ACADEMIC REGULATIONS, COURSE STRUCTURE
and
DETAILED SYLLABUS
under
Choice Based Credit System (CBCS)
(Effective from the Academic Year 2015- 16 onwards)
(RA15)

B.Tech.
COMPUTER SCIENCE AND ENGINEERING

SR ENGINEERING COLLEGE

Innovation | Creativity | Entrepreneurship

(An Autonomous Institution)
Approved by AICTE I Affiliated to JNTUH I Accredited by NAAC 'A' Grade
Ananthasagar (V), Hasanpathy (M), Warangal – 506 371, Telangana.
www.srecwarangal.ac.in

SR ENGINEERING COLLEGE *(Autonomous)*
(RA15) COURSE STRUCTURE:: B. TECH. COMPUTER SCIENCE AND ENGINEERING
(Applicable from the batch admitted during 2015-16 academic year and onwards)

L: Theory, T: Tutorial, P/D: Practical / Drawing, C: Credits,
CIE: Continuous Internal Evaluation, SEE: Semester End Examination

I Year I Semester

S. No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	HS101	English –I	2	-	-	2
2	BS101	Mathematics - I	4	-	-	4
3	BS103	Engineering Physics – I	3	-	-	3
4	BS105	Engineering Chemistry	3	-	-	3
5	ES107	Computer Programming	4	-	-	4
6	ES101	Introduction to Engineering	2	-	-	2
7	HS103	English Language Communication Skills Lab	-	-	3	2
8	BS108	Engineering Chemistry Lab	-	-	3	2
9	ES108	Computer Programming Lab	-	-	3	2
10	AC	*Audit Course	-	-	2	-
Total						**24**

I Year II Semester

S. No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	HS102	English –II	2	-	-	2
2	BS102	Computational Mathematics	3	1	-	3
3	BS104	Engineering Physics – II	3	-	-	3
4	BS106	Environmental Studies	3	-	-	3
5	ES102	Basics of Electrical and Electronics Engineering	4	-	-	4
6	ES110	Data Structures	3	-	-	3
7	BS107	Engineering Physics Lab	-	-	3	2
8	ES106	Product Design Studio	-	-	3	2
9	ES111	Data Structures Lab	-	-	3	2
10	AC	*Audit Course	-	-	2	-
Total						**24**

*** Audit Course:** (AC101) Sports, (AC102) NSS, (AC103) Yoga, (AC104) Dance, (AC105) Music, (AC106) Arts, (AC107) Sketching

Note: *Student has to choose any two different Audit Courses from the specified list and he / she has to complete one in I Semester and the other in II Semester.*

II Year I Semester

S.No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	ES112	Foundations to Product Design	3	-	-	3
2	CS101	Mathematical Foundations for Computer Science	4	1	-	4
3	CS102	Computer Architecture and Organization	4	-	-	4
4	CS103	Data Base Management Systems	4	-	-	4
5	CS104	Objective Oriented Programming Concepts through Java	3	-	-	3
6	BS111	Computational Mathematics Lab	-	-	3	2
7	CS108	Data Base Management Systems Lab	-	-	3	2
8	CS109	Objective Oriented Programming Concepts through Java Lab	-	-	3	2
9	MC102	Gender Sensitization	-	-	2	-
Total						**24**

II Year II Semester

S.No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	BS110	Probability and Statistics	3	-	-	3
2	EC149	Microprocessor and Embedded Systems	4	-	-	4
3	CS105	Operating Systems	3	-	-	3
4	CS106	Theory of Computation	4	1	-	4
5	CS107	Web Technologies	4	-	-	4
6	EC150	Microprocessor and Embedded Systems Lab	-	-	3	2
7	CS110	Operating Systems Lab	-	-	3	2
8	CS111	Web Technologies Lab	-	-	3	2
9	MC101	Business Communication and Public Speaking	1	-	1	-
Total						**24**

III Year I Semester

S. No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	OE	**Open Elective – 1**	3	-	-	3
2	HS104	Economics and Finance for Engineers	3	-	-	3
3	HS105	Engineering Ethics	2	-	-	2
4	ES113	Mechotronics	4	-	-	4
5	CS112	Design and Analysis of Algorithms	3	1	-	3
6	CS113	Computer Networks	3	-	-	3
7	ES114	Mechatronics Lab	-	-	3	2
8	CS121	Computer Networks Lab	-	-	3	2
9	CS124	Media Project	-	-	-	2
Total						**24**

III Year II Semester

S. No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	OE	**Open Elective – 2**	3	-	-	3
2	HS106	Technical Writing	2	-	-	2
3	CS114	Software Engineering	4	-	-	4
4	CS115	Compiler Design	4	-	-	4
5	CS116	Cryptography and Network Security	4	-	-	4
6	CS117 CS118 CS119 CS120	**Professional Elective – 1** 1. Principles of Programming Languages 2. Artificial Intelligence 3. Computer Graphics and Multi Media 4. Advanced Data Base Management Systems	3	-	-	3
7	CS122	Software Engineering Lab	-	-	3	2
8	CS123	Compiler Design Lab	-	-	3	2
Total						**24**

IV Year I Semester

S. No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	HS107	Project Management	3	-	-	3
2	CS125	Data Warehousing and Data Mining	3	-	-	3
3	CS126	Grid and Cloud Computing	3	-	-	3
4	CS127 CS128 CS129 CS130	**Professional Elective – 2** 1. Software Testing 2. Simulation and Modeling 3. Human Computer Interaction 4. Image Processing and Pattern Recognition	3	-	-	3
5	CS131 CS132 CS133 EC144	**Professional Elective – 3** 1. Machine Learning 2. Design Patterns 3. Expert Systems and Neural Networks 4. Internet of Things	3	-	-	3
6	CS134 CS135 CS136 CS137	**Professional Elective – 4** 1. Parallel Programming 2. Software Project Management 3. Wireless Sensor Networks 4. Speech Processing	3	-	-	3
7	CS145	Grid and Cloud Computing Lab	-	-	3	2
8	CS146	Mobile Application Development Lab	-	-	3	2
9	CS147	Certification Course / Mini Project / App Development	-	-	-	2
Total						**24**

IV Year II Semester

S. No.	Course Code	Course	Hours / Week			
			L	T	P/D	C
1	OE	**Open Elective –3**	3	-	-	3
2	EC132 CS138 CS139 CS140	**Professional Elective –5** 1. PLC and Robotics 2. Big Data and Analytics 3. Distributed Systems 4. Semantic Web and Social Networks	3	-	-	3
3	CS141 CS142 CS143 CS144	**Professional Elective – 6** 1. Information Retrieval Systems 2. High Performance Computing 3. Natural Language Processing 4. Web Mining	3	-	-	3
4	CS148	Technical Seminar	-	-	2	1
5	CS149	Major Project / Practice School	-	-	-	14
Total						**24**

Note: Based on the industry / societal demand, additional relevant course(s) may be added under Professional Elective(s) and / or Open Elective(s).

