B.E. COMPUTER SCIENCE AND ENGINEERING

SYLLABUS
2015 (REGULAR PROGRAMME)

Department of Computer Science and Engineering
FACULTY OF ENGINEERING

KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed University Established Under Section 3 of UGC Act 1956)
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SEMESTER – I

15BECC101 COMMUNICATIVE ENGLISH – I L P T C

3 0 0 3

COURSE OBJECTIVES

- To enable students to attain fluency and accuracy to inculcate proficiency in professional communication
- To enable students to meet the growing demand in the field of Global communication.
- To help students acquire their ability to speak effectively in real life situations.
- To inculcate the habit of reading and to develop their effective reading skills.
- To ensure that students use dictionary to improve their active and passive vocabulary.
- To enable students to improve their lexical, grammatical and communicative competence.

COURSE OUTCOMES

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

- Effectively use English language for communication: verbal & non –verbal.
- Express comprehension and acquisition of speaking & writing ability.
- Improve the student confidence in using English language in real life situations.
- Develop word power: lexical, grammatical and communication competence.
- Prepare the students to write business letters and other forms of technical writing.
- Demonstrate the students to prepare for oral communication in formal contexts.

Unit I (9)

Listening– Types of listening - Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative.**Writing** – Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II (10)

Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical reading – Finding key information in a given text (Skimming - Scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar**– Parts of speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary**– Compound Nouns/Adjectives – Irregular verbs.

Unit III (10)

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

Unit IV (8)

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate- Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters.**Grammar** – Sentence pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

Unit V **(8)**

Listening - Listening to different accents, speeches/presentations. **Speaking-** Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing -** Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2009
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES:

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

Semester – I

15BECC102 ENGINEERING MATHEMATICS I L P T C
3 2 0 4

COURSE OBJECTIVES:

- To develop analytical skills for solving different engineering problems.
- To understand the concepts of Matrices, sequences and series.
- To solve problems by applying Differential Calculus and Differentialequations.
- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with mathematical tools needed in evaluating integrals and their usage.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.

COURSE OUTCOMES:

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

- understand matrices and its various functions
- Apply advanced matrix knowledge to Engineering problems.
- improve their ability in solving geometrical applications of differential calculus problems
- solve engineering problems involving hyperbolic functions, Beta and Gamma functions
- expose the concept of sequences and series
- apply differential and integral calculus to evaluate real world problems.

UNIT I MATRICES (12)

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II DIFFERENTIAL CALCULUS (12)

Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes- Evolutes as Envelope of normals – Maxima and Minima of functions of two or more Variables – Method of Lagrangian Multipliers

UNIT III SEQUENCES AND SERIES (13)

Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparision test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT IV HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS (12)

Hyperbolic functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.

Beta And Gamma Functions : Definitions – Properties – Relation between beta and gamma integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V DIFFERENTIAL EQUATIONS (11)

Linear Differential equations of second and higher order with constant coefficients - Euler's form of Differential equations – Method of variation parameters.

Total : 60

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi.	2014

2	Sundaram, V. Lakhminarayan,K.A. & Balasubramanian,R.	Engineering Mathematics for first year.	Vikas Publishing Home, New Delhi.	2006

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2014
2	Bhaskar Rao. P. B, Sri Ramachary SKVS, Bhujanga Rao. M	Engineering Mathematics I	**BS Publications, India.**	2010
3	Ramana. B.V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
4	Shahnaz Bathul	Text book of Engineering Mathematics(Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES :

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.intmath.com/matrices-determinants
4. www. Intmath.com/calculus/calculus-intro.php

Semester – I

15BECC103 ENGINEERING PHYSICS 3 0 0 3

COURSE OBJECTIVES:

- To understand the properties of matter and thermodynamics
- To understand the fundamentals of quantum physics and their applications.
- To inculcate the characteristics of electronic materials through basics.
- To divulge knowledge on the basics of semiconducting materials for diode applications.
- To introduce the features of light interaction with semiconductor for optoelectronic applications.
- To impart the basic knowledge of new semiconducting materials for engineering applications.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

- Develop the idea of quantum mechanics through applications.
- Apply the concepts of quantum theory for various methodologies.
- Explain the basic ideas of classical electron theory and energy band structures.
- Illustrate the basics of semiconductor physics and its applications in various electronic devices.
- Identify the basic properties and functioning of optical materials for optoelectronics.
- Summarize the features of low dimensional materials for engineering applications.

UNIT IPROPERTIES OF MATTER AND THERMODYNAMICS(9)

Three types of modulus of elasticity – basic definitions, relation connecting the modulii (Derivation), poison ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending.Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS (9)

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER -CO_2, Semiconductor LASER- Applications of LASER in industry and medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram)

UNIT III QUANTUM PHYSICS (9)

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- scanning electron microscope.

UNIT IV CRYSTAL PHYSICS (9)

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V ULTRASONICS AND NUCLEAR PHYSICS (9)

Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications - Sonogram

Introduction – basics about nuclear fission and fusion, nuclear composition –Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

Total: 45

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2nd Edition-2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	8th Edition 2010
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	Dhanpat Rai Publications,New Delhi.	9th Edition 2011

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www. oyc.yale.edu
4. www.physics.org

Semester – I

15BECC104 ENGINEERING CHEMISTRY 3 0 0 3

COURSE OBJECTIVES:

- To gain knowledge on adsorption phenomena.
- To make the students conversant with basics of water technology.
- To make the student acquire sound knowledge of electrochemistry and storage devices.
- To acquaint the student with concepts of fuels and rocket propellants.
- To develop an understanding of the basic concepts of corrosion science.
- To acquaint the students with the basics of surface chemistry.

COURSE OUTCOMES:

- Outline the basic principles of chemistry for water treatment (K)
- Examine the electrochemical properties to design non – conventional energy storage devices (S)
- Apply the concepts combustion of different fuels (S)
- Identify the concepts of corrosion and its protection in the engineering field (S)
- Apply the concepts of surface chemistry in the field of engineering (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I WATER TECHNOLOGY (9)

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation. UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES (9)

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+}vs dichromate) –Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery.

UNIT III FUELS AND ROCKET PROPELLANTS (9)

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas,An introduction to Fuel Cell, H_2-O_2 Fuel Cell -Rocket engines-Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE (9)

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings - Paints - Constituents and functions –- Metallic coatings - Electroplating (Au) and Electro less plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY (9)

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Industrial adsorbent materials- Role of adsorbents in catalysis and water softening-Emulsion-Types-water/oil, oil/water- Applications of adsorption.

Total: 45

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr. Vairam.S	Engineering Chemistry	Gems Publishers, Coimbatore.	2014
2.	Dr.Ravikrishnan.A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company (P) Ltd., Chennai.	2012

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Raman Sivakumar	Engineering Chemistry I &II	McGraw-Hill Publishing Co.Ltd., 3rd Reprint NewDelhi.	2013
2.	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
3.	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
4.	Dara.S.S	Text book of Engineering Chemistry.	S.Chand & Co.Ltd., New Delhi	2008
5.	Sharma.B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001

WEBSITES:

- http://www.studynotes.ie/leaving-cert/chemistry/
- http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html
- http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm
- http://ocw.mit.edu/courses/#chemistry
- http://www.chem.qmul.ac.uk/surfaces/sec

Semester – I

15BECS105

COMPUTER FUNDAMENTALS AND C PROGRAMMING **3 0 0 3**

COURSE OBJECTIVES:

- Identify and understand the working of key components of a computer system.
- Identify and understand the various kinds of input-output devices and different types of storage media commonly associated with a computer
- Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language
- Write small programs related to simple/ moderate mathematical and logical problems in 'C'.
- Study, analyze and understand simple data structures and how to use it in C language

COURSE OUTCOMES:

- Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer
- Write, compile and debug programs in C language and use different data types for writing the programs.
- Design programs connecting decision structures, loops and functions.
- Explain the difference between call by value and call by address.
- Understand the dynamic behavior of memory by the use of pointers.
- Use different data structures and create / manipulate basic data files and developing applications for real world problems.

UNIT I OVERVIEW OF COMPUTER (8)

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types-Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages- Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP-Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II OVERVIEW OF 'C' **(8)**

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C-C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program-Data types-Arithmetic Instructions- Type conversions- Relational and Logical Operators-Hierarchy and associativity

UNIT III SELECTION AND ITERATION **(9)**

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop-break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV FUNCTIONS **(10)**

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V ARRAYS, STRINGS AND POINTERS **(10)**

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays-Passing array elements as function arguments-2D Array - Matrix Addition and multiplication-Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Characters, Introduction to pointers- declaration and Initialization of pointers-basic pointer examples.

Total : 45

REFERENCES:

1. E. Balagurusamy, " Computing Fundamentals and C Programming", TMH Education, 5th Edition, 2014
2. Yashavant Kanetkar, " Let us C", BPB Publications, 13th Edition, 2013
3. H. M. Deitel and D. J. Deitel, 'C: How to Program', Prentice Hall, 7th Edition, 2012
4. E. Balagurusamy, " Programming in ANSI C", TMH Education, 6th edition, 2012

***This course is offered in the first semester to the branches CSE, EEE, ECE and in the second semester to the branches CIVIL, MECH and AUTO.**

Semester – I

15BECC111 ENGINEERING PHYSICS AND CHEMISTRY LABORATORY 0 0 3 2

ENGINEERING PHYSICS

COURSE OBJECTIVES:

- To develop basic laboratory skills
- To demonstrate the application of physical principles.
- To learn the basic concepts in physics relevant to different branches of Engineering and Technology.
- To study the concept of semiconductor and conductivity.
- Explain the basic concepts of velocity of sound and compressibility of liquid
- To learn the properties of materials.

COURSE OUTCOME:

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

- Familiarize the properties of material and basic concepts in physics.
- Familiarize with the basic concepts of thermal conductivity, thermocouple, optical fibre and ultrasonic.
- Familiarize with the basic concepts of velocity of sound and compressibility of liquid
- Familiarize with the basic concepts of various Laser parameters
- Familiarize with the basic concepts of Torsional pendulum
- The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

ENGINEERING CHEMISTRY

COURSE OBJECTIVE

- To provide students with practical knowledge of quantitative analysis of materials
- Provide details of analysis done by classical and instrumental methods
- Study concepts of developing experimental skills in building technical competence.
- Study various conductometric and potentiometric titrations on various chemicals
- Determination of molecular weight and degree of polymerization
- Determination of corrosion rate by weight loss method.

COURSE OUTCOMES

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

- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity
- Determine conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt
- Understand all the concepts of developing experimental skills in building technical competence.
- Understand various conductometric and potentiometric titrations on various chemicals

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using $BaCl_2$ vs Na_2 SO_4.
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$).
10. Estimation of Ferric iron by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
13. Determination of chemical oxygen demand.

Semester–I

15BECS112 COMPUTER PRACTICE AND PROGRAMMING LABORATORY 0 0 3 2

COURSE OBJECTIVES:

- Study various tools like Text editor, Spread sheet and Power point presentation
- Determine methods to draw flowcharts and write Algorithms
- Provide methods to design and develop C problem solving skills
- Determine methods to trace and debug a program
- Determine methods to write C programs using functions and arrays
- Determine to use concepts of pointers,structures and files to write C programs

COURSE OUTCOMES:

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

- Ability to use Text editor, Spread sheet and Power point presentation
- Ability to draw flowcharts and write Algorithms
- Ability to design and develop C problem solving skills
- Ability to trace and debug a program
- Ability to write C programs using functions and arrays
- Ability to use concepts of pointers,structures and files to write C programs

LIST OF EXPERIMENTS

1. Working with word Processing, Spreadsheet and presentation software in Linux

2. Programming in Scratch:
   Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming

3. C Programming:
   Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and function

Total Hours: 45

Semester–I

15BECS113 ENGINEERING GRAPHICS 1 0 4 3

COURSE OBJECTIVES:

- To understand the importance graphics in engineering
- To learn basic engineering drawing formats
- To develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings.
- To learn to take data and transform it into graphic drawings.
- To prepare the students to communicate effectively
- To explain students to use the techniques, skills, and modern engineering tools necessary for engineering practice

COURSE OUTCOMES:

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

- Know and understand the conventions and the method of engineering drawing.
- Interpret engineering drawings using fundamental technical mathematics.
- Construct basic and intermediate geometry.
- Improve their visualization skills so that they can apply these skill in developing new products.
- Improve their technical communication skill in the form of communicative drawings.
- Comprehend the theory of projection.

UNIT I INTRODUCTION (3 + 10)

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES (3 + 10)

SCALES:Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING (3 + 12)

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES (3 + 12)

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLIDS (3 + 12)

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

INTRODUCTION TO DRAFTING SOFTWARE/PACKAGE (NOT FOR EXAM) (4)

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TOTAL: 75

TEXT BOOKS

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. VTU, “A Primer on Computer Aided Engineering Drawing” Belgaum, 2006.

REFERENCES

1. Kumar M S, “Engineering Graphics”, D D Publications, Chennai, Ninth Edition, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998.

WEBSITES:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

15BECC201 COMMUNICATIVE ENGLISH – II 3 0 0 3

COURSE OBJECTIVES:

- To motivate learners to acquire listening & speaking skills in both formal and informal context.
- To focus on various question forms
- To make them understand the importance of using question tags and also the functional use of transformation of sentences.
- To improve their reading habit and to train them in critical and analytical reading.
- To equip them to write for academic as well as work place context.
- To enable students to face interviews.

COURSE OUTCOMES:

Students undergoing this course will be able to:

- Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
- Enhance them reading texts critically and analytically.
- Develop writing effectively and persuasively
- Producing different types of writing such as narrating, description, exposition and argument
- To produce creative, critical, analytical and evaluative writing.
- Enrich the ability to face interviews with confidence.

UNIT-1 (10)

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentences - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II (8) Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III (9)

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid reading – Skimming, Scanning and Surveying. (SQ3R)**Writing** - Essay writing - Minutes of meeting - Agenda – **Grammar** - Active and Passive voice - Purpose expression. **Vocabulary** - Same words used as noun and verb - Often misspelt and confused words.

UNIT-IV (8)

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job

application - Resume writing - Checklist preparation. **Grammar** - Numerical expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT- V **(10)**

Listening – Types of listening- Improving listening comprehension**. Speaking** - Oral presentation - Vocal communication techniques - Voice, quality, volume, pitch etc., **Reading** -Note making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation writing – Short essays writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabularies with their meanings.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES :

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

Semester–II

15BECC202 ENGINEERING MATHEMATICS II 3 2 0 4

COURSE OBJECTIVES:

- To understand the concepts and applications of partial differential equations
- To have knowledge in integral calculus and Vector calculus
- To expose to the concept of Analytical function and Complex integration.
- To introduce sequence and series and Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To understand the concept of functions of several variables and vector identities.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage

COURSE OUTCOMES:

The student will be able to

- Solve problems in Fluid Dynamics, Theory of Elasticity, heat and mass transfer etc.
- Find the areas and volumes using multiple integrals
- Improve their ability in Vector calculus
- Expose to the concept of Analytical function.
- Apply Complex integration in their Engineering problems
- To understand the ideas of limits and continuity and an ability to calculate with them and apply them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.

UNIT- IPARTIAL DIFFERENTIAL EQUATIONS (11)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constantcoefficients.

UNIT-II MULTIPLE INTEGRALS (11)

Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integrals.

UNIT-III VECTOR CALCULUS (13)

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorems (Statement Only)- Surfaces : hemisphere and rectangular parallelopipeds.

UNIT-IV ANALYTIC FUNCTIONS (12)

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: $w = z+a$, az, $1/z$, z^2 and bilinear transformation.

UNIT-V COMPLEX INTEGRATION (13)

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi circle (excluding poles on the real axis).

Total : 60

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2014

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2005
3	Narayanan. S, Manicavachagam pillay.T.K and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES:

1.www.efunda.com
2. www.mathcentre.ac.uk
3. www.sosmath.com/diffeq/laplace/basic/basic.html
4. www.mathworld.wolframe.com

Semester–II

15BECC203 MATERIALS SCIENCE 3 0 0 3

COURSE OBJECTIVES:

- To understand the fundamentals of material science and their applications.
- To inculcate the characteristics of conducting materials
- To divulge knowledge on the basics of semiconducting materials for diode applications.
- To understand about dielectric materials
- To introduce the features of magnetic and superconducting materials.
- To impart the basic knowledge of new semiconducting materials for engineering applications.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

- Develop the idea of quantum mechanics through applications.
- Apply the concepts of quantum theory for various methodologies.
- Explain the basic ideas of classical electron theory and energy band structures.
- Illustrate the basics of semiconductor physics and its applications in various electronic devices.
- Identify the basic properties and functioning of dielectric materials and advances materials.
- Summarize the features new semiconducting materials for engineering applications.

UNIT I CONDUCTING MATERIALS (9)

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS (9)

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIAL (9)

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS (9)

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS (9)

Metallic glasses: preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications.

Composite materials, Aircraft materials and non-metallic materials.

Nano materials: synthesis – Physical and chemical vapour deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

Total: 45

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2 nd Edition-2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William D Callister Jr	Material Science and Engineering-An Introduction	John Wiley & Sons Inc., New York.	9th Edition 2013
2	James F Shackelford	Introduction to Materials Science for Engineers	Macmillan Publication Company, New York	8th Edition 2014
3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	8th Edition 2005

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www. oyc.yale.edu
4. www.physics.org

Semester–II

15BECC204 ENVIRONMENTAL STUDIES 3 0 0 3

COURSE OBJECTIVES

- To give a comprehensive insight into natural resources
- Understand ecosystem and biodiversity.
- To educate the ways and means of the environment
- To protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures.
- Understand various Social issues and its effect on environment

COURSE OUTCOMES

Upon completion of this course the student will be able to:

- Prepare them to go eco-friendly and help preserving the nature and environment.
- Educate the means in preserving the environment.
- Understand the various types of pollution and environmental status.
- Enhance the fundamental knowledge on human welfare measures
- Sustainable and unsustainable development.
- Get an insight on various Social issues and how it effectsthe environment

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (9)

Definition, Scope and Importance – Need for public awareness -Forestresources: Useandover-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM (9)

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, Food web and Ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III BIODIVERSITY (9)

Introduction to biodiversity, Definition- Genetic diversity, Species diversity and Ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity - Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION (9)

Definition – causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT (9)

FromUnsustainable to Sustainable development, Urban problems related to energysources,Water conservation, Rain water harvesting and Watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and Global warming, Acid rain, Ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value education, Role of Information Technology in Environment and Human health-Population growth, Variation of population among nations-Population explosion.

Total: 45

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr. Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubha kaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (P) Ltd., New Delhi.	2010

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	William P.Cunningham	Principles of Environmental Science	Tata Mc Graw -Hill Publishing Company, New Delhi.	2008
2.	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw -Hill Publishing Company Ltd., New Delhi.	2005
3.	Bharucha Erach	Environmental Science Demystified	Mapin Publishing (P) Ltd., Ahmedabad.	2005
4.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications, Jaipur.	2003

WEBSITES:

1. http://people.eku.edu/ritchisong/envscinotes1.html
2.http://nptel.ac.in/courses.php?disciplineId=120
3.www.newagepublishers.com/samplechapter/001281.
4.www.unesco.org/ext/field/beijing/scienceb.htm,www.infinitepower.org/education.htm
5. http://www.sciencedaily.com/news/top/environment/

Semester – II

15BECS205 ADVANCED COMPUTER PROGRAMMING 3 2 0 4

COURSE OBJECTIVES:

- To Identify and understand the working of key components of a computer program.
- To Identify and understand the various kinds of keywords
- To explain about different data types of C programming
- To Understand, analyze and implement software development tools like algorithm,
- To develop pseudo codes and programming structures.
- To Study, analyze and understand logical structure of a computer program, and different constructs to develop a program in "C" language.

COURSE OUTCOMES:

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

- Formulate simple algorithms for arithmetic and logical problems
- Translate the algorithms to programs (in C language)
- Test and execute the programs and correct syntax and logical errors
- Implement conditional branching, iteration and recursion
- Decompose a problem into functions and synthesize a complete program using divide and conquer approach
- Understand concept of computer graphics in C

UNIT-I POINTERS AND BUILT-IN-FUNCTIONS (10)

Introduction and features of pointers- Declaration of pointers- Void pointer- Array of pointers- Pointers to Pointers- Built-in-functions- String functions- Math functions- Character functions- Memory Management Functions- static and dynamic memory

UNIT-II STRUCTURES AND UNIONS (8)

Introduction and features of Structures- Declaration and initialization- Array of Structures- Pointers to structures- Passing structures as arguments to functions- Enumerated data type- typedef- Union

UNIT-III FILES (7)

Introduction- File operations- Open, read and close- Text modes- Binary modes- File functions- fprintf,fscanf,getc,putc,fgetc,fputc,fseek,feof- Command line arguments

UNIT-IV PREPROCESSOR DIRECTIVES (10)

The #define Statement- Program Extendability- Program Portability- The # Operator- The ## Operator-The #include Statement- System Include Files- conditional compilation- The #if, #endif, #else, #elif, #ifndef Statements- #error, #line and #undef Statement

UNIT-V GRAPHICS IN C (10)

Graphics and Text mode- Video Adapter- Initialize Graphics Mode and resolution, graphics.h header file-Functions for drawing a Point on Screen, drawing lines, rectangle, circles, arcs, polygon- Functions to fill colors- Display Text in Graphics mode, outtext(), outtextxy(), justifying text.

Total: 45+15=60

REFERENCES:

1. Yashavant Kanetkar, "Let us C", BPB Publications, 13th Edition, 2013
2. H.M. Deitel and D.J. Deitel, 'C:How to Program', Prentice Hall, 7th Edition, 2012
3. A.P. Godse and D.A.Godse, "Advanced C Programming", Technical Publications, 1st Edition, 2008
4. How to solve it by Computer by R.J. Dromey, Prentice-Hall India EEE Series, 2012

Semester–II

15BECS206 ELECTRON DEVICES 3 0 0 3

COURSE OBJECTIVES:

- To understand the operational characteristics of a Semiconductor in Equilibrium and Non-Equilibrium conditions.
- To understand the working of PN junction diodes and special purpose diodes.
- To understand the basic working physics of BJT and FET both in ideal and non-ideal conditions.
- To understand the working of Rectifiers and Voltage regulators.
- To understand the fabrication process of Monolithic ICs.
- To explain various applications of semiconductors in real time applications

COURSE OUTCOMES:

Upon completion of this course the student will be able to:

- Understand the characteristics and operations of semiconductors
- DesignandimplementCombinationaland Sequential diodes .
- Understand theprocess Oftransistors
- Understand the functions of field effect transistors
- Implement Thyristors and IC fabrication
- Implement various applications of semiconductors in real time applications

UNIT I SEMICONDUCTORS (9)

Motion of Charged particle in electric, magnetic and combined fields- Semiconductor fundamentals - Fermi Level - Energy Band diagram - Intrinsic and Extrinsic Semiconductors- Carrier Concentration -Drift and Diffusion currents - Space charge effect.

UNIT II CHARACTERISTICS OF DIODES (9)

Working and description of a PN diode- Diode Equation - Minority carrier Concenteration - Varactor Diode - Avalanche and Zener Breakdown - Zener diode - Tunnel Diode -PIN diode - Photo diode - Photo voltaic cell - Light emitting diode - Liquid crystal display - Light dependant resistor- Thermistors.

UNIT III TRANSISTORS (9)

Principle of transistor action - Current Components - Cut off, Active and saturation regions of a transistor - CE,CB,CC Configurations - Ebers Moll model of a BJT - Evaluation of H- parameters - Hybrid pi model - Charge control approach of Hybrid pi model - Transistor as a switch - Use of a heat sink.

UNIT IV FIELD EFFECT TRANSISTORS (9)

Constructional features of a field effect transistor - theory of operation and current equations - VVR operation of a FET - MOSFET -Working and V-I Characteristics - Depletion and enhancement types -Threshold Voltage - Gate capacitance - MOS as a charge transferring Device - CCD, BBD -Power MOSFET-characteristics of UJT.

UNIT V THYRISTORS AND IC FABRICATION (9)

Working and V-I characteristics features of Silicon Controlled Rectifier, DIAC, TRIAC, GTO - Device Technology - Planar process -Diffusion - Ion Implantation - Vapour Deposition - NMOS, PMOS Fabrication - Twin Tub Process of CMOS - Thick film and thin film Technology.

TEXT BOOKS :

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Millman and	Electronic devices	Tata McGraw	1994

	Halkias	and Circuits	Hill International	
2	G.K.Mithal	Electronic Devices and Circuits	Khanna Publishers	1999

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Street Man	Solid State Electronic Devices'	Prentice Hall Of India	1995
2	David A.Bell	Electron Devices and Circuits	Prentice Hall Of India	1995
3	Mathur Kulshrestha and Chadha	Electron devices and Applications and Integrated circuits'	Umesh Publications	1986
4	Thomas L. Floyd	Electron Devices	Charles and Messil Publications	1989
5	S.Salivahanan N.Sureshkumar A.Vallavaraj	Electronic devices and Circuits	Tata Mcgraw Hill	2010

Semester II

15BECS211 ENGINEERING PRACTICE LABORATORY 0 0 3 2

COURSE OBJECTIVES:

- To identify and use of tools, types of joints in carpentry, fitting, tin smithy and plumbing operations.
- To demonstrate on Smithy operations, Foundry operations ,Plumbing andCarpentary Works
- To understand of electrical wiring and components.
- To Observe the function of lathe, shaper,
- To practice drilling, boring, milling, grinding machines.
- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

COURSE OUTCOMES:

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

- To identify different Tools required for Wood working.
- Familiarize the students to different cutting fluids.
- Use the Cutting tools required for Metal working in the Fitting work.
- Identify the need for heating of the Mild Steel and to understand the Hot Working of the metals in Black Smithy
- Demonstrate Manufacturing practices on CNC Machine tools.
- Expose different types of solid state welding and other welding practices viz Arc welding, Gas welding, Brazing, Soldering etc.

PART – A (CIVIL & MECHANICAL)

i. WELDING (6)

i. Preparation of arc welding of butt joints, lap joints and tee joints.

ii. BASIC MACHINING (6)

i. Simple Turning and Taper turning
ii. Drilling and Tapping

iii. SHEET METAL WORK (6)

i. Model making – Trays, funnels, etc.

iv. DEMONSTRATION ON (4)

i. Smithy operations
ii. Foundry operations
iii. Plumbing Works
iv. Carpentary Works

PART –B (ELECTRICAL & ELECTRONICS)

v. ELECTRICAL ENGINEERING (10)

i. Study of electrical symbols and electrical equipments.
ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring.
iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.
v. Measurement of energy using single phase energy meter.

vi. ELECTRONICS ENGINEERING (13)

i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
iii. Study of logic gates AND, OR, NOT, NOR and NAND.
iv. Study of HWR and FWR.

TOTAL: 45

REFERENCES

1. Jeyachandran, K., Natarajan, S. and Balasubramanian, S, “A Premier on Engineering Practices Laboratory”, Anuradha Publications, Kumbakonam, 2007.
2. Jeyapoovan, T., Saravanapandian, M, “Engineering Practices Lab Manual”, Vikas Puplishing House Pvt. Ltd, Chennai, 2006.
3. Bawa, H.S, “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007.

Semester – II

15BECS212 ADVANCED COMPUTER PROGRAMMING LABORATORY 0 0 3 2

COURSEOBJECTIVE:

- To Understand the basic concept of C programming
- To discuss different modules that includes Arrays, Strings, Functions, Pointers, Structures and File programming
- To understand the concept of Array and pointers dealing with memory management.
- To understand the concept of structures and unions through which derived data types can be Formed
- To understand and apply the in-built functions and customized functions for solving the problems.
- To learn graphics functions in C.

COURSE OUTCOME:

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, linking
- Able to execute a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Able to explain and apply the in-built functions and customized functions for solving the problems.
- Apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

LIST OF EXPERIMENTS

1. Implementing simple C program for practicing pointers
2. Implementation of Structures
3. Implementation of array of structures
4. Implementation of pointers to structures
5. Implementation of recursion in C
6. Implementing programs for Passing arrays and structures to functions
7. Implementation of memory management functions in C
8. Working with math and character built-in functions
9. Implementation of file functions
10. Working with preprocessor directives
11. Implementation of C program to practice graphics functions

15BECS301 **Discrete Structures**

L	T	P	C
0	0	3	2

COURSE OBJECTIVES:

- To acquire the knowledge needed to test the logic of a program.
- To gain knowledge in the applications of expert system, in data base.
- To gain understanding on set theory and functions
- To provide understanding on various mathematical logics
- To provide adequate knowledge in class of functions, lattices and Boolean algebra
- To explain about Number theory and graph theory.

COURSE OUTCOMES:

- The student will gain the fundamentals about the logic of a programme.
- Be able to construct simple mathematical proofs
- Enrichment of the knowledge in applications of expert system, in data base.
- Gaining the adequate concepts in class of functions, lattices and Number theory
- Incrementally build sophisticated programs by a systematic design process based on discretemathematics.
- Permutations and combinations and Graph Theory.

UNIT- I Set Theory and Functions **9**

Basic concepts – Notation – Subset –The power set – Ordered pairs and Cartesian product – Relations on sets – Types of relations and their properties – Relation matrix and the graph of a relation – Equivalence relations – Composition of binary relations - Functions – Injective, Surjective, Bijective, Composition, Identity, Inverse and Characteristic function of a set – Permutation functions.

UNIT -II Mathematical Logic **9**

Basic connectives and truth tables – Tautologies – Logical equivalence and Implications – Propositional logic and First order Logic – Laws of logic – Rules of inference – The Predicate calculus – The Statement Function, Variables and Quantifiers – Predicate Formulas – Free and Bound Variables – The Universe of discourse.

UNIT- IIILattices and Boolean Algebra **9**

Lattices as Partially ordered sets – Hasse diagram – Some Properties of Lattices – Sublattices, Direct product and Homomorphism – Some Special Lattices - Boolean algebra – Definition and Examples.

UNIT -IVNumber Theory **9**

Theory of Numbers – Prime – Composite – Perfect amicable numbers – The Sieve of Eratosthenes – Number of primes is infinite – Resolution of composite numbers in to prime factors – Divisor of a given number – Euler's function $\phi(N)$ – Highest power of prime p contained in $n!$ – Congruence – Fermat's theorem – Generalization of Fermat's theorem – Wilson's theorem – Lagrange's theorem. (Statements and simple problems only)

UNIT – VGraph Theory9

Graphs and graph models – Graph terminology and special types of graphs – Representation graphs and graph-isomorphism – connectivity – Matrix Representation of Graphs – Trees.

