To make the students familiar with different table driven base protocols for mobile adhoc networks.
4. To introduce the concept of on demand approach and various protocols related to this approach.
5. To make the student familiar with the GPS system and introduce the concept of location based routing.
6. To make the student aware about the quality of service in mobile adhoc environment. To find out various QoS parameters and how QoS can be achieved in adhoc environment.
7. To introduce the necessity of energy and how to manage the energy of a node and network in adhoc networks.

UNIT I :

Introduction: Wireless Networks, Infrastructure and Infrastructure less Wireless Networks, Ad hoc Wireless Networks, Heterogeneity in Mobile Devices, Types of Ad hoc Mobile Communications, Challenges Facing Ad hoc Mobile Networks, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks , classifications of Routing Protocols: Table Driven Routing Protocols, On-Demand Routing Protocols

UNIT II

Table-Driven Ad hoc Routing Protocols: Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Cluster Switch Gateway Routing (CSGR)

UNIT III:

On-Demand Ad hoc Routing Protocols:Ad hoc On–Demand Distance Vector Routing (AODV) , Dynamic Source Routing (DSR) ,Temporally Ordered Routing Algorithm (TORA) , Signal Stability Routing (SSR) , Location–Aided Routing (LAR) , Power–Aware Routing (PAR) , Zone

Routing Protocol (ZRP).

UNIT IV:

QoS in Ad hoc Networks:Issues and Challenges in Providing QoS in Ad hoc Wireless Networks , classifications of QoS Solutions , MAC Layer Solutions , Network Layer Solutions , QoS Frameworks for Ad hoc Wireless Networks Energy Management in Ad hoc Wireless Networks.

UNIT V:

Energy ManagementNeed for Energy Management in Ad hoc Wireless Networks – Classification of Energy Management Schemes – Battery Management Schemes – Transmission Power Management Schemes – System Power Management Schemes.

Course Outcomes

Upon successful completion of the course, the student will be able to:

a. Identify different types of wireless network and how wireless network is advantageous over the traditional wired network. Identify various issues related to wireless communication.
b. Understand the concept of adhoc network and differentiate between infrastructure based and infrastructure less networks.
c. Understand the concept of routing and issues related to routing in mobile adhoc network.
d. Classify different categories of mobile adhoc network.
e. Understand the concept of table driven approach and various routing protocols available for table driven approach.
f. Advantages and disadvantages of various routing protocols of proactive routing.
g. Understand the on demand approach. Differentiate various reactive routing protocols based on their strategies.
h. Understand the concept of GPS and location based routing. What are the advantages and disadvantages of location based routing .
i. Understand how zone based routing make use of both proactive and reactive approaches.
j. Understand QoS and its parameters. Classify QoS solution, why QoS provision is difficult in adhoc environment and what are various approaches related to QoS in MANET.
k. Understand the need of energy management in MANET, What are the various energy management schemes available in MANET.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Objectives ---->	**a**	**B**	**C**	**d**	**e**	**f**	**g**	**H**	**I**	**J**	**k**
1	√	√	√								
2			√	√							

3				√	√	√					
4				√			√		√		
5				√			√	√			
6				√						√	
7				√							√

REFERENCES

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols", Prentice Hall, PTR, 2004.
2. C. K. Toh, "Ad Hoc Mobile Wireless Networks Protocols and Systems", Prentice Hall, PTR, 2001.
3. Charles E. Perkins, "Ad Hoc Networking", Addison Wesley, 2000

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-425

SUBJECT NAME: WEB MINING (Elective-IV)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To familiarize the students with the basic roadmap of data mining and various data mining techniques.
2. To introduce the concept of Web mining, types, various measures and techniques
3. To acquaint students with Web content mining and its applications on World Wide Web.
4. To introduce students with Web structure mining and its applications on Web graph and page ranking algorithms.
5. To understand basics of Web usage mining, usage patterns and its applications on web logs.
6. To introduce various applications areas of web usage mining like personalized systems and recommendation systems.

Unit-1: Data Mining Techniques and Algorithms: Data mining, Association Rule Mining, Supervised Learning: Classification & Prediction; Unsupervised Learning: Cluster Analysis; Markov Models.