LIST OF OPEN ELECTIVES - CSE

S. No.	Course Code	Course	Offered by the department
1	OE101	Philosophy	H&Sc
2	OE102	Psychology*	H&Sc
3	OE103	Sociology	H&Sc
4	OE104	Design Thinking and Innovation*	Business Management
5	OE105	Technology Entrepreneurship*	Business Management
6	OE106	Marketing for Engineers	Business Management
7	OE107	Business Analytics	Business Management
8	OE108	Engineering Project in Community Services (EPICS)*	CE, ME, EEE, ECE, CSE
9	OE109	Smart Cities	CE, ME, EEE, ECE, CSE
10	OE110	Cognitive Engineering*	CE, ME, EEE, ECE, CSE
11	OE111	Intellectual Property Rights	CE, ME, EEE, ECE, CSE
12	OE112	Disaster Management	CE
13	OE113	Pollution and Control Engineering	CE
14	OE114	Scripting Languages	CSE
15	OE115	Cyber Laws	CSE
16	OE118	Hybrid Electric Vehicles	EEE
17	OE120	Fundamentals of Electrical Machines	EEE
18	OE121	Introduction to Control Systems	EEE
19	OE122	Basics of Thermodynamics	ME
20	ME111	Operations Research	ME / MATHS
21	ME138	Renewable Energy Sources	ME / EEE

Activity based course (CIE & SEE are assessed with 50 marks each)

(HS101) ENGLISH – I

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	2	-	-	2	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Recall and improve the language proficiency of the students in english.
2. Paraphrase and interpret the ideas and thoughts in a dynamic way.
3. Prioritize the importance of practical learning of english.
4. Distinguish the various levels of listening, speaking, reading and writing skills in english.
5. Construct statements in writing and speaking in a professional manner.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recall essentials of communication methods.
2. Sketch flawless grammar usage.
3. Design effective ideas for presentations.
4. Prioritize the importance of various speaking methods as per situations.
5. Compile effective paragraphs and essays.
6. Build critical thinking.
7. Evaluate the effectiveness in improving speaking levels.
8. Compile technical and non-technical terminology.

UNIT –I

Chapter entitled '**Animals**' from Unlock Reading and Writing Skills – Cambridge University Press Unlock Listening and Speaking Skills - Cambridge University Press

L-Listening for Sounds, Stress and Intonation from **Animals,** from Unlock Listening and Speaking Skills

S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)

R- Reading for Subject/ Theme from **Animals,** from Unlock Reading and Writing Skills

W- Writing Paragraphs

G-Types of Nouns and Pronouns

V- Homonyms, Homophones and Homographs

UNIT –II

Chapter entitled "**Customs and Traditions"** from Unlock Reading and Writing Skills-Cambridge University Press, Unlock Listening and Speaking Skills-Cambridge University Press.

L – Listening for themes and facts from **Customs and Traditions,** from Unlock Listening and Speaking Skills

S – Apologizing, interrupting, requesting and making polite conversation

R- Reading for theme and gist, from **Customs and Traditions,** from Unlock Reading and Writing Skills

W- Describing people, places, objects, events

G- Verb forms

V- Noun, Verb, Adjective and Adverb

UNIT –III

Chapter entitled **History,** from Unlock Reading and Writing Skills – Cambridge University Press, Unlock Listening and Speaking Skills - Cambridge University Press

L – Listening for main points and sub-points for note taking from **History,** from Unlock Listening and Speaking Skills

S – Giving instructions and directions; Speaking of hypothetical situations

R – Reading for details Comprehension- from **History,** from Unlock Reading and Writing

W – Note-making, Information transfer, Punctuation

G – Present tense

V – Synonyms and Antonyms

UNIT –IV

Chapter entitled **Transport,** from Unlock Reading and Writing Skills – Cambridge University Press, Unlock Listening and Speaking Skills - Cambridge University Press

L -Listening for specific details and information from **Transport,** from Unlock Listening and Speaking Skills

S- Narrating, expressing opinions and telephone interactions

R -Reading for specific details and information- from chapter entitled **Transport,** from Unlock Reading and Writing Skills

W- Writing e-mails

G- Past and Future tenses

V- Vocabulary - Idioms and Phrasal verbs

UNIT –V

L- Critical Listening and Listening for speaker's tone/ attitude from Environment from Unlock Listening and Speaking Skills

S- Group discussion and Making presentations

R- Critical reading, reading for reference - Chapter entitled **Environment,** from Unlock Reading and Writing Skills

W- Project Proposals, Project Reports, Research Papers

G- Adjectives, Prepositions and Concord

V- Collocations and Technical vocabulary

- **Exercises from the texts not prescribed will also be used for classroom tasks.**

TEXT BOOKS:

1. Carolyn Westbrook, "Unlock Reading and Writing Skills 3 - B1 English Profile", Cambridge University Press.
2. Sabina Ostrowska, "Unlock Listening and Speaking Skills 3 - B1 English Profile", Cambridge University Press.

REFERENCE BOOKS:

1. Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge University Press.
2. K R Narayanaswami, "Success with Grammar and Composition", Orient Longman.
3. "A Hand Book of English for Engineers", Tata McGraw Hill.
4. M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw Hill.