Total Hours: 45+15=60

Text Books:

1. Kenneth H Rosen, Discrete Mathematics and its Applications with Combinations and Graph theory, Tata McGraw - Hill Pub. Co. Ltd, New Delhi, Sixth Edition,2008

References:

1. Bernard Kolman, Robert, C., Busby and Sharan Cutler Ross, Discrete Mathematical Structures, Pearson Education Pvt. Ltd, New Delhi, Fifth Edition.2006
2. Tremblay, J. P. and Manohar, R , Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw–Hill Pub. Co. Ltd, New Delhi.2008
3. Ralph P Grimaldi, Discrete and Combinatorial Mathematics – An Applied Introduction Addison, Wesley Publishing Company, USA, Fifth Edition 2006
4. Thomas Koshy, Discrete Mathematics with Applications , Elsevier Academic Press, New Delhi. 2012
5. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, PHI Learning Pvt. Ltd.,2004
6. V. K. Krishnan, Elementary Number Theory: A Collection of Problems With Solutions , Universities Press,2012

Websites:

1. www.mhhe.com/rosen
2. www.siam.org/books/series/dt.php
3. www.dmtcs.org/dmtcs-ojs/index.php/dmtcs

15BECS302 **Data Structures**

L	T	P	C
3	2	0	4

COURSE OBJECTIVES:

- Understand the properties of various data structures
- Identify the strengths and weaknesses of different data structures
- Design and employ appropriate data structures for solving computing problems
- Possess the knowledge of various existing algorithms
- Analyze and compare the efficiency of algorithms
- Possess the ability to design efficient algorithms for solving computing problems

COURSE OUTCOMES:

- Able to understand the basic properties of data structures
- Able to identify the strength and weakness of data structures
- Able to implement Linear data structures for singly linked list, stack and Queue
- Design and implement the basic search and sorting algorithms
- Able to implement non linear data structures for Binary Trees
- Design and employ non linear data structure for solving graph application

UNIT-1 Introduction to Data Structures and Algorithms 7

Arrays, Structures, Pointers to structures and Strings- Algorithm Development- Complexity Analysis- Recursion

UNIT-II Linear Data Structures 9

Abstract Data Type(ADT)-Definition- List ADT – Linked List- Operations-Creation-Insertion-Deletion-Doubly Linked List- Stack ADT-Definition-Implementation - Operations and Applications-Queue ADT-Definition-Implementation, Operations and Applications

UNIT-III Sorting and Searching 10

Bubble sort-Selection Sort-Insertion Sort-Merge Sort-Quick Sort- Running Time analysis of each sort – Linear Search-Binary Search-Hash Search Table

UNIT-IV Non Linear Data Structures-I 10

Trees-terminologies- binary Tree-Applications-Tree Traversals-Search Trees- Binary Search Tree- AVL Trees- Operations and Applications- B-Trees

UNIT-V Non Linear Data Structures-II 9

Graph-Definition-Terminologies- Graph Representations- Graph Traversals- Basic Algorithms- Shortest Path Algorithm- Minimum Spanning Tree Construction Algorithms-Prim’s and Kruskal’s- Bi-connectivity- Graph Applications

Total Hours: 45+15=60

Text Books:

1. Mark Allen Weiss, " Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition,2011

References:

1. Richard.F., Gilberg A, Behrouz A., Forouzan, "Data Structures- A Pseudocode Approach with C", Thomson Brooks, 2nd Edition,2008
2. Aho Hopcroft and Ullman, " Data Structures and Algorithms, Pearson Education, 4th Edition,2009

Websites:

1. http://www.cs.auckland.ac.nz/software/AlgAnim/trees.html
2. http://www.itl.nist.gov/div897/sqg/dads/HTML/graph.htmlhttp://www.cmpe.boun.edu.tr/~akin/cmpe223/chap2.htm

15BECS303 **Digital Principles and System Design** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To learn the basics of binary number systems, Boolean functions and their simplification using K-map.
- To study, analyse and design combinational logic circuits
- To explain synthesis of the combinational circuits using HDL.
- The design issues of MSI devices are taught in detail
- To explain their synthesis using HDL are learnt.
- To study, analyze and design sequential circuits.

COURSE OUTCOMES:

- At the end of this course, the student will be able to:
- Perform arithmetic operations in any number system.
- Simplify the Boolean expression using K-Map and Tabulation techniques.
- Use Boolean simplification techniques to design a combinational hardware circuit.
- Design and analysis of a given digital circuit – combinational and sequential and

a circuit using PLD

- Possess the ability to design an efficient digital circuit for simple real time applications

UNIT-I Number Systems **9**

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421-Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm- Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don't care conditions.

UNIT-II Logic Gates And Combinational Circuits Logic Gates **9**

AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations –Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics –Tristate gates.
COMBINATIONAL CIRCUITS: Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA.

UNIT-III Sequential Circuit **9**

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter –Classification of sequential circuits – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State

assignment- ASM-Excitation table and maps-Circuit implementation - Register – shift registers-Universal shift register – Shift counters – Ring counters.

UNIT-IV Asynchronous Sequential Circuits 9

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT-V Memory Devices 9

Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)- Field Programmable Gate Arrays (FPGA).

Total Hours: 45

Text Books:

1. Morris Mano.M Digital Design Prentice Hall of India Pvt. Ltd., New Delhi,5th edition, 2013
2. Jain.R.P Modern Digital Electronics Tata McGraw–Hill publishing company limited, New Delhi,4th edition,2010

References:

1. John M .Yarbrough Digital Logic Applications and Design Thomson- Vikas publishing house, New Delhi 2003
2. Salivahanan.S and Arivazhagan.S Digital Circuits and Design Vikas Publishing House Pvt. Ltd, New Delhi,3rd edition,2009
3. Charles H.Roth Fundamentals of Logic Design Thomson Publication Company, New Delhi. 2013
4. Donald P.Leach and Albert Paul Malvino Digital Principles and Applications Tata McGraw Hill Publishing Company Limited, New Delhi,7th edition,2011
5. Thomas L. Floyd Digital Fundamentals Pearson Education, New Delhi,8th edition,2009

Websites:

1. http://www.allaboutcircuits.com/vol_2/chpt_9/2.html
2. http://www.educypedia.be/electronics/digital.htm

15BECS304 **Object-Oriented Programming with Java**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- Understand the concepts of object-oriented, event driven, and concurrent programming paradigms
- Develop skills in using these paradigms using Java.
- Analyze and compare the efficiency of algorithms
- Possess the ability to design efficient algorithms for solving computing problems
- Explain simple Java programming environment, compile programs and interpret compiler errors.
- Explain syntax and use of the fundamental data types.

COURSE OUTCOMES:

- Able to use a simple Java programming environment, compile programs and interpret compiler errors.
- Able to understand and use the fundamental data types.
- Able to develop a program from a given design.
- Able to understand and implement the branching and looping statements
- Able to identify the objects and classes and apply in the suitable context.
- Able to develop a program from a given design

UNIT I Fundamentals of Object-Oriented Programming 9

Object oriented programming concepts – Benefits of OOP-Applications of OOP- How Java Differs from C and C++- Java and Internet-Java and World Wide Web-Web Browsers-Hardware and Software Requirements-Java Support Systems-Java Environment

UNIT II Overview of Java Language 10

Simple Java Program-An Application with Two Classes-Java Program Structure-Java Tokens-Java Statements-Installing and Configuring Java-Implementing a Java Program-Java Virtual Machine-Command Line Arguments-Programming Style

UNIT III Constants, Variables, and Data Types 10

Constants-Variables-Data Types-Arithmetic Operators-Relational Operators-Logical Operators-Assignment Operators-Increment and Decrement Operators-Conditional Operator-Bitwise Operators-Special Operators-Arithmetic Expressions-Evaluation of Expressions-Mathematical Functions

UNIT IVBranching and Looping 8

Decision Making with if Statement-Simple if Statement-The if…Else Statement-Nesting of if…Else Statements-The Else if Ladder-The Switch Statement-The? : Operator-The While Statement-The Do Statement-The For Statement-Jumps in Loops-Labelled Loops

UNIT V Classes, Objects and Methods 8

Defining a Class-Creating Objects-Accessing Class Members-Constructors-Methods Overloading-Static Members-Nesting of Methods-Inheritance: Extending a Class-Overriding Methods-Final Variables and Methods-Final Classes-Finalizer Methods-Visibility Control-Arrays-Strings-Vectors

Total Hours: 45

Text Books:

1. E. Balagurusamy, "Programming with Java", 4th Edition, Tata Mc Graw Hill, 2010
2. C. Thomas Wu, "An Introduction to Object-Oriented programming with Java", 5th Edition Tata McGraw-Hill Publishing company Ltd 2010
3. Yashawant Kanetkar, "Let Us Java", 1st Edition, PBP Publications, 2012

References:

1. Cay S. Horstmann and Gary Cornel, "Core Java: Volume I – Fundamentals", 8th Edition, Sun Microsystems Press, 2011
2. Timothy Budd "Understanding Object-oriented programming with Java" Pearson Education,2nd edition, 2006
3. Herbert Schildt, "Java The Complete Reference", Oracle Press, 8th edition, 2011

Websites:

1. http://www.intap.net/~drw/cpp/
2. http://www.cplusplus.com/doc/tutorial/
3. www.learncpp.com/

15BECS305	Basics of Electrical Engineering	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- An understanding of basic EE abstractions on which analysis and design of electrical and electronic circuits
- Explain systemsincluding lumped circuit, digital and operational amplifier abstractions.
- The capability to use abstractions to analyze and design simple electronic circuits.
- The ability to formulate and solve the differential equations describing time behavior of circuits containing energy storage elements.
- An understanding of how complex devices such as semiconductor diodes and field-effect transistors are modeled and how the models are used in the design and analysis of useful circuits.
- The capability to design and construct circuits, take measurements of circuit behavior and performance, compare with predicted circuit models and explain discrepancies.

COURSE OUTCOMES:

- Understand the fundamentals of e.m.f, potential difference, current, resistance and energy conversions from one form to another. They should be able to calculate cost of energy consumption.
- Understand the basics of magnetic circuits and Identify the relationship between current and magnetic fields with application to determination of inductance.
- Apply the concept of electromagnetism to understand transformer operation and interpret the relationship between charge and electric fields with its application.
- Understand basic knowledge of sinusoidal quantities and phasors with their behavior and apply it to purely resistive, inductive and capacitive circuits.
- Analyze A. C. circuits, interpret relationship between voltage, current and power, examine concept o resonance, and analyze balanced three phase circuits.
- Analyze and solve D. C. networks by applying various laws and theorems.

UNIT I Electric Circuits & Measurements 9

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase balanced Circuits.

UNIT II Electrical Machines 9

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III Measuring Instruments 9

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT IV Semiconductor Devices And Applications 9

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics

UNIT V Digital Electronics 9

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

Total Hours: 45

Text Books:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill,2010.
2. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 6th edition 2013.

References:

1. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press, 2nd edition, 2011.
2. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, 11th edition,2008.
3. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 2009.
4. Sedha R.S., "Applied Electronics", S. Chand & Co., 2013.

15BECS311	Object-Oriented Programming with Java	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- A competence to design, write, compile, test and execute straightforward programs using a high level language;
- An appreciation of the principles of object oriented programming;
- An awareness of the need for a professional approach to design
- Explain the importance of good documentation to the finished programs.
- Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- Demonstrate the ability to use simple data structures like arrays in a Java program.

COURSE OUTCOMES:

- Understand the principles of OOP;
- Be able to demonstrate good object-oriented programming skills in Java;
- Be able to describe, recognise, apply and implement selected design patterns in Java;
- Be familiar with common errors in Java and its associated libraries.
- Able to develop a program from a given design
- Understand the capabilities and limitations of Java;

List of Experiments

1. Create Java package with simple stack and queue class
2. Write a Java program to perform Complex number manipulation
3. Write a Java program for Date class similar to java.util package
4. Write a Java program for implementing dynamic polymorphism in java
5. Write a Java program for ADT stack using Java interface
6. Write a Java program for DNA file creation
7. Develop a simple paint like program using applet
8. Develop a scientific calculator using java
9. Developing a template for linked list
10. Develop a multi threaded producer consumer Application
11. Write a Java program for generating prime numbers and Fibonacci series
12. Write a Java program for Multithreaded GUI application

Total Hours: 45

15BECS312	Digital Electronics Lab	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- To learn and understand basic digital design techniques.
- To learn and understand design and construction of combinational and sequential circuits.
- To understand the digital logic and create various systems by using these logics.
- Explain analysis and design digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, multiplier).
- Explain how to analyze sequential digital circuits like flip-flops, registers, counters.
- Understand the importance and need for verification, testing of digital logic and design for testability

COURSE OUTCOMES

- Learn the basics of gates.
- Construct basic combinational circuits and verify their functionalities
- Apply the design procedures to design basic sequential circuits
- Able to analyze and design digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, multiplier).
- Able to analyze sequential digital circuits like flip-flops, registers, counters.
- Understand the importance and need for verification, testing of digital logic and design for testability.

List of Experiments

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices
4. Design and implementation of parity generator / checker using basic gates and MSI devices
5. Design and implementation of magnitude comparator
6. Design and implementation of application using multiplexers
7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters
9. Coding combinational circuits using Hardware Description Language (HDL software required)
10. Coding sequential circuits using HDL (HDL software required)

Total Hours: 45

15BECS313 **Data Structures Lab**

L	T	P	C
0	0	3	2

COURSE OBJECTIVES:

- Analyze performance of algorithms.
- Choose the appropriate data structure and algorithm design method for a specified application.
- Determine which algorithm or data structure to use in different scenarios.
- Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs
- Use various data structures effectively in application programs.
- Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

COURSE OUTCOMES:

- Able to understand the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.
- Able to analyze and differentiate different algorithms based on their time complexity.
- Able to understand the linked implementation, and its uses both in linear and non-linear data structure.
- Able to understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.
- Able to implement a given problem by applying the linear and non linear data structure
- Able to identify the strength and weakness of data structures.

List of Experiments

1. Implementation of List using Arrays
2. Implementation of Singly Linked List
3. Implementation of Linked Stack
4. Implementation of Linked Queue
5. Implementation of any two stack applications
6. Implementation of Insertion Sort
7. Implementation of Merge Sort
8. Implementation of Quick Sort
9. Implementation of Insertion operation in Binary Search Tree
10. Implementation of Tree Traversals
11. Implementation of Hashing with any one collision resolution method
12. Implementation of Dijkstra’s Shortest Path Algorithm

Total Hours: 45

15BECS401 **Database Management Systems**

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- Understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- Learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- Be able to explain a database and report on the process.
- Be able to teach how to write query in databases
- Know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- Possess the knowledge about the emerging trends in the area of distributed DB- OO DB- Data mining and Data Warehousing and XML.

COURSE OUTCOMES:

On successful completion of this module, the student should:

- Have gained knowledge and understanding of what is involved in the design of a database.
- Have gained knowledge and understanding of the models used for structuring data in database systems.
- Be able to implement a database and report on the process.
- Be able to query a database.
- Apply the database knowledge to avoid the concurrency and deadlock problems
- Able to apply the database knowledge in the up coming current trends.

UNIT-I Introduction and Conceptual Modeling 9

Introduction to File and Database systems- Database system structure –Introduction and concept Modeling-Database user Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

UNIT-II Relational Model 9

SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design-Relational Models-Design issues – Functional dependences and Normalization for Relational Databases (up to BCNF).

UNIT- IIIData Storage and Query Processing 9

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree

– Query Processing. Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.

UNIT- IVTransaction Management **9**

Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT- V Current Trends **9**

Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing.

Total Hours: 45 +15 =60

Text Books:

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan" Database System Concepts", McGraw-Hill, 6th edition,2011.
2. Raghuramakrishnan and Johannes Gehrke, "Database Management Systems", 3rd Edition, Mc Graw Hill, 2002
3. Ramesh Elmasri, Shamkant B.Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2008

References:

1. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom" Database System Implementation" Pearson Education, 2nd Edition,2013
2. Peter Rob and Corlos Coronel "Database System, Design Implementation and Management", Thompson Learning Course Technology, 11th Edition,2014.

Websites:

1. http://www.tutorialized.com/tutorial/DB2-Tutorial/
2. http://www.techtutorials.info/datadb2.html

3. http://www.firstsql.com/tutor.htm
4. http://sqlzoo.net/

	L	T	P	C
15BECS402 Computer Architecture	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- To discuss the basic structure of a digital computer
- To study in detail the organization of the Control unit, the Arithmetic and Logical unit, the Memory unit and the I/O unit.
- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms
- To implement fixed-point and floating-point addition, subtraction, multiplication & division.
- To study in detail the different types of control and the concept of pipelining.

COURSE OUTCOMES:

The main goal of the course is for students to:

- Be able to understand simple circuits from logic formula.
- Understand the basics of assembly language.
- Understand the main concepts of computer architecture.
- Be able to explain how the various parts of a modern computer function and cooperate.
- Be able to exploit the advantages of an advanced computer memory having virtual memory and cache
- Implement assembly programs that accomplish basic computational and I/O operations.

UNIT- I Basic structure of computers **9**

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

UNIT- II Arithmetic unit **9**

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

UNIT- IIIBasic processing unit **9**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Microprogrammed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

UNIT- IVMemory system and i/o organization **9**

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage. Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits-Serial Communication

UNIT- V Multiprocessor architecture 9

Forms of Parallel Processing:Array Processors-Multiprocessors-Interconnection Networks :Single Bus-Crossbar NetworksMultistage Networks-Hypercube NetworksMesh Networks-Tree Networks Ring Networks-Memory Organization in Multiprocessors- Program Parallelism and Shared Variables-Performance Consideration: Amdahl's Law –Performance Indicators-Intel connection structure, intel connection arbitration

Total Hours: 45

Text Books:

1. Computer Organization and Architecture Designing for Performance, William Stallings, Pearson Education, New Delhi. 2013
2. Computer System Architecture , M. Morris Mano (3rd Edition), Prentice Hall, 2013

References:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic and Safwat Zaky, McGraw-Hill,2012
2. Computer Organization and Design: The hardware / software interface, David A.Patterson and John L.Hennessy, Morgan Kaufmann, Pune.2011
3. Computer Architecture and Organization, John P.Hayes, McGraw Hill ,New Delhi , 2012

Websites:

1. www.eastaughs.fsnet.co.uk/cpu/structure-alu.htm
2. http://e-articles.info/e/a/title/Types-of-Memory/www.comptechdoc.org/hardware/pc/begin/hwmemory.html

15BECS403 **System Software**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To have an understanding of foundations of design of assemblers, loaders, linkers, and macro processors
- To understand the relationship between system software and machine architecture.
- To know the design and implementation of assemblers
- To know the design and implementation of linkers and loaders.
- To have an understanding of macro processors.
- To understand the functions of Operating Systems and usage of system software tools

COURSE OUTCOMES:

- To have an understanding of foundations of design of assemblers, loaders, linkers, and macro processors
- To understand the relationship between system software and machine architecture.
- To know the design and implementation of assemblers
- To know the design and implementation of linkers and loaders.
- To have an understanding of macro processors.
- Explain the functions of Operating Systems and usage of system software tools

UNIT- I Introduction **9**

System software and machine architecture – The Simplified Instructional Computer (SIC) - XE - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

UNIT- II Assemblers **9**

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT- IIILoaders and Linkers **9**

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

UNIT-IV Macro Processors **9**

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.

UNIT- V Operating system and system software tools 9

Basic Operating System Functions-Machine Dependent Operating System Features:Interrupt Processing-Process Scheduling-I/O Supervision- Machine Independent Operating System Features: File Processing, Operating System Design Options: Multiprocessor Operating Systems-Distributed Operating Systems-Object Oriented Operating Systems. Text editors - Editor Structure. - Interactive debugging systems

Total Hours: 45

Text Books:

1. Leland L. Beck, "System Software – An Introduction to Systems Programming ", Pearson Education Asia.3rd edition,2011

References:

1. Dhamdhere.D.M, "Systems Programming and Operating Systems ", Tata McGraw-Hill, New Delhi, 2009
2. John J. Donovan, "Systems Programming ", Tata McGraw-Hill , New Delhi, 2002

Websites:

1. http://www.omninerd.com/articles/PC_Bootstrap_Loader_Programming_Tutorial_in_ASM
2. www.tenouk.com/ModuleW.html

15BECS404	Advanced Java Programming	L	T	P	C
		3	2	0	4

COURSE OBJECTIVES:

- Understand the concepts of object-oriented, event driven,
- To explain concurrent programming paradigms
- Develop skills in using these paradigms using Java.
- To explain concurrent object-oriented programming in Java
- To describe event-driven programming
- To explain in detail event handling in the context of Java GUI programming

COURSE OUTCOMES:

To be able to describe & discuss advanced features of Java programming including:

- Able to understand and implement the concepts of interfaces and packages
- Able to implement a multithreaded program
- Able to manage exceptions for real time applications
- Able to design an event driven program using applet
- Able to use strams, buffers for handling I/O operations
- Able to design a complete Java program using the given design

UNIT I Interfaces and Packages 9

Defining Interfaces-Extending Interfaces-Implementing Interfaces-Accessing Interface Variables-Java API Packages-Using System Packages-Naming Conventions-Creating Packages-Accessing a Package-Using a Package-Adding a Class to a Package-Hiding Classes-Static Import

UNIT II Multithreaded Programming 9

Creating Threads-Extending the Thread Class-Stopping and Blocking a Thread-Life Cycle of a Thread-Using Thread Methods-Thread Exceptions-Thread Priority-Synchronization

UNIT III Managing Errors and Exceptions 9

Implementing the 'Runnable' Interface-Inter thread Communication-Types of Errors-Exceptions-Syntax of Exception Handling Code-Multiple Catch Statements-Using Finally Statement-Throwing Our Own Exceptions-Using Exceptions for Debugging

UNIT IVApplet and Graphics 9

How Applets Differ from Applications-Preparing to Write Applets-Building Applet Code-Applet Life Cycle-Creating an Executable Applet-Designing a Web Page-Applet Tag-Adding Applet to HTML File-Running the Applet-Getting Input from the User-Event Handling-The Graphics Class-Introduction to AWT Package-Introduction to Swings

UNIT V Managing Input/output Files in Java 9

Concept of Streams-Stream Classes-Byte Stream Classes-Character Stream Classes-Using Streams-Other Useful I/O Classes-Using the File Class-Input/Output Exceptions-Creation of Files-Reading/Writing Characters-Reading/Writing Bytes-Handling Primitive Data Types-Concatenating and Buffering Files-Random Access Files-Interactive Input and Output-Other Streamclasses

Total Hours: 45+15=60

Text Books:

1. E. Balagurusamy, "Programming with Java", 4th Edition, Tata Mc Graw Hill, 2010
2. C. Thomas Wu, "An Introduction to Object-Oriented programming with Java", 5th Edition Tata McGraw-Hill Publishing company Ltd 2010
3. Yashawant Kanetkar, "Let Us Java", 1st Edition, PBP Publications, 2012

References:

1. Cay S. Horstmann and Gary Cornel, "Core Java: Volume I – Fundamentals", 8th Edition, Sun Microsystems Press, 2011
2. Timothy Budd "Understanding Object-oriented programming with Java" Pearson Education,2nd edition, 2006
3. Herbert Schildt, "Java The Complete Reference", Oracle Press, 8th edition, 2011

Websites:

1. http://java.sun.com.

15BECS405 **Design and Analysis of Algorithms**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To create analytical skills, to enable the students to design algorithms for various applications, and to analyze the algorithms
- To introduce basic concepts of algorithms
- To introduce mathematical aspects and analysis of algorithms
- To introduce sorting and searching algorithms
- To explain applications of the algorithms and design techniques to solve problems
- To describe the complexities of various problems in different domains.

COURSE OUTCOMES:

The main goal of the course is for students to:

- Able to understand and implement the concepts of interfaces and packages
- Able to implement a multithreaded program
- Able to manage exceptions for real time applications
- Able to design an event driven program using applet
- Able to use strams, buffers for handling I/O operations
- Able to design a complete Java program using the given design

UNIT- I Basic Concepts of Algorithms **9**

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

UNIT- II Mathematical Aspects and Analysis of Algorithms **9**

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

UNIT -III Analysis of Sorting and Searching Algorithms **9**

Brute Force – Selection Sort and Bubble Sort – Sequential Search and Brute-force string matching – Divide and conquer – Merge sort – Quick Sort – Binary Search – Binary tree- Traversal and Related Properties – Decrease and Conquer – Insertion Sort – Depth first Search and Breadth First Search.

UNIT- IVAlgorithmic Techniques **9**

Transform and conquer – Presorting – Balanced Search trees – AVL Trees – Heaps and Heap sort – Dynamic Programming – Warshall's and Floyd's Algorithm – Optimal Binary Search trees – Greedy Techniques – Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman trees.

UNIT- V Algorithm Design Methods **9**

Backtracking – n-Queen's Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem- P, NP and NP-Complete Problems

Total Hours: 45

Text Books:

1. Introduction to the Design and Analysis of Algorithm, Anany Levitin, Pearson Education, Asia, 3rd edition,2014
2. The Design and Analysis Of Computer Algorithms, Aho A.V, J.E.Hopcroft and J.D.Ullman, Pearson Education Asia, New Delhi, 2013

References:

1. Introduction to Algorithms , Cormen.T.H, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd, New Delhi, 3rd edition,2009
2. Computer Algorithms - Introduction to Design and Analysis, Sara Baase and Allen Van Gelder, Pearson Education, Asia, New Delhi, 2003
3. Fundamentals of Algorithmics, Bratley Paul, Brassard Gilles,Phi Learning, 1st Edition,2009

Websites:

1. http://www.ics.uci.edu/~eppstein/161/960312.html
2. http://cpp.datastructures.net/presentations/Analysis.pdf
3. www.tsp.gatech.edu

15BECS411 **Advanced Java Programming Laboratory**

L	T	P	C
0	0	3	2

COURSE OBJECTIVES:

- Understand the concepts of object-oriented, event driven, and concurrent programming paradigms
- Develop skills in using these paradigms using Java.
- To understand and implement the concepts of interfaces and packages
- To implement a multithreaded program
- Explain how to manage exceptions for real time applications
- Explain how to design an event driven program using applet

COURSE OUTCOMES:

- After completion of this course, the students would be able to
- Understand programming language concepts, particularly Java and object-oriented concepts.
- Write, debug, and document well-structured Java applications.
- Implement Java classes from specifications.
- Effectively create and use objects from predefined class libraries.
- Understand the behavior of primitive data types, object references, and arrays.
- Apply decision and iteration control structures to implement algorithms.

List of Experiments

1. Write a Java program for generating prime numbers and Fibonacci series
2. Write a Java program for finding greatest number among 3numbers in java
3. Write a Java program for Overloading in Java
4. Write a Java program for Overriding in Java
5. Write a Java program for Exception Handling
6. Write a Java program for Multithreading
7. Write a Java program to show the connectivity with JDBC
8. Write a Java program for Overloading in eclipse
9. Write a Java program to implement Jtable
10. Write a program of an applet that receives two numerical values as the input from user and displays the sum of these two numbers.

Total Hours: 45

15BECS412 **Scientific Computing Lab**

	L	T	P	C
COURSE	**1**	**0**	**3**	**3**

OBJECTIVES:

- To introduce the scientific computing
- Discuss various concepts covering some important aspects of solving equations, IVP, BVP.
- To implement the methods using the spread sheet in Excel
- To explain various numeric methods and find their solutions
- Explain how to work numerically on the ordinary differential equations
- Work numerically on the partial differential equations using different methods

COURSE OUTCOMES:

After completion of this course, the students would be able to

- To do the scientific computing to solving algebraic equations, IVP, BVP and also implement the methods using the spread sheet in Excel .
- Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.
- Apply various interpolation methods and finite difference concepts.
- Work out numerical differentiation and integration whenever and wherever routine methods are not applicable
- Work numerically on the ordinary differential equations using different methods through the theory of finite differences.
- Work numerically on the partial differential equations using different methods through the theory of finite differences.

List of Experiments

1. Finding solution of Transcendental equation
   i) Newton – Raphson Method
   ii) Bisection method
   iii) Iterative method by reducing the equation to the form x= f(x)
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
   i) Gauss 2 point and 3 point formulae
   ii) Trapezoidal method
   iii) Simpson's 1/3 rule
4. Solution of initial value problems governed by ODE
   i) Runge - Kutta 4^{th} order method
   ii) Modified Euler's method
   iii) Milne's method
   iv) Adam – Bashforth method
5. Solution of BVP governed by PDE
   i) Laplace Equation
   ii) One – dimensional heat equation
      a) Explicit method : Bender – Schmidt's method
      b) Implicit method : Crank - Nicolson's method
   iii) One dimensional wave equation

Implicit method

Total Hours: 45

Reference Books:

1. Curtis F. Gerald and Patrick O. Wheatley, Applied Numerical Analysis, Pearson Education, South Asia, 2009.
2. Steven C. Chapra, Raymond P. Canale, Numerical Methods for Engineers, McGraw - Hill Pub. Co. Ltd, 2014.

15BECS413	Database Management Systems Lab	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- Master the basic concepts and appreciate the applications of database systems.
- Master the basics of SQL and construct queries using SQL.
- Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.
- Be familiar with the relational database theory, and be able to write relational algebra expressions for queries.
- Mater sound design principles for logical design of databases, including the E-R method and normalization approach.
- Master the basics of query evaluation techniques and query optimization.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database, Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application.

List of Experiments

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High-level language extension with Cursors.
4. High level language extension with Triggers
5. Procedures and Functions.
6. Embedded SQL.
7. Database design using E-R model and Normalization.
8. Design and implementation of Payroll Processing System.
9. Design and implementation of Banking System.
10. Design and implementation of Library Information System.
11. Database connectivity using JDBC
12. Database connectivity using ODBC

Total Hours: 45

15BECS501 **Operating Systems** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To have a thorough knowledge of processes, scheduling concepts, memory management, I/O and file systems in an operating system
- To have an overview of different types of operating systems
- To know the components of an operating system.
- To have a thorough knowledge of process management
- To have a thorough knowledge of storage management
- To know the concepts of I/O and file systems.

COURSE OUTCOMES:

- Understand device and I/O management functions in operating systems as part of a uniform device abstraction.
- Have an understanding of disk organization and file system structure.
- Be able to give the rationale for virtual memory abstractions in operating systems.
- Understand the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling.
- Understand the main mechanisms used for inter-process communication.
- Understand the main problems related to concurrency and the different synchronization mechanisms available.

UNIT- I Introduction **9**

Introduction – OS Concepts- OS Structures- kernel, shell-Evolution of OS- Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

UNIT –II Scheduling **9**

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

UNIT- IIIDeadlocks **9**

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

UNIT- IVVirtual Memory **9**

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File Sharing – Protection

UNIT- V File Systems **9**

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Case Study: The Linux System, Windows 2000 –Introduction -UNIX

Total Hours: 45

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne“ Operating Systems

2. Andrew S. Tanenbaum, Albert S Woodhull, “The MINIX Book- Operating Systems Design and Implementation,” 3rd Edition, Pearson Education Pvt Ltd., 2006.

References:

1. Harvey M. Deitel, “Operating Systems” Pearson Education Pvt. Ltd, 2009.
2. Andrew S. Tanenbaum.” Modern Operating Systems”, Prentice Hall of India Pvt. Ltd, NewDelhi, 4th edition, 2014.
3. William Stallings, “Operating System”, Prentice Hall of India, 8th edition, 2014.

Websites:

1. http://courses.cs.vt.edu/~csonline/OS/Lessons/index.html
2. www.ee.surrey.ac.uk/Teaching/Unix/

15BECS502	Microprocessors and Microcontrollers	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the architecture and programming of 8085 microprocessor.
- To introduce the interfacing of peripheral devices with 8085 microprocessor.
- To introduce the architecture and programming of 8086 microprocessor.
- To introduce the architecture, programming and interfacing of 8051 micro controller.
- Explain various analysis using assembly language programs
- Describe various assembly language programs

COURSE OUTCOMES:

- Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.
- Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.
- Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
- Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
- Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
- Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems

UNIT I Microprocessor- 8086 **9**

Register Organization -Architecture-Signals-Memory Organization-Bus Operation-I/O Addressing-Minimum Mode-Maximum Mode-Timing Diagram-Interrupts - Service Routines – I/O and Memory Interfacing concepts.

UNIT II Programming of 8086 **9**

Addressing Modes-Instruction format-Instruction set-Assembly language programs in 8086. RISC architecture – introduction to ARM Programming-register configuration and instruction set – sample program.

UNIT III Interfacing Devices 9

Programmable Peripheral Interface (8255) - Programmable Interval Timer (8254) - Programmable Interrupt Controller (8259A) - Programmable DMA Controller (8257) - Programmable Communication Interface (8251A) –Programmable Keyboard and Display Controller (8279).

UNIT IV Microcontroller-8051 9

Register Set-Architecture of 8051 microcontroller- I/O and memory addressing-Interrupts-Instruction set-Addressing modes. .