Unit-2: Foundation of Web Mining: Data mining and Web mining, Characteristics of Web Data, Web Data Model; Textual, Linkage and Usage Expressions; Similarity Functions, Information Retrieval Performance Evaluation Metrics, Web Mining Categories, Techniques and Applications.

Unit-3: Web Content Mining: Vector Space Model, Web Crawling, Web Search, Feature Enrichment of Short Texts, Automatic Topic Extraction from Web Documents.

Unit-4: Web Structure Mining: Web Search and Hyperlinks, Co-citation and Biographic Coupling, Page Rank and HITS Algorithm, Weighted Page Rank Algorithm, Web Graph Measurement and Modeling, Using Link Information for Web Page Classification.

Unit-5: Web Usage Mining: Modeling Web User Interests, Discovery and Analysis of Web Usage Patterns, Bipartite Graph Model, Clustering user sessions and web pages, Mining Web Logs to Improve Website Organization, Clustering User Queries from Web Logs for Related Query.

Unit-6: Web Mining and Recommendation Systems: User based and Item based Collaborative Filtering Recommender Systems, Web Query Recommendations.

Course Outcomes:

a. The students will be able to understand basic concepts of data mining, supervised and unsupervised learning techniques, association rule discovery, clustering, classification and prediction techniques.
b. The students will be able to understand Web mining in detail and how its different from data mining.
c. The students will be able to understand Web data models, various similarity functions and performance measures.
d. The students will be able to understand types of web mining viz. content, structure and usage mining.
e. The students will be able to understand Web content mining in detail, vector space model and applications on the web.
f. The students will understand Web structure mining, concept of web graph and applications in ranking web pages.
g. The students will understand Web usage mining, Bipartite Graph Model and applications on web Logs to Improve Website Organization.
h. Students will understand applications of web mining to build various web based systems.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	A	**b**	**c**	**d**	**e**	**F**	**G**	**h**
1	√	√						
2			√	√				
3					√			
4						√		
5							√	
6		√						√

REFERENCES

1. Web Mining and social Networking: Techniques and Applications- Guandong Xu, Yanchung Zhang, Lin Li, Springer Book Series 2011.

2. Web Data Mining- Bling Liu, Springer Book Series.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-427

SUBJECT NAME: AGENT BASED COMPUTING (Elective-IV)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives

1. To teach the students fundamental concepts of agents
2. To explain the taxonomy and applications of software agents
3. To provide a detailed understanding of intelligent software agents
4. To explain the student need and approach for implementing Multi Agent Systems
5. To make the student learn various protocols available for communication in MAS
6. To make the students familiar with Agent Communication Languages
7. To provide an in depth knowledge of mobile agents
8. To discuss various security models of agents
9. To learn an agent based framework : aglets

UNIT I AGENTS – OVERVIEW

Agent Definition, Origin of Agents, Agent Programming Paradigms, Distinguishing features of Software agents, Taxonomy of Agents, Applications of Agents

UNIT II INTELLIGENT SOFTWARE AGENTS

Environments, Intelligent Agents, Agents and Objects, Agents nd Expert Systems,Agents as Intentional Systems,Abstract Architecture for Intelligent Agents, Howe to tell an agent what to do,Synthesizing agents.

UNIT III MOBILE AGENTS : AGENTS WITH MOBILITY

Need of Mobile Agents, Application areas of Mobile Agents, Mobile Agent migration process,general framework for agent migration, mobility models, classification of communication models for mobile agents.

UNIT IV AGENTS AND SECURITY

Agent Security Issues , Mobile Agents Security , Protecting Agents against Malicious Hosts , Untrusted Agent , Black Box Security , Authentication for agents.