((BS101) MATHEMATICS - I

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. State the mean value theorems, fundamental theorem of integral calculus.
2. Calculate the maxima and minima of functions of several variables and solve the problems with and without constraints.
3. Classify the different types of ordinary differential equation (O.D.E) and interprets the concept to practical problems.
4. Analyze the second and higher order linear differential equations.
5. Calculate the complimentary function and particular integrals of different types of functions.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Calculate the extreme values of functions of several variables.
2. Test the given function for its saddle points.
3. Examine the conditions for the existence of absolute, minimum and extreme values.
4. Solve the different types of differential equations (D.E) by using appropriate solving methods.
5. Apply the solution methods to solve linear, non-linear, orthogonal trajectories and to different practical physical, mathematical problems.
6. Construct the simple O.D.E models for real world problems.
7. Evaluate the double and triple integrals in a given region of integration by using change of variables.
8. Analyze the properties of β, Γ (beta, gamma function) and evaluates the improper integrals using these functions.

UNIT-I

Differential and Integral Calculus: Review of Differentiation and integration. Mean Value Theorems: Rolle's theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's theorem – Maclaurin's theorem (all theorems without proofs)-verification and applications. Functions of several variables: Functional dependence and independence – Jacobian of function of several variables – maxima and minima of functions of several variables (two and three only) with and without constraints.

UNIT-II

Ordinary Differential Equations of First Order and First Degree: Formation of a differential equation – solution methods – variable separable method – homogeneous and non-homogeneous – exact and non exact differential equations – linear differential equations – Bernoulli's differential equations – applications – orthogonal trajectories – Newton's law of cooling – law of natural growth and decay.

UNIT-III

Higher Order Linear Differential Equations: Linear differential equations of second and higher order with constant coefficients – solution – finding complimentary function and particular integral – RHS of the type e^{ax} , $\sin ax$, $\cos ax$, x^n , $e^{ax}v(x)$, $x^n v(x)$ and method of variation of parameters.

UNIT – IV

Multiple Integrals: Double integrals: evaluation, region of integration, change of order of integration, change of variables. Triple integrals: evaluation change of variables, (cylindrical and spherical co-ordinates) - applications to areas, volumes.

UNIT-V

Special Functions: Beta functions – Gamma functions – properties – relation between beta and gamma functions – evaluation of improper integrals using beta and gamma functions.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", - John wiley and Sons, 605 Third Avenue, New York.
2. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2-B Nath Market, Nai Sarak, Delhi.

REFERENCE BOOKS:

1. Peter V. O'Neil, "Advanced Engineering Mathematics", Cengage Learning- Engineering.
2. R.K.Jain, S.R.K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, New Delhi.
3. Iyengar TKV, MVSN Prasad, S. Ranganatham, Gandhi and B. Krishna, "A Text Book of Engineering Mathematics", S. Chand.
4. Ramana B.V, "Engineering Mathamatics", Tata McGraw Hill.

(BS103) ENGINEERING PHYSICS - I

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recall the fundamental principles of electromagnetism.
2. Develop familiarity with the physical concepts and facility with the mathematical methods of quantum mechanics.
3. Justify the origin of energy bands in solids by knowing Kronig-Penny model.
4. Discuss the characteristics, three quantum processes, gas laser and semiconductor laser principles.
5. Classify the types of optical fibers and attenuation in optical fibers.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Discuss the physical significance of divergence and curl.
2. Analyze Maxwell's equations in differential form.
3. Solve the particle in one dimensional potential box problem using schrodinger time independent wave equation.
4. Apply the Bloch theorem and draw the band structure of solids on the basis of Kronig-Penny model.
5. Judge the laser applications based on characteristics of laser.
6. Explain the working of He-Ne laser and semiconductor laser.
7. Criteria for low loss optical fibers.
8. Estimate the advantages of optical fiber communication over conventional communication.

UNIT - I: Electrodynamics

Introduction to electrostatics, Coulomb's law, Gauss law of electrostatics, Introduction to magnetostatics, Biot-Savart law, Ampere's law, Gauss law of magnetostatics, Time varying electric and magnetic fields - Faraday's laws of electromagnetic induction, Lenz's law, Displacement current, Differential form of Maxwell's equations, Physical significance of Maxwell's equations, Electromagnetic waves– wave equation, Electromagnetic energy density, Poynting theorem.

UNIT - II: Quantum Mechanics

Classical mechanics and its limitations, Planck's radiation law – Wien's law and Rayleigh-Jean's law, de Broglie hypothesis, Matter waves, Davisson-Germer experiment, Heisenberg's uncertainty principle, Consequences of uncertainty principle. Equation of motion of matter waves – Schrodinger time independent wave equation, Physical significance and properties of wave function, Particle in one dimensional box and extension to three dimensions, Tunnelling effect (qualitative) – Applications.

UNIT - III: Band Theory of Solids

Electron in periodic potential, Bloch theorem, Kronig-Penny model (qualitative), Origin of energy bands in solids, Effective mass of an electron, Distinction between conductors, semi conductors and insulators, Direct and indirect band gap semi conductors

UNIT - IV: Laser and Holography

Characteristics of laser, Absorption and emission of radiation, Einstein's coefficients and relation between them, Block diagram of laser, Types of lasers - He-Ne laser and semiconductor laser, Classes of laser, Applications of laser, Holography - Recording of hologram and reconstruction of image, Applications of holography

UNIT - V: Fiber Optics

Introduction to optical fiber, Acceptance angle and Acceptance cone, Numerical aperture, Types of optical fibers – Single mode step index, Multi mode step index and Multi mode graded index, Attenuation in optical fibers, Advantages of optical communication, Application of optical fibers

TEXT BOOKS:

1. M.N.Avadhanulu and P.G. Kshirasagar, "A Text book of Engineering Physics" S. Chand and Company Ltd.
2. R.K.Gaur and S.L.Gupta, "Engineering Physics", Dhanpat Rai Publications (P) Ltd.

REFERENCE BOOKS:

1. K.K. Gupta, "Solid State Physics", New Age International (P) Ltd.
2. M.R. Srinivasan, "Physics for Engineers", New Age International (P) Ltd.
3. P.K. Palanisamy, "Engineering Physics", SciTech Publications, India (P) Ltd.
4. P. Madhusudhan Rao, "Applied Physics for Engineers", Academic Publishing Company.