UNIT V Programming And Interfacing Of 8051 9

Timer-Serial Communication-Interrupts Programming-Interfacing to External Memory-Interfacing to ADC, LCD, DAC, Keyboard and stepper motor.

Total Hours: 45

Text Books:

1. K. Ray and K. M. Bhurchandi, Advanced Microprocessors and Peripherals. Tata McGraw Hill, New Delhi,3rd edition,2013.
2. Douglas V.Hall, Microprocessor and Interfacing:Programming and Hardware. Tata McGraw Hill, New Delhi 2007

References:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay The 8051 Microcontroller and Embedded Systems Pearson Education, New Jersy,2nd edition,2009
2. Krishna Kant, Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051 and 8096, PHI, New Delhi, 2008
3. Kenneth J.Ayala, The 8051 Microcontroller, Thompson Delmar Learning, New Delhi, 2007
4. Barry B.Brey, The Intel Microprocessors Architecture, Programming and Interfacing,
5. Pearson Education, New Delhi, 2007

Websites:

1. http://www.8052.com/tut8051http://www.eastaughs.fsnet.co.uk/cpu/index.htm
2. http://www.webphysics.davidson.edu/faculty/dmb/py310/**8085**.pdf
3. http://www.aust.edu/cse/moinul/8086_lectures.pdf
4. http://www.cache.com.hk/datasheetC8255ovview.html

15BECS503 **Computer Networks**

L	T	P	C
3	2	0	4

COURSE OBJECTIVES:

- Understand the division of network functionalities into layers.
- Be familiar with the components required to build different types of networks
- Be exposed to the required functionality at each layer
- Learn the flow control and congestion control algorithms
- To introduce the concepts, terminologies and technologies used in modern days data communication and computer networking.
- To understand the concepts of data communications.

COURSE OUTCOMES:

- To understand the division of network functionalities into layers
- To understand the concepts of data communications
- To understand the working of router
- Able to identify the ports used for transferring and receiving data
- Able to identify the flow control mechanism to be adopted in transport layer
- Able to understand the functions of application layer

UNIT- I Fundamentals & Link layer **9**

Building a network - ISO / OSI model - Requirements - Layering and protocols - Internet Architecture - Network software - Performance ; Link layer Services - Framing - Error Detection - Flow control

UNIT –II Media access & Internetworking **9**

Media access control - Ethernet (802.3) - Wireless LANs - 802.11 - Bluetooth - Switching and bridging - Basic Internetworking (IP, CIDR, ARP, DHCP,ICMP)

UNIT –III Routing **9**

Routing (RIP, OSPF, metrics) - Switch basics - Global Internet (Areas, BGP, IPv6), Multicast - addresses - multicast routing (DVMRP, PIM)

UNIT- IV Transport layer **9**

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission - TCP Congestion control - Congestion avoidance (DECbit, RED) - QoS - Application requirements

UNIT –V Application layer **9**

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) - HTTP - Web Services - DNS – SNMP

Total Hours: 45+15=60

Text Books:

1. Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011.
2. Andrew S. Tanenbaum, “Computer Networks”, Fifth Edition, 2011
3. William Stallings, “Data and Computer Communication”, Tenth Edition, Pearson Education, 2013

References:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.

2. James F. Kurose, Keith W. Ross, “Computer Networking - A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.

Websites:

1. http://www.freeprogrammingresources.com/tcp.html
2. http://www.mcmcse.com/cisco/guides/osi.shtml
3. http://compnetworking.about.com/od/vpn/a/vpn_tunneling.htm

15BECS504 **Formal Languages and Automata Theory**

L	T	P	C
3	2	0	4

COURSE OBJECTIVES:

- To understand a finite automata for a given language.
- Discuss about a Turing machine
- To understand the relation between grammar and language
- To understand the basic principles of working of a compiler
- To study about the type checking procedure during the compilation
- To understand the storage structure of the running program

COURSE OUTCOMES:

Upon completion of the course, the students should be able to :

- Design a finite automaton for a specific language.
- Design a Turing machine.
- Select appropriate grammar for the implementation of compiler phases
- Design a lexical analyser, Design a simple parser
- Design and implement techniques used for optimization by a compiler.
- Write a very simple code generator

UNIT- I **Introduction To Automata** **9**

Basics of String and Alphabets - Finite Automata (FA) – Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Conversion of NFA to DFA- Finite Automata with Epsilon transition-Equivalence and Minimization of Automata

UNIT- II **Regular Expressions And Languages** **9**

Regular Expression – FA and Regular Expressions – Proving languages not to be regular –Pumping lemma for regular sets - Closure properties of regular languages- Decision Properties of Regular Languages

UNIT- IIIContext-Free Grammar And Languages **9**

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata- Pumping Lemma for CFL - Closure Properties of CFL- Context Sensitive Grammar (CSG) & Languages

UNIT IV **Properties Of Context Free Grammar** **9**

Normal forms for Context Free Grammar- Chomsky Normal Form- The Pumping lemma for Context free Languages- Closure properties of Context Free Languages-Inverse Homomorphism-Decision Properties of CFL

UNIT- V **Turing Machine** **9**

Turing Machines – Introduction- Definition – Turing machine construction- Storage in Finite control-Multiple tracks- Subroutines-Checking of Symbols – Two way infinite tape-Undecidability .

Total Hours: 45+15=60

Text Books:

1. Hopcroft J.E, R.Motwani and J.D.Ullman, Introduction to Automata Theory, Languages and Computations, Pearson Education, 2011.

References:

1. Lewis H.R and C.H.Papadimitriou, Elements of The theory of Computation, Pearson Education, PHI, 2009.
2. Martin J, Introduction to Languages and the Theory of Computation, TMH, 2010
3. Micheal Sipser, Introduction of the Theory and Computation, Edition,Thomson Brokecole,2012.
4. An Introduction to Formal Languages and Automata, 5th Edition, Peter Linz, 2011

Websites:

1. http://www.regular-expressions.info/tutorial.html
2. http://www.cs.duke.edu/csed/jflap/tutorial/fa/nfa2dfa/index.html
3. http://web.cecs.pdx.edu/~harry/compilers/slides/LexicalPart3.pdf

15BECS511	Computer Networks Lab	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- Understand fundamental underlying principles of computer networking
- Understand details and functionality of layered network architecture
- Apply mathematical foundations to solve computational problems in computer networking
- Utilizing Network tools and simulator
- Explain computer networking concepts and vocabulary
- Explain the concept of protocols

COURSE OUTCOMES:

- Understand fundamental underlying principles of computer networking
- Understand details and functionality of layered network architecture
- Apply mathematical foundations to solve computational problems in computer networking
- Understands computer networking concepts and vocabulary
- Understands the concept of protocols
- Utilizing Network tools and simulator

List of Experiments

1. Implementation of Sliding Window Protocol.
2. Study of Socket Programming and Client - Server model
3. Write a code simulating ARP /RARP protocols.
4. Write a code simulating PING and TRACEROUTE commands
5. Create a socket for HTTP for web page upload and download.
6. Write a program to implement RPC (Remote Procedure Call)
7. Implementation of Subnetting .
8. Applications using TCP Sockets like Echo client and echo server
9. Applications using TCP and UDP Sockets like File Transfer
10. Study of Network simulator (NS3), Wireshark

Total Hours: 45

15BEEC512 Microprocessor and Microcontroller Laboratory **L T P C 0 0 3 2**

COURSE OBJECTIVES:

The student should be made to:

- Introduce ALP concepts and features
- Explain to write a program for 8085 Microprocessor
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Illustrate program for 8051 Microcontroller
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors

COURSE OUTCOMES

- Ability to write a program for 8085 Microprocessor
- Ability to write a program for 8086 Microprocessor
- Ability to determine the program for Interfacing
- Ability to write a program for 8051 Microcontroller
- Design and implement 8051 microcontroller based systems
- To Understand the concepts related to I/O and memory interfacing

List of Experiments

Minimum 12 Experiments to be conducted

1. Programs for 8/16 bit Arithmetic operations (Using 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Programs on Subroutines (Using 8086)
6. Interfacing ADC and DAC(Using 8085).
7. 8255 PPI.
8. Transfer data serially between two kits (8253/8251).
9. 8279 Keyboard & display
10. Temperature control.
11. Traffic Control.
12. 8259 Programmable Interrupt Controller.
13. Interfacing and Programming of DC Motor Speed control (8085/8051)
14. Interfacing and Programming of Stepper Motor and (8085/8051).
15. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051microcontroller.

Total Hours: 45

15BECS513	Operating Systems Lab	L	T	P	C
		0	0	3	2

COURSE OBJECTIVE:

- Grasp a fundamental understanding of computer and operating systems
- Explain various Identify the services provided by operating system
- Learn basic shell programming
- Understand memory management
- Understand process concurrency and synchronization
- Learn the scheduling policies of operating systems

COURSE OUTCOMES:

- Identify the services provided by operating system
- Able to write programs on Shell Script
- Understand the internal structure of an operating system and be able to write programs
- Understand and solve problems involving key concepts and theories in operating systems
- Able to implement scheduling algorithms
- Able to understand the memory management concepts

List of Experiments

(Implement the following on LINUX platform. Use C for high level language implementation)

1. Shell programming
   - command syntax
   - write simple functions
   - basic tests
2. Shell programming
   - loops
   - patterns
   - expansions
   - substitutions
3. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
5. Write C programs to simulate UNIX commands like ls, grep, etc.
6. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
8. Implement the Producer – Consumer problem using semaphores.
9. Implement some memory management schemes – I
10. Implement some memory management schemes – II
11. Case study: “awk” Scripting Language

Total Hours: 45

15BECC601 Engineering Economics and Financial Management

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To know the fundamentals of cost analysis and economics.
- To learn about the basics of economics
- To understand cost analysis related to engineering so as to take economically sound decisions.
- To make the students to understand capital market, breakeven point analysis and depreciation
- Explain various financial statements and cost information
- Describe the concepts of the time value of money

COURSE OUTCOMES:

- Understand financial statements and cost information
- Understand the concept of the time value of money
- Understand money and its management
- Apply present worth analysis in evaluating alternatives apply annual worth analysis in evaluating alternatives
- Apply rate of return analysis in evaluating alternatives
- Apply the knowledge in cost analysis and changing economics situations

UNIT- I Fundamentals of Engineering Economics **9**

Introduction to Engineering Economics – Definition and Scope – Significance of Engineering Economics- Demand and supply analysis-Definition – Law of Demand – Elasticity of Demand – Demand Forecasting. Supply – Law of supply – Elasticity of Supply.

UNIT- II Financial Management **9**

Objectives and functions of financial management – financial statements, working capital management– factors influencing working capital requirements – estimation of working capital. Capital budgeting - Need for Capital Budgeting – Project Appraisal Methods - Payback Period – ARR – Time Value of Money.

UNIT- IIICapital Market **9**

Stock Exchanges – Functions – Listing of Companies – Role of SEBI – Capital Market Reforms. Money and banking - Money – Functions –Inflation and deflation – Commercial Bank and its functions – Central bank and its functions.

UNIT- IVNew Economic Environment **9**

National Income – concepts – methods of calculating national income - Economic systems, economic Liberalization –Privatization – Globalization. An overview of International Trade – World Trade Organization – Intellectual Property Rights.

UNIT- V Cost Analysis And Break Even Analysis **9**

Cost analysis - Basic cost concepts – FC, VC, TC, MC – Cost output in the short and long run. Depreciation - meaning – Causes – Methods of computing Depreciation (simple problems in Straight

Line Method, Written Down Vale Method). Meaning – Break Even Analysis - Managerial uses of BEA.

Total Hours: 45

Text Books:

1. Ramachandra Aryasri .A, and V. V.Ramana Murthy," Engineering Economics &Financial Accounting", Tata McGraw Hill,–,New Delhi,2007
2. Varshney R. L., and K.L Maheshwari," Managerial Economics", Sultan Chand & Sons, New Delhi,1st edition,2008

References:

1. Samuelson and Nordhaus," Economics", Tata McGraw Hill, New Delhi,2009
2. Prasanna Chandra," Fundamentals of Financial Management", Tata McGraw Hill, New Delhi,8th edition,2011

Websites:

1. http://www.handbook.unsw.edu.au/postgraduate/courses/.../CVEN9701.ht...
2. http://www.rejinpaul.com/2011/11/eefa-engineering-economics-and.html
3. http://www.eogogics.com › Descriptions of Publications

15BECS602 **Software Engineering**

L	T	P	C
3	2	0	4

COURSE OBJECTIVES

- To introduce the methodologies involved in the development
- To explain maintenance of software over its entire life cycle.
- To explain the various effective software engineering processes
- To explain design, cost and principles in a software engineering
- To describe different projects of software testing
- To be aware of Different life cycle models and requirement dictation process

COURSE OUTCOMES:

- Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.
- Employ group working skills including general organization, planning and time management and inter-group negotiation.
- Translate a requirements specification into an implementable design, following a structured and organised process.
- Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.
- Evaluate the quality of the requirements, analysis and design work done during the module.
- Able to back track effectively to improve the current functionalities using appropriate software measures

UNIT -I Software Process **9**

Introduction –S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation – life cycle process – development process –system engineering hierarchy.

UNIT- II Software Requirements **9**

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -S/W document. Analysis and modelling – data, functional and behavioural models – structured analysis and data dictionary.

UNIT- IIIDesign Concepts and Principles **9**

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design – transform and transaction mapping – user interface design – user interface design principles. Real time systems - Real time software design – system design – real time executives – data acquisition system - monitoring and control system.

UNIT- IVTesting **9**

Taxonomy of software testing – levels – test activities – types of s/w test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large. S/W testing strategies – strategic approach and issues - unit testing – integration testing – validation testing – system testing and debugging.

UNIT- V Software Project Management 9

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method. - Defining Task Network – Scheduling – Earned Value Analysis – Error Tracking - Software changes- program evolution dynamics- software maintenance – Risk management -Architectural evolution.

Total Hours: 45+15=60

Text Books:

1. Roger S.Pressmen, "Software Engineering : A Practitioner's Approach", McGraw-Hill International Edition,4th edition,2014
2. Ian Sommerville, "Software engineering", Pearson education Asia,9th edition,2011

References:

1. Fundamentals of software engineering, Rajib Mall Phi learning pvt. Ltd,4th edition,2014
2. Pankaj Jalote," An Integrated Approach to Software Engineering", Springer Verlag,3rd edition,2010
3. James F Peters and Witold Pedryez," Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi,2007

Websites:

1. http://www.testingbrain.com/WHITEBOX/WHITE_BOX_Testing.html
2. http://www.cs.drexel.edu/~spiros/teaching/CS576/slides/control-testing.pdf

15BECS603 **Compiler Design** **L T P C**
3 2 0 4

COURSE OBJECTIVES:

- At the end of the course the student will be able to design and implement a simple compiler.
- To understand, design and implement a lexical analyzer.
- Explain how to build lexical analyzers and use them in the construction of parsers;
- To understand, design and implement a parser.
- To understand various grammars of a programming langugage
- To understand, design code generation schemes

COURSE OUTCOMES:

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

- build lexical analyzers and use them in the construction of parsers;
- express the grammar of a programming language;
- build syntax analyzers and use them in the construction of parsers;
- perform the operations of semantic analysis;
- discuss the merits of different optimization schemes.
- Able to design and Implement a simple compiler

UNIT- I Introduction to compiling **9**

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis **–** Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT- II Syntax Analysis **9**

Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

UNIT –IIIIntermediate code generation **9**

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.

UNIT- IVCode generation **9**

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

UNIT- V Code optimization and run time environments **9**

Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.

Total Hours: 45+15=60

Text Books:

1. Compilers Principles, Techniques and Tools, Alfred Aho, Ravi Sethi, Jeffrey D Ullman, Pearson Education Asia, 2nd edition,2013
2. Compiler Design in C, Allen I. Holub, Prentice Hall of India, 2006.

References:

1. Engineering a Compiler, Keith Cooper and Linda Torczon, 2nd Edition, 2011.
2. Introduction to Compiler Techniques, Bennet.J.P, Tata McGraw-Hill, 2007
3. Lex & Yacc , John R. Levine, Tony Mason, Doug Brown, 2nd edition (October 1992) O'Reilly & Associates.
4. Compiler Construction: Principles and Practice, Kenneth C. Louden, Thompson Learning. 2006

Websites:

1. http://www.tenouk.com/ModuleW.html
2. http://www.mactech.com/articles/mactech/Vol.06/06.04/LexicalAnalysis/index.html

15BECS604 **Graphics and Multimedia**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To study the graphics techniques and algorithms.
- To study the multimedia concepts and various I/O technologies.
- To enable the students to develop their creativity
- To explain the standards for representing audio files.
- To discuss the aspects of multimedia design.
- To impart the fundamental concepts of Computer Graphics and Multimedia.

COURSE OUTCOMES:

- Students will demonstrate an understanding of contemporary graphics hardware.
- Appreciation of the standards for representing audio files.
- Appreciation of the standards and issues concerned in representing static/dynamic visual input/output.
- An understanding of aspects of multimedia design.
- An understanding of the tools available for multimedia production and image/audio processing
- Apply the logic to develop animation and gaming programs

UNIT- I Output Primitives **10**

Overviews of graphics system-Video display devices, Raster scan system-Random scan systems. Line, Circle Drawing Algorithms – Attributes – Two-Dimensional Geometric Transformations – Two-Dimensional Clipping and Viewing.

UNIT- II Three-Dimensional concepts **9**

Three-Dimensional Object Representations – Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation.

UNIT- IIIMultimedia systems design **9**

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Databases.

UNIT- IVMultimedia storage technologies **8**

Compression & Decompression–Types of Compression-Data and file format standards-Multimedia I/O technologies -Storage and retrieval Technologies.

UNIT- V Hypermedia **9**

Digital voice and audio – Video image and animation – Full motion video – Hypermedia messaging - Mobile Messaging – Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards-Distributed Multimedia Systems.

Total Hours: 45

Text Books:

1. Judith Jeffcoate, Multimedia in practice technology and Applications, PHI,2007
2. Foley, Vandam, Feiner, Huges, Computer Graphics: Principles & Practice, Pearson Education,2005

References:

1. Udit Agarwal, Computer Graphics & Multimedia, S.K. Kataria & Sons;
2. Donald Hearn and M.Pauline Baker, Computer Graphics C Version, Pearson Education,2013
3. Prabat K Andleigh and Kiran Thakrar, Multimedia Systems and Design,PHI,2011

Websites:

1. http://www.tenouk.com/ModuleW.html
2. http://www.mactech.com/articles/mactech/Vol.06/06.04/LexicalAnalysis/index.html

		L	T	P	C
15BECS611	**Graphics and Multimedia Lab**	**0**	**0**	**3**	**2**

COURSE OBJECTIVES:

The objectives of the course are to:

- Understand the need of developing graphics applications.
- Learn the hardware involved in building graphics applications.
- Learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc.
- To explain program functions to implement graphics primitives.
- To explain how to write programs that demonstrate geometrical transformations.
- Learn the representation and transformation of graphical images and pictures.

COURSE OUTCOMES:

- Students will create interactive graphics applications using one or more graphics application programming interfaces.
- Students will write program functions to implement graphics primitives.
- Students will write programs that demonstrate geometrical transformations.
- Students will write program functions to implement visibility detection.
- Students will write programs that demonstrate computer graphics animation.
- Students will apply the logic to develop animation and gaming programs

List of Experiments

1. To implement Bresenham's algorithms for line, circle and ellipse drawing
2. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
3. To implement Cohen-Sutherland 2D clipping and window-viewport mapping
4. To perform 3D Transformations such as translation, rotation and scaling.
5. To visualize projections of 3D images.
6. To convert between color models.
7. To implement text and image compression algorithm.
8. To perform animation using any Animation software.
9. To perform basic operations on image using any image editing software .
10. Web document creation using Dream weaver.
11. Raster scan lines and circular drawing.

Total Hours: 45

15BECS612	Case Tools Lab	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- Practicing the different types of case tools such as Rational Rose / other Open Source
- Illustrate used for all the phases of Software development life cycle.
- Learn the basics of OO analysis and design skills.
- Be exposed to the UML design diagrams.
- Learn to map design to code.
- Be familiar with the various testing techniques

COURSE OUTCOMES:

- The students understands the process to be followed in the software development life
- Cycle
- find practical solutions to the problems
- solve specific problems alone or in teams
- manage a project from beginning to end
- work independently as well as in teams
- define, formulate and analyze a problem

List of Experiments

1. Implementation of Student Marks Analyzing System
2. Implementation of Quiz System
3. Implementation of Online Ticket Reservation System
4. Implementation of Payroll System
5. Implementation of Course Registration System
6. Implementation of Expert Systems
7. Implementation of ATM Systems
8. Implementation of Stock Maintenance

Total Hours: 45

15BECS701	Professional Ethics	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To develop managerial and entrepreneurial skills our Culture and Ethics
- Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations.
- After studying this course, students will be able to have a clear understanding of the managerial functions
- Illustrate various activities like planning, organizing, staffing, leading and controlling.
- Student should understand concepts of directing and controlling
- To create an awareness and practice through Engineering Ethics and Human Values.

COURSE OUTCOMES:

- Advanced philosophical knowledge of the profession of recreation and leisure
- Synthesis of trends and issues as related to current professional practice
- Evaluation of organizational theories and human resource management principles
- Information Competency
- Ethical practices and Ethical Management
- To mould an individual in becoming a successful entrepreneur

UNIT I Management, Planning, Organizing 9

Definition of Management – Management and Administration – Contribution of Taylor and Fayol – Functions of Management – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Forecasting – Decision-making – Formal and informal organization – Organization Chart .

UNIT II Directing and Controlling 9

Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment –Process of Communication – System and process of Controlling – Requirements for effective control – Control of Overall Performance – Direct and Preventive Control .

UNIT III Engineering Ethics 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT IV Factors of Changes 9

Forces that shape culture, social control – Meaning, Agencies, Institution, Customs, Values, Folkways, Norms and Laws. Social changes – Meaning and nature – Theories.

UNIT V Entrepreneurship and Motivation 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth- Major Motives Influencing an Entrepreneur – Achievement

Motivation Training, self rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

Total Hours: 45

Text Books:

1. Mike Martin and Roland Schinzinger," Ethics in Engineering", McGraw-Hill, NewYork,2005
2. Govindarajan M, Natarajan S, Senthil Kumar V. S," Engineering Ethics", Prentice Hall of India, New Delhi,2011

References:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2012
2. Charles E Harris, Michael S. Protchard and Michael J Rabins," Engineering Ethics – Concepts
3. and Cases", Wadsworth Thompson Leatning, United States,2009
4. John R Boatright," Ethics and the Conduct of Business", Pearson Education, New Delhi,2010
5. Edmund G Seebauer and Robert L Barry," Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2008

Websites:

1. http://www.ubter.in/Curriculum/Mechanical/Document/sem6.pdf
2. http://www.foothill.edu/programs/programs.php?rec_id=769

15BECS702 **Web Technology**

COURSE OBJECTIVES:

- To learn the basic web concepts and Internet protocols.
- To understand CGI Concepts & CGI Programming.
- To familiarize with Scripting Languages.
- To study DHTML, XML, SERVELETS AND JSP.
- To explain how to create, install and update sophisticated web sites.
- Explain application of the computer systems and computer based data.

COURSE OUTCOMES:

- Demonstrate an understanding of the components of a computer information networked system, including application and software, communication protocols, and networking hardware and software.
- To understand CGI concepts and CGI programming
- Create, install and update sophisticated web sites.
- Install and manage server software and other server side tools.
- Demonstrate critical thinking in the understanding, evaluation and application of technology solutions to a variety of real-life situations.
- Articulate ethical and professional standards as they apply to the use of the computer systems and computer based data.

UNIT I Introduction **9**

Internet Principles – Basic Web Concepts – Client/Server model – retrieving data from Internet – HTML and Scripting Languages – Standard Generalized Mark –up languages – Next Generation – Internet – Protocols and Applications.

UNIT-IICommon gateway interface programming **9**

CGI Concepts – HTML tags Emulation – Server – Browser Communication – E-mail generation – CGI client Side applets – CGI server applets – authorization and security.

UNIT III Scripting languages **9**

HTML – forms – frames – tables – web page design- XML - JavaScript introduction – control structures – functions – arrays – objects – simple web applications

UNIT IV Dynamic HTML **9**

Dynamic HTML – introduction – cascading style sheets – object model and collections – event model – filters and transition – data binding – data control – ActiveX control – handling of multimedia data

UNIT V Servlets and JSP **9**

JSP Technology Introduction-JSP and Servelets- Running JSP Applications Basic JSP- JavaBeans Classes and JSP-Tag Libraries and Files- Support for the Model-View- Controller Paradigm- Case Study- Related Technologies.

Total Hours: 45+15=60

Text Books:

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition. (Ch-1,4,5,6,12,14,26,27)
2. Uttam K.Roy, "Web Technologies", Oxford University Press, 2011.

References:

1. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.(Ch- 1 to 11)
2. Paul Dietel and Harvey Deitel,"Java How to Program", Prentice Hall of India, 8th Edition.(Ch-29),2012
3. Mahesh P. Matha, "Core Java A Comprehensive study", Prentice Hall of India, 2011.
4. Thomno A. Powell," The Complete Reference HTML and XHTML", Tata McGraw Hill, 2008.

Websites:

1. www.wileyindia.com/web-technologies-html-javascript-php-java-jsp-xml
2. www.comptechdoc.org/independent/web/

L	T	P	C
3	1	0	4

L	T	P	C
3	0	0	3

15BECS703 **Open Source Software**

COURSE OBJECTIVES:

- To understand concepts, strategies, and methodologies related to open source software development.
- To understand the business, economy, societal and intellectual property issues of open source software.
- To familiarize with open source software products
- To discuss the development tools currently available on the market.
- To explain coding in PHP and MySQL
- Be able to utilize open source software for developing a variety of software applications, particularly Web applications.

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COURSE OUTCOMES:

- Understanding of the issues and currents in open source and open source development
- Having the ability to choose between the various open source licenses understanding the implications for users, developers, and the software community in general
- Able to develop projects in python
- Have a basic understanding of HTML5 and how to develop modern web enabled applications
- Able to develop projects in PHP and MySQL
- Write software that integrates and interacts with existing open source systems (e.g., Firefox). For example: add-ons; bug fixes; new features; etc.

UNIT I Introduction to OSS and Unix OS 9

Overview of Free/Open Source Software-- Definition of FOSS & GNU, Advantages of Free Software and GNU /Linux, FOSS usage , trends and potential - global and Indian. GNU/Linux OS installation-- detect hardware, configure disk partitions & file systems and install a GNU/Linux distribution ; Basic shell commands - logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management ; User and group management, file ownerships and permissions.

UNIT II Python Overview 9

History-Features-Setting up path-Working with Python- Basic Syntax- Variable and Data Types- Operator - Conditional Statements – Looping - Control Statements - String Manipulation – Lists – Tuple – Dictionaries – Functions – Modules - Input-Output - Exception Handling

UNIT III Python 9

Database – Introduction- Connections - Executing queries - Transactions - Handling error – Networking - Socket - Socket Module - Methods - Client and server -Internet modules – Multithreading- Thread - Starting a thread -Threading module -Synchronizing threads -Multithreaded Priority Queue

UNIT IVPHP 9

Introduction to PHP- Evaluation of Php -Basic Syntax -Defining variable and constant -Php Data type - Operator and Expression - Handling Html Form With Php - Decisions and loop –Function- Generating Images with PHP - Database Connectivity with MySql

UNIT V MYSQL 9

MySQL Database definition- Theory, Terminology and Concepts -Data Definition using MySQL - Basic Data Manipulation using MySQL - Advanced Data Manipulation using MySQL – Transactions - Import/Export

Total Hours: 45

Text Books:

1. Steve Suchring, “MySQL Bible”, John Wiley, 2002
2. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
3. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001

References:

1. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
2. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.

Websites:

1. php.net/manual/en/refs.webservice.php
2. php.net/docs.php
3. https://cloud.google.com/appengine/docs/python/
4. https://www.python.org/doc/
5. https://docs.python.org/3/library/
6. https://www.mysql.com/...mysql/.../mysql-reference-architectures-for-sca
7. dev.mysql.com/doc/en/
8. https://www.mysql.com/...mysql/.../mysql-web-reference-architectures-fo...

15BECS711	Open Source Software Lab	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- To understand concepts, strategies, and methodologies related to open source software development.
- To familiar with open source software products
- Explain various concepts of python
- Discuss programming in Php and mysql
- To discuss about the development tools currently available on the market.
- Be able to utilize open source software for developing a variety of software applications, particularly Web applications.

.

COURSE OUTCOMES:

- Having the ability to choose between the various open source licenses understanding the implications for users, developers, and the software community in general
- Able to develop projects in python
- Have a basic understanding of HTML5 and how to develop modern web enabled applications
- Able to develop projects in PHP and MySQL
- Write software that integrates and interacts with existing open source systems (e.g., Firefox). For example: add-ons; bug fixes; new features; etc.
- Able to utilize open source software for developing a variety of software application, particularly web applications

List of Experiments

1. Linux operating system installation
2. Working basic commands in Unix.
3. Simple programs to practice condition and input and output statements using Python.
4. Working with Strings in Python
5. Programming in python- program to perform functions in List & Tuple
6. Programming in python- working with Loops
7. Installation of Mysql and working with MySQL queries
8. Database connectivity with PhP and Mysql

Total Hours: 45

15BECS712	Web Technology Lab	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- To learn the basic web concepts and Internet protocols.
- To develop web page using HTML
- To familiarize with Scripting Languages.
- To study DHTML, XML, SERVELETS AND JSP.
- Create, install and update sophisticated web sites.
- Install and manage server software and other server side tools.

COURSE OUTCOMES:

- The students will be able to design Web pages using HTML/XML and style sheets
- Able to use XML to store and forwarding data.
- Students will find the ease of implementation of a website and the role of servlets in creating the dynamic websites
- The students will be able to write Client Server applications
- The students will be able to create dynamic web pages using server side scripting.
- Able to create a complete Web Application with all the required modules.

List of Experiments

1. Develop a web page using HTML with containing map with hot spots that hyperlinks to related information.
2. Develop a web page and use various CSS formatting options on the text.
3. Develop a web page and use external CSS formatting with different formatting options than the ones' used in the previous experiment.
4. Develop a XSL parser for an XML document for data display.
5. Using CSS to format an XML Document
6. Develop a mechanism to validate user input at the client side using JavaScript.
7. Program to set a cookie using JavaScript
8. Develop a computer program that utilizes Java Applet technology to demonstrate some functions.
9. Developing a Java Applet that utilizes the Sound function and is included in the HTML document
10. Develop a mini web application of your choosing.

Total Hours: 45

15BECS713 **Mobile Application Development Lab**

L	T	P	C
1	0	2	3

COURSE OBJECTIVES:

- Describe those aspects of mobile programming that make it unique from programming for other platforms,
- Explain installation and working of Android
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced phone features, and
- Deploy applications to the Android marketplace for distribution.