UNIT V AGENT BASED FRAMEWORKS

Study of various agent based frameworks , case study : aglets

Course Outcomes

h. Acquainted with the basics of software agents
i. Learned the application domain of software agents
j. Have an in depth knowledge of intelligent software agents
k. Learned where and how to use Multi Agent Systems
l. Develop various models for communication between agents using ACLs
m. To apply/ include mobile agents in given distributed systems
n. Become familiar with the various types of attacks in agent systems and their security mechanisms

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ⟶

↑
Course
Objectives

	A	b	c	D	E	F	g
1	✓						
2		✓	✓				
3			✓				
4				✓			
5					✓		
6					✓		
7						✓	
8							✓
9					✓		

REFERENCES

1. Michael Wooldridge, *An introduction to multiagent systems* , Wiley Publications, ISBN 0-471-4969 I-X, (2nd Edition)
2. Intelligent Software Agents by Richard Murch & Tony Johnson
3. Mobile Agents: Basic Concepts, Mobility Models, and the Tracy Toolkit by Peter Braun and Wilhelm R. Rossak
4. Bigus & Bigus, " Constructing Intelligent agents with Java ", Wiley, 1997.
5. Bradshaw, " Software Agents ", MIT Press, 2000.
6. Russel, Norvig, "Artificial Intelligence: A Modern Approach", Second Edition, Pearson Education, 2003.
7. Richard Murch, Tony Johnson, "Intelligent Software Agents", Prentice Hall, 2000.
8. Gerhard Weiss, "Multi Agent Systems – A Modern Approach to Distributed Artificial
9. Intelligence", MIT Press, 2000.

B.TECH COMPUTER ENGINEERING 2016

CODE: CE-16-431

SUBJECT NAME: SEMANTIC WEB (Elective-IV)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Course Objectives:

1. To make the students familiar with Semantic Web technology and its applications.
2. To make the students familiar with origin of semantic web and meta data search engines.
3. To enable students understand Ontology.
4. To give knowledge about role of Ontology, OWL, OWL Stack.
5. To give knowledge about Protégé and make Ontology using protégé.
6. To enable students understand the concept of Semantic search engine .
7. To make the student familiar with semantic web services: UDDI, OWL-S.
8. To make the students understand architecture of Swoogle.
9. To make student familiar with FOAF.
10. To make the students understand sematic markup and semantic web search engine

Unit-1 Semantic Web: Introduction to semantic web technology, need, problems, applications, it's relation with Artificial Intelligence. Traditional web to semantic web – meta data search engines.

Unit-2 Ontology: XML, RDF, RDFS core, URI and other components of Ontology. Ontology for different applications, Role of Ontology in intelligent information retrieval on web. OWL, OWL Stack: define classes- set operators –enumerations- defining properties – Validating OWL ontology, Mapping Ontology, Writing OWL ontology with Protege.

Unit-3 Semantics: Kinds of semantics, use of semantics Search Engines: Role of search Engines in intelligent retrieval of information on web. Semantic web services and applications : Web services – web services standards – web services to semantic web services- UDDI Concept of OWL-S – building blocks of OWL-S- mapping OWL-S to UDDI- WSDL-S overview.

Unit-4 Real world examples and applications: Swoogle- architecture and usage of meta data; FOAF – vocabulary – creating documents – overview of semantic markup – semantic web search engines.

Course Outcomes:

a. The students will be able to understand basics of Semantic Web technology and its applications.
b. The students will be able to need, problems, applications, semantic web relation with Artificial Intelligence
c. The students would be able to define Ontology: XML, RDF, RDFS.
d. The students will be able to understand OWL, OWL Stack.
e. The students will be able define classes- set operators –enumerations- defining properties – Validating OWL ontology.
f. The students will be able to analyze how to map ontology .
g. The students will be able to construct ontology using Protege.
h. The students will be able to understand the concept of Semantic search engines.
i. The students would be able to UDDI,OWL Stack: OWL-S.
j. The students will be familiar with the architecture of SWOOGLE(semantic search Engine)
k. The students would be able to define FOAF and will be able to create document using semantic markup.

MAPPING OF COURSE OBJECTIVES AND COURSE OUTCOMES:

Course Outcomes ------->

Course Objectives ---->

	a	b	c	d	E	f	g	h	i	j	K
1	√	√									
2		√									
3			√	√							
4				√	√						
5						√	√				
6								√			
7									√		
8										√	
9										√	√
10											√

References:

1. Tim Berner's Lee, "Weaving the web: The original design and ultimate destiny of www", Harper Business (imprint of Harper Collins) .

2. Liyang Yu .Introduction to the Semantic Web and Semantic web services. Chapman & Hall/CRC, Taylor & Francis group, 2007.

3. Michael C Daconta, Leo, Kelvin Smith , "The Semantic Web:A guide to the future of XML,Web services, and knowledge management", Wiley.