(BS105) ENGINEERING CHEMISTRY

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Outline the concept of electro chemistry, electrodes and cells.
2. Explain construction of batteries, fuel cells and mechanism, prevention of corrosion.
3. Apply reference electrodes and calculate the effect of corrosion.
4. Estimate drinking water quality parameters and properties of lubricants, refractories and fuels.
5. Formulate polymers, molecular interactions and spectroscopic methods.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recall types of electrodes and potentials.
2. Illustrate chemically modified electrodes and corrosion control methods.
3. Show varying potentials using electrodes and corrosion inhibitors.
4. Analyze types of batteries and metallic coatings for prevention of corrosion.
5. Examine the synthesis of conducting, liquid crystal and green polymers.
6. Prove alkalinity, content of dissolved oxygen and hardness of water.
7. Elaborate types of molecular interactions and electronic transitions.
8. Build refractories, glasses and ceramics.

UNIT-I: Electrochemistry

Introduction-Electrochemical cell, Review of the concept of electrode potentials, Nernst Equation, Standard Electrode potential, measurement of single electrode potential, EMF of cell, Spontaneity of cell, Electrochemical Series. Brief mention of types of electrodes with examples (Gas electrode, Metal- Metal ion electrode, Metal-Metal sparingly soluble salt electrode, oxidation-reduction electrode), Ion-selective electrode-Glass Electrode- Derivation of equation between electrode potential and pH, Determination of pH of a solution using a glass electrode, Determination of F^- ion using fluoride electrode (Numerical calculations), Potentiometer - Potentiometric titrations, Chemically modified electrodes (CMEs) Redox and Acid base electrodes-Concepts, CMEs as potentiometric sensors, Electrochemical energy systems-Electrochemistry of secondary cells e.g: Lead-acid cell, Rechargeable lithium batteries, Fuel Cells e.g: H_2-O_2, Methanol-O_2 Fuel Cell.

UNIT- II: Corrosion and its prevention

Introduction, Corrosion by chemical reaction (Dry corrosion), Pilling-Bedworth rule, Wet Corrosion in acidic, basic and Neutral environments with example, Galvanic Corrosion, Galvanic series, Differential aeration corrosion, Factors affecting corrosion rate (purity of metal, Position in galvanic series, relative areas of anode and cathode, effect of temperature, pH and dissolved oxygen). Prevention of corrosion–cathodic protection (Sacrificial Anode Protection and Impressed Current Cathode), application of corrosion inhibitors (cathodic and anodic),application of metal coatings (Electroplating, anodizing, cementation) with examples.

UNIT-III: Polymers

Polymer Chemistry-Introduction (definition of terms-monomer, polymer, tacticity with types, functionality). Classification based on-origin (natural and synthetic), composition (homo and co-polymers), structure (linear, branched chain and cross linked) and mechanism (addition, condensation and coordination polymerization with examples). Thermoplastic and Thermosetting polymers-differences and examples, conducting polymers: Mechanism of conduction in polymers-Example (Poly aniline) and applications. Some industrially important polymers-Nylon fibers-(Nylon: 6, Nylon 6:6 and Nylon 6:10), Synthetic Rubber- example (Thiokol Rubber), Silicones and Kevlar- properties and applications.

Green polymers: Introduction, synthesis and applications of Poly hydroxyl alkanoates (PHA), Poly lactic acid (PLA), Triglycerides and Polyesters.

UNIT-IV: Molecular Interactions and Introduction to Chemical Analysis

Molecular Interactions-Nature of ion-ion interactions, ion-dipole interactions, dipole-dipole interactions, charge transfer interactions, introduction of supramolecular interactions.

Spectroscopic Methods: Introduction to spectroscopy, Electromagnetic radiation concept of absorption,UV-visible spectra, types of electronic transitions, Lambert-Beer's law-derivation, verification and its applications.

Water Analysis: Drinking water Quality parameters-WHO Guidelines, BIS Guidelines Alkalinity, Dissolved Oxygen and Hardness of water- representation, types and units of Hardness, determination of hardness by EDTA method, problems. Boiler troubles- caustic embrittlement, Boiler corrosion, scale and sludge formation, Methods of softening of water-Zeolite process, Ion-exchange process, Brackish water-Electro dialysis and Reverse Osmosis.

UNIT-V: Engineering Materials

Lubricants: Introduction, classification with examples, criterion for good lubricants. Properties –Viscosity, Flash Point, Fire Point, Cloud Point and Pour Point .

Refractories: Characteristics of Refractories, classification – acidic, basic and neutral with examples, Concept of Refractoriness (RUL and Segar cone test).

Glasses and Ceramics: Introduction, classification with examples, properties and applications.

Fuels: Types and Characteristics of fuels (Liquid and gaseous fuels**),** Knocking-Octane number, anti-knocking agents and Cetane number. CNG, LPG, Calorific values (Units), Dulong's formulae for NCV, GCV-Numerical problems.

TEXT BOOKS:

1. Oleg Roussak and H.D. Gesser, "Applied Chemistry: A Textbook for Engineers and Technologists", Springer, 2nd Edition 2013.
2. P.C. Jain and Jain, "Engineering Chemistry"-Sixteenth Edition, Dhanpat Rai Publishing Company, New Delhi-2014.

REFERENCE BOOKS:

1. Gurudeep Raj, "Advance Physical Chemistry", Krishna Prakasham Media, GOEL Publishing House.
2. K.Mukkanti and SS Dara,"A Text book of Engineering Chemistry",S Chand Publications.
3. C. Parameswara Murthy, CV Agarwal and Andra Naidu, "Text book of Engineering Chemistry", BS Publications, Hyderabad (2008).
4. Shashi Chawla, "A Text Book of Engineering Chemistry", Tata McGraw Hill Education Private Limited, New Delhi-2012.