COURSE OUTCOMES:

- Ability to install Android in Eclipse
- Understanding of the Android environment to develop projects
- Ability to develop simple Android projects
- Understanding of the android widgets and inclusion of it in projects
- Ability to create android application for playing audio and video files
- Ability to deploy application to the android market place for distribution

List of Experiments

1. Installation of Android in eclipse and study of Android Development Tools, Components and Architecture.
2. Creating and Running Android Virtual Device (AVD)
3. Running Hello World Android Project
4. Working with different Android User Interface
5. A simple android application to study various android widgets like text box, buttons, toggle Buttons and Images
6. Working with Android Activity life cycle
7. Working with intents
8. Working with fragments
9. Working with TTS engine in Android
10. A simple android application for playing audio and video files

Total Hours: 45

COMPUTER SCIENCE AND ENGINEERING
DEPARTMENT ELECTIVE

15BECS5E01 **C++ Programming**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To arm the students with the basic programming concepts.
- To Introduce different techniques pertaining problem solving skills
- To arm the students with the necessary constructs of C++ programming.
- Explain various OOPs concepts
- Discuss various basic data structure concepts
- To emphasis on guided practical sessions

COURSE OUTCOMES:

- Articulate the principles of object-oriented problem solving and programming.
- Outline the essential features and elements of the C++ programming language.
- Explain programming fundamentals, including statement and control flow and recursion.
- Apply the concepts of class, method, constructor, instance
- Apply various oops concepts like data abstraction, Functionabstraction,inheritance,overriding,overloadingandpolymorphism in programs
- Program with basic data structures using array, list, and linked structures.

UNIT I Introduction to C++ **9**

Object Oriented Programming Paradigms - Comparison of Programming Paradigms – Object Oriented Languages - Benefits of Object Oriented Programming - Comparison with C - Overview of C++ -Pointers-References and Structures - Functions - Scope and Namespaces - Source Files and Programs.

UNIT II Classes and Objects **9**

Working with classes – Classes and objects – Class specification-Class objects-Accessing class members-Defining class members-Inline functions-Accessing member functions within class-Data hiding-Class member accessibility-Empty classes, constructors-Parameterized constructors-Constructor overloading-Copy constructors-new, delete operators-”this” pointer-friend classes and friend functions-Function overloading-Operator overloading.

UNIT III Derived Classes **9**

Base class and derived class relationship-Derived class declaration-Forms of inheritance-Inheritance and member accessibility- Constructors in derived class-Destructors in derived class-Multiple inheritance-Multi level inheritance-Hybrid inheritance-Virtual base classes-Member function overriding-Virtual functions.

UNIT IV I/O and Library Organization **9**

I/O Stream - File I/O - Exception Handling - Templates - STL – Library Organization and Containers – Standard Containers - Overview of Standard Algorithms-Iterators and Allocators.

UNIT V Object Oriented Design 9

Development Process – Management - Object Identification – Components - Object Oriented Design Fundamentals – Case Studies.

Total Hours: 45

Text Books:

1. Balagurusamy, ”Object Oriented Programming with C++”, Tata McGraw Hill,4th Edition,2010
2. Venu Gopal.K.R, Ravishankar.T, and Raj kumar, ”Mastering C++”, Tata McGraw Hill,2011.

References:

1. Bjarne Stroustrup, ”The C++ programming language”, Addision Wesley, 4th Edition,2013.
2. John R Hubbard, “Programming with C++”, Shaums Outline Series, McGraw Hill, 2nd edition,2000.
3. James Martin & James J.Odell,”Object Oriented methods-A foundation”,Prentice Hall,1997.
4. Grady Booch, “Object Oriented Analysis and Design with application”, Addission Wesley, 3rd Edition,2007

15BECS5E02 **Advanced Databases**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- Understand and describe current and emerging database models and technologies.
- Design and implement relational database solutions for general applications
- Develop database scripts for data manipulation and database administration.
- Understand and perform common database administration tasks, such as database monitoring, performance tuning, data transfer, and security.
- Explain various data mining, uncertainty data management, XML data.
- Understand the concepts and practices of data warehouse and OLAP

COURSE OUTCOMES:

- Able to understand the background and knowledge of some advanced topics in database that have become key techniques in modern database theory and practices;
- typical topics are distributed concurrency control, database recovery, query optimization, spatial databases.
- Able to understand the background and knowledge of some contemporary topics in database research;
- Implement applications on data mining, uncertainty data management, XML data.
- Able to understand the background and knowledge of some contemporary topics in information management,
- Able to understand typical topics like cloud computing, web information management, social network technology.

UNIT I Relational Model Issues **9**

ER Model – Normalization – Query processing – Query optimization – Transaction processing – Concurrency control – Recovery – Database tuning.

UNIT II Distributed Databases **9**

Parallel databases – Inter and intra query parallelism – Distributed database features – Distributed database architecture – Fragmentation – Distributed query processing – Distributed transactions processing – Concurrency control – Recovery – Commit protocols

UNIT III Object Oriented Databases **9**

Introduction to object oriented databases – Approaches – Modeling and design – Persistence – Query languages – Transaction – Concurrency – Multi version locks – Recovery – POSTGRES – JASMINE – GEMSTONE – ODMG model.

UNIT IV Emerging Systems **9**

Enhanced data models – Client/Server model – Data warehousing and data mining – Web databases – Mobile databases – XML and web databases.

UNIT V Current Issues **9**

Rules – Knowledge bases – Active and deductive databases – Multimedia databases – Multimedia data structures – Multimedia query languages – Spatial databases.

Total Hours: 45

Text Books:

1. Thomas Connolly and Carlolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Pearson Education 2009.

References:

1. R. Elmasri, S.B.Navathe, "Fundamentals of Database Systems", 6th Edition,Pearson Education, 2011.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th Edition, Tata McGraw Hill, 2010.
3. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

15BECS5E03 **Advanced Data Structures**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To extend the students' knowledge of algorithms and data structures
- To enhance theirexpertise in algorithmic analysis and algorithm design techniques.
- To explain in detail various non linear data structures like graphs and trees
- Expected to learn a variety of useful algorithms and techniques
- Able to apply those algorithms and techniques to solve problems
- To explain various concepts of time and space complexity of advanced data structures

COURSE OUTCOMES:

- Solve problems using the procedural, functional, and object-orientedprogrammingparadigms.
- Relates all binary heap trees to form a large binomial queue for large data structures creation.
- Analyze how to balance a binary search tree using rotation methods and color changing methods
- Solve problems using graph algorithms, including single-source and all-pairs shortest paths, and minimum spanning tree algorithms.
- Analyze the time and space complexity of advanced data structures and their supported operations
- Compare the time and space tradeoff of different advanced data structures and their common operations

UNIT I **Fundamentals** **9**

Asymptotic Notations – Properties of Big-oh Notation –Conditional Asymptotic Notation – Algorithm Analysis – A006Dortized Analysis – Introduction to NP-Completeness/NP-Hard – Recurrence Equations – Solving Recurrence Equations

UNIT II

Heap Structures

9

Priority Queues-Min/Max heaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – lazy Binomial Heaps.

UNIT III Trees **9**

Counting Binary Trees-Huffman coding – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees – Tries.

UNIT IV Set & Graph Algorithms **9**

Set ADT- Union & Find data structure and Applications- Graph traversals-DFS, BFS, Bi connected components, Cut vertices, Graph Matching, Network flow Problems

UNIT V Geometric Algorithms **9**

Segment Trees – 1-Dimensional Range Searching - k-d Trees – Line Segment Intersection – Convex Hulls - Computing the Overlay of Two Subdivisions - Range Trees – Voronoi Diagram.

Total Hours: 45

Text Books:

1. T. Cormen, C. Leiserson, R. Rivest, C. Stein, Introduction to Algorithms, Prentice-Hall India, 2009.
2. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Fundamentals of Data Structures in C, Second Edition, University Press, 2008

References:

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structures using C and C++, Second Edition, PHI Learning Private Limited, 2010
2. Anany Levitin, Introduction to The Design & Analysis of Algorithms, Pearson Education, 3rd Edition, New Delhi, 2014.
3. Aho Hopcroft and Ullman, "Data Structures and Algorithms, Pearson Education, 4th Edition,2009.

15BECS5E04 Advanced Computer Architecture L T P C
3 0 0 3

COURSE OBJECTIVES:

- To do an advanced study of the Instruction Set Architecture, Instruction Level Parallelism with hardware and software approaches, Memory and I/O systems and different multiprocessor architectures with an analysis of their performance
- To study the ISA design, instruction pipelining and performance related issues.
- To do a detailed study of ILP with dynamic approaches.
- To do a detailed study of ILP with software approaches.
- To study the different multiprocessor architectures and related issues.
- To study the Memory and I/O systems and their performance issues.

COURSE OUTCOMES:

Upon the completion of the course the student is able to:

- Design the application of computer architecture
- Construct application specific solutions in the field of Pipelining and ILP
- Appreciate that the solution to any problem in computer architecture
- Able to quickly invalidated by time
- Strive for solutions that minimize the effects of this reality
- Develop confidence in specifying computational requirements and formulating original solutions in a timely manner.

UNIT I Pipelining and ILP 9

Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level Parallelism and Its Exploitation - Concepts and Challenges - Overcoming Data Hazards with Dynamic Scheduling – Dynamic Branch Prediction - Speculation - Multiple Issue Processors – Case Studies.

UNIT II Advanced Techniques for Exploiting ILP 9

Compiler Techniques for Exposing ILP - Limitations on ILP for Realizable Processors - Hardware versus Software Speculation - Multithreading: Using ILP Support to Exploit Thread-level Parallelism - Performance and Efficiency in Advanced Multiple Issue Processors - Case Studies.

UNIT III Multiprocessors 9

Symmetric and distributed shared memory architectures – Cache coherence issues - Performance Issues – Synchronization issues – Models of Memory Consistency - Interconnection networks – Buses, crossbar and multi-stage switches.

UNIT IV Multi-Core Architectures 9

Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture – IBM cell architecture.- hp architecture.

UNIT V Memory Hierarchy Design **9**

Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations - Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.

Total Hours: 45

Text books:

1. John L. Hennessey and David A. Patterson, Computer Architecture A Quantitative Approach, Morgan Kaufmann, New York 2006

References:

1. Sima D, Fountain.T, and Kacsuk.P, Advanced Computer Architectures A Design Space Approach, Addison Wesley, New York. 2005
2. Kai Hwang, Advanced computer architecture Parallelism Scalability Programmability, Tata McGraw Hill, New Delhi2004
3. Vincent P.Heuring, Harry F.Jordan, Computer System Design and Architecture, Addison Wesley, New York. 2008
4. William Stallings, Computer Organization and Architecture – Designing for Performance, Pearson Education, Seventh Edition 2006

15BECS6E01	Network Security	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Discuss aboutEncryption techniques and key generation techniques
- Study about Public key encryption
- Describe various authentication and security measures
- Describe various security practices
- Discuss various concepts of system security
- Detailed description to be given on intrusion and filtering analysis

COURSE OUTCOMES:

The main goal of the course is for students to:

- Identify some of the factors driving the need for network security.
- Identify and classify particular examples of attacks.
- Identify physical points of vulnerability in simple networks.
- Describe methods of providing assurances about data integrity.
- Describe and distinguish between different mechanisms to assure the freshness of a message.
- Discuss the effectiveness of passwords in access control and the influence of human behavior.

UNIT I Conventional and Modern Encryption 9

Model of network security – Security attacks, services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher Principles- DES – Strength of DES - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC5 - Differential and linear crypto analysis – Placement of encryption function – traffic confidentiality

UNIT II Public Key Encryption 9

Number Theory – Prime number – Modular arithmetic – Euclid's algorithm – Fermet's and Euler's theorem – Primality – Chinese remainder theorem – Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography

UNIT III Authentication 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – MD5 – SHA - HMAC – Digital signature and authentication protocols – DSS

UNIT IV Security Practice 9

Authentication applications – Kerberos – X.509 Authentication services - E-mail security – IP security - Web security

UNIT V System Security 9

Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security

Total Hours: 45

Text Books:

1. William Stallings, “Cryptography & Network Security”, Pearson Education, 4th Edition 2010.

References:

1. Charlie Kaufman, Radia Perlman, Mike Speciner, “ Network Security, Private communication in public world” PHI 2nd edition 2002
2. Bruce Schneier, Neils Ferguson, “Practical Cryptography”, Wiley Dreamtech India Pvt Ltd, 2003
3. Douglas R Simson “Cryptography – Theory and practice”, CRC Press 1995

15BECS6E02	Distributed Computing	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts in distributing computing in operating systems
- To discuss various issues related to designing distributed system
- To study concepts of remote procedure calls
- To learn basic architecture and other details of distributed shared memory
- To enable the students to understand synchronization and management of distributed systems
- To make the students to get idea of files systems in distributed computing

COURSE OUTCOMES:

The main goal of the course is for students to:

- Identify the differences among: concurrent, networked, distributed, and mobile computing
- Able to understand all concepts on remote procedure calls
- Understand Resource allocation and deadlock detection and avoidance techniques.
- Analyze distributed shared memory
- Understand IPC mechanisms in distributed systems.
- Design and build newer distributed file systems for any OS.

UNIT I Fundamentals **9**

What is distributed computing systems – Evolution of distributed computing systems – Distributed computing system models – What is distributed operating system – Issues in designing distributed operating systems. Message passing – Features of a good message-passing system – Issues in IPC by message passing – Synchronization –Buffering – Multidatagram messages – Encoding and decoding of message data – Failure handling – Group communication.

UNIT II Remote Procedure Calls **9**

RPC Models –Transparency of RPC – Implementing RPC mechanism – Stub generation – RPC messages –Marshaling arguments & results – Server Management – Parameter-passing semantics – Call semantics – Communication protocols for RPCs – Complicated RPCs – Client server binding – Security – Special types of RPCs – Light weight RPC.

UNIT III Distributed Shared Memory **9**

General architecture of DSM systems – Design & implementation issues of DSM – Granularity – Structure of shared memory space – Consistency models – Replacement strategy – Thrasing – Hetrogenous DSM – Advantages of DSM.

UNIT IV Synchronization and Management **9**

Synchronization – Clock synchronization – Mutual exclusion – Election algorithms – Deadlocks.- Resource Management – Task assignment approach – Load balancing approach – Load sharing approach - Process Management – Process migration – Threads.

UNIT V Distributed File Systems **9**

Desirable features of a good distributed file system – File models – File accessing models – File sharing semantics – File caching schemes – File replications – Fault tolerance – Atomic transaction.

Total Hours: 45

Text Books:

1. Andrew S.Tanenbaum, and Steen, Maarten van, “Distributed Systems”, 2nd Edition, Prentice Hall of India, 2007

References:

1. Pradeep K Sinha, ”Distributed Operating Systems, Concepts & Design”, Prentice Hall of India, 2009.
2. Andrew S.Tanenbaum, ”Distributed Operating Systems”, Prentice Hall of India, 2005.

15BECS6E03 **C# and .NET**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To explain the fundamental concepts of the C# language and the .NET framework.
- To discuss the various types of Assemblies present
- To learn about server object types
- Learn about interfaces and collections in C# and .NET
- Learn basic concepts about IO Namespace and ADO .NET
- Learn about ASP.net and various web services which can be developed using it

COURSE OUTCOMES:

The main goal of the course is for students able to:

- Write clear and effective C# code and .Net.
- Gained knowledge about various types of Assemblies present and server objects
- Understood concepts of interface and collections in C# and .NET
- Develop web applications using ASP.NET Web Forms.
- Develop and use various ASP.NET Web Services.
- The student will gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the framework.

UNIT I Introduction **9**

Overview of .NET – Advantages of .NET over the other languages – Overview of .NET binaries – Intermediate Language – Metadata – .NET Namespaces – Common language runtime – Common type system – Common language specification – C# fundamentals – C# class – object – string formatting – Types – scope – Constants – C# iteration – Control flow – Operators – Array – String – Enumerations – Structures – Custom namespaces – Object oriented programming concepts –Class – Encapsulation – Inheritance – Polymorphic – Casting.

UNIT II Assemblies **9**

Assemblies – Versioning – Attributes – Reflection – Viewing metadata – Type discovery – Reflecting on a type –Marshaling – Remoting – Understanding server object types – Specifying a server with an interface – Building a server – Building the client – Exception handling – Garbage collector.

UNIT III Interfaces and Collections **9**

Interfaces and collections – Enumerator – Cloneable objects – Comparable objects – Collections – Indexes – Delegates – Events – Multithreaded programming. Programming with windows form controls – Windows form control Hierarchy – Adding controls – TextBox – CheckBoxes – RadioButtons – GroupBoxes – ListBoxes – ComboBoxes – TrackBar – Calender – Spin Control – Panel – ToolTips –ErrorProvider – Dialog Boxes.

UNIT IVIO Namespace and ADO .NET **9**

Input and output – Introduction to System. IO .namespace – File and folder operations – Stream class – Introduction to ADO .NET – Building data table – Data view – Data set – Data relations – ADO.NET managed providers – OleDb managed provider – SQL.

UNIT V ASP .NET and Web Services 9

Web development and ASP.NET – Web applications and web servers – HTML form development – Client side scripting – GET and POST – ASP.NET application – ASP.NET namespaces – creating sample C# web Applications. Understanding Web Security – Windows authentication – Forms authentication – Web services – Web services – Web service clients – The City View application.

Total Hours: 45

Text Books:

1. Andrew Troelsen, "C# and the .NET Platform", A! Press, 6th edition, 2012.

References:

1. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 3rd edition,2008.

15BECS6E04 **Analog and Digital Communication** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- Apply analog and digital communication techniques.
- Learn data and pulse communication techniques.
- Be familiarized with source and Error control coding.
- Gain knowledge on multi-user radio communication.
- Use data and pulse communication techniques.
- Utilize multi-user radio communication.

COURSE OUTCOMES:

- Demonstrate about various blocks in communication system.
- Student is able to differentiate between analog and digital communication concepts
- Analyze the types of modulations.
- Analyze and design the analog modulator and demodulator circuits.
- Learnt details related to source and error coding
- Analyze All Modulation techniques in time and frequency domains.

UNIT I Analog Communication **9**

Source of Noise - External Noise - Internal Noise- Noise Calculation. Introduction to Communication Systems: Modulation – Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation – Comparison of various Analog Communication System (AM – FM – PM).

UNIT II Digital Communication **9**

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) – Phase Shift Keying (PSK) – BPSK – QPSK – 8 PSK – 16 PSK - Quadrature Amplitude Modulation (QAM) – 8 QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

UNIT III Data and Pulse Communication **9**

Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques - Data communication Hardware - serial and parallel interfaces. Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM – PCM)

UNIT IV Source and Error Control Coding **9**

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm

UNIT V Multi-User Radio Communication **9**

Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) - Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Hand off - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.

Total Hours: 45

Text Books:

1. Wayne Tomasi, “Advanced Electronic Communication Systems”, 6th Edition, Pearson Education, 2013.
2. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley & Sons, 2010.

References:

1. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2010.
2. H.Taub, D L Schilling and G Saha,”Principles of Communication”, 3 rd Edition, Pearson Education, 2007.
3. B.P.Lathi, “Modern Analog and Digital Communication Systems”, 3 rd Edition, Oxford University Press, 4th edition, 2010.
4. Blake, “Electronic Communication Systems”, Thomson Delmar Publications, 2002.

15BECS6E05 **Network Routing Algorithms**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn the basic concepts of Network Routing Algorithms
- To create in-depth awareness of packet routing in computer communication networks
- To provide comprehensive details of routing algorithms and protocols
- To describe the architectures of routers followed by the concepts of MPLS towards the next generation routing
- To study various mobile IP networks concept
- To study concept of mobile Ad-Hoc networks

COURSE OUTCOMES:

- To be able to explain basic network routing concepts and algorithms
- To be able to explain how the Internet protocol suite operates
- To be able to classify the functions of various RWA algorithms
- To be able to understand concepts of Mobile IP networks
- To be able to classify the Mobile Ad –Hoc Networks
- To be able to explain the concept and usage of node addressing classify addresses into network layers

UNIT I Introduction **7**

ISO OSI Layer Architecture, TCP/IP Layer Architecture, Functions of Network layer, General Classification of routing, Routing in telephone networks, Dynamic Non hierarchical Routing (DNHR), Trunk status map routing (TSMR), real-time network routing (RTNR), Distance vector routing, Link staterouting, Hierarchical routing.

UNIT II Internet Routing **10**

Interior protocol : Routing Information Protocol (RIP), Open Shortest Path First(OSPF), Bellman Ford Distance Vector Routing. Exterior Routing Protocols: Exterior Gateway Protocol (EGP) and Border Gateway Protocol (BGP). Multicast Routing: Pros and cons of Multicast and Multiple Unicast Routing, Distance Vector Multicast Routing Protocol (DVMRP), Multicast Open Shortest Path First (MOSPF), MBONE, Core Based Tree Routing.

UNIT III Routing In Optical Wdm Networks **10**

Classification of RWA algorithms, RWA algorithms, Fairness and Admission Control, Distributed Control Protocols, Permanent Routing and Wavelength Requirements,Wavelength Rerouting-Benefits and Issues, Lightpath Migration, Rerouting Schemes, Algorithms- AG, MWPG.

UNIT IV Mobile - IP Networks **9**

Macro-mobility Protocols, Micro-mobility protocol:Tunnel based : Hierarchical Mobile IP, Intra domain Mobility Management, Routing based: Cellular IP, Handoff Wireless Access Internet Infrastructure (HAWAII).

UNIT V Mobile Ad –Hoc Networks 9

Internet-based mobile ad-hoc networking communication strategies, Routing algorithms – Proactive routing: destination sequenced Distance Vector Routing (DSDV), Reactive routing: Dynamic Source Routing (DSR), Ad hoc On-Demand Distance Vector Routing (AODV), Hybrid Routing: Zone Based Routing (ZRP).

Total Hours: 45

Text Books:

1. William Stallings, „High speed networks and Internets Performance and Quality of Service", 2nd Edition, Pearson Education Asia. Reprint India 2002
2. M. Steen Strub, „Routing in Communication network, Prentice –Hall International, Newyork, 1995.

References:

1. S. Keshav, „An engineering approach to computer networking" Addison Wesley 1999.
2. William Stallings, „High speed Networks TCP/IP and ATM Design Principles, Prentice-Hall, New York, 1995
3. C.E Perkins, „Ad Hoc Networking", Addison – Wesley, 2001
4. Ian F. Akyildiz, Jiang Xie and Shantidev Mohanty, "A Survey of mobility Management in Next generation-All IP- Based Wireless Systems", IEEE Wireless Communications Aug.2004, pp 16-27.
5. A.T Campbell et al., "Comparison of IP Micro mobility Protocols," IEEE Wireless Communications Feb.2002, pp 72-82.
6. C.Siva Rama Murthy and Mohan Gurusamy, " WDM Optical Networks – Concepts, Design and Algorithms", Prentice Hall of India Pvt. Ltd, New Delhi –2002.

15BECS6E06	Data Mining and Data Warehousing	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To serve as an introductory course to under graduate students with an emphasis on the design aspects of Data Mining and Data Warehousing
- To introduce the concept of data mining with in detail coverage of basic tasks, metrics, issues,
- Core topics like classification, clustering and association rules are exhaustively dealt with.
- To introduce the concept of data warehousing with special emphasis on architecture and design.
- Various association rules are to be discussed
- Discuss recent trends in data mining

COURSE OUTCOMES:

- Understand why there is a need for data warehouse in addition to traditional operational database system
- Identify components in typical data warehouse architectures
- Understand why there is a need for data mining and in what ways it is different from Traditionalstatisticaltechniques
- Understand the details of different algorithms
- Solve real data mining problems to find interesting patterns
- Understand a typical knowledge discovery process

UNIT- I Introduction and Data Warehousing 9

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining

UNIT- II Data Preprocessing, Language, Architectures, Concept Description 9

Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

UNIT- III Association Rules 9

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases

UNIT- IV Classification And Clustering 9

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.

UNIT- V Recent Trends 9

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining

Total Hours: 45

Text Books:

1. J. Han, M. Kamber, Data Mining: Concepts and Techniques, Harcourt India / Morgan Kauffman, 3rd edition,2011.
2. Sam Anahory, Dennis Murry , Data Warehousing in the real world, Pearson Education, 2007

References:

1. Margaret H.Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education 2006
2. David Hand, Heikki Manila, Padhraic Symth, Principles of Data Mining, PHI 2004
3. W.H.Inmon, Building the Data Warehouse, Wiley 2005.

15BECS6E07 **User Interface Design**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To study the concept of menus, windows, interfaces.
- To study the characteristics and components of windows.
- To study the various controls for the windows.
- To study about various problems in windows design with color, text, graphics
- To implement the basics and in-depth knowledge about UID.
- To enable the students to take up the design the user interface, design, menu
- creation and windows creation andconnection between menu and windows

.

COURSE OUTCOMES:

- Able to understand all the concept of Human Computer Interface
- To demonstrate knowledge of some theories of user interface design
- To demonstrate knowledge of different interaction controls
- To be able to analyze a user interface from a communication perspective
- To demonstrate an awareness of the relation between interaction design and users expectations
- Develop Web page using User Interface

UNIT- I Introduction **9**

Introduction- Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles.

UNIT- II UI Design Process **9**

User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.

UNIT- III UI Controls **9**

Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

UNIT- IV Web Page Designing **9**

Text for web pages - effective feedback-guidance & assistance-Internationalization-aaccessibility-Icons-Image-Multimedia -coloring.

UNIT- V UI Tests **9**

Windows layout-test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

Total Hours: 45

Text Books:

1. Wilbent. O. Galitz, The Essential Guide to User Interface Design, John Wiley& Sons, 2007

References:

1. Ben Sheiderman, Design the User Interface, Pearson Education, 5th edition,2010
2. Alan Cooper, The Essential of User Interface Design, Wiley – Dream Tech Ltd,2002

15BECS6E08	Visual Programming	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students to understand the windows programming concepts including Microsoft Foundation Classes
- To introduce the concepts of windows programming
- To introduce GUI programming using Microsoft Foundation Classes
- To enable the students to develop programs and simple applications using Visual C++
- Identify and use the features of a Visual Basic (VB) development environment.
- Locate, resolve, and handle various types of programming errors.

COURSE OUTCOMES:

- Students are able to use the different elements of a visual programming language as building blocksto perform programming in Windows
- Able to understand the overview of Unicode
- Able to develop correct and coherent programs in Visual C++
- Analyze problems, develop conceptual designs that solve those problems, and transform those designs to Visual Programs.
- Program using the fundamental software development process, including design, coding, documentation, testing, and debugging.
- Perform Activex and object linking, embedding and advanced concepts in Windows.

UNIT I Windows Programming 9

Windows environment – a simple windows program – windows and messages – creating the window – displaying the window – message loop – the window procedure – message processing – text output – painting and repainting – introduction to GDI – device context – basic drawing – child window controls-An introduction to Unicode-An architectural overview-processing the messages

UNIT II Visual C++ Programming – Introduction 9

Application Framework – MFC library – Visual C++ Components – Event Handling – Mapping modes – colors – fonts – modal and modeless dialog – windows common controls – bitmaps-Overview of MFC programming ,Class hierarchy simple graphics programs-Creating frame windows

UNIT III The Document And View Architecture 9

Menus – Keyboard accelerators – rich edit control – toolbars – status bars – reusable frame window base class – separating document from its view – reading and writing SDI and MDI documents – splitter window and multiple views – creating DLLs – dialog based applications-Virtual key code,CTOOLBar class ,RC files

UNIT IV Activex And Object Linking And Embedding (OLE) 9

ActiveX controls Vs. Ordinary Windows Controls – Installing ActiveX controls – Calendar Control – ActiveX control container programming – create ActiveX control at runtime – Component Object

Model (COM) – containment and aggregation Vs. inheritance – OLE drag and drop – OLE embedded component and containers –Dialogue based applications –Writing simple dialog based programs

UNIT V Advanced Concepts 9

Database Management with Microsoft ODBC – Structured Query Language – MFC ODBC classes – sample database applications – filter and sort strings – DAO concepts – displaying database records in scrolling view – Threading –Connecting visual C++ programs to remote database,M-strsort,M-strfilter variables

Total hours:45

Text Books:

1. Steve Holtzner, Visual C++ Programming, Wiley Dreamtech India Pvt. Ltd. 2003

References:

1. Charles Petzold , Windows Programming, Microsoft press 2010
2. David J.Kruglinski, George Shepherd and Scot Wingo, Programming Visual C++ , Microsoft press 2003

15BECS7E01	Ad-Hoc Network	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Gives an introduction to Ad-Hoc Wireless Networks, Issues, and Classification of MAC Protocols.
- Describes different types of Ad-Hoc Routing Protocols and TCP over Ad-Hoc Protocol.
- Provides in-depth knowledge about Sensor Network Architecture, its Applications and MAC Protocols for sensor networks.
- Different Issues in Wireless Sensor Routing are discussed.
- Discusses Indoor and outdoor Localization and Quality of Service in WSN.
- Emphasizes necessity for Mesh Networks , IEEE 802.11s Architecture and different types of Mesh Networks

COURSE OUTCOMES:

- Identify the basic problems, limitations, strengths and current trends of mobile computing
- Able to explain the current wireless networking mechanisms for mobile computing
- Able to explain concepts related to WSN-MAC
- Analyse and critique the routing, localization and QOS performance of different networks and algorithms for WSN
- Develop an attitude to propose solutions with comparisons for problems related to mobile computing through investigation of different protocols and mobile/wireless networks
- Illustrate the various concepts of mesh networks

UNIT I Ad-Hoc MAC **9**

Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

UNIT II Ad-Hoc Network Routing & TCP **9**

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-Bus, Ad Hoc TCP, and Split TCP.

UNIT III WSN –MAC **9**

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT IVWSN Routing, Localization & QOS **9**

Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

UNIT V Mesh Networks **9**

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

Total Hours: 45

Text Books:

1. C.Siva Ram Murthy and B.Smanoj, " Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2011.

References:

1. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.
2. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
3. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O"Reilly Publishers, 2007

15BECS7E02 **Cloud Computing**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To analyze the components of cloud computing and its business perspective.
- To understand the basics of cloud computing concepts
- To evaluate the various cloud development tools.
- To collaborate with real time cloud services and file system
- To analyze the need for virtualization and ways in which we can perform virtualization
- To understand the security, standards and various applications of cloud computing

COURSE OUTCOMES:

- Able to understand the basic concepts of cloud computing
- Understand and appreciate the technological impact of service and file systems
- Analyze cloud computing forfuture enterprises, and the technologies underpinning it.
- Apply systematic and principled practices to designing, implementing and deploying serviceandcloud-orientedcomputing.
- Review and assess the risks, opportunities, costs and steps towards migrating existing systems to service and cloud computing.
- Developing cloud computing for real time applications

UNIT- I Cloud Introduction **9**

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus – Open Nebula, CloudSim.

UNIT-II Cloud Services and File System **9**

Types of Cloud services**:** Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers - Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT-III Collaborating with Cloud **9**

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

UNIT-IV Virtualization for Cloud **9**

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT-V Security, Standards, and Applications 9

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Total Hours: 45

Text Books:

1. John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press, 2010.

References:

2. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing for Dummies" (Wiley India Edition), 2010.
3. Antohy T Velte , Cloud Computing : "A Practical Approach", McGraw Hill,2009.
4. Michael Miller, Cloud Computing: "Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.
5. James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers, 2006.

15BECS7E03 **Artificial Intelligence** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- Explain the basic concepts of Artificial Intelligence and its problem solving capacity
- Artificial Intelligence aims at developing computer applications, which encompasses perception, reasoning and learning
- To provide an in-depth understanding of major techniques usedto simulate intelligence.
- To provide a strong foundation of fundamental concepts in Artificial Intelligence
- To provide a basic exposition to the goals and methods of Artificial Intelligence
- To enable the student to apply these techniques in applications which involve perception, reasoning and learning.

COURSE OUTCOMES:

- Understand the history, development and various applications of artificial intelligence
- Familiarize with propositional and predicate logic and their roles in logic programming;
- Understand the programming language Prolog and write programs in declarative programming style;
- Learn the knowledge representation and reasoning techniques in rule-based systems, case based systems, and model-based systems;
- Appreciate how uncertainty is being tackled in the knowledge representation and reasoning process, in particular,
- Interpreted the techniques based on probability theory and possibility theory (fuzzy logic);

UNIT I Introduction and Problem Solving 9

Introduction – Foundations of AI – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies – Breadth first search – Uniform cost search – Depth first search –Depth limited search – Bidirectional search – Searching with partial Information.