6. Dieter Fensel, James Hendler, Henry Lieberman, Tim Berner's Lee "Spinning the Semantic Web", MIT press

7. Grigoris Antonion, Frank Van Harmalen,"Semantic Web primer", MIT press Thomas B Passin, "Explorer's guide to Semantic Web", Hanning

B.TECH COMPUTER ENGINEERING(OPEN ELECTIVE)

CODE:OEC-4

SUBJECT NAME: Web Technology and Information Retrieval

NO OF CREDITS: 3

B.TECH SEMESTER VII	SESSIONAL: 40
L P	THEORY EXAM: 60
3 0	TOTAL: 100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

Unit 1 Web Server Technology

Web's Robot global access to information, HTML, HTTP, Accessing a web server, publishing on web server, secure HTTP, Secure Sockets Layer, WWW Proxies, IIS, Case study of apache web server.

Unit 2 Web search basics

Background and history,Anatomy of WWW, Web characteristics, Spam, The web graph, The Web Search Users, search engines, architecture of search engines, search tools, DNS resolution, The URL frontier, Link analysis, PageRank,

UNIT 3 Web Crawlers

Basics of Web crawling, Various crawling techniques , incremental crawler, parallel crawler, distributed crawlers, focused crawler, agent based crawler, Hidden web Crawler

Unit 4 Introduction to Information Retrieval

Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes

Unit 5 Index construction

Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes Index compression: Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law:

Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression.

B.TECH COMPUTER ENGINEERING (OPEN ELECTIVE)

OEC-5

SUBJECT NAME: Intellectual Property Rights (IPR)

NO OF CREDITS: 3

B.TECH	SEMESTER VII	SESSIONAL:	40
L	P	THEORY EXAM:	60
3	0	TOTAL:	100

NOTE: Question paper has two parts. Part-1 has 10 questions each of 2 marks. It covers the entire syllabus. Attempt any four questions out of six from Part-2.

UNIT 1: Introduction to Intellectual Property: Concept of Intellectual Property, Kinds of Intellectual Property, Economic Importance of Intellectual Property, **Indian Theory on Private Property:** Constitutional Aspects of Property, Constitutional Protection of Property and Intellectual Property, **Economic Development and Intellectual Property Rights Protection**

UNIT II: Introduction to Patents: Overview, Historical Development, Concepts: Novelty, Utility, **Patentable Subject-matter:** Patent Act, 1970- Amendments of 1999, 2000, 2002 and 2005, Pharmaceutical Products and Process and Patent , Protection, Software Patents, Business Method, Protection of Plant Varieties and Farmers' Rights Act, 2001, Patenting of Micro-organism

UNIT III: Procedure of Obtaining of Patents: Concepts of a Patent Application,, Specification: Provisional, Complete, Disclosure Aspects, Claims: Principal, Dependant, Omnibus, Examination of Application, Opposition of Application, Sealing of Patents

UNIT IV: Working of Patents – Compulsory License: Commercialization of Inventions: License- Terms of License Agreement, Assignments of Patents, Revocation of Patents

UNIT V: Infringement: What is Infringement?, How is Infringement determined? Who is an Infringer?, Direct, Contributory and Induced, Defences of Infringement:
5.2.1 Research Exemption, Invalidity, Misuse, Failure to mark, Laches and Estoppel and first sale doctrine

References Books:

1. W.R. Cornish, Intellectual Property, Sweet & Maxwell, London (2000)
2. P. Narayana, Patent Law, Wadhwa Publication
3. Merges, Patent Law and Policy: Cases and Materials, 1996
4. Brian C. Reid, A Practical Guide to Patent Law, 2nd Edition, 1993
5. Brinkhof (Edited), Patent Cases, Wolters Kluwer.
6. Prof. Willem Hoyng & Frank Eijsvogels, Global Patent Litigation, Strategy and Practice, Wolters Kluwer.
7. Gregory Stobbs, Software Patents Worldwide, Wolters Kluwer.
8. Feroz Ali Khader, The Law of Patents- With a special focus on Pharmaceuticals in India, Lexis Nexis Butterworths Wadhwa, Nagpur.
9. Sookman, Computer Law, 1996
10. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009). Eastern Book Company, Lucknow.