(ES107) COMPUTER PROGRAMMING

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Comprehend the computer as a system for computation.
2. Appreciate the program development and execution environment.
3. Learn a programming language through C.
4. Acquire the problem solving skills through computer programming.
5. Recognize the applications of C language.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Appreciate the stored program computing environment.
2. Analyze and implement software development tools like algorithm, pseudo codes and programming structure.
3. Acquire syntactic familiarity with C programming language.
4. Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.
5. Apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
6. Apply and practice logical ability to solve the problems.
7. Apply C programming to solve problems related to scientific computing.
8. Compose efficient programs.

UNIT - I

Van-Neuman computer architecture and Concepts of stored program computing, Computer memory, Data Representation in computers: text, image, voice and numbers-integers and floating points. Role of Compilers in Computer System design, Different C compilers-turbo C, Ansi C, GCC and interpreters. Role of Operating Systems in computer system design. Architecture of UNIX operating system. Basic Shell Commands, Unix Editors-vi Editor. Programming Environment of C in UNIX.

UNIT - II

Introduction to problem solving: Flow charts, Algorithms, definitions and examples. Introduction to C Programming Language: Data types in C, primary and secondary data types, constants and variables. Operators: arithmetic, logical, bitwise. Expressions: Valid expressions, evaluation of expressions, type conversion, precedence and associativity. I/O functions: printf, scanf and their variations. Control structures in C: if , if-else ternary operator, looping statements, nesting of control structures, break and continue. The switch-case statement.

UNIT - III

Arrays: Single and multi-dimensional arrays. Basics of pointers, pointer to array, array of pointers, void pointer, pointer to pointer. Basics of structure in C, structure members, accessing structure members, nested structures, array of structures, pointers to structures. Unions- accessing union members. Programming examples using arrays, structures and unions.

UNIT –IV

Functions: User-defined functions, parameter passing in functions: call by value, call by reference, recursive functions. Passing arrays to functions, passing a structure to a function.
Strings: Declaration, storage and string manipulation. Built in functions: String functions and Character and Arithmetic functions. Memory Management in C: alloc , malloc and calloc-examples and discussion for each.

UNIT - V

File management: read, write, append and seek. Handling different types of data files: text, image and binary files.
Applications of C
Case study 1. Embedded software examples
Case study 2. Firmware examples
Case study 3. Verification software examples.

TEXT BOOKS:

1. B. A. Forouzan and R.F. Gilberg, “Computer Science: A Structured Programming Approach Using C”, Cengage Learning, Third Edition.
2. B.W.Kernighan Dennis M. Ritchie, “The C Programming Language”, PHI/Pearson Education.

REFERENCE BOOKS:

1. Yashwant Kanetkar, “Let us C”, BPB Publications.
2. E Balagurusamy, “Computer Programming and Data Structures”, TMH.
3. R. Hanly Jeri, “Programming in C and Data Structures”, Pearson.

Web links:

1. http://nptel.iitm.ac.in

(ES101) INTRODUCTION TO ENGINEERING

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	2	-	-	2	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Summarize different engineering disciplines and identify engineering challenges.
2. Evaluating opportunities and design process applicable to real world.
3. Mention the methods for generating ideas to improve the design of existing product.
4. Build multi-disciplinary system perspective.
5. Design a physical model and recognizing the importance of technical report writing.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Define various disciplines technology and engineering challenges.
2. Judge the responsibilities as professional engineer in solving the societal problems.
3. Identify new opportunities to formulate and solve engineering problems.
4. Create personal skills and attributes at critical thinking.
5. Predict the importance of oral, written and academic skills.
6. Adopt social context of engineering practice.
7. Apply engineering reasoning to problem solving.
8. Integrate working with multi-disciplinary teams and build team work skills.

UNIT – I

Engineering Process: A brief history of engineering and technology, engineering as a profession, science Vs engineering, stages of design – from the world of imagination to world of objects

Assignment: Report on an identified technological evolution and factor s driving technological evolution.

UNIT - II

Opportunity Identification: Opportunity Identification from inspiration – an act of creative awareness, how to find inspiration, Painstorming method for identifying opportunities. Methods of evaluating opportunities. Case studies.

Assignment: Identify new potential opportunities based on the customer pain points and evaluate them to identify real opportunities.

UNIT – III

Conceptualization: Methods for generating ideas to solve the customer pain points including brainstorming, concept maps, and SCAMPER.

Assignment: Application of idea generation methods to improve an existing product

UNIT – IV

Skill Development: Sketching, Prototyping Communication. Interaction with peers, demonstration of projects developed by senior students and alumni.

UNIT - V

Project Work: A open-ended design project executed from opportunity to prototype. Culminating with a presentation, model, display and report.

TEXT BOOKS:

1. Karl Aspelund, "The Design Process –Fairchild books", Bloomsbury Publishing Inc.
2. ND Bhatt, "Engineering Drawing, Plane and Solid Geometry", Charotar Publishing House Pvt. Ltd., Publishers of Engineering Text Books.

REFERENCE BOOKS:

1. Paul H Wright, "Introduction to Engineering", John Wiley and Sons, Inc.
2. Saeed Moaveni, "Engineering Fundamentals: an Introduction to Engineering", Cengage Learning, printed in USA.
3. Reymond B Landis, "Studying Engineering: A Road Map to rewarding career", Discovery press.

E-BOOKS:

1. Robin Mckenzie and Robin Mckenzie, "Product Design and Engineering".
2. Idris Mootee, "Design Thinking for strategic Innovation", Wiley publication.
3. Carl Liu, "Innovative product design practice".

(HS103) ENGLISH LANGUAGE COMMUICATION SKILLS LAB

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recognize and clear the issues in oral communication.
2. Summarize and present thought and ideas in an understandable way.
3. Execute the writing and speaking skills learnt in class room as well as lab sessions.
4. Develop the language skills using proper grammar rules.
5. Compose sentences and develop them in to meaningful speaches.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Reproduce the sounds of language as per the rules of pronunciation.
2. Paraphrase the description of people, objects and place.
3. Produce meaningful sentences and giving them proper structure.
4. Identify the main idea and supporting details shown in the course videos.
5. Build speaking abilities with proper body language.
6. Draw information from various sources of visualized images or hypothetical situations.
7. Build professional writing skills making use of the standards of grammar.
8. Prioritize and build employability skills and develop career competency.