UNIT II Informed Search and Game Playing 9

Informed search – Strategies – A* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm – Optimal decisions in games - Pruning- Imperfect decisions –Alpha-Beta pruning – Games that include an element of chance.

UNIT III Knowledge and Reasoning 9

Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules – First-orderlogic – Syntax and semantics – Situation calculus – Buliding a knowledge base – Electronic circuit domain – Ontology– Forward and backward chaining – Resolution – Truth maintenance system.

UNIT IV Acting Logically 9

Planning – Representation of planning – Partial order planning –Planning and acting in real world – Acting under uncertainty – Bayes‟s rules – Semantics of Belief networks – Inference in Belief networks – Making simple decisions – Making complex decisions.

UNIT V Learning and Communication 9

Learning from observation – Learning decision trees –Ensemble learning – Learning general logical descriptions – Computational learning theory – Neural networks – Applications – Reinforcement learning – Passive reinforcement– Active reinforcement – Communication as action – Types of communicating agents – Parsing – DCG – Semantic interpretation.

Total hours:45

Text Books:

1. Stuart J.Russel, Peter Norvig, “Artificial Intelligence A Modern Approach”, Pearson Education, 2010.

References:

1. Elaine Rich, Kevin Knight, “Artifical Intelligence", 2nd Edition, Tata McGraw Hill, 2001.

15BECS7E04	Software Testing	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make students understand the principles of software testing
- To explain the basics of software testing
- To highlight the strategies for software testing
- To stress the need and conduct of testing levels
- To identify the issues in testing management
- To bring out the ways and means of controlling and monitoring testing activity

COURSE OUTCOMES:

- Understand and apply the principal approaches to software testing, together with their associated techniques.
- Plan, analyze, design, implement, execute and evaluate the testing of a software component or system intended to implement a given software specification.
- Apply test automation techniques and testing tools in support of test execution andevaluation.
- Apply appropriate international standards for test documentation
- Able to perform various types of test management
- .Defining various terms and controlling and monitoring various data software testing

UNIT- I Introduction **9**

Testing as an Engineering Activity- Role of Process in Software Quality-Testing as a Process-Basic Definitions- Software Testing Principles- The Tester's Role in a Software Development Organization-Origins of Defects- Defect Classes- The Defect Repository and Test Design- Defect Examples-Developer/Tester Support for Developing a Defect Repository

UNIT -II Test Case Design **9**

Introduction to Testing Design Strategies, The Smarter Tester- Test Case Design Strategies-Using Black Box Approach to Test Case Design- Random Testing- Equivalence Class Partitioning, Boundary Value Analysis- Other Black-box Test Design Approaches- Black-box testing and COTS-Using White-Box Approach to Test design- Test Adequacy Criteria-Coverage and Control Flow Graphs- Covering Code Logic- Paths:Their Role in White-box Based Test Design- Additional White Box Test Design Approaches- Evaluating Test Adequacy Criteria

UNIT-III Levels of Testing **9**

The Need for Levels of Testing- Unit Test- Unit Test Planning- Designing the Unit Tests- The Class as a Testable Unit- The Test Harness- Running the Unit tests and Recording results-Integration tests-Designing Integration Tests- Integration Test Planning- System Test – The Different Types-Regression Testing- Alpha- Beta and Acceptance Tests

UNIT- IV Test Management **9**

Introductory Concepts- Testing and Debugging Goals and Policies- Test Planning- Test Plan Components-Test Plan Attachments- Locating Test Items-Reporting Test Results- The role of three groups in Test Planning and Policy Development- Process and the Engineering Disciplines-Introducing the test specialist- Skills needed by a test specialist- Building a Testing Group

UNIT- V Controlling and Monitoring 9

Defining Terms-Measurements and Milestones for Controlling and Monitoring- Status Meetings-Reports and Control Issues- Criteria for Test Completion- SCM- Types of reviews-Developing a review program-Components of Review Plans- Reporting review results

Total Hours: 45

Text Books:

1. Elfriede Dustin, “Effective Software Testing”, Pearson Education New Delhi, 2003
2. Renu Rajani and Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw-Hill, New Delhi, 2003

References:

1. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, Chennai, 2010.
2. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education, New Delhi, 2000

15BECS8E01	Managing Big Data	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- Explain basic concepts in Hadoop
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

Intended Outcomes

- Understanding of Big Data and Hadoop ecosystem
- Understanding fundamentals of Hadoop ecosystem and NoSQL technologies
- Working with Hadoop Distributed File System (HDFS)
- Ability to write MapReduce programs and implementing HBase
- Ability to write Hive and Pig scripts
- Able to perform Big Data Analysis in Hadoop environment

UNIT I Introduction to Big Data 8

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

UNIT II Mining Data Streams 9

Introduction To Streams Concepts –Stream Data Model and Architecture -Stream Computing -Sampling Data in a Stream –Filtering Streams –Counting Distinct Elements in a Stream –Estimating Moments –Counting Oneness in a Window –Decaying Window -Real time Analytics Platform(RTAP)Applications -Case Studies -Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III Hadoop 10

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

UNIT IV Hadoop Environment 9

Setting up a Hadoop Cluster -Cluster specification -Cluster Setup and Installation –Hadoop Configuration-Security in Hadoop -Administering Hadoop –HDFS -Monitoring-Maintenance-Hadoop bench marks-Hadoop in the cloud

UNIT V Frameworks 9

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

Total Hours: 45

Text Books:

1. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoopand Streaming Data, Tata McGraw Hill Publications, 2011
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing,2012

References:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Tom White, " Hadoop: The Definitive Guide", Third Edition, O"reilly Media, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", JohnWiley & sons, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
5. PeteWarden, "Big Data Glossary", O"Reilly, 2011.
6. Paul Zikopoulos ,Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles David Corrigan , Harness the Power of Big Data -The IBM Big Data Platform, Tata McGraw HillPublications, 2012
7. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, BigAnalytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses,WileyPublications,2013

15BECS8E02	Wireless Sensor Networks	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the concepts of sensor networks
- To learn how to program sensor motes
- Explain Communication Characteristics and Deployment Mechanisms in networks
- Study basic concepts of Mac Layer Network Layer and Transport Layer
- To understand the challenging issues in each layer of sensor networks
- Discuss in detail about Middleware and Security Issues

COURSE OUTCOMES:

- Able to understand concepts of Sensor Networks in detail
- Apply deployment in various networks and analyse the communication aspects
- Apply knowledge of wireless sensor networks to various application areas.
- Ability to Design, implement and maintain wireless sensor networks.
- Ability to formulate and solve problems creatively.
- Understood various middleware and security issues

UNIT I Fundamentals of Sensor Networks 9

Introduction and Overview - Overview of sensor network protocols, architecture, and applications, Challenges, Main features of WSNs; Research issues and trends, Platforms-Standards and specifications-IEEE802.15.4/Zigbee, Hardware: Telosb, Micaz motes ,Software: Overview of Embedded operating systems-Tiny OS, Introduction to Simulation tools- TOSSIM, OPNET, Ns-2.

UNIT II Communication Characteristics and Deployment Mechanisms 9

Wireless Communication characteristics - Link quality, fading effects, Shadowing, Localization, Connectivity and Topology - Sensor deployment mechanisms, Coverage issues, Node discovery protocols.

UNIT III Mac Layer 9

Fundamentals of Medium access protocol- Medium access layer protocols - Energy efficiency, Power allocation and Medium access control issues.

UNIT IV Network Layer and Transport Layer 9

Network layer protocols-Data dissemination and processing, multichip and cluster based routing protocols- Energy efficient routing- Geographic routing, Transport layer- Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V Middleware and Security Issues 9

Middleware and Application layer -Data dissemination, Data storage, Query processing, Security - Privacy issues, Attacks and Countermeasures

Total Hours :45

Text Books:

1. Waltenegus Dargie, Christian Poellabauer , "Fundamentals of Wireless Sensor Networks, Theory and Practice", Wiley Series on wireless Communication and Mobile Computing, 2010.
2. Kazem Sohraby, Daniel manoli , "Wireless Sensor networks- Technology, Protocols and Applications", Wiley InderScience Publications, 2010.

References:

1. Bhaskar Krishnamachari , " Networking Wireless Sensors", Cambridge University Press, 2011.
2. C.S Raghavendra, Krishna M.Sivalingam, Taieb znati , "Wireless Sensor Networks", Springer Science, 2006.

15BECS8E03	Human Computer Interaction	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Discuss the contributions of human factors and technical constraints on human-computer
- Explain the role of current HCI theories in the design of software.
- Apply HCI techniques and methods to the design of software.
- Categorize and carefully differentiate various aspects of multimedia interfaces.
- Design and develop issues related to HCI for real application.
- Explain the overall process of HCI developing and testing

COURSE OUTCOMES:

- Understand key aspects of human psychology which can determine user actions at and satisfaction of the interface.
- Describe the key design principles for user interfaces.
- Set up and carry out a process to gather requirements for, engage in iterative design
- Evaluate the usability of an user interface.
- Describe how user interface development can be integrated into an overall software development process.
- Understanding of the ethical issues involved in design and testing user interfaces.

UNIT I Design Process **9**

Humans – Information Process – Computer – Information Process – Differences and Similarities – Need for Interaction – Models – Ergonomics – Style – Context – Paradigms – Designing of Interactive Systems – Usability – Paradigm shift – Interaction Design Basics – Design Process – Scenarios – Users Need –Complexity of Design

UNIT II Design and Evaluation of Interactive Systems **9**

Software Process – Usability Engineering – Issue based Information Systems – Iterative Design Practices – Design Rules – Maximum Usability – Principles – Standards and Guidelines – Design Patterns – Programming Tools – Windowing Systems – Interaction Tool Kit – User Interface Management System – Evaluation Techniques – Evaluation Design – Evaluating Implementations – Observational Methods.

UNIT III Models **9**

Universal Design Principles – Multimodal Systems – User Support – Presentation and Implementation Issues – Types – Requirements – Approaches – Cognitive Model – Hierarchical Model – Linguistic Model – Physical and Device Models – Socio technical Models – Communication and Collaboration Models – Task Models – Task Analysis And Design.

UNIT IVExperimental Design and Statistical Analysis of HCI **9**

Basic Design Structure – Single Independent Variable – Multiple Independent Variable – Factorial Design – Split-Plot Design – Random Errors – Experimental Procedure – Statistical Analysis – T Tests – Analysis of Variance Test – Regression – Chi-Square Test – Survey – Probabilistic Sampling – Non-Probabilistic Sampling – Developing Survey Questions.

UNIT V Theories **9**

Dialogue Notations and Design – Dialogue Need – Dialogue Design Notations – Graphical – Textual - Representing Dialogue – Formal Descriptions – Dialogue Analysis – System Models – Interaction Models – Relationship with Dialogue – Formalisms – Formal Notations – Interstitial Behavior – Virtual Reality – Modeling Rich Interaction – Status Event Analysis – Properties – Rich Contexts – Sensor-based Systems – Groupware – Applications – Ubiquitous Computing – Virtual Reality

Total Hours:45

Text Books:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", Third Edition, Prentice Hall, 2004.

References:

1. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, "Research Methods in Human Computer Interaction", Wiley, 2010.
2. Ben Shneiderman and Catherine Plaisant, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", Fifth Edition, Addison-Wesley Publishing Co, 2010.

15BECS8E04	Total Quality Management	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To describe the basic concepts of TQM
- To facilitate the understanding of Quality Management principles and process.
- To study various tools and techniques of TQM
- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
- Discuss the various concepts of Quality analysis of systems
- Student should be able to analyze the overall quality of the software

COURSE OUTCOMES:

- Understand the fundamental principles of Total Quality Management;
- Choose appropriate statistical techniques for improving processes;
- Write reports to management describing processes and recommending ways to improve them;
- Develop research skills that will allow them to keep abreast of changes in the field of Total Quality Management;
- Develop various tools and techniques for TQM, Able to analyze quality of various systems
- Emphasis the process of learning and discovery rather than the presentation of fact.

UNIT I Introduction 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

UNIT II Tqm Principles 9

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT IIITqm Tools and Techniques I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IVTqm Tools and Techniques II 9

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V Quality Systems 9

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, QualityAuditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

Total Hours - 45

Text Books:

1. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

References:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8 th Edition, First Indian Edition, Cengage Learning, 2012.
2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006

15BECS8E05 **Mobile and Pervasive Computing** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- Understand the advanced concepts of mobile computing
- Apply transactions for complex model
- Explore the modern design structures of pervasive computing
- Analyze various advanced mobile network models
- Describe various concepts of pervasive computing
- Illustrate different applications present in pervasive computing

COURSE OUTCOMES:

Upon the completion of this course given in the curriculum, students should be able to

- Outline the basic problems, performance requirements of pervasive computing applications
- Analyze the trends of pervasive computing and its impacts on future computing applications and society
- Analyze and compare the performance of different data dissemination techniques andalgorithms for mobile real-time applications
- Analyze the performance of different sensor data management and routing algorithms for sensor networks.
- Develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation.
- Able to categorize various concepts about the pervasive computing application device

UNIT I Introduction to Mobile Computing **9**

Mobility of bits and bytes – Wireless the beginning – Mobile computing- Dialogue control-Networks – Middleware and gateways- Application and services- Developing mobile computing applications-Security- Standards- Players in wireless space- Architecture for mobile computing-Three tier architecture- Design considerations-Mobile computing through internet-Making existing applications mobile enabled-Developing IVR application.

UNIT II Mobile Technologies **9**

Emerging technologies: Bluetooth-Radio frequency identification- Wireless broadband-Mobile IP-Internet protocol version 6-Java card- GSM- Short message services- General packet radio services: Packet data network Architecture-Operations-Data services-Application for GPRS-Limitations of GPRS-Wireless application protocol CDMA and 3G.

UNIT III Mobile Networking Wireless **9**

LAN advantage-Standards-Architecture-Mobility-Deploying-Mobile Ad Hoc networks and sensor networks-Security- Wi Fi verses 3G-Internet networks and interworking: Fundamentals of call processing – Intelligence in the networks-SS #7 signaling-IN conceptual model-Soft switch-Programmable networks-Client programming.

UNIT IV Introduction to Pervasive Computing **9**

Introduction to pervasive computing: Scenarios–Roaming environment-Pervasive computing infrastructure Personalized services – Pervasive computing market- m-business- Applications examples-Hardware - Human - Machine interfaces biometrics and Operating systems-Java for pervasive devices.

UNIT V Pervasive Computing Application Device 9

Connectivity – Protocols, security and device management - Pervasive web application architecture – Transcoding –Client authentication via internet- WAP and beyond - Voice technology: Speech application–Personal digital assistants: Device- Operating systems-Characteristics-Software components-Standards-Mobile applications.

Total Hours - 45

Text Books:

1. Asoke K Talukder and Poopa R Yavagal, Mobile Computing,Tata McGraw-Hill,2nd edition,2010.
2. Jochen Buekhardt, Horst Henn, Stefan Hepper, Klaus Rintdorff and Thomas Schack, Pervasive Computing:Technology and architecture of mobile internet applications,Pearson Education,2009.

References:

1. Reza B Fat and Roy T Fielding, Mobile Computing Principles, Cambridge University Press, 2010.
2. Hansmann Uwe, Merk Lothar and Nicklous Mart, Pervasive Computing: The Mobile World, Springer Professional, 2011.
3. Chimay J, Anumba and Xiangyu Wang, Mobile and Pervasive Computing, Springer Professional, 2012.

15BECS8E06 **Semantic Web**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- Explain various concepts of semantics web services and processing
- Discuss about RDF data model available and its organization
- To discuss about queries in Semantic web
- To dicuss about OWL concepts in ontology
- To describe about logic and interference
- Familiarize with the applications of semantic web technology

COURSE OUTCOMES:

- Gained knowledge on basic concepts of semantic web technologies
- Students are able to categorize RDF and various querying semantic web
- Gained knowledge on OWL and ontology movement
- Critically assess the adequacy of relevant standards (WSDL, RDF, OWL, etc) as a basis for building practical systems.
- Demonstrate an understanding of logic inference
- Develop the applications of Semantic Web Technologies

UNIT I Introduction **9**

History – Semantic web layers –Semantic web technologies – Semantics in semantic web – XML: Structuring – Namespaces – Addressing – Querying-Processing XML.

UNIT II Rdf and Querying the Semantic Web **9**

RDF data model-syntaxes-Adding semantics-RDF schema-RDF and RDF schema in RDF schema-An axiomatic semantics for RDF and RDF schema-Querying the semantic web-SPARQL-Basics-Filters-Constructs-Organizing result sets-Querying schemas.

UNIT III Ontology **9**

Introduction – Ontology movement – OWL – OWL specification - OWL elements – OWL constructs: Simple and complex – Ontology engineering: Introduction – Constructing ontologies – Reusing ontologies – On-To-Knowledge semantic web architecture

UNIT IV Logic and Inference **9**

Logic – Description logics - Rules – Monotonic rules: syntax, semantics and examples – Non-monotonic rules – Motivation, syntax, and examples – Rule markup in XML: Monotonic rules - Non-Monotonic rules

UNIT V Applications of Semantic Web Technologies **9**

Good relations-BBC artists-BBC world cup 2010 website-Government data, Newyork times-Sigma and sindiceopen Calais-schema.org-Future of semantic web

Total Hours - 45

Text Books:

1. Grigorous Antoniou and Van Hermelen, A Semantic Web Primer. New Delhi: The MIT Press, 2012.
2. James Hendler, Henry Lieberman and Wolfgang Wahlster, Spinning the Semantic Web: Bringing the World Wide Web to its full potential. New Delhi: The MIT Press, 2005.

References:

1. Shelley Powers, Practical RDF. Mumbai: O‟reilly publishers, 2009
2. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies, Chapman & Hall/CRC, 2009

15BECS8E07 **Unix Internals** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- Identify the data structures for Unix Kernel.
- Get thorough understanding of the kernel.
- Describe the methods for managing a Buffer Cache.
- Illustrate the concept of Inter Process Communication
- Implement the various system calls for Unix OS.
- Enhance knowledge about various system calls.

COURSE OUTCOMES

Upon successful completion of this course, students will be able to

- Look up information using man pages.
- Use a debugger and a program profiler; benchmark program execution and identify both critical and dead code.
- Write C programs that use UNIX system calls and behave as Unix commands and filters.
- Use structures to pass information and document structures using labelled diagrams.
- Set up callback routines such as those used in handling signals.
- Create a C program and a script that interprets command line options.
- Develop test data and test scripts.

UNIT I Kernel Data Structures and Buffer Cache 9

History of Unix OS– System Structure- User Perspective- Operating System Services-User & Kernel Modes .Introduction to Kernel: Architecture –Introduction to system concepts. The Buffer Cache: Buffer Headers – Structure of Buffer Pool- Scenarios for retrieval of a buffer- Advantages and Disadvantages of Buffer Cache. 9 Hours Reading and writing disk blocks

UNIT II Files and System Calls for File System 9

Inode- Structure of a regular File- Directories-Conversion of pathname to an Inode- Super block – Inode ssignment to a file- System calls for File System. Allocation of Disk blocks

UNIT III Process Structure and Control Structure of a Process 9

Process states and transitions- Layout of System Memory-Context of a process- saving the context-manipulation of process address space. Process Control: Process Creation- Signal. Process Termination

UNIT IV Process Scheduling and Memory Management Policies 9

Process Scheduling: Scheduling-System calls for time and clock. Memory Management: Swapping – Demand Paging.

UNIT V Drivers and Inter Process Communication 9

The I/O Subsystem: Driver Interfaces- Disk drivers-Terminal Drivers-Streams Inter Process Communication: Process Tracing- System V IPC – Network Communications.

Total Hours - 45

Text Books:

1. Leffler S.J., Mckusick M.K., Karels M.J. and Quarterman J.S., The Design and Implementation of the 4.3 BSD Unix Operating System, Addison Wesley, 1998

References:

1. Bach M.J. The Design of the Unix Operating System, Prentice Hall Of India, 2011
2. Goodheart B. Cox J, The Magic Garden Explained, Prentice Hall of India, 1994

15BECS8E08 **Service Oriented Architecture**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To gain understanding of the basic principles of service orientation
- To learn service oriented analysis techniques
- To learn technology underlying the service design
- To learn advanced concepts such as service composition, orchestration and Choreography
- To know about various WS-* specification standards
- review several issues in the business adoption of SOA in an IT context

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to

- Look up information using man pages.
- Use a debugger and a program profiler; benchmark program execution and identify bothcritical and dead code.
- Write C programs that use UNIX system calls and behave as Unix commands and filters.
- Use structures to pass information and document structures using labelled diagrams.
- Set up callback routines such as those used in handling signals.
- Create a C program and a script that interprets command line options.
- Develop test data and test scripts.

UNIT I Introduction **9**

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

UNIT II Services **9**

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration – Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer

UNIT III Analysis **9**

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task- centric business service design

UNIT IV SOA **9**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE)

UNIT V WS **9**

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS- Security

Total Hours: 45

Text Books:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2nd edition, 2015.
2. Judith Hurwitz, Robin Bloor, "Service Oriented Architecture for Dummies", Willey Publications, 2nd edition, 2009

References:

1. Nicolai M. Josuttis, " SOA-The Art of Distributed System Design", O"Reily Publications, 2009.
2. Douglas K. Barry, " Web Services, Service Oriented Architecture and Cloud Computing", Elsevier Publicaions, 2nd Edition, 2013.

15BECS8E09 **Software Metrics and Software Project Management**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand software metrics and measurement.
- To emphasize the use of product and quality metrics.
- To explain quality assurance and various tools used in quality management.
- To learn in detail about various quality assurance models.
- To understand the audit and assessment procedures to achieve quality.
- To introduces the concepts and methods required for the construction of large software intensive systems.

COURSE OUTCOMES:

- Identify the fundamental issues that a project manager has to consider, and describe, chiefly in the context of software development projects, what approaches exist to manage these issues
- Identify and analyze software project activities using contemporary work breakdown techniques
- Identify and apply selected techniques for estimating the effort and duration of project activities
- Construct a schedule of project activities using contemporary planning techniques
- Construct a quality model for a software development project
    - Includes identification ofsuitable quality attributes, suitable metrics for measuring these, and suitable threshold values for these metrics to indicate acceptable quality

UNIT I Software Process and People Management 9

Process Maturity – Capability Maturity Model (CMM) – Variations in CMM - Productivity improvement process. Organization structure – Difficulties in people management - Effective team building – Role of Project manager - Team structures – Comparison of different team structures.

UNIT IISoftware Metrics 9

Role of metrics in software development - Project metrics – Process metrics – Data gathering - Analysis of Data for measuring correctness, integrity, reliability and maintainability of Software products.

UNIT III Project Management 9

Project initiation – Feasibility study - Planning - Estimation - Resource allocation - Root CauseAnalysis.

UNIT IVRisk Management 9

Risk analysis and management - Types of Risk involved - RMM plan.

UNIT V Project Scheduling and Tracking Software Configuration Management 9

Scheduling - Critical path – Tracking - Timeline chart – Earned value chart. Baselines - Software configuration items - The SCM process- Version control- Change control -Configuration audit - SCM standards.

Total Hours:45

Text Books:

1. Pankaj Jalote, “Software Project Management in practice”, Pearson Education, New Delhi, 2002.

References:

1. Roger S Pressman, “Software Engineering, A Practitioner‟s Approach” McGraw Hill Edition, New Delhi, 8th edition, 2014.
2. Watts Humphrey, “Managing the Software Process “, Pearson Education, New Delhi, 2000.

15BECS8E10	Information Storage and Management	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Evaluate storage architectures and key data center elements in classic, virtualized and cloud environments
- Explain physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems
- Explain the process of taking backup and virtualization for the same
- Describe storage networking technologies such as FC-SAN, IP-SAN, FCoE, NAS and object-based, and unified storage
- Understand and articulate business continuity solutions – backup and replications,
- Explain the process to archive for managing fixed content Explain key characteristics, services, deployment models, and infrastructure components for a cloud computing

COURSE OUTCOMES:

- Describe and apply storage technologies
- Identify leading storage technologies that provide cost-effective IT solutions for medium to large scale businesses and data centers
- Describe important storage technologies‟ features such as availability, replication, scalability and performance
- Work in project teams to install, administer and upgrade popular storage solutions
- Identify and install current storage virtualization technologies
- Manage virtual servers and storage between remote locations
- Design, analyze and manage clusters of resources

UNIT I Storage System 9

Introduction to information storage, Virtualization and cloud computing, Key data center elements, Compute, application, and storage virtualization, Disk dive & flash drive components and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning)

UNIT II Storage Networking Technologies and Virtualization 9

Fibre Channel SAN components, FC protocol and operations, Block level storage virtualization, iSCL and FCIP as an IP-SAN solutions, Converged networking option – FcoE, Network Attached Storage (NAS) – components, protocol and operations, File level storage virtualization, Object based storage and unified storage platform.

UNIT IIIBackup, Archive and Replication 9

Business continuity terminologies, planning and solutions, Clustering and multipathing to avoid single points of failure, Backup and recovery – methods, targets and topologies, data deduplication and backup in virtualized environment, fixed content and data archive, Local replication in classic and virtual environments, Remote replication in classic and virtual environments, Three-site remote replication and continuous data protection.

UNIT IV Cloud Computing **9**

Characteristics and benefits**,** Services and deployment models, Cloud infrastructure components, Cloud migration considerations.

UNIT V Securing and Managing **9**

Storage Infrastructure Security threats, and countermeasures in various domains, Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, Information lifecycle Management (ILM) and storage tiering.

Total Hours:45

Text Books:

1. Information Storage and Management: Storing, Managing and Protecting Digital Information in classic, Virtualized and Cloud Environments, 2nd Edition, EMC Educations Services, Wiley, May 2012.

References:

1. Ulf Troppens, Rainer Erkens, Wolfgang Mueller-Friedt, Rainer Wolafka, Nils Haustein ,"Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, iSCSI, InfiniBand and FCoE, 2nd Edition, Wiley, July 2009
2. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley, January 2010

15BECS8E11 **Information Security**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of Information Security
- Understand the investigation based on various security need
- To know the legal, ethical and professional issues in Information Security
- Teach inorder to develop various logical designs
- To know the aspects of risk management
- To study the critical need for ensuring Information Security in Organizations

COURSE OUTCOMES:

- Understood the basic concepts of information security
- Learn to select appropriate techniques to tackle and solve problems in the discipline of information security management
- Learn the importance of security and its management for any modern organization;
- Learn how an information security management system should be planned, documented, implemented and improved, according to the BSI standard on information security management.
- Able to describe the physical design of the system security
- Develop a secured application using the information security concepts

UNIT I Introduction **9**

History, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II Security Investigation **9**

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III Security Analysis **9**

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV Logical Design **9**

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V Physical Design **9**

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

Total Hours: 45

Text Books:

1. Michael E Whitman and Herbert J Mattord. “Principles of Information Security”, Second Edition, Vikas Publishing House, New Delhi, 2003.

References:

1. Micki Krause, Harold F. Tipton,“ Handbook of Information Security Management”, Auerbach Publications, 4th edition,2012.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 7th edition, 2012.

15BECS8E12 **Natural Language Processing**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To provide the student with knowledge of various levels of analysis involved in NLP.
- To explain the basic concepts of word level and semantic analysis
- To understand language modeling.
- To explain the process of Semantic Analysis and Discourse Processing
- To explain Natural Language Generation and Machine Translation
- To gain knowledge in automated natural language generation and machine translation.

COURSE OUTCOMES:

- Compose key NLP elements to develop higher level processing chains
- Assess / Evaluate NLP based systems
- Choose appropriate solutions for solving typical NLP subproblems (tokenizing, tagging, parsing)
- Describe the typical problems and processing layers in NLP
- Analyze NLP problems to decompose them in adequate independent components
- Understood the basic concepts of Information Retrieval and Lexical Resources

UNIT I Overview and Language Modeling **8**

OVERVIEW**:** Origins and challenges of NLP- Language and Grammar- Processing Indian Languages-NLP Applications-Information Retrieval.

LANGUAGE MODELING: Introduction-Various Grammar-based Language Models-Statistical Language Model.

UNIT II Word Level and Syntactic Analysis **9**

WORD LEVEL ANALYSIS: Introduction- Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. SYNTACTIC ANALYSIS: Introduction-Context-free Grammar-Constituency-Parsing-Probabilistic Parsing.

UNIT III Semantic Analysis and Discourse Processing **10**

SEMANTIC ANALYSIS: Introduction- Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. DISCOURSE PROCESSING: Introduction- cohesion-Reference Resolution- Discourse Coherence and Structure.

UNIT IV Natural Language Generation and Machine Translation **9**

NATURAL LANGUAGE GENERATION**:** Introduction-Architecture of NLG Systems- Generation Tasks and Representations-Application of NLG.MACHINE TRANSLATION: Introduction-Problems in Machine Translation- Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.

UNIT V Information Retrieval and Lexical Resources 9

INFORMATION RETRIEVAL**:** Introduction-Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – Evaluation. LEXICAL RESOURCES**:** Introduction-WordNet-FrameNet-Stemmers-POS Tagger- Research Corpora.

Total Hours: 45

Text Books:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

References:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition, 2008.
2. James Allen, Bejamin/cummings, "Natural Language Understanding", 2nd edition, 1995.

OPEN ELECTIVES OFFERED BY COMPUTER SCIENCE AND ENGINEERING

15BECS7OE01 **Python Programming**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings.
- To study decision structures and loops
- To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs.
- To understand the process and skills necessary to effectively deal with problem solving
- To discuss in relation to writing programs.
- To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs.
- Understand various program object and graphics based on python

UNIT I Fundamentals **9**

The Universal Machine-Program power- What is Computer Science?-Hardware Basics-Programming Languages-Python-Inside Python program-Software Development Process- Example program-Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II Decision Structures and Loops **9**

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops-common loop patterns-Booleans

UNIT III Functions **9**

Function of functions -Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV Sequences **9**

String data type- String Processing -List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V Objects and Graphics **9**

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

Total Hours: 45

Text Books:

1. John Zelle, " Python Programming: An Introduction to Computer Science", 2nd Edition, Franklin & Associates, 2009

References:

1. Mark Lutz, "Learning Python", OReily, 2013
2. David Beazly & Brian K. Jones, "Python Cookbook", OReily, 2013

15BECS7OE02 **Internet Programming**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To introduce the Java programming language and explore its current strengths and Weaknesses
- To study the way that object-oriented concepts are implemented in the Java programming language
- To write working Java code to demonstrate the use of applets for client side programming
- To study the way that exceptions are detected and handled in the Java programming language
- To write working Java code that demonstrates multiple treads of execution
- To study the concepts of Internet Telephony

COURSE OUTCOMES:

- Implement interactive web page(s) using HTML, CSS and JavaScript.
- Design a responsive web site using HTML5 and CSS3.
- Demonstrate Rich Internet Application.
- Build Dynamic web site using server side PHP Programming and Database connectivity.
- Describe and differentiate different Web Extensions and Web Services.
- Demonstrate web application using Python web Framework-Django

UNIT I Introduction **9**

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML **9**

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL **9**

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IVClient-Server programming **9**

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic

transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V Internet Telephony 9

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

Total Hours: 45

Text Books:

1. Paul Deitel, Harvey Deitel and Abby Deitel, “Internet and World Wide Web-How to Program”, 5th Edition, 2011.
2. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.

References:

1. Rahul Banerjee, Internetworking Technologies, An Engineering Perspective, PHI Learning, Delhi, 2011.
2. Robert W. Sebesta, “Programming the World Wide Web”, Pearson Education, 2015

15BECS7OE03 Multimedia and Animation

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To study the graphics techniques and algorithms.
- To study the multimedia concepts and various I/O technologies.
- To enable the students to develop their creativity
- To impart the fundamental concepts of Computer Animation and Multimedia.
- To understand various networking aspects used for multimedia applications.
- To develop multimedia application and analyze the performance of the same.