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

Syllabus: English Language Communication Skills Lab shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Exercise – I

CALL Lab: Video Exercises- Chapters from **Animals, Customs and Traditions,** Sharks; Wild life conservation, Customs in Dagestan; Japan Customs and Traditions of Unlock Reading and Writing Skills, Unlock Listening and Speaking Skills– Cambridge University Press

ICS Lab: Ice-Breaking activity and JAM session

Articles, Prepositions, Word formation- Prefixes and Suffixes, Synonyms and Antonyms

Exercise – II

CALL Lab: Chapters from **History, Transport,** Egyptian Archaeology; the Desert Mummies of Peru

Indian transport; How to make a BMW of Unlock Reading and Writing Skills, Unlock Listening and Speaking Skills– Cambridge University Press

ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise - III
CALL Lab: Chapters from **Environment, Health and Fitness,** Alaskan glaciers; Seeping giants: Russian volcanoes Cycling; Training for a triathlon: the ultimate event of Unlock Reading and Writing Skills, Unlock Listening and Speaking Skills– Cambridge University Press
ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.
Sequence of Tenses, Question Tags and One word substitutes.

Exercise – IV
CALL Lab: Chapters from **Discovery and Invention, Fashion,** Robots; Engineering a ski resort in the desert Missoni Italian fashion; From function to fashion of Unlock Reading and Writing Skills, Unlock Listening and Speaking Skills– Cambridge University Press
ICS Lab: Group Discussions
Official Letters

Exercise – V
CALL Lab: Chapters from **The Brain**The Russian Economy; Economic migration: the Chinese dreamThe Amazing Brain; The placebo effect of Unlock Reading and Writing Skills, Unlock Listening and Speaking Skills– Cambridge University Press
ICS Lab: Oral Presentation
Reading Comprehension and Job Application with Resume Preparation.

TEXT BOOKS:
1. Carolyn Westbrook, "Unlock Reading and Writing Skills 3 - B1 English Profile", Cambridge University Press.
2. Sabina Ostrowska, "Unlock Listening and Speaking Skills 3 - B1 English Profile", Cambridge University Press.

SUGGESTED READING:
1. Laxminarayana K, "English for Technical Communication", SciTech.
2. Sudha Rani D, "A Manual for English Language Laboratory", Pearson.
3. Sudha Rani D, "Advanced Communication Skills Laboratory", Pearson.

SUGGESTED SOFTWARE:
1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley.
3. Punctuation Made Easy by Darling Kindersley.
4. Oxford Advanced Learner's Compass, 8th Edition.
5. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
6. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

(BS108) ENGINEERING CHEMISTRY LAB

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recognize the nature of electro chemical reactions and corrosion of metals.
2. Illustrate the fundamentals of water analysis like hardness, alkalinity and dissolved oxygen.
3. Show the instrumentation techniques like conductometry, potentiometry and colorimetry.
4. Assess the basic knowledge of volumetric analysis like permanganometric, complexometric titrations.
5. Create awareness regarding laboratory performance among engineering students.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Mention the types of various titration methods.
2. Explain about the determination of alkalinity and hardness of water methods.
3. Apply comprehensive knowledge of theory and practice of instrumental methods.
4. Examine the pH, electromotive force, conductance by using instrumental methods.
5. Test the amount of dissolved oxygen present in water sample.
6. Prove the knowledge of volumetric analysis.
7. Estimate the amount of copper in Brass by colorimetry.
8. Analyze the rate of corrosion by the use of corrosion inhibitors.

List of Experiments:

1. Determination of Alkalinity of the given Water Sample
2. Determination of Hardness of Water by Complexometric (EDTA) method
3. Estimation of Calcium in Limestone by Permanganometry
4. Determination of dissolved oxygen in the given sample of water
5. Titration of Strong Acid Vs Strong Base by Conductometric Method
6. Redox Titration by Potentiometric Method
7. Titration of Weak Acid Vs Strong Base by pH metry.
8. Determination of Copper in Brass by Colorimetry Method
9. Determination of Rate of Corrosion of oxide steel in acidic environment in the absence and presence of an inhibitor.
10. Preparation of a Polymer sample (Thiokol Rubber / Urea Formaldehyde)

REFERENCE BOOKS:

1) K. Mukkanti, “Practical Engineering Chemistry”, BS Publications, Hyderabad (2209).
2) Gurudeep R. Chatwal and Sham K Anand, “Instrumental Methods of Chemical Analysis”, Himalaya Publishing House.

(ES108) COMPUTER PROGRAMMING LAB

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Comprehend the computer as a system for computation.
2. Appreciate the program development and execution environment.
3. Learn a programming language through C.
4. Acquire the problem solving skills through computer programming.
5. Recognize the applications of C language.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Appreciate the stored program computing environment.
2. Analyze and implement software development tools like algorithm, pseudo codes and programming structure.
3. Acquire syntactic familiarity with C programming language.
4. Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.
5. Apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
6. Apply and practice logical ability to solve the problems.
7. Apply C programming to solve problems related to scientific computing.
8. Compose efficient programs.

Recommended Systems/Software Requirements:

- 'gcc' Compiler for CSE

Week 1 (Content Focus) Basics

a) Basic Commands of Linux,
b) vi Editor Usage,
c) first C program.
d) Compiling and Executing a C Program.

Week 2. (Content Focus) Operators.

a) write a C program to demonstrate all arithmetic and bitwise operators .
b) Write a C program to find the Euclidean distance between two given points.
c) The total distance travelled by vehicle in 't' seconds is given by distance = $ut+1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2).
Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'.

Week 3. (Content Focus) Conditional Statements and Logical Operators

a)Write a C program to check wheather the given triplet is a Pythagorean.

b)Write a C program to accept a coordinate point in a XY coordinate system and determine its quadrant
c) Accept Student Marks , calculate Total and find his Grade.

Week 4. (Content Focus) Iterative Statements
a) Write a C program to find the sum of individual digits of a positive integer.
b)Write a C Program to Find the biggest of n numbers.
c) Calculate the sum of upper triangle of a given matrix.
d)Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Week 5. (Content Focus) Iterative statements Continued.....
a)Factorial of a given number.
b) Febonacci series upto a given range.
c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Week 6 (Content Focus) Iterative statements Continued.....
a) Write a C program to generate Pascal's triangle.
b) Write a C program to construct a pyramid of numbers.
c) Write a C program to find Birthday Probability.

Week 7. (Content Focus) Iterative statements Continued.....
a) Write a C program to read in two numbers, x and n, and then compute the series of sin, cos, tan check accuracy
b) Write C program to input real numbers and find the mean, variance and standard deviation

Week 8 (Content Focus) Array's
a) Search a given item in an array of integers and find the sum of array elements.
b) Maze Problem- Write a C program to check wheather there is a path form starting point to ending point .
c) Write a C program that uses functions to perform the following:
i) Addition and Multiplication of 2 matrices
ii) Determinant of matrix and inverse of a matrix

Week 9 (Content Focus) Structures
a) write a C program for defining a structure of bank customer details.(account number , acc holder name, acctype, balance)
b)Write a C program to Demonstrate Elecricity Bill of One Year.

Week 10 (Content Focus) Strings
a) Write a C program s to perform the following operations on strings
i) To insert a sub-string in to given main string from a given position.
ii) To delete n Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not.
c) Write a C program to convert a floating point number to binary number.
d) Write a C program to check wheather the given numbers are anagrams or not.
e) Write a C program to check wheather the CREDIT card is valid or not.

Week 11 (Content Focus) Functions
a) Write a C program to find the sum of all elements of an array using pointers as arguments.
b) Write a C program to convert a Floating Point Number base(10) to binary number.
c) Write a C program which copies one file to another.
d) Write a C program computes statistics on a file of numbers

Week 12 (Content Focus) Hardware Interaction
a) Program for setting different display modes of output.
b) Write a C program that interacts with RAM data .

TEXT BOOKS:
1. B. A. Forouzan and R.F. Gilberg, "Computer Science: A Structured Programming Approach Using C", Cengage Learning, Third Edition.
2. B.W. Kernighan and Dennis M. Ritchie, "The C Programming Language", PHI/Pearson Education.

REFERENCE BOOKS:
1. Yashwant Kanetkar, "Let us C", BPB Publications.

Web links:
1. http://nptel.iitm.ac.in

(HS102) ENGLISH – II

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	2	-	-	2	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Recognize and modify their problems in pronunciation action to make themselves ready for native speaker.
2. Summarize a short passage on a familiar topic in their words.
3. Execute classroom discussion, encourage equal participation of all.
4. Distinguish between the concepts of phrasing, blending and linking.
5. Construct sentences using past/ present / future tenses.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Reproduce the words using the given rules of pronunciation.
2. Paraphrase a short passage on given topic in their own words.
3. Produce basic grammatical structures and generate new sentences in a given paradigm.
4. Identify the main idea and supporting details in academic passages.
5. Build telephone etiquette by using language for assent and dissent.
6. Draw information from various sources and develop writing.
7. Build professional writing skills to meet the future standards in technology.
8. Prioritize the requirements of industrial needs and communicate accordingly.

UNIT –I

Chapter entitled '**Health and Fitness**' from Unlock Reading and Writing Skills – Cambridge University Press Unlock Listening and Speaking Skills - Cambridge University Press

L-Listening for Conversation from **Health and Fitness** from Unlock Listening and Speaking Skills

S-Telephone Etiquette

R- Reading for understanding from **Health and Fitness** from Unlock Reading and Writing Skills

W- Introduction to Essay writing

G-Types of Articles

V- Idioms

UNIT –II

Chapter entitled "**Discovery and Invention"** from Unlock Reading and Writing Skills– Cambridge University Press, Unlock Listening and Speaking Skills-Cambridge University Press

L – Listening for understanding stress from **Discovery and Invention** from Unlock Listening and Speaking Skills

S – Presenting ideas

R- Reading for note making, from **Discovery and Invention** from Unlock Reading and Writing Skills

W- Writing supporting sentences

G- Tenses
V- Words often confused

UNIT –III

Chapter entitled **Fashion,** from Unlock Reading and Writing Skills – Cambridge University Press, Unlock Listening and Speaking Skills - Cambridge University Press
L – Listening for main points and sub-points for note taking from **Fashion,** from Unlock Listening and Speaking Skills
S – Speaking using visual aids
R – Reading for contextualization- from **Fashion,** from Unlock Reading and Writing
W – Information transfer techniques
G – Direct and Indirect Speech
V – One word substitutions

UNIT –IV

Chapter entitled **Economics,** from Unlock Reading and Writing Skills – Cambridge University Press, Unlock Listening and Speaking Skills - Cambridge University Press
L -Listening for speaker's tone from **Economics,** from Unlock Listening and Speaking Skills
S- Analyzing graphs and pictorial expressions
R -Reading between lines- from chapter entitled **Economics,** from Unlock Reading and Writing Skills
W- Writing Cohesion, coherence in drafting essay
G- Active and Passive Voice
V- Vocabulary – usage of adverbs

UNIT –V

L- Critical Listening understanding intonation tone/ attitude from **The Brain** from Unlock Listening and Speaking Skills
S- Public Speaking - introduction
R- Critical reading from - Chapter entitled **The Brain,** from Unlock Reading and Writing Skills
W- Technical Report
G- Simple, Compound and Complex Sentences
V- Collocations and Technical vocabulary

- **Exercises from the texts not prescribed will also be used for classroom tasks.**

TEXT BOOKS:

1. Carolyn Westbrook, "Unlock Reading and Writing Skills 3 - B1 English Profile", Cambridge University Press.
2. Sabina Ostrowska, "Unlock Listening and Speaking Skills 3 - B1 English Profile", Cambridge University Press.

REFERENCE BOOKS:

1. Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge University Press.
2. V R Narayanaswami, "Strengthen your English", Orient Longman.
3. "A Hand Book of English for Engineers", BSP.
4. M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw Hill.