COURSE OUTCOMES:

- Developed understanding of technical aspect of Multimedia Systems.
- Understand various file formats for audio, video and text media.
- Develop various Multimedia Systems applicable in real time.
- Design interactive multimedia software.
- Apply various networking protocols for multimedia applications.
- To evaluate multimedia application for its optimum performance

UNIT I

Introduction9

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II Creating Animation in Flash 9

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D Animation & its Concepts 9

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV Motion Caption 9

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V Concept Development 9

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

Total Hours: 45

Text Books:

1. Computer Graphics, Multimedia and Animation-Malay K. Pakhira,PHI Learning PVT Ltd,2010

References:

1. Principles of Multimedia – Ranjan Parekh, 2007, TMH. (Unit I, Unit V)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication.
3. Encyclopedia of Multimedia and Animations-Pankaj Dhaka, Anmol Publications-2011

15BECS7OE04 **PC Hardware and Trouble shooting** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- Assemble/setup and upgrade personal computer systems
- Perform installation, configuration, and upgrading of microcomputer hardware and software.
- Install/connect associated peripherals.
- Diagnose and troubleshoot microcomputer systems hardware and software, and other peripheral equipment.
- Understand the concept of networking models, protocols, functionality of each layer.
- Learn basic networking hardware and tools

COURSE OUTCOMES:

- Knowwhat are registers, various types of registers and interfacing various registers.
- learn about the architecture of common bus system.
- learn about the different micro-operations used.
- learn about Instruction Cycle, Interrupt Cycle.
- learn about I/O interface, DMA controller, modes of data transfer and various address modes.
- learn how to assemble a PC

UNIT I Introduction **9**

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II Peripheral Devices **9**

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC Hardware Overview **9**

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV Installation and Preventive Maintenance **9**

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V Troubleshooting **9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

Total Hours: 45

Text Books:

1. B. Govindarajalu, “IBM PC Clones Hardware, Troubleshooting and Maintenance”, 2/E, TMH, 2002.

References:

1. Peter Abel, Niyaz Nizamuddin, “IMB PC Assembly Language and Programming”, Pearson Education, 2007
2. Scott Mueller, “Repairing PC's”, PHI, 1992

15BECS7OE05 **Game Programming**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the basic history and genres of games
- To demonstrate an understanding of the overall game design process
- To explain the design tradeoffs inherent in game design
- To design and implement basic levels, models, and scripts for games
- To describe the mathematics and algorithms needed for game programming
- To design and implement a complete three-dimensional video game

COURSE OUTCOMES:

- Initiating projects of game development
- creative design of games
- design and preparation of user interface
- selection of method of implementation of a designed game
- specification and preparation of games assets
- programming of developing games

UNIT I

Introduction9

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II Safecracker Project 9

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III Match Game Project 9

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV Pizza Delivery Project 9

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V Moon Landing Project 9

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

Total Hours: 45

Text Books:

1. Philip Conrod, Lou Tylee, “Programming Games with Java”,2013

References:

1. Timothy M.Right, “Fundamental 2D Game Programming with Java”,Cengage Learning PTR,2015
2. Wayne Holder,Doug Bell, “Java Game Programming for Dummies”,

VALUE ADDED COURSES

15BECS451 Quantitative Aptitude & Soft Skills Training

L	T	P	C
1	1	0	1

COURSE OBJECTIVES:

- To demonstrate various principles involved in solving mathematical problems and adopt new and faster methods of calculations.
- To bring out behavioral changes among the trainees so that they develop interpersonal, communication, team building skills and leadership skills.
- It helps themin enhancing productivity and performance at the workplace. The training helps them to acquire employability skills so that they can get employment easily.
- The objective of this course is to enhance the problem solving skills in the areas of 'Quantitative Aptitude' and 'Reasoning' which will enable the students to achieve in Campus Placements and competitive examinations.
- To improve the logical thinking and mathematical ability of the students.
- To enable the students to give better presentation and explanation on their projects, posters and assignments – this makes them industry ready.

COURSE OUTCOMES:

- To solve basic and complex mathematical problems in short time.
- To perform well in various competitive exams and placement drives.
- To communicate with more confidence using better spoken and written English
- To give better presentation and explanation with the use of digital inventions
- During class time the students are expected to engage in group & pair work
- To perform well during Campus Drives and different Interviews

Module -1

Introduction, Speed Math's, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

Module – 2

Percentage, Data Interpretation, Profit and loss, Simple and Compound Interest

Module – 3

Time Speed and Distance, Time and Work, Pipes and Cistern, Geometry, Probability, Permutation and Combination

Module-4

Overview to communication, self Introduction, Presentation on their own topic, Extempore, Group Activity

Module -5

Group Discussion, Do's and Don'ts of Group Discussion, Body language, Grooming and Resume, Resume correction

Module -6

Introduction to HR, HR questions and Do's and Don‟t's in HR, HR Interview, Mock GD & HR

Text books:

1. Quantitative Aptitude – Abhijit Guha
2. Quantitative Aptitude – R.S.Agarwal

15BECS751 **Animation with Flash**

L	T	P	C
1	1	0	1

COURSE OBJECTIVES:

- To familiarize the students with various approaches, methods and techniques of Animation Technology.
- To develop competencies and skills needed for becoming an effective Animator.
- Mastering traditional & digital tools to produce stills and moving images.
- Exploring different approaches in computer animation.
- To enable students to manage Animation Projects from its Conceptual Stage to the final Product creation.
- To train students in applying laws of human motion and psychology in 2-D or 3-D Characters.

COURSE OUTCOMES:

- Understand what Flash is and what you can do with it.
- Manage Website Content. Use the Timeline.
- Add and Manage Tweens.
- Create Slideshows.
- Incorporating Sound and Video.
- Use ActionScript

UNIT I

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation? Concept Development –Story Developing. Interface Fundamentals: The Tool panel – The Document Window – The Timeline Window – Drawing in Flash: Using Geometric shape Tools – Using Drawing Tools – Creating fPrecise Lines with the Pen Tool – Using Fill and Stroke Controls – Optimizing Drawings: - Putting selection Tools to work – Designing and Aligning Elements. Symbols, Instances, and the Library : Understanding the Document Library – Defining Content Types – Editing Symbols – Modifying Instance properties – Building Nested Symbol Structures – 9-Slice Scaling for Movie Clip backgrounds – using the Movie Explorer – Using Author time Shared Libraries. Applying Color: Introducing Color Basics – Working in the Color swatches Panel – Using the Color Mixer Panel – Working with Droppers, Paint Buckets and Ink Bottles.

UNIT II

Working with Text; Considering Typography – Text Field Type in Flash – The Text Tool and the Property Inspector – Font Export and Display – Font Symbols and Shared Font Libraries – Modifying Text.

Modifying Graphics : Sampling and Switching Fills and Strokes – Transforming Gradients and Bitmap Fills – Gradient Transform used for Lighting Effects – Applying Modify Shape Menu commands – Free Transform Commands and Options – Modifying Item Types – Working with Drawing Objects and Combine Object Commands – Working with Compound Shapes Animation Strategies : Establishing Ground Rules – Defining variables – Adding Personality – Manipulating Perception and Illusion – Understanding the Laws of Nature Timeline Animation : Basic Methods of Flash Animation – Frame –by – Frame Animation – Modifying Multiframe Sequences – Using Tweens for Animation – Integrating Multiple Animation Sequences.

Text Books:

1. Alex Michael, Animating with Flash MX: Professional Creative Animation Techniques, CRCPress,2012

References:

1. Ranjan Parekh, Principles Of Multimedia,TMH,2007
2. Ashok Banerji, Ananda Mohan Ghosh, Multimedia Technologies, McGraw Hill Publication,2010
3. Robert Reinhardt and Snow Dowd, Macromedia Flash 8 Bible, Wiley India Edition,2006
4. Geoff Johns, Howard PorterAshok Banerji, Ananda Mohan Ghosh, The Flash: rogue war, McGraw Hill Publication,2006
5. **Alex Michael, Animating with Flash 8: Creative Animation Techniques, CRC Press,2006

OPEN ELECTIVES

Department of Science & Humanities

15BESHOE01 INDUSTRIAL MATHEMATICS–I L T P C 3 0 0 3

Course Objectives

- To develop analytical skills for solving engineering problems
- To teach the students the basic concepts of LPP,
- To learn the techniques to solve transportation and Assignment problems
- To make the students to study about the Integer Programming and Network Analysis
- Analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To learn the knowledge about application of it

Course Outcomes

- To define and formulate linear programming problems and appreciate their limitations.
- To solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
- To be able to build and solve Transportation Models, Assignment Models,
- To construct linear integer programming models and discuss the solution techniques.
- To formulate and solve problems as networks and graphs.
- To be able to solve problems in different environments and develop critical thinking

UNITI LINEARPROGRAMMINGPROBLEM 9

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method.

UNITII TRANSPORTATIONPROBLEM 9

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNITIIIASSIGNMENTPROBLEM 9

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNITIV INTEGERPROGRAMMING 9

Integer Programming Problem – Gromory's fractional cut Method – Branch Bound Method

UNITV NETWORKANALYSIS 9

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication

1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES

1. www.mathworld.Wolfram.com
2. www.mit.edu
3. www.nptel.com

15BESHOE02 INDUSTRIAL MATHEMATICS – II L T P C 3 0 0 3

Course Objectives

- To kindle analytical skills for solving engineering problems
- To impact the knowledge about inventory models
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making.
- To analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To learn the knowledge about application of it

Course Outcomes

The students will

- To be able to solve simple models in Inventory problems and Replacement problems.
- To understand different queuing situations and find the optimal solutions using models for different situations.
- Simulate different real life probabilistic situations using Monte Carlo simulation technique.
- To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- **Convert** and **solve** the practical situations into replacement mod
- To understand how to model and solve problems using non integer programming.

UNIT-1 INVENTORYMODELS 9

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT– II NONLINEARPROGRAMMING 9

Khun-tucker conditions with non-negtive constraints- Quadratic programming- Wolf's modified simplex method.

UNIT– III SIMULATIONMODELS 9

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving (M\M\1): (∞\FIFO) , (M\M\c): (∞\FIFO) Models.

UNIT–IV DECISIONMODELS 9

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

UNIT–V REPLACEMENT MODELS 9

Models based on models that gradually detoriate with time-whose maintenance cost increase with time-Replacement of items that fail suddenly and completely.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES

1. www.mathworld.Wolfram.com
2. www.mit.edu
3. www.nptel.com

15BESHOE03PROBABILITY ANDRANDOMPROCESS L T P C 3 0 03

Course Objectives

- To gain knowledge in measures of central tendency.
- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in IT fields.
- To understand the concept of correlation and spectral densities.
- To learn the knowledge about application of it

Course Outcomes

- Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
- The students will have an exposure of various distribution functions, correlation and spectral densities.
- To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- To apply the concept random processes in engineering disciplines.
- To understand and apply the concept of correlation and spectral densities.

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UNITI MEASURES OF CENTRAL TENDENCYANDPROBABILITY 9

Measures of central tendency – Mean, Median, Mode - Standard Deviation
Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT IISTANDARDDISTRIBUTIONS 9

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma(one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – Chebyshev's inequality**.**

UNIT III TWO DIMENSIONALRANDOMVARIABLES 9

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT IV CLASSIFICATION OFRANDOM PROCESS 9

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION ANDSPECTRALDENSITIES 9

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Pubishers, New Delhi.	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
2	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
3	Veerarajan,T.	Probabilitiy, Statistics and Random process	Tata McGraw-Hill Education pvt. Ltd., New Delhi	2008
4	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002

WEBSITES

1. www.cut-theknot.org/probability.shtml

2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

15BESHOE04 PROBABILITY AND STATISTICALMETHODS

L T P C 3 0 0 3

Course Objectives

- To gain knowledge in measures of central tendency and probability.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
- To introduce the basic concepts of classifications of design of experiments
- To learn the knowledge about application of it

Course Outcomes

- The student gain the knowledge in measures of central tendency and probabil**ity**
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments and statistical quality control.
- Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

UNITI MEASURES OF CENTRAL TENDENCYAND PROBABILITY 12

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration.Probability-Randomvariable-Axiomsofprobability-Conditionalprobability
Total probability – Baye's theorem - Probability mass function - Probability densityfunction.

UNITII STANDARDDISTRIBUTIONS 12
Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions - Moment generating functions, Characteristic function and their properties.

UNITIII TWO DIMENSIONALRANDOMVARIABLES 12
Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNITIV TESTINGOFHYPOTHESIS 12
Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNITV DESIGNOFEXPERIMENTS 12
Analysis of variance – One way classification – CRD – Two way classification – RBD - Latin square.
Note: Use of approved statistical tables permitted in the examination.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
2	Athanasios	Probability Random	McGraw-Hill	2002
	Papoulis and S Unnikrishna Pillai	variables and Stochastic Processes	Publications, New Delhi.	

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Walpole, R.E., Myers, R.H., Myers, S.L and Ye, K	Probability and Statistics for Engineers and Scientists	Pearson Education Inc., Delhi.	2007
2	Lipschutz, S. and Schiller, J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross, S	A first Course in Probability	Pearson Education Inc., Delhi.	2014
4	Johnson, R.A, Irwin Miller	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi	2014

WEBSITES

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

15BESHOE05 PROBABILITY AND QUEUEINGTHEORY

L T P C 3 0 0 3

Course Objectives

- To understand the fundamental knowledge of probability theory.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To introduce the concepts of random processes and Markov chain
- To understand the different Queuing models and solve problems
- To learn the knowledge about application of it

Course Outcomes

- The student gain the knowledge in measures of central tendency and probability
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Understand the concepts of random process and markov chains
- They will be able to solve the Queuing models
- The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

UNITIPROBABILITY ANDRANDOMVARIABLE 9

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNITII STANDARDDISTRIBUTIONS 9

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNITIIITWO DIMENSIONALRANDOMVARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNITIRANDOM PROCESS ANDMARKOVCHAINS 9

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNITQUEUEINGTHEORY 9

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ross,S	A first course in probability	Pearson Education, Delhi	2014
2	Medhi,J	Stochastic Process	New Age Publishers ,New Delhi	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Veerarajan,T	Statistics and Random Processes	Tata McGraw-Hill, 2nd Edition, New Delhi.	2008
2	Allen,O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross, D., Shortle, J. F., Thompson J.M. and Harris, C.M	Fundamentals of Queuing theory	John Wiley and Sons Inc., NewJersey.	2008
4	Taha,H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2006

WEBSITES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.mit.edu

15BESHOE06 FUZZYMATHEMATICS L T P C 3 0 0 3

Course Objectives

- Be able to understand basic knowledge of fuzzy sets and fuzzy logic
- Be able to apply basic knowledge of fuzzy operations.
- To know the basic definitions of fuzzy relations
- Be able to apply basic fuzzy inference and approximate reasoning
- To know the applications of fuzzy Technology.
- To learn the knowledge about application of it

COURSE OUTCOME:

- To gain the main subject of fuzzy sets.
- To understand the concept of fuzziness involved in various systems and fuzzy set theory.
- To gain the methods of fuzzy logic.
- To comprehend the concepts of fuzzy relations.
- To analyze the application of fuzzy logic control to real time systems.
- The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNITI FUZZYSETS 9

Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – F u z z y functions - Zadeh's Extension Principle

UNITII OPERATIONS ONFUZZYSETS 9

Operations on Fuzzy Sets Operations on [0,1] – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNITIII FUZZYRELATIONS 9

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNITIV FUZZYMEASURES 9

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNITV FUZZYINFERENCE 9

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall of India, New Delhi.	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Zimmermann H.J.	Fuzzy Set Theory and its Applications	Kluwer Academic publishers, USA.	2001
2	Michal Baczynski and Balasubramaniam Jayaram	Fuzzy Implications	Springer-Verlag publishers, Heidelberg	2008

WEBSITES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

15BESHOE07 MATHEMATICAL PHYSICS L T P C 3 0 0 3

Course Objectives

- To know the fundamentals ofTensors.
- To know the series solutions to differentialequations.
- To introduce the concepts of specialfunctions.
- To study about Calculus of variations and integralequations
- To learn the knowledge about application of it

Course Outcomes

- Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
- Learn about special type of matrices that are relevant in physics and then learn about tensors.
- Get introduced to Special functions like Bessel, Legendre , Hermite and Laguerre functions and their recurrence relations
- Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
- Students will master in calculus of variations and linear integral equations.
- The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNITI TENSORS 8

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudo tens

UNIT IIDIFFERENTIALEQUATIONS-SERIESSOLUTIONS

Series Solution : Classification of singularities of an ordinary differential equation - Series solution-Method of Frobenius - indicial equation – example

UNIT IIISPECIALFUNCTIONS 8

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre , Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUSOFVARIATIONS 9

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEARINTEGRAL EQUATIONS 12

Introduction – conversion of a linear differential equation to an integral equations and vice versa – conversion of boundary value problem to integral equations using Green's function – solution of a integral equation – integral equations of the convolution type – Abel's integral equations –

integro–differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2013
2	Murray R Spiegel, Seymour Lipschutz, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010

WEBSITES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.nptel.ac.in

15BESHOE08 ADVANCED ENGINEERING MATHEMATICS L T P C 3 0 0 3

Course Objectives

- To introduce the concepts of special functions.
- To find the solutions to partial differential equations and their applications
- To study about mathematical physics and perturbation techniques
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making
- To learn the knowledge about application of it

Course Outcomes

- Students know the concepts of improper integrals, Beta and Gamma functions.
- The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
- Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.
- To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- **Convert** and **solve** the practical situations into replacement models.
- To understand how to model and solve problems using non integer programming.

UNITIINTRODUCTION TO SOMESPECIAL FUNCTIONS 9

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wavefunction.

UNIT II PARTIAL DIFFERENTIAL EQUATIONSANDAPPLICATIONS 9

Formation PDEs, Solution of Partial Differential equations f(x,y,z,p,q) = 0, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourierintegral

UNIT IIIPERTURBATIONTECHNIQUES 9

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundarylayer.

UNIT IVSIMULATION MODELS **9**

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving (M\M\1): (∞\FIFO) , (M\M\c): (∞\FIFO) Models.

UNIT VDECISIONMODELS **9**

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kreyszig,E	Advan ced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Gupta, A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	2008
3	Sankara Rao, K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	2010
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008
5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010

WEBSITES

1. www.mathworld.wolfram.com
2. www.efunda.com
3. www.nptel.ac.in

15BESHOE09 **LINEAR ALGEBRA** **L T P C 3 0 0 3**

Course Objectives

- To introduce the basic concepts of vector space
- To know the fundamentals of linear Algebra
- To solve system of linear equations
- To study about the linear transformations
- To introduce the concepts of inner product spaces Course Outcomes
- To learn the knowledge about application of it

Course Outcomes

The student will be able to

- To explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- To apply the fundamental concepts in their respective engineering fields
- To visualize linear transformations as matrix form
- To recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
- To articulate the importance of Linear Algebra and its applications in branches of Mathematics
- To analysis the real time application

UNITI VECTORSPACES **9**

General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space,UNIT II EIGEN VALUES ANDEIGENVECTORS 9

Eigen values and Eigen vectors - Diagonalization - Power method - QR decomposition

UNIT III SYSTEM OFLINEAREQUATIONS **9**

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss–Seidel method, convergence criteria.

UNIT IVLINEARTRANSFORMATIONS **9**

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors -Diagonalization

UNIT V INNERPRODUCT SPACES **9**

The Dot Product on R^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

- **TOTAL: 45 HOURS**

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition, New Delhi.	2012
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill, New Delhi.	2008

WEBSITES

1. www.sosmath.com
2. www.nptel.ac.in
3. www.mathworld.wolfram.com

15 BESHOE10 TRANSFORMS ANDPARTIAL DIFFERENTIAL EQUATIONS

LTPC3003

Course Objectives

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the basic concepts of PDE for solving standard partial differential equations
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Course Outcomes:

- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- The learners can equip themselves in the transform techniques and solve partial differential equations
- Understand how to solve the given standard partial differential equations.
- Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
- Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT IFOURIER SERIES **10**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sineseries – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.

UNIT IIFOURIERTRANSFORM **9**

Fourier integral theorem (without proof) – Fourier transform pair –Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIALDIFFERENTIAL EQUATIONS **9**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIALDIFFERENTIALEQUATIONS 9

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT- V Z -TRANSFORM ANDDIFFERENCE EQUATIONS 8

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Outcomess. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P., Manish Goyal	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEBSITES

1. www.sosmath.com
2. http://mathworld.wolfram.com/FourierSeries.html
3. www.nptel.ac.in

15BESHOE11 TECHNICAL WRITING L T P C 3 0 0 3

Course Objectives

- To Develop abilities to write technically and expressively,
- To Recognize writing as a constructive, meaningful process,
- To Practise using reading strategies for effective writing.
- To equip them to write for academic as well as work place context.
- To enable students to be familiar with structure and style of formal written communication
- To learn the knowledge about application of it

Course Outcomes

- Construct simple sentences, correct common grammatical errors in written English.
- Build confidence in English language by imbibing lexical and syntax rules.
- Enrich their reading ability for effective writing.
- Know the value of LSRW skills in document writing.
- Understand the structure, content and format of technical documents.
- Improve their writing skills and be ready with documents related ideas and notions.

UNIT I BASICSOFWRITING 7

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT2PARAGRAPHSANDESSAYS 9

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kindsofparagraphs–Writingdrafts–Paragraphlengthandpattern–TypesofEssays– **Characteristics of Essays – Salient point of sentence constructions.**

UNIT3MEMOSANDEMAIL 9

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT 4 THE ART OF CONDENSATION AND TECHNICAL PROPOSALS 9

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – DialogueWriting.

UNIT 5 REPORTS ANDRESEARCHARTICLES 11

Discussion of newspaper articles -Course Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
	V.N. Arora & LakshmiChandra	Improve Your Writing: Revised First Edition	OUP, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	David Morley	The Cambridge Intro. to Creative Writing	CUP, New Delhi.	2010
2	Graham King	Collins Improve Your Writing	Collins; First edition, UK	2009
3	Crème, P. and M. Lea.	Writing at University: A guide for Outcomess.	OUP, New Delhi.	2003

WEBSITES

1. http://www.stevepavlina.com/blog/2006/08/10-ways-to-improve-your-technical-skills/ - Unit-I
2. http://www.nyu.edu/classes/keefer/brain/net2.html - Unit-I, II, &III
3. https://www.udemy.com/technical-writing-and-editing/ - Unit-IV &V
4. http://techwhirl.com/what-is-technical-writing/ - AllUnits

15BESHOE12 GEOPHYSICS L T P C 3 0 03

Course Objectives

- To inculcate the basics of brief history of Earth sciences
- To divulge knowledge on the basics of structure of earth and earth's gravitational field.
- To disseminate the fundamentals of magnetic field and thermal distribution of earth.
- To introduce the concepts of seismology and seismic waves .
- To impart the basic knowledge of oceans
- To learn the knowledge about application of it

Course Outcomes

- Gain knowledge on the basics of history of Earth sciences.
- Acquire knowledge on concepts of structure of earth and earth's gravitational field.
- Have adequate knowledge on the concepts of magnetic field and thermal distribution of earth
- Obtain knowledge on the basics of seismic waves.
- Understand the basics of oceans and properties of sea water.
- Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

UNITIORIGINOFEARTH 9

A brief history of the development of Earth Sciences . An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure andcomposition.

UNIT II STRUCTUREOFEARTH 9

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy.

UNIT III MAGNETIC FIELD AND THERMAL DISTRUBUTION OF EARTH 9

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle.

15BESHOE12 GEOPHYSICS L T P C 3 0 03

UNITIVSEISMOLOGY 9

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indiansubcontinent.

UNITVOCEANS 9

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A.Jacobs, R.D.Russel	Physics and Geology	McGraw-Hill	2002

WEBSITES

1. www.ocw.mit.edu
2. www.physicsclassroom.com
3. www.nptel.ac.in
4. www.physics.org

15BESHOE13 ENGINEERING ACOUSTICS L T P C 3 0 03

Course Objectives

- To disseminate the fundamentals of acoustic waves. (K)
- To inculcate the characteristics of radiation and reception of acoustic waves. (K)
- To divulge knowledge on the basics of pipe resonators and filters.(S)
- To introduce the features of architectural acoustics.**(S)**
- To impart the basic knowledge of transducers and receivers.(K)
- To learn the knowledge about application of it

Course Outcomes

- Develop the idea of the fundamentals of acoustic waves.
- Apply the concepts of radiation and reception of acoustic waves.
- Explain the basic ideas of pipe resonators and filters.
- Illusrate the basics of architectural acoustics..
- Illustrate the transducers and receivers and its applications in various electronic devices.
- Apply the knowledge inputs of the course for engineering applications.

UNITIINTRODUCTION9

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves - Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OFACOUSTICWAVES **9**

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient.

UNIT III PIPES RESONATORSANDFILTERS **9**

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmoltz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combing band levels and tones – detecting signals in noise – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IVARCHITECTURAL ACOUSTICS 9

Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design ofportions.

UNITVTRANSDUCTION **9**

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker– horn loud speaker, receivers – condenser –microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration ofreceivers.

TOTAL: 45HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Lawerence E.Kinsler, Austin R.Frey,	Fundamentals of Acoustics	John Wiley & Sons	4th edition 2000

REFERENCE

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	F. AltonEverest & Ken Pohlmann	Master Handbook of Acoustics	McGraw Hill Professional	6th edition 2014

WEBSITES

1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www.ocw.mit.edu

15BESHOE14 ALTERNATE FUELS AND ENERGY SYSTEMS L T P C 3 0 0 3

Course Objectives

- To understand about the fuel
- To study about the alcohols and its importance in engine
- To gain knowledge on the fuel gas and oils
- To get the information on fuel cell
- To understand electric, hybrid and solar cars
- To learn the knowledge about application of it

Course Outcomes

- Students will know about the basic concepts of alternate fuels
- Students will know about the basic concepts of alcohols.
- Students will understand about fuel gas and oils
- Students can enrich their knowledge about the alternate fuels and energy systems
- Develop their knowledge in studies of vegetable oils
- Students knows about the importance of electric, hybrid and solar cars

UNITIINTRODUCTION 9

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNITIIALCOHOLS 9

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGENANDBIOGAS 10

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications.

UNIT IVVEGETABLE OILSS 8

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL ANDSOLARCARS 9

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jain, P.C. and Monika Jain	Engineering Chemistry	Dhanpat Rai PublishingCompany (P) Ltd., NewDelhi.	2009
2	Richard.L.Bechfold	Alternative Fuels	SAE International , USA	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing, 2nd edition.	Gulf Professional Publisher, USA	2012
2	Nagpal G.R	Power Plant Engineering	Khanna Publishers, Delhi.	2002

WEBSITES

1.www.fao.org/docrep/t4470e/t4470e08.htm
2.http://www.exergy.se/goran/hig/ses/06/alternative%20fuels3.http://www.alternative-energy-news.info/technology/transportation/hybrid-cars/

15BESHOE15 SOLID WASTE MANAGEMENT L T P C 3 0 03

Course Objectives

- To make the students conversant with basics of Solid wastes and its classification.
- To make the student acquire sound knowledge of different treatments of solid wastes.
- To acquaint the student with concepts of waste disposals.
- To develop an understanding of the basic concepts of Hazardous waste managements.
- To acquaint the students with the basics of energy generation from waste materials.
- To get the information on energy conservation.

Course Outcomes

- Outline the basic principles of Solid waste and separation of wastes (K)
- Identify the concepts of treatment of solid wastes (S)
- Identify the methods of wastes disposals. (S)
- Examine the level of Hazardousness and its management. (S)
- Examine the possible of the energy production using waste materials. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNITISOLIDWASTE 9

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of MunicipalWaste.

UNIT IIWASTETREATMENT 9

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration.

UNIT IIIWASTE DISPOSAL 9

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classficaition, Types, Methods &Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfillRemediation.

UNIT IV HAZARDOUSWASTE MANAGEMENT 9

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediaiton, risk assessment.

UNITV ENERGY GENERATIONFROMWASTE 9

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, Energy recovery systems. Biological & Chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dara.S.S,Mishra.D.D	A Text book of Environmental Chemistry and Pollution Control	S.Chand and Company Ltd., New Delhi.	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Naomi B. Klinghoffer and Marco J. Castaldi	Waste to Energy Conversion Technology (Woodhead Publishing Series in Energy)	Woodhead Publishing Ltd., Cambridge, UK	2013
2	Frank Kreith, George Tchobanoglo us	Hand Book of Solid Waste Management-	McGraw Hill Publishing Ltd., Newyork, 2nd edition	2002
3	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall (P) Ltd., New Delhi.	1999

WEBSITES

1.www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
2.http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/3.www.alternative-energy-news.info/technology/garbage-energy/4.nzic.org.nz/ChemProcesses/environment/

15BESHOE16 GREEN CHEMISTRY L T P C 3 0 03

Course Objectives

- To make the students conversant about the green chemistry
- To make the student acquire sound knowledge of the atom efficient process and synthesis elaborately.
- To acquaint the student with concepts of green technology.
- To develop an understanding of the basic concepts of renewable energy resources.
- To acquaint the students with the basic information on catalysis.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic principles of green chemistry (K)
- Examine the different atom efficient process and synthesis elaborately (S)
- Apply the concepts combustion of green technology (S)
- Identify and apply the concepts of renewable energy (S) Apply the concepts of green catalysts in the synthesis (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)
- Analysis the real time application of it

UNIT I INTRODUCTION TO GREENCHEMICALPRINCIPLES 9

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOMEFFICIENT PROCESSES 9

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis.

UNIT III BIOTECHNOLOGY ANDGREENCHEMISTRY 9

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology- Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and biocatalysts.

UNIT IVRENEWABLE RESOURCES 9

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion.

UNIT V CATALYSIS INGREENCHEMISTRY 9

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sanjay K. Sharma, Ackmez Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press , London	2010
2	Ahluwalia V. K. and M.Kidwai	New Trends in Green Chemistry	Anamaya publishers., New Delhi. 2nd edition	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons., New Delhi.	2012
2	Mukesh Doble. Ken Rollins, Anil Kumar	Green Chemistry and Engineering, 1st edition	Academic Press, Elesevier., New Delhi.	2007
3	Desai K. R.	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
4	Matlack A. S.	Introduction to Green Chemistry	Marcel Dekker: New York	2001

WEBSITES

1. http://www.organic-chemistry.org/topics/green-chemistry.shtm

2.http://www.essentialchemicalindustry.org/processes/green-chemistry.html

3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm

4. http://www.epa.gov/research/greenchemistry/

5. http://www.amazon.in/Green-Chemistry-Catalysis

15BESH7OE17 APPLIED ELECTROCHEMISTRY L T P C 3 0 03

CourseObjectives

- To make the students conversant with **the information on electrochemical material**.
- To make the student acquire sound knowledge of **conducting polymers**.
- To acquaint the student with concepts of Energy storage devices.
- To develop energy storage devices.
- To impart knowledge on basic principles of solar cells and its application.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic principles of chemistry in **electrochemical material (K)**
- Examine the properties of conducting polymers (S)
- Apply the concepts of electrochemistry in storage devices. (S)
- Identify the concepts of storage devices and its applications. (S)
- Apply the suitable materials for the manufacturing of storage devices. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNITIMETAL FINISHING 9

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electrowinning.

UNIT II CONDUCTING POLYMERSANDELECTROCHEMICALS 9

lectropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation ofconducting polymers- poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES ANDPOWERSOURCES-I 9

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES ANDPOWERSOURCES-II 9

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICALMATERIAL SCIENCE 9

Solar cells- Preparation of CdS/Cu_2S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elesevier.,UK	2007
2	D.Pletcher and F.C.Walsh	Industrial Electrochemistry	Chapman and Hall, London	1990

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M. Barak	Electrochemical Power Sources	I.EEE series, Peter Peregrinius Ltd, Steverage, U.K.	1997
2	Bruno Scrosati	Applications of Electroactive Polymers	Chapman & Hall, London	1993
3	K.L. Chopra and I. Kaur	Thin Film Devices and their Application	Plenum Press, New York.	1983
4	M.M.Baizer	Organic Electrochemistry	Dekker Inc. New York	1983

WEBSITES

1. http://www.anoplate.com/finishes/
2. http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

15BESHOE18 INDUSTRIAL CHEMISTRY L T P C 3 0 03

Course Objectives

- To make the students conversant with **cement and lime** and its uses.
- To make the student acquire sound knowledge of abrasives and refractories.
- To acquaint the student with concepts of inorganic chemicals.
- To develop an understanding of the basic concepts **explosives**.
- To acquaint the students with the basics of **agriculture chemicals**.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic chemistry of **cement and lime (K)**
- Examine the uses of abrasives and refractories (S)
- Identify the usage of the inorganic chemicals. (S)
- Identify the concepts of explosives and smoke screens (S)
- Identify the usage of the **agriculture** chemicals (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNITI CEMENT ANDLIME 9

Manufacture of Portland cement – settling of hardening of portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydrauliclime.

UNIT IIABRASIVESANDREFRACTORIES 9

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT IIIINORGANICCHEMICALS 9

Common salt and soda ash – manufacture – different grades – products – alkalis – Na_2CO_3, caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, sulphur and sulphuricacid – **extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.**

UNITIV EXPLOSIVES 9

Explosives–uses–propertiesandtests–explosivesforwar–nitrocellulose–picricacidand T.N.T.–industrialexplosives–nitroglycerinanddynamites–blackpowder–smokescreens–incendiaries – gas mask.

UNIT V AGRICULTURECHEMICALS 9

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Harikrishan	Industrial Chemistry	Goel Publishing House, Meerut.	2014
2	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut.	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2	James A. Kent	Hand Book of Industrial Chemistry, 9^{th} edition	Van Nostrand Reinhold, New York.	1992
3	R.N. Sherve	Chemical Process Industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
4	S.D. Shukla and G.N. Pandy	A Text book of Chemical Technology	Vikas Publishing House (P) Ltd, New Delhi.	1979

WEBSITES

1. http://en.wikipedia.org/wiki/Cement
2. http://www.hon.ch/HONselect/Selection/D01.html
3. http://fas.org/man/dod-101/navy/docs/fun/part12.htm
4. http://toxics.usgs.gov/topics/agchemicals.html

15BECSOE01 PYTHONPROGRAMMING L T P C 3 0 03

COURSE OBJECTIVES:

- To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings
- To study decision structures and loops
- To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs
- To understand the process and skills necessary to effectively deal with problem solving
- To discuss in relation to writing programs
- To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs
- Structure simple Python programs for solving problems
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries
- Read and write data from/to files in Python Programs
- Understand various program object and graphics based on python

UNITI FUNDAMENTALS 9

The Universal Machine-Program power- What is Computer Science?-Hardware Basics-Programming Languages-Python-Inside Python program-Software Development Process- Example program-Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNITII DECISION STRUCTURESANDLOOPS 9

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops- indefinite loops-common loop patterns-Booleans

UNITIII FUNCTIONS 9

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNITIV SEQUENCES 9

String data type- String Processing-List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNITV OBJECTS ANDGRAPHICS 9

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Zelle	Python Programming: An Introduction to Computer Science	2nd Edition, Franklin & Associates	2009
2	Mark Lutz	Learning Python	OReily	2013
3	David Beazly & Brian K. Jones	Python Cookbook	OReily	2013

15BECSOE02 INTERNETPROGRAMMING L T P C 3 0 03

COURSE OBJECTIVES:

- To study concepts of Internet, IP addresses and protocols
- To explain the concept of web page development through HTML
- To introduce the PERL and explore its current strengths and Weaknesses
- To write working Java code to demonstrate the use of applets for client-side programming
- To study Internet telephony and various multimedia applications
- To Elaborate on the principles of web page development

COURSE OUTCOMES:

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

- Learn the advanced concepts& techniques of Internet and Java.
- Analyze the requirements for and create and implement the principles of web page development
- Understand the concepts of PERL
- Implement client-side programming using java applets
- Generate internet telephony based upon advanced concepts
- Develop applications on internet programming based on java applets and scripts

UNITIINTRODUCTION 9

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNITII HTML 9

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNITIII PERL 9

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IVCLIENT-SERVERPROGRAMMING 9

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT VINTERNET TELEPHONY 9

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N.P. Gopalan and J. Akilandeswari	Web Technology: A Developer's Perspective	PHI Learning, Delhi	2013
2	Rahul Banerjee	Internetworking Technologies, An Engineering Perspective	PHI Learning, Delhi	2011

15BECSOE03 MULTIMEDIAANDANIMATION L T P C 3 0 0 3

COURSE OBJECTIVES:

- To impart the fundamental concepts of Computer Animation and Multimedia
- To study the graphic techniques and algorithms using flash
- Explain various concepts available in 3D animation
- Explain various devices available for animation
- To study the multimedia concepts and various I/O technologies for concept development
- To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

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

- Develop their creativity using animation and multimedia
- Understand the concepts of Flash and able to develop animation using it
- Understand about various latest interactive 3D animation concepts
- Know the various devices and software available in motion capture
- Understand the concept development process
- Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNITI INTRODUCTION 9

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II CREATING ANIMATIONINFLASH 9

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D ANIMATION &ITSCONCEPTS 9

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3DAnimation.

UNIT IVMOTIONCAPTION 9

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT VCONCEPT DEVELOPMENT 9

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ranjan Parekh	Principles of Multimedia	TMH	2007
2	Malay K. Pakhira	Computer Graphics, Multimedia and Animation	PHI Learning PVt Ltd	2010
3	Pankaj Dhaka	Encyclopedia of Multimedia and Animations	Anmol Publications	2011

15BECSOE04 PC HARDWARE AND TROUBLE SHOOTING L T P C 3 0 0 3

COURSE OBJECTIVES:

- To study the basic parts of computer in detail
- Introduce various peripheral devices available for computer and its detailed working concepts
- Overview of various interfaces and other hardware overview
- Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
- To study basic concepts and methods in troubleshooting
- To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

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

- Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
- Identify various peripheral devices available and its working
- Understand various concepts of hardware and its interface and control
- Perform basic installation of PC. Importance of maintenance is understood
- Understand Various faults and failures are identified and troubleshooting in detail
- Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNITI INTRODUCTION 9

Introduction-ComputerOrganization–NumberSystemsandCodes–Memory–ALU–CU–Instructionprefetch–Interrupts–I/OTechniques–DeviceControllers–ErrorDetectionTechniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC andUser.

UNIT II PERIPHERALDEVICES 9

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – SpecialTypesofDiskDrives–MouseandTrackball–Modem–Fax-Modem–CDROMDrive– **Scanner – Digital Camera – DVD – Special Peripherals.**

UNIT III PCHARDWARE OVERVIEW 9

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV INSTALLATION ANDPREVENTIVEMAINTENANCE 9

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – DataRecovery.

UNITV TROUBLESHOOTING 9

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification– Troubleshooting levels – FDD, HDD, CD ROM Problems.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B. Govindarajalu	IBM PC Clones Hardware, Troubleshooting and Maintenance	2/E, TMH	2002
2	Peter Abel, Niyaz Nizamuddin	IMB PC Assembly Language and Programming	PHI Learning, Delhi	2011
3	Scott Mueller	Repairing PC's	PHI	1992

15BECSOE05 GAME PROGRAMMING L T P C 3 0 0 3

COURSE OBJECTIVES:

- To understand the basic requirements, installation and structure of gaming using Java
- Discuss various aspects of safe cracker projects
- Discuss various aspects of match game projects
- Discuss various aspects of pizza delivery projects
- Discuss various aspects of moon landing projects
- Discuss the process of development of gaming using Java

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Interpret various concepts of gaming based on Java
- Design the frame and code to develop safe cracker project
- Design the frame and code to develop match game project
- Design the frame and code to develop pizza delivery project
- Design the frame and code to develop moon landing project
- Design and develop various games using Java

UNITI INTRODUCTION 9

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT IISAFECRACKERPROJECT 9

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III MATCHGAMEPROJECT 9

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV PIZZADELIVERYPROJECT 9

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project- Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects-Updating Scores

UNIT V MOONLANDING PROJECT 9

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

TOTAL: 45 HOURS

15BECSOE05 **GAME PROGRAMMING** **L T P C 3 0 0 3**

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Philip Conrod, Lou Tylee	Programming Games with Java		2013
2	Timothy M.Right	Fundamental 2D Game Programming with Java	Cengage Learning PTR	2013
3	Wayne Holder,Doug Bell	Java Game Programming for Dummies		

15BEECOE01 REAL TIMEEMBEDDEDSYSTEMS L T P C 3 0 03

Course Objectives

- To introduce students to the embedded systems, its hardware and software.
- To introduce devices and buses used for embedded networking.
- To study about task management
- To learn about semaphore management and message passing
- To study about memory management
- To imparts knowledge on

Course Outcomes

At the end of the course the students will be able to

- Understand overview of embedded systems architecture
- Acquire knowledge on embedded system, its hardware and software.
- Gain knowledge on overview of Operating system
- Discuss about task Management
- Gain knowledge about semaphore management and message passing.
- Gain knowledge about memory management.

UNIT I INTRODUCTION TOEMBEDDEDSYSTEM 9

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection &tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT II OPERATINGSYSTEMOVERVIEW 9

Introduction –Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT IIITASKMANAGEMENT 9

Introduction - µC/OS-II Features - Goals of µC/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks –Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under µC/OS-II – Clock Tick - µC/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT IV SEMAPHORE MANAGEMENT ANDMESSAGEPASSING 9

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue –

Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing aQueue.

UNIT VMEMORYMANAGEMENT 9

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with µC/OS-II – Installing µC/OS-II – Porting µC/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with µC/OS-II - µC/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of µC/OS-II.

- **REFERENCES**

S.NO	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARMArchitecture ReferenceManual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

15BEECOE02 CONSUMERELECTRONICS L T P C 3 0 03

Course Objectives

- To study about various speakers and microphone
- To learn the fundamental of television systems and standards
- To learn the process of audio recording and reproduction
- To study various telephone networks
- To discuss about the working of home appliances
- To familiarize with TV services like ISDN.

Course Outcomes

At the end of the course the students will be able to

- Understand working of various type of loud speakers
- Acquire knowledge on various types of picture tubes
- Demonstrate the working of various optical recording systems
- Distinguish various standards for color TV system
- Acquire knowledge on various telecommunication networks
- Demonstrate the working of various home appliances

UNIT I LOUDSPEAKERSANDMICROPHONES 9

Dynamic Loudspeaker, Electrostatic loudspeaker,Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics,Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT II TELEVISION STANDARDSANDSYSTEMS 9

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT III OPTICAL RECORDINGANDREPRODUCTION 9

Audio Disc – Processing of the Audio signal –read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT IVTELECOMMUNICATIONSYSTEMS 9

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT VHOME APPLIANCES 9

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

TOTAL: 45 HOURS

TEXT BOOK

S.NO	Author(s)Name	Title of the book	Publisher	Year of Publication
1	S.P.Bali	Consumer Electronics	Pearson Education	2005

15BEECOE03 FUNDAMENTALS OF NANOTECH L T P C 3 0 0 3

Course Objectives

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

UNIT I LIMITATIONSOFCMOS 9

Fundamentals of MOSFET devices - Scaling of CMOS – Limitations – Alternative concepts in materials – Structures of MOS devices: **SOI MOSFET, FINFETS, Dual Gate MOSFET, Ferro electric FETs.**

UNIT II MICRO ANDNANO FABRICATION 9

Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nanolithography.

UNIT IIICHARACTERIZATIONEQUIPMENTS 9

Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.

UNIT IV NANO DEVICES–I 9

Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.

UNIT V NANO DEVICES–II 9

Quantum computing**: principles – Qbits – Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM**

TOTAL: 45 HOURS

TEXT BOOK

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Rainer Waser (Ed)	Nano electronics and information technology	Wiley- VCH. 3rd Edition	2012

REFERENCES

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Thomas Heinzel	A Microscopic Electronics in Solid State Nanostructure	Wiley- VCH	2008
2	Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse	Nanotechnology – (Basic Science and Emerging Technologies	Overseas Press	2002
3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction tothe Next Big idea	Pearson education	2003

15BEECOE04 IMAGE AND VIDEO PROCESSING L T P C 3 0 03

Course Objectives

- Tostudytheimagefundamentalsandmathematicaltransformsnecessaryforimage processing.
- Tostudytheimageenhancementtechniques
- Tostudytheimagecompressionprocedures.
- Tostudytheimagesegmentationandrepresentationtechniques.
- Tostudythevideoprocessingfundamentals
- To know the concepts ofmotionestimation

Course outcomes

- Understandtheimagefundamentalsandmathematicaltransforms necessaryforimage processing.
- Understandtheimageenhancementtechniques
- Understandtheimagecompressionprocedures.
- Understandtheimagesegmentationandrepresentationtechniques.
- Understand the video processing fundamentals
- Understand motion estimation concepts

UNIT I FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS 9

Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGEPROCESSINGTECHNIQUES 9

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters,Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selectivefiltering.

UNIT III IMAGE SEGMENTATIONANDCOMPRESSION 9

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffmann coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEGstandards.

UNIT IV BASICS OFVIDEOPROCESSING 9

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filteringoperations.

UNIT V 2-DMOTIONESTIMATION 9

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TOTAL: 45 HOURS

TEXTBOOKS

1. Gonzaleze and Woods ,"Digital Image Processing ", 3rd editionPearson.
2. Yao wang, Joem Ostarmann and Ya – quin Zhang, "Video processing andcommunication **",1st edition PHI.**

REFERENCES

1. M. Tekalp ,"Digital video Processing", Prentice llInternational.
2. Aner ozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", JohnWiley &Sons.
3. Chris Solomon, Toby Breckon ,"Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", John Wiley &Sons.

15BEECOE05 VLSI TECHNOLOGY L T P C 3 0 03

Course Objectives

- To learn the processing steps in fabrication of VLSI devices.
- To learn the concepts of assembling and packaging for VLSI devices.
- To imparts a good knowledge in reactive plasma etching techniques and equipment.
- To familiarize the students with the NMOS and CMOS IC technology.
- To make the student acquire reactive Plasma Etching techniques and Equipment.
- To acquaint the student with the VLSI assembly technology and package fabrication technology

Course outcomes

After completing this course, the students will be able to

- List out various fabrication techniques
- Understand the etching principle in IC fabrication
- Gain knowledge on deposition and diffusion methods
- Understand the process simulation and integration.
- Assembling and packing techniques
- various technologies used for fabricating VLSI devices

UNIT1 **9**

Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: Ids-Vds relationships, Threshold Voltage Vt, Gm, Gds and ωo, Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Zpu/Zpd, MOS Transistor circuit model, Latch-up in CMOS circuits.

UNITII **9**

Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.

Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNITIII **9**

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNITIV **9**

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNITV **9**

Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

TOTAL: 45 HOURS

TEXT BOOKS

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	K. Eshraghian Eshraghian. D, A.Pucknell	Essentials of VLSI Circuits and Systems	PHI	2005
2	Wayne Wolf	Modern VLSI Design	Pearson Education, 3rd edition	1997

REFERENCES

1. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., AdissonWesley.

15BEECOE06 FUNDAMENTALS OF MEMS L T P C 3 0 0 3

Course Objectives

- To study materials used for MEMS and its working
- To study the fabrication process used for MEMS
- To study the packaging process used for MEMS
- To familiarize the students with various micro actuators and micro sensors.
- To learn the survey of materials central to micro engineering.
- To imparts good knowledge in micro system packaging materials

Course Outcomes

At the end of the course the students will be able to

- Appreciate the underlying working principles of MEMS devices.
- Understand the working of Micro sensors and actuators
- Explain the IC fabrication processes
- Gain knowledge on bulk manufacturing
- Understand the Design of Micro systems.
- Design and model MEMS devices.

UNIT I INTRODUCTION TO MEMS ANDMICROFABRICATION 9

History of MEMS Development, Characteristics of MEMS-Miniaturization - Micro electronics integration - Mass fabrication with precision. Sensors and Actuators- Energy domain. Sensors, actuators Micro fabrication - microelectronics fabrication process- Silicon based MEMS processes- New material and fabrication processing- Points of consideration for processing. Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process- structural and sacrificial material.

UNIT II ELECTRICAL AND MECHANICAL CONCEPTSOFMEMS 9

Conductivity of semiconductors, crystal plane and orientation, stress and strain - definition - Relationship between tensile stress and strain- mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- longitudinal strain under pure bending -deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and qualityfactor.

UNIT III ELECTROSTATIC AND THERMAL PRINCIPLE SENSING AND ACTUATION 9

Electrostatic sensing and actuation-Parallel plate capacitor - Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuations-Thermal sensors-Actuators-Applications Inertial, flow and infraredsensors.

UNIT IV PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLE SENSORS ANDACTUATOR 9

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane-Application-Inertial, pressure, flow and tactile sensor.Piezoelectric sensing and actuation- piezoelectric material properties-quartz- PZT-PVDF -ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation- Micro magnetic actuation principle- Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V POLYMER ANDOPTICALMEMS **9**

Polymers in MEMS- polymide-SU-8 Liquid crystal polymer(LCP)- PDMS – PMMA – Parylene - Flurocorbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

TOTAL: 45 HOURS

TEXT BOOK

S.No.	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1st Edition	2012

REFERENCES

S.No.	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Gaberiel M. Rebiz	RF MEMS Theory, Designand Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J.Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W.Gardnerand Vijay K Varadhan	Microsensors,MEMS and Smart Devices	John Wiley & sons	2001

15BEECOE07 NEURAL NETWORKS AND ITS APPLICATIONS L T P C 3 0 03

Course Objectives

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

UNIT I INTRODUCTION TONEURAL NETWORKS 9

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks.

UNIT IILEARNING PROCESS 9

Error – correction learning – memory based learning - hebbian learning-competitive learning-Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNITIII PERCEPTION 9

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm-Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm.

UNIT IV ATTRACTOR NEURAL NETWORKANDART 9

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain- Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP.

UNIT VSELFORGANIZATION 9

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements.

TOTAL: 45 HOURS

REFERENCES

S.No.	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Simon Haykin	Neural Networks and Learning Machines	-3/E - Pearson/ Prentice Hall	2009
2	Satish Kumar	Neural Networks :A ClassroomApproach	TMH	2008
3	Freeman J.A., Skapura D.M	Neural networks, algorithms, applications, and programming techniques	Addition Wesley	2005
4	Laurene Fausett	Fundamentals of Neural Networks: Architectures, Algorithms, and Applications	Pearson/ Prentice Hall	2000
5	Robert J Schalkoff	Artificial Neural Networks	McGraw Hill	1997

15BEECOE08 FUZZY LOGIC ANDITSAPPLICATIONS L T P C 3 0 03

Course Objectives

- To introduce the basic concepts of Fuzzy logic and its applications in various domain
- To educate how to use Fuzzy computation to solve real-world problems
- To have a solid understanding of Basic fuzzy models.
- Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
- To learn about applications on Fuzzy based systems
- To familiarize with fuzzy fiction and de fuzzy fiction procedures

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of Fuzzy logic and its applications in various domain
- Gain knowledge on theory of Reasoning
- Develop fuzzy controllers
- Understand concepts of adaptive fuzzy control
- Ability to develop how to use Fuzzy computation to solve real- world problems
- Design fuzzy based model for any application

UNITI **9**

Basics Of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNITII **9**

Theory Of Approximate Reasoning: **Linguistic variables, Fuzzy proportions, Fuzzy if- then statements, inference rules, compositional rule of inference-fuzzymodels**

UNITIII **9**

Fuzzy Knowledge Based Controllers (Fkbc): **Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzyfication and defuzzyfication procedures – Design of Fuzzy LogicController**

UNITIV **9**

Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNITV **9**

FUZZY BASED SYSTEMS

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications-Introduction to ANFIS.

TOTAL: 45 HOURS

TEXT BOOKS

S.No.	Author(s)Name	Title of the book	Publisher	Year of Publication
1	D. Diankar, H. Hellendoom and M. Reinfrank	An Introduction to Fuzzy Control	Narosa Publishers India	1996
2	G. J. Klir and T. A. Folger	Fuzzy Sets Uncertainty and Information	PHI IEEE	1995

BIO TECHNOLOGY

15BTBTOE01 BIOREACTORDESIGN L T P C 3 0 0 3

Course Objectives

- To impart basic knowledge in bioprocess Engineering
- To design the bioreactors for various operations.
- To understand the principle and working of heat transfer equipment.
- To extend the knowledge in principle of heat transfer inside a bioreactor
- To construct the equipment's used in mass transfer operations.
- To learn the equipment's used in separation process.

Course Outcomes

- Summarize the basic concepts in bioprocess Engineering.
- Ability to design the bioreactors for various operations.
- Ability to develop the heat transfer equipment's for Bioprocess Engineering.
- Ability to construct the equipment's used in mass transfer operations.
- To acquire the knowledge of regulatory constraints in bioprocess
- Categorize the equipment's used in separation process.

UNITI ENGINEERING PROPERTIES ANDSTORAGETANK 9

Introduction to various mechanical properties of material to be used material of construction, designof cylindrical storagetank.

UNITII REACTORDESIGN 9

Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNITIII HEATTRANSFEREQUIPMENTS 9

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNITIV MASSTRANSFEREQUIPMENTS 9

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNITV SEPERATIONEQUIPMENTS 9

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotart drum drier and Swenson –walker crystallizer.

TEXT BOOKS

S. No	Author(s) Name	Title of the book	Publisher	Yearof Publications
1	James Edwin Bailey, David F.Ollis	Biochemical Engineering	McGraw-Hill	2007

2	Don W. Green, Robert H. Perry	Chemical Engineer Hand book	The McGraw-Hill Companies	2008

REFERENCES

S. No	Author(s) Name	Title of the book	Publisher	Yearof Publications
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

15BTBTOE02 FOOD PROCESSING AND PRESERVATION L T P C 3 0 0 3

Course Objectives

- To learn the scope and importance of food processing.
- To impart basic knowledge in different food processing methods carried out in the food tech companies.
- To extend the brief knowledge in food conservation operations.
- To study the methods of food preservation by cooling.
- To familiarize the students on the concepts of preservation methods for fruits.
- To create deeper understanding on preservation methods for vegetables.

Course Outcomes

- Describe the scope and importance of food processing.
- Outline the various processing methods for foods.
- Extend the knowledge in food conservation operations.
- Describe the methods of food preservation by cooling.
- Summarize the preservation methods for fruits.
- Demonstrate the preservation methods for vegetables.

UNIT I SCOPE AND IMPORTANCE OFFOODPROCESSING 9

Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading,peeling.

UNIT IIPROCESSINGMETHODS 9

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives- fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipmentused.

UNIT III FOODCONVERSIONOPERATIONS 9

Size reduction- Fibrous foods, dryfoods and liquid foods- Theory and equipments- membrane separation- filtration- equipmentand application.

UNIT IV FOOD PRESERVATIONBYCOOLING 9

Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control wateractivity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES 9

Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar - Heat preservation– Food irradiation- Combined preservationtechniques.

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing	2000
3	Mircea Enachescu Dauthy	Fruit and Vegetable Processing	FAO agricultural services	1995

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Yearof Publications
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineeringproperties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

15BTBTOE03 MOLECULARMODELLING L T P C 3003

COURSE OBJECTIVES

1. To understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. To use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. To study reaction mechanisms, relative free energies and structural dynamics
4. To compute different experimental properties and spectra using computational techniques.
5. To understand how to construct, interpret and utilise potential energy surfaces.
6. To understand the theoretical and practical challenges associated with computational modeling.

COURSE OUTCOMES

1. Understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. Can use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. Study reaction mechanisms, relative free energies and structural dynamics
4. Compute different experimental properties and spectra using computational techniques.
5. Understand how to construct, interpret and utilise potential energy surfaces.
6. Understand the theoretical and practical challenges associated with computational modeling.

UNIT I MOLECULARMODELLING 9

Introductiontoconceptofmolecularmodeling,molecularstructureandinternalenergy,applicationsof moleculargraphics,coordinatesystems,potentialenergysurfaces,discussionoflocalandglobalenergy minima.

UNITII QUANTUMMECHANICS 9

Introduction tothecomputationalquantum mechanics;oneelectronatom,ply electronicatomsand molecules, HartreeFockequations;calculatingmolecular properties usingabinitioandsemiempirical methods.

UNITIII MOLECULARMECHANICS 9

Molecular mechanics;generalfeaturesofmolecular mechanicsforcefield,bondstretching,angle bending,torsionalterms,non–bondedinteractions;forcefieldparameterizationandtransferability;energy minimization;derivativeandnon–derivativemethods,applicationsofenergyminimization.

UNITIV MOLECULARDYNAMCS 9

Molecular dynamicssimulation methods;moleculardynamics usingsimple models, molecular dynamicswithcontinuouspotential, setting upandrunningamolecular dynamicsimulation,constraint dynamics;MonteCarlosimulation;MonteCarlosimulationofmolecules.

UNITV MODELLINGANDDRUGDESIGN 9

Macromolecular modeling,designofligandsforknownmacromoleculartargetsites,Drug-receptor interaction,classicalSAR/QSARstudiesandtheirimplicationstothe3Dmodeler,2-Dand3-Ddatabase

searching,pharmacophore identificationandnoveldrugdesign,moleculardocking,Structure-based drug design forallclassesoftargets.

TOTAL: 45 HOURS

TEXTBOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Year of Publications
1	AndrewLeach	Molecular Modelling: PrinciplesandApplications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular ModelinginDrugDesign	Academic Press	1996

REFERENCEBOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Year of Publications
1	Yvonne C. Martin, editor, PeterWillett	Designing bioactive molecules :three- dimensional techniquesand applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	MolecularModelingonthe PC	Wiley- Blackwell; Har	1998

15BTBTOE04 BIOREMEDIATION L T P C3003

COURSE OBJECTIVES

1. To understand the basics ofbiology
2. To gain knowledge about differentbiomolecules
3. To get familiarize with humandiseases.
4. To learn about DNA & RNA.
5. To learn about different clinicalinvestigations
6. To know the recent advances inbiology

COURSE OUTCOMES

At the end of the course

1. Summarize the cell structures and itsfunctions
2. Explain the Biomoleculesfunctions
3. Classify the communicable and non-communicable humandiseases
4. Illustrate the different organ functiontests
5. Tell the applications of biology in environmentalapplications
6. Describe the concept ofbiomechanics

UNIT I OVERVIEWOFBIOREMEDIATION 9

Pollution : Types and its consequences, Historyofbioremediation,Sourcesofcontamination,Bioremediationprocesses,Environmentswhere bioremediationisused,Microbiologyofbioremediation.

UNITII BIOFILMPROCESSES 9

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media Filters,Fluidized-bedReactors,HybridBiofilmProcesses.

UNITIII BIOREMEDIATIONFORSOILENVIRONMENT 9

EnvironmentofSoilMicroorganisms, SoilOrganicMatterandCharacteristics,SoilMicroorganisms AssociationwithPlants,PesticidesandMicroorganisms, PetroleumHydrocarbonsandMicroorganisms, IndustrialsolventsandMicroorganism,BiotechnologiesforEx-SituRemediation&in-SituRemediation ofSoil PhytoremediationTechnologyforSoilDecontamination.

UNIT IV BIOREMEDIATIONFORAIRANDWATERENVIRONMEN 9

AtmosphericEnvironmentforMicroorganisms,MicrobialDegradationofContaminantsinGasPhase, BiologicalFiltrationProcessesforDecontaminationofAirStream-Biofiltration,BiotricklingFiltration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater BiotreatmentTechnologies,BiotreatmentofSurfaceWaters.

UNITV BIOREMEDIATIONOFMETALS 9

Microbial Transformation of Metals**,** Biological Treatment Technologies for Metals Remediation**,**Bioleaching and Biobenificiation**,** Bioaccumulation**,** Oxidation/Reduction Processes**,** Biological Methylation

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Rittmann,B.E., and McCarty, P.L.,	Environmental Biotechnology : Principles andApplications.	McGraw Hill,	2001
2	JohnCookson	BioremediationEngineering: DesignandApplications	McGraw-Hill	1995

REFERENCES

S.No.	Author(s) Name	Titleofthebook	Publisher	Year of Publications
1	Prescott,L.M., Harley, and Klein,D.A	Microbiology	McGraw-HillHigher Education	2008

15BTBTOE05 BIOPHYSICS L T P C 3003

COURSE OBJECTIVES

1. To study selected biological phenomena using physical principles.
2. To understand the biological and environmental sciences.
3. To gain the knowledge on technical enormous impact of the biological sciences.
4. To acquire the knowledge about molecular structure of biological systems.
5. To know the uses of proteins and its functions.
6. To understand the biological structure & function: Size and shape of macromolecules.

COURSE OUTCOMES

1. Study selected biological phenomena using physical principles.
2. Understand the biological and environmental sciences.
3. Gain the knowledge on technical enormous impact of the biological sciences.
4. Acquire the knowledge about molecular structure of biological systems.
5. Know the uses of proteins and its functions.
6. Understand the biological structure & function: Size and shape of macromolecules.

UNITI MOLECULARSTRUCTUREOFBIOLOGICALSYSTEMS 9

Intramolecularbonds–covalent–ionicandhydrogenbonds–biologicalstructures-generalfeatures – waterstructure– hydration – interficial phenomena and membranes – self assembly and molecular structureofmembranes.

UNITII CONFORMATIONOFNUCLEICACIDS 9

Primarystructure–thebases–sugarsandthephosphodiesterbonds-doublehelicalstructure–A,B andZforms–propertiesofcircularDNA–topology–polymorphismandflexibilityofDNA–structure ofribonucleicacids–hydrationofnucleicacids.

UNITIII CONFORMATIONOFPROTEINS 9

Conformation ofthepeptidebond–secondarystructures–ramachandranplots–useofpotential functions–tertiarystructure–folding–hydrationofproteins–hydropathyindex.

UNITIV ENERGETICS&DYNAMICSOFBIOLOGICALSYSTEMS 9

Kineticsofligandinteractions;Biochemicalkineticsstudies,uni-molecular reactions,simplebimolecular multipleintermediates,steadystatekinetics,catalyticefficiency,relaxationspectrometry,ribonuclease as an example.

UNITV APPLIEDTECHNIQUES 9

Techniquesforthestudyofbiologicalstructure&function:Sizeandshapeofmacromolecules–methodsof direct visualizationmacromoleculesashydrodynamicparticles–macromoleculesdiffusion–ultra centrifugation–viscometryx-raycrystallography determinationofmolecularstructures,X-rayfibre diffusionelectronmicroscopyneutronscattering–light scattering.