(BS102) COMPUTATIONAL MATHEMATICS

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	3	1	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recall the linear system of equations, find the rank and inverse of any matrix.
2. Find the Eigen values, vectors and applies the cayley-hamilton theorem to square matrix.
3. Calculate the approximate numerical solution for any equation and to any set of points by using relevant formule.
4. Integrate any function, explain about fitting of different curves by using method of least squares.
5. Solve the IVP problems and compare the numerical solution with analytical solution.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Define and calculate the rank, solution of n-linear equations, inverse of matrices.
2. Apply the concept of eigen values, vectors in communication theory, coding and Cryptography.
3. Apply the cayley-hamilton theorem to calculate the inverse and higher powers of any ordered square matrix.
4. Explain how to get the approximate root (solution) of any equation by using different numerical methods.
5. Formulate any given data points to get the numerical solution by different interpolating formulas.
6. Estimate the numerical solution for any definite integral by using different rules.
7. Interpret the given set of data points to best fit the linear curve by using method of least squares.
8. Compares the numerical solution of any IVP problem with analytical solution by using different single and multi step methods.

UNIT-I

Solution of Linear Systems: Matrices – basic definitions – real symmetric, skew-symmetric and orthogonal matrices – complex matrices – hermitian, skew-hermitian and unitary matrices – elementary row and column operations – echelon form – rank – normal form – inverse by elementary row operations(Gauss - Jordan method) – solutions of linear system of equations (homogeneous and non - homogeneous).

UNIT-II

Eigen Values and Eigen Vectors: Eigen values and eigen vectors – properties of eigen values and eigen vectors of real and complex matrices – Cayley-Hamilton theorem (without proof) – inverse and powers of a matrix by Cayley-Hamilton theorem.

UNIT-III

Numerical Solutions of Non-Linear Equations: Solution of algebraic and transcendental equations – Bisection method – Regula-falsi method –Newton Raphson method – iteration method.

Interpolation: Interpolation with unevenly spaced points – Newton's Divided Difference – Lagrange's Interpolation formula.

UNIT-IV

Numerical Integration and Curve Fitting: Numerical integration – Newton-cotes formula – Trapezoidal rule – Simpson's 1/3 and 3/8 rules. Curve fitting by method of least squares – fitting of straight line – parabola – exponential curve – power curve.

UNIT-V

Numerical Solutions of Initial Value Problems in ODE: Numerical solutions of initial value problems – introduction – Taylor series method, Picard's method, Euler's method, Modified Euler's method, Runge Kutta methods.

TEXT BOOKS:

1. K. A. Stroud with Dexter J. Booth, "Advanced Engineering Mathematics", Industrial Press, inc.
2. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2 - B Nath Market, Nai Sarak, Delhi.

REFERENCE BOOKS:

1. Peter V. O'Neil, "Advanced Engineering Mathematics", Cengage Learning- Engineering.
2. Iyengar TKV, MVSN Prasad, S. Ranganatham, Gandhi and B. Krishna, "Mathematical Methods", S. Chand.
3. S.S. Sastry, "Introductory Methods of Numerical Analysis",- PHI Learning Pvt. Ltd.
4. M.K.Jain, S.R.K.Iyengar, R.K.Jain, "Numerical Methods", Newage International (P), Ltd.

(BS104) ENGINEERING PHYSICS - II

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Identify the crystal systems and types of defects in solids.
2. Discuss the role of dielectric materials in various engineering applications.
3. Categorize the different magnetic materials and list their applications.
4. Evaluate the carrier concentration in semiconductors as well as understand the device physics.
5. Elaborate the types and properties of nanomaterials as well as their characterization.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recognize the importance of defects in physical properties of crystalline solids.
2. Assess crystal structure and interplanar spacing of crystals using X-ray diffraction techniques.
3. Illustrate the variation of polarization with field, stress as well as temperature in dielectrics.
4. Select the magnetic materials for the desired engineering applications.
5. Estimate the carrier concentration and understand the types of currents in semiconductor.
6. Examine the construction and working of diodes in various applications.
7. Discuss synthesis methods of novel nanomaterials for various applications.
8. Apply the knowledge acquired from basic principles of materials science to design devices with higher performance and smaller in size**.**

UNIT - I: Crystallography

Introduction, Unit cell, Crystal systems and Bravais lattices, Crystal planes and Miller indices, Interplanar spacing of orthogonal crystal systems, Crystal defects – classification, Effect of crystal defects on physical properties, X-ray diffraction – Bragg's law, Bragg's spectrometer, Debye-Scherrer powder method, Applications of X-ray diffraction

UNIT - II: Dielectric Materials

Introduction, Polarization mechanisms - Electronic, Ionic, Orientation and Space charge polarizations (qualitative), Dielectric relaxation, Piezo-electricity - Production and detection of ultrasonics by piezo-electric effect, Applications of ultrasonics, Pyro-electricity, Ferro-electricity – hysteresis, Applications of dielectric materials

UNIT - III: Magnetic Materials and Superconductivity

Introduction, Origin of magnetic moment, Classification and characteristics of magnetic materials, Ferromagnetism - hysteresis, Soft and hard magnetic materials, Magnetostrictive effect, Applications of magnetic materials, Superconductivity - Meisner effect, Soft and hard superconductors, High T_c superconductors and applications of superconductors

UNIT – IV: Semiconductors and Devices

Concept of Fermi energy, Intrinsic and Extrinsic semiconductors – Carrier concentration and Fermi level, Drift and diffusion currents, Einstein relation, Hall effect, Formation of PN junction diode, Energy band diagram (unbiased, biased), Volt-Ampere characteristics, PN junction diode as rectifier (qualitative), Principle, Construction and Applications of - light emitting diode (LED), photo diode and solar cell

UNIT - V: Nanomaterials

Historical development, Nanoscale, Surface area to volume ratio, Quantum confinement, Classification of nanomaterials (1D, 2D, 3D), Properties of nanomaterials, Types and properties of carbon nanotubes, Top-down fabrication - ball milling method, Bottom-up fabrication - Sol-gel method, Characterization of nanomaterials: X-ray diffractometer (XRD) – Determination of particle size, Transmission Electron Microscope (TEM) and Atomic Force Microscope (AFM), Applications of various nanomaterials

TEXT BOOKS:

1. S.O. Pillai, “Solid State Physics