TOTAL: 45 HOURS

TEXTBOOKS

S.No	Author(s)Name	Titleofthebook	Publisher	Year of Publications
1	RolandGlaser	Biophysics	Springer Science &Business Media	2001
2	MichelDaune	Molecular Biophysics: StructuresinMotion	Oxford University Press	1999
3	CharlesR.Cantor	BiophysicalChemistry, Part2:Techniques f theStudy ofBiologic StructureandFunction	W. H. Freeman and Company	1980

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15BTBTOE06 BASICBIOINFORMATICS L T P C 3003

COURSE OBJECTIVES

1. To understand the available tools and databases for performing research inbioinformatics.
2. To expose students to sequence alignment tool inbioinformatics.
3. To construct the phylogenetic trees forevolution.
4. To get familiar with the 3D structure of protein andclassification.
5. To acquire basic knowledge in protein secondary structureprediction.
6. To extend the brief knowledge in Micro array dataanalysis.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Summarize the basic concepts and importance of Bioinformatics in varioussectors.
2. Demonstrate the sequence alignment tool inbioinformatics.
3. Construct the phylogenetic trees forevolution.
4. Analyze the three dimensional protein structure and classification using varioustools.
5. Illustrate the protein secondary structure prediction by comparativemodeling.

6. Extend the knowledge in micro array technology and applications of bioinformatics in varioussectors.

UNITI OVERVIEWOFBIOINFORMATICS 9

Thescopeofbioinformatics; bioinformatics&theinternet;usefulbioinformatics sites.Data acquisition:sequencingDNA,RNA&proteins;determination ofproteinstructure;gene&protein expression data;proteininteractiondata. Databases–contents,structure&annotation:fileformats; annotatedsequencedatabases;miscellaneousdatabases.

UNITII RETRIEVALOFBIOLOGICALDATA 9

DataretrievalwithEntrez&DBGET/LinkDB;dataretrievalwithSRS(sequence retrieval system).Searching sequencedatabasesbysequencesimilaritycriteria:sequencesimilarity searches;aminoacidsubstitution matrices;databasesearches,FASTA&BLAST;sequence filters;iterativedatabasesearches&PSI-BLAST.Multiple-sequence alignment,gene&protein families:multiple-sequence alignment&family relationships;proteinfamilies&pattern databases;proteindomainfamilies.

UNITIII PHYLOGENETICS 9

Phylogenetics, cladistics &ontology; building phylogenetic trees; evolution of macromolecularsequences.Sequenceannotation:principlesofgenomeannotation;annotationtools &resources.

UNITIV STRUCTURALBIOINFORMATICS 9

Conceptualmodelsofproteinstructure;therelationshipofproteinthree-dimensional structureto proteinfunction;theevolutionofproteinstructure&function;obtaining, viewing&analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure:CATH&SCOP;introduction toproteinstructureprediction;structurepredictionby comparativemodeling;secondary structureprediction;advancedproteinstructureprediction& predictionstrategies.

UNITV MICROARRAYDATAANALYSIS 9

Microarray data,analysismethods;microarraydata,tools&resources;sequencesampling&SAGE.Bioinformatics inpharmaceuticalindustry:informatics&drugdiscovery; pharmainformatics resources.Basicprinciplesofcomputinginbioinformatics:runningcomputer software;computeroperatingsystems;softwaredownloading &installation;database management.

TOTAL: 45 HOURS

TEXTBOOK

S. No.	Author (s) Name	Titleof thebook	Publisher	Year of Publication
1	Dan E. Krane, Michae L. Rayme	Fundamental Concepts of Bioinformatics	Pearsoneducation	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical GuidetotheAnalysisofGenes andProteins	Wiley-Interscience	2004
3	David W. Mount	SequenceandGenomeAnalysis	ColdSpringHarbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCES

S. No.	Author (s) Name	Titleof thebook	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: MethodsandApplications	Springer Science & BusinessMedia	2007

15BTBTOE07 FUNDAMENTALSOFNANO BIOTECHNOLOGY L T P C 3003

COURSE OBJECTIVES

1. To impart the skills in the field of nano biotechnology and itsapplications.
2. To acquire knowledge in the nano particles and its significance in variousfields.
3. To extend the knowledge in types and application of nano particles insensors.
4. To define the concepts of biomaterials through molecular selfassembly.
5. To equip students with clinical applications of nanodevices.
6. To describe deeper understanding of the socio-economic issues innanobiotechnology.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Develop skills in the field of nano biotechnology and itsapplications.
2. Summarize the nanoparticles and its significance in variousfields.
3. Extend the knowledge in types and application of nano particles insensors.
4. Define the concepts of biomaterials through molecular selfassembly.
5. Outline the clinical applications of nanodevices.
6. **Describe the socio-economic issues innanobiotechnology.**

UNITI INTRODUCTION 9

Introduction, ScopeandOverview,Lengthscales,Importance ofNanoscaleandTechnology, HistoryofNanotechnology, FutureofNanotechnology:NanoTechnologyRevolution,Silicon basedTechnology,BenefitsandchallengesinMolecularmanufacturing: TheMolecular assemblerconcept,Controversiesandconfusions,Understanding advancedcapabilities, NanotechnologyinDifferent,Fields:Nanobiotechnology,Materials,Medicine,Dentalcare.

UNITII NANOPARTICLES 9

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, CharacterizationofNanoparticles, Applications,ToxiceffectsofNanomaterials, Significance ofNanoparticlesNanofabrications-MEMS/NEMS,Atomic ForceMicroscopy,Selfassembled monolayers/Dip-penNanolithography, SoftLithography, PDMSMolding,NanoParticles, Nanowires andNanotubes.

UNITIII APPLICATIONS 9

Nanomedicine,NanobiocensorandNanofludics.Nanocrystals inbiologicaldetection, ElectrochemicalDNAsensorsandIntegratedNanolitersystems.Nano-Biodevices and Systems.Fabricationof NovelBiomaterialsthroughmolecularself assembly-Small scale systemsforinvivodrugdelivery-Futurenanomachine.

UNITIV NANOBIOTECHNOLOGY 9

Clinicalapplicationsofnanodevices.Artificialneurons.Real-timenanosensors-Applicationsin cancerbiology.Nanomedicine.Synthetic retinylchipsbasedonbacteriorhodopsins.High throughputDNAsequencingwithnanocarbontubules.Nanosurgicaldevices.

UNITV ETHICALISSUESINNANOTECHNOLOGY 9

Introduction,Socioeconomic Challenges,EthicalIssuesinNanotechnology: WithEspecial ReferencetoNanomedicine, NanomedicineAppliedinNonmedicalContexts,SocialIssues RelatingtoNanomedicine. SocialandEthicalIssues,EconomicImpacts,OtherIssues, Nanotechnologyand FutureSocio-economicchallenges.

TOTAL: 45 HOURS

TEXTBOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Yearof Publications
1	Niemeyer,C.M. andMirkin,C.A	Nanobiotechnology:Concepts, Applicationsand Perspectives	Wiley-VCH	2004
2	Goodsell,D.S.	Bionanotechnology	JohnWiley andSons, Inc	2004

REFERENCES

S.No.	Author(s) Name	Titleofthebook	Publisher	Yearof Publications
1	Shoseyov,O. and Levy,I	Nanobiotechnology: BioinspiredDevicesand Materialsof theFuture	Humana Press	2007
2	Bhushan,B.	SpringerHandbookof Nanotechnology	Springer-Verlag Berlin Heidelberg	2004
3	FreitasJrR.A	Nanomedicine	Landes Biosciences	2004
4	Kohler,M.and Fritzsche,W.	Nanotechnology–An IntroductiontoNanostructuring Techniques	Wiley-VCH	2004

MECHANICAL ENGINEERING

15BEMEOE01 INTRODUCTION TO MEMS L T P C 3 0 0 3

Course Objective

1. To explain to the students about MEMS Technology, Present, Future and Challenges.
2. To gain a knowledge of basic approaches for microsystem design.
3. To gain a knowledge of state-of-the-art lithography techniques for microsystems.
4. To learn new materials, science and technology for microsystem applications.
5. To understand materials science for microsystem applications.
6. To understand state-of-the-art micromachining and packaging technologies.

Course Outcome

1. Students will explain MEMS Technology, Present, Future and Challenges.
2. Grain a knowledge of basic approaches for microsystem design
3. Gain a knowledge of state-of-the-art lithography techniques for microsystems
4. Learn new materials, science and technology for microsystem applications
5. Understand materials science for microsystem applications
6. Understand state-of-the-art micromachining and packaging technologies

UNIT I INTRODUCTION 9

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I 9

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II 9

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING 9

Silicon Anisotropic Etching – Anisotrophic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS 9

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Education Inc	2006
2	Stephen D Senturia	Microsystem Design	Springer Publication	2000
3	Tai Ran Hsu	MEMS & Micro systems Design and Manufacture	Tata McGraw Hill, New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nadim Maluf	An Introduction to Micro Electro Mechanical System Design	Artech House	2000
2	Mohamed Gad-el-Hak	The MEMS Handbook	CRC press Baco Raton	2000
3	Julian w. Gardner, Vijay K. Varadan, Osama O. Awadelkarim	Micro Sensors MEMS andSmart Devices	John Wiley & Son LTD	2002
4	James J.Allen	Micro Electro Mechanical System Design	CRC Press Publisher	2010
5	Thomas M.Adams and Richard A.Layton	Introduction MEMS, Fabrication and Application	Springer	2012

Course Objective

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

Course Outcome

1. Develop the student's knowledge in various robot structures and their workspace.
2. Develop student's skills in performing spatial transformations associated with rigid body motions.
3. Develop student's skills in perform kinematics analysis of robot systems.
4. Provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. Provide the student with some knowledge and analysis skills associated with trajectory planning.
6. Provide the student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OF ROBOT 9

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations and problems.

UNIT II DRIVES AND SENSORS 9

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMING AND APPLICATIONS 9

Robot programming languages – VAL programming – Motion Commands, Sensorscommands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINE VISION 9

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD,CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS 9

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Klafter R.D., Chmielewski T.A and Negin M	Robotic Engineering - An Integrated Approach	Prentice Hall	2003
2	Groover M.P	Industrial Robotics - Technology Programming and Applications	McGraw Hill	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Craig J.J	Introduction to Robotics Mechanics and Control	Pearson Education	2008
2	Deb S.R	Robotics Technology and Flexible Automation	Tata McGraw Hill Book Co	1994
3	Koren Y	Robotics for Engineers	Mc Graw Hill Book Co	1992
4	Fu.K.S.,Gonzalz R.C. and Lee C.S.G	Robotics Control, Sensing, Vision and Intelligence	Mc Graw Hill Book Co	1987
5	Janakiraman P.A	Robotics and Image Processing	Tata McGraw Hill	1995
6	Rajput R.K	Robotics and Industrial Automation	S.Chand and Company	2008
7	Surender Kumar	Industrial Robots and Computer Integrated Manufacturing	Oxford and IBH Publishing Co. Pvt. Ltd	1991

15BEMEOE03 INDUSTRIAL SAFETY AND ENVIRONMENT L T P C 3 0 0 3

Course Objective

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

Course Outcome

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS 9

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN 9

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS 9

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES 9

Structuring the SC, SC and new products, functional roles in SC - SC design frame- work - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM 9

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shari.P.B and Lassen.T.S	Managing the global supply chain	Viva books, New Delhi	2000
2	Ayers.J.B	Hand book of supply chain	The St. Lencie press	2000

		management		

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nicolas.J.N	Competitive manufacturing management - continuous improvement	Lean production, customer focused quality, McGrawHill, New York	1998
2	Steudel.H.J and Desruelle.P	Manufacturing in the nineteen - How to become a mean, lean and world class competitor	Van No strand Reinhold, New York	1992

15BEMEOE04 TRANSPORT PHENOMENA L T P C 3 0 0 3

Course Objective

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

Course Outcome

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS 9

General overview of transport phenomena including various applications, Transport of momentum, heat and mass , Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS 9

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT 9

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non- Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT 9

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometrics in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT 9

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion- Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

TOTAL: 45 HOURS

REFERENCES

1. Geankoplis, C. J. 2003. Transport Processes and Separation Processes Principles. 4th Edition. Prentice Hall.
2. https://laulima.hawaii.edu/portal

15BEMEOE05 INTRODUCTION TO BIOMECHANICS L T P C 3 0 0 3

Course Objective

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

Course Outcome

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION 9

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEY MECHANICAL CONCEPTS 9

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY 9

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION 9

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM 9

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Duane Knudson	Fundamentals of Biomechanics	Springer Science Business Media, LLC	2007
2	C. Ross Ethier Craig A. Simmons	Introductory Biomechanics	Cambridge University Press	2007

15BEAEOE01 AUTOMOBILE ENGINEERING L T P C
3 0 0 3

Course Objectives:

- To impart knowledge on the constructional details and principle of operation of various automobile components.
- To learn the function and working of various components in transmission and drive lines.
- To study the concept and working of steering and suspension systems in an automobile.
- To give knowledge on the wheels, tyres and brakes of automobiles.
- To provide information on the current and future trends in automobiles.
- Identify and explain the types of steering system.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Demonstrate the operating principles and constructional details of various automobile components.
- Explain the function and working of components in transmission and drive lines.
- Identify and explain the types of steering system.
- Identify and explain the types of suspension system.
- Classify and describe the types of wheels, tyres and brakes of automobiles.
- Discuss the current and future trends in the automobiles.

UNIT I ENGINE AND FUEL FEED SYSTEMS 9

Classification of Engine , construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI).

UNIT II TRANSMISSION SYSTEMS **9**

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propellar Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT III SUSPENSION SYSTEM 9

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT IV BRAKES 9

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT -V ELECTRICAL SYSTEM 9

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator. Starting System and charging system.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment", 3rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

15BEAEOE02 BASICS OF TWO AND THREE WHEELERS L T P C
3 0 0 3

Course Objectives

- **The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.**
- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
- Explain the servicing of two and three wheelers.

UNIT I INTRODUCTION 9

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS 9

2 stoke and 4 stoke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION 9

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES 9

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS 9

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

15BEAEOE03 AUTOMOBILE MAINTENANCE L T P C
3 0 0 3

Course Objectives

- **The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems inAutomobile.**
- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.
- Explain the fault diagnosis in the electrical and air conditioner systems.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES 9

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE 9

Dismantling of engine components and cleaning, cleaning methods, visual anddimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE 9

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE 9

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY 9

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing,

greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	John Doke	Fleet Management	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

15BEAEOE04 INTRODUCTION TO MODERN VEHICLE TECHNOLOGY

L T P C
3 0 0 3

Course Objectives:

- To impart knowledge on trends in the vehicle power plants.
- To learn the various advanced driver assistance systems.
- To study the working of advanced suspension and braking systems in an automobile.
- To give information about motor vehicle emission and noise pollution control.
- To provide knowledge of the vehicle telematics.
- To give information about the noise control techniques

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Distinguish and describe the various modern vehicle power plant systems.
- List and explain the various driver assistant mechanisms.
- Identify and describe the working of advanced suspension and braking systems.
- Apply the knowledge of motor vehicle emission and noise pollution control.
- Describe the noise control techniques
- Describe the vehicle telematics and its applications.

UNIT I TRENDS IN POWER PLANTS 9

Hybrid vehicles - Stratified charged / learn burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II DRIVER ASSISTANCE SYSTEMS 9

Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system.

UNIT III SUSPENSION BRAKES AND SAFETY 9

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV NOISE & POLLUTION 9

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT V TELEMATICS **9**

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Ljubo Vlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems Progress in Technology	**Automotive Electron Series,SAE, USA**	1998

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	William B Riddens	"Understanding Automotive Electronics", 5th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	"Understanding Automotive Electronics"	SAE	1998
3.	Robert Bosch,	"Automotive HandBook", 5th Edition	SAE	2000

CIVIL ENGINEERING

15BECEOE01 HOUSING, PLAN AND MANAGEMENT L T P C

3 0 0 3

COURSE OBJECTIVES

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOME

The students will be able to

1. Know the Importance of basic housing policies and building bye laws
2. Use Housing Programmes and Schemes
3. Plan and Design of Housing projects
4. Examine Innovative construction methods and Materials
5. Know Housing finance and loan approval procedures
6. Understand Construction as well as managing techniques

UNIT I INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems).

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Meera Mehta and Dinesh Mehta	Metropolitan Housing Markets	Sage Publications Pvt. Ltd., New Delhi	2002
2	Francis Cherunilam and Odeyar D Heggade	Housing in India	Himalaya Publishing House, Bombay	2001

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

15BECEOE02 BUILDING SERVICES L T P C
3 0 0 3

COURSE OBJECTIVES

1. Defining and identifying of eng. services systems in buildings.
2. The role of eng. services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOME

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES 9

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS 9

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN 9

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS 9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION 9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	E.R.Ambrose	Heat Pumps and Electric Heating	John and Wiley and Sons, Inc., New York	2002
2		Handbook for Building Engineers in Metric systems	NBC, New Delhi	2005

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 2000.
2 A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 2005.
3 National Building Code.

15BECEOE03 COASTAL ZONE MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

1. To understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. To describe the Coastal zone regulations, coastal processes and wave dynamics.
3. To forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

OUTCOMES:

1. Understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. The Coastal zone regulations, coastal processes and wave dynamics.
3. Forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

UNIT I COASTAL ZONE **9**

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II WAVE DYNAMICS **9**

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III WAVE FORECASTING AND TIDES **9**

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV COASTAL PROCESSES **9**

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V HARBOURS **9**

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Richard Sylvester	Coastal Engineering, Volume I and II	Elseiner Scientific Publishing Co	2006
2	Quinn, A.D	Design & Construction of Ports and Marine Structures	McGraw-Hill Book Co	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ed. A.T. Ippen	Coastline Hydrodynamics	McGraw-Hill Inc., New York	2002
2	Dwivedi, S.N., Natarajan, R and Ramachandran, S	Coastal Zone Management in Tamilnadu	Wiley – 2nd edition	2012

15BECEOE04 EXPERIMENTAL METHODS AND MODEL ANALYSIS L T P C
3 0 0 3

OBJECTIVE:

1. To Describe some of the factors affecting reproducibility and external validity.
2. To List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. To explain the concept of variability, its causes and methods of reducing it
4. To describe possible causes of bias and ways of alleviating it
5. To identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. To describe the six factors affecting significance, including the meaning of statistical power and "p-values".

OUTCOMES:

1. Describe some of the factors affecting reproducibility and external validity.
2. List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. Explain the concept of variability, its causes and methods of reducing it
4. Describe possible causes of bias and ways of alleviating it
5. Identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. Describe the six factors affecting significance, including the meaning of statistical power and "p-values".

UNIT I MEASUREMENTS **9**

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc..).

UNIT II GAUGING **9**

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES **9**

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading-Moire's techniques.

UNIT IV NON DESTRUCTIVE TESTING TECHNIQUES **9**

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE **9**

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dally J W and Riley W.F	Experimental stress Analysis	McGraw-Hill, Inc. New York	2005
2	Srinath L S et al	Experimental Stress Analysis	Tata McGraw-Hill Publishing co., Ltd., New Delhi	2006

REFERENCE BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rangan C S et al	Instrumentation – Devices and Systems	Tata McGraw-Hill Publishing Co., Ltd., New Delhi	2002
2	Sadhu Singh	Experimental Stress Analysis	Khanna Publishers, New Delhi	2006

15BECEOE05 MANAGEMENT OF IRRIGATION SYSTEMS L T P C
3 0 0 3

OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOME

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I IRRIGATION SYSTEM REQUIREMENTS 9

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II IRRIGATION SCHEDULING 9

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation.

UNIT III MANAGEMENT 9

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV OPERATION 9

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study.

UNIT V INVOLVEMENT OF STAKE HOLDERS 9

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dilip Kumar Majumdar	Irrigation Water Management – Principles and Practice	Prentice Hall of India Pvt. Ltd., New Delhi	2000
2	R.T. Gandhi, et. al	Hand book on Irrigation Water Requirement	**Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi**	

REFERENCES

1. **Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 2000**
2. **Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 2000**

15BECEOE06 COMPUTER AIDED DESIGN OF STRUCTURE L T P C
3 0 0 3

OBJECTIVE

At the end of this course, the students should have learnt the fundamentals of CAD, computer graphics, fundamentals of finite elements analysis, design and optimization and expert systems.

UNIT I INTRODUCTION 9

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS 9

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

UNIT III STRUCTURAL ANALYSIS 9

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

UNIT IV DESIGN AND OPTIMISATION 9

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V EXPERT SYSTEMS 9

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Groover M.P. and Zimmers E.W. Jr	CAD/CAM, Computer Aided Design and Manufacturing	Prentice Hall of India Ltd, New Delhi	2005
2	Krishnamoorthy C.S.Rajeev S	Computer Aided Design	Narosa Publishing House, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Harrison H.B	Structural Analysis and Design	Part I and II Pergamon Press, Oxford	2002
2	Rao S.S	Optimisation Theory and Applications	Wiley Eastern Limited, New Delhi	2002
3	Richard Forsyth (Ed)	Expert System Principles and Case Studies	Chapman and Hall, London	2000

15BECEOE07 PAVEMENT ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To design flexible and rigid pavements as per IRC.

COURSE OUTCOMES

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

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Will gain the knowledge of horizontal and vertical curves.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM **9**

Introduction - Pavement as layered structure - Pavement types - rigid and flexible -Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS 9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS 9

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE 9

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS 9

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control –Stabilisation for rural roads in India -use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kadiyali, L.R	Principles and Practice of Highway Engineering	Khanna tech. Publications, New Delhi	2007
2	Croney, D	Design and Performance of Road Pavements	HMO Stationary Office	2005
3	Wright, P.H	Highway Engineers	John Wiley & Sons, Inc., New York	2001

REFERENCES

1. Yoder R.J and Witczak M.W., "Principles of Pavement Design", John Wiley, 2003.
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC:58-2001, The Indian Roads Congress, New Delhi.
4. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001.

15BECEOE08 ROCK ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

1. To understand the role of geology in the design and construction process of underground openings in rock.
2. To apply geologic concepts and approaches on rock engineering projects
3. To identify and classify rock using basic geologic classification systems.
4. To use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. To sequential design process used in geotechnical engineering practice.
6. To Require civil engineering students to read and summarize geologic literature for site specific projects.

OUTCOMES:

1. Understand the role of geology in the design and construction process of underground openings in rock.
2. Geologic concepts and approaches on rock engineering projects
3. Identify and classify rock using basic geologic classification systems.
4. Use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. Sequential design process used in geotechnical engineering practice.
6. Require civil engineering students to read and summarize geologic literature for site specific projects.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 9

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 9

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 9

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 9

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING 9

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Goodman P.E	Introduction to Rock Mechanics	John Wiley and Sons	2005

2	Stillborg B	Professional User Handbook for rock Bolting	Tran Tech Publications	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Brow E.T	Rock Characterisation Testing and Monitoring	Pergaman Press	2002
2	Arogyaswamy R.N.P	Geotechnical Application in Civil Engineering	Oxford and IBH	2000
3	Hock E. and Bray J	Rock Slope Engineering	Institute of Mining and Metallurgy	1991

15BECEOE09 STORAGE STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

1. To learnt the design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and pre stressed concrete water tanks
2. To design the storage structures.
3. To gain knowledge of steel water tanks and their design.
4. To get a brief idea about concrete water tanks.
5. To design steel bunkers and silos
6. To design pre stressed concrete water tanks

OUTCOMES:

1. The design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and pre stressed concrete water tanks
2. Design the storage structures.
3. Gain knowledge of steel water tanks and their design.
4. Get a brief idea about concrete water tanks.
5. Design steel bunkers and silos
6. Design pre stressed concrete water tanks

UNIT I STEEL WATER TANKS 9

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation

UNIT II CONCRETE WATER TANKS 9

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III STEEL BUNKERS AND SILOS 9

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS 9

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS 9

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rajagopalan K	Storage Structures	Tata McGraw-Hill, New Delhi	2002
2	Krishna Raju N	Advanced Reinforced Concrete Design	CBS Publishers and Distributors, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	R.G.Hopkinson and J.D.Kay	The Lighting of buildings	Faber and Faber, London	2000
2	William H.Severns and Julian R.Fellows	Air-conditioning and Refrigeration	John Wiley and Sons, London	2000

15BECEOE10 WIND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

1. To understand the need of energy conversion and the various methods of energy storage
2. To explain the field applications of solar energy
3. To identify Winds energy as alternate form of energy and to know how it can be tapped
4. To explain bio gas generation and its impact on environment
5. To understand the Geothermal &Tidal energy, its mechanism of production and its applications
6. To illustrate the concepts of Direct Energy Conversion systems & their applications.

OUTCOMES:

1. Understand the need of energy conversion and the various methods of energy storage
2. Explain the field applications of solar energy
3. Identify Winds energy as alternate form of energy and to know how it can be tapped
4. Explain bio gas generation and its impact on environment
5. Understand the Geothermal &Tidal energy, its mechanism of production and its applications
6. Illustrate the concepts of Direct Energy Conversion systems & their applications.

UNIT I INTRODUCTION **9**

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II EFFECT OF WIND ON STRUCTURES **9**

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III EFFECT ON TYPICAL STRUCTURES **9**

Tail buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV APPLICATION TO DESIGN **9**

Design forces on multistorey building, towers and roof trusses.

UNIT V INTRODUCTION TO WIND TUNNEL **9**

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peter Sachs	Wind Forces in Engineering	Pergamon Press, New York	2002
2	Lawson T.V	Wind Effects on Buildings, Vols. I and II	Applied Science and Publishers, London	2005

REFERENCES

1. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottowa, 2003
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 2002.

15BECEOE11 ADVANCED CONSTRUCTION TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

OUTCOMES:

1. Implementation of new technology concepts which are applied in field of Advanced construction.
2. Different methods of construction to successfully achieve the structural design with recommended specifications.
3. Application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. Will gain the Knowledge of construction equipment's, and temporary works required to facilitate the construction process
5. Development to the students for the courses in sector of Advanced construction technology.
6. The new technology of civil Engineering and concepts related Advanced construction technology.

UNIT I MODERN CONSTRUCTION METHODS **9**

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES **9**

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines.

UNIT III MODERN CONSTRUCTION EQUIPEMENTS -I **9**

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting,Tunneling and hoisting.

UNIT IV MODERN CONSTRUCTION EQUIPEMENTS -II **9**

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant.

UNIT V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES 9

Principles and Practices of Temporary structures, Shoring, and Strutting,Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peurifoyu , R. L., , Ledbette, W.B	Construction Planning , Equipment and Methods	Mc Graw Hill Co	2000
2	Antill J.M	PWD, Civil Engineering Construction	Mc Graw Hill Book Co	2005

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Varma.M	Construction Equipment and its Planning & Applications	Metropoltian Book Co	2000
2	Nunnaly, S.W	Construction Methods and Management	Prentice – Hall	2000
3	Ataev, S.S	Construction Technology	MIR , Pub	2000

LIST OF OPEN ELECTIVES OFFERED BY

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

15BEEEOE01 ELECTRIC HYBRID VEHICLE L T P C
3 0 0 3

Course Objectives

- To understand the basic concepts of electric hybrid vehicle.
- To gain the knowledge about electric propulsion unit.
- To gain the concept of Hybrid Electric Drive-Trains.
- To gain the different Energy Management Strategies.
- To study about the efficiency manipulation in drives
- To understand and gain the knowledge about various energy storage devices

Course Outcomes:

- Summarize the basic concepts in bioprocess Engineering.
- Explain the concept of Hybrid Electric Vehicles.
- Understand the concept of Hybrid Electric Drive-Trains.
- Identify the different Energy Management Strategies.
- Understand the concept of different Energy Storage devices.
- Analyze the different motor drives used in Hybrid Electric Vehicles.

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UNIT I INTRODUCTION 9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS 9

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT 9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE 9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES 9

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press – 2nd edition	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	Standardsmedia – 2nd edition	2009
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley – 2nd edition	2012

15BEEEOE02 ENERGY MANAGEMENT AND ENERGY AUDITING L T P C
3 0 0 3

Course Objectives:

- To gain the knowledge about energy management.
- To understand the basic concepts in economic analysis in energy management.
- To understand the basic principles of energy audit.
- To gain the knowledge about the basic concept of types of Energy Audit
- To gain and Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concept of Energy Management.
- Analyze the different methods for economic analysis
- Knowledge about the basic concept of Energy Audit and types.
- Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT
9

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS
9

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT
9

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS
9

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS
9

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice- lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	Energy Management	Heinemann Publications	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	▪ Lulu Enterprises, Inc. - 8th Edition Volume II	2013

15BEEEOE03 SENSORS AND TRANSDUCERS L T P C
3 0 0 3

Course Objectives

- It deals with various types of Sensors & Transducers and their working principle
- It deals with resistive transducers
- It deals with capacitive transducers
- It deals with inductive transducers
- It deals with some of the miscellaneous transducers
- It deals with characteristics of transducers

Course Outcomes (COs)

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

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
3Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS
9

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS9

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER 9

Self inductive transducer – Mutual inductive transducers– LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLEANEOUS TRANSDUCERS 9

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication

1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	London : McGraw-Hill Higher Education 5th edition	2003
2	Patranabi. D	Sensors and Transducers	PHI Learning Pvt. Ltd – 2nd edition	2003
3	John. P, Bentley	Principles of Measurement Systems	4th Edition, Prentice Hall	2004
4	Murthy.D.V.S	Transducers and Instrumentation	PHI Learning Pvt. Ltd 2nd edition	2010

15BEEEOE04 PROGRAMMABLE LOGIC CONTROLLER L T P C
3 0 0 3

Course Objectives

- To understand the basic principles of PLC systems.
- To gain the knowledge about data handling functions.
- To gain the knowledge of storage techniques in PLC
- To acquire the knowledge about how to handle the data and functions
- To study about flowcharts of ladder and spray process system
- To understand the principles of PID.

Course Outcome

- At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
- To acquire the knowledge of storage techniques in PLC
- Students know how to handle the data and functions
- Students known about advanced controller in PLC applications
- Students gather real time industrial application of PLC
- Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION
9

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment
Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING
9

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS
9

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS
9

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and
Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES **9**

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	2004
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, 5th Edition	2009

WEBSITE

http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm,- Introduction to programmable Logic controller

15BEEEOE05 RENEWABLE ENERGY SOURCES L T P C
3 0 0 3

Course Objectives

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- To study about solar energy collectors and its storages
- To study about the inter connected system in wind power
- To understand the basic principles fuel cell, Geo thermal power plants.
- To gain the knowledge about hydro energy.

Course Outcomes

At the end of this course, students will demonstrate the ability to

- Analyze the Energy Scenario in India
- Understand the concept of Solar Energy
- Understand the concept of Wind Energy
- Understand the concept of Hydro Energy
- Analyze the different energy sources
- Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION 9

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY 9

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY 9

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY 9

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES 9

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional sources of energy	Khanna publishers	2011
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rao.S. & Parulekar	Energy Technology	Khanna publishers, Eleventh Reprint	2013
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis – 3rd edition	2015

WEBSITES

1. www.energycentral.com
2. www.catelelectricpowerinfo.com

15BEEEOE06 ADVANCED CONTROL SYSTEMS L T P C

3 0 0 3

Course Objectives

- **To study the state variableanalysis**
- **To provide adequate knowledge in the phase plane analysis andalso describing functionanalysis.**
- **To study the analysis discrete time systems using conventionaltechniques.**
- **To analyze the stability of the systems using differenttechniques.**
- **To study the design of optimalcontroller.**
- **To study the types of compensators**

Course Outcomes

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

- **understand the state variable analysis, Z- transform,stateequation**
- **Construct the frequency response of the system using various plots**
- **Correlate the time and frequency domain specifications and effect of compensation**
- **Design the different types of compensators using frequency response plots to stabilize the control system**
- **Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems.**

UNIT 1 STATE VARIABLE ANALYSIS 9

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement –State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS 9

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearizing non-linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM 9

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT 1V STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM 9

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL 9

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TOTAL 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers – 4th edition	2006
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press – 2nd edition	2012

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M.Gopal	Modern control system theory	New Age International Publishers	2002
2	Gene F. Franklin, J. David Powell and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Prentice Hall, 7th edition	2014
3	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University Press,	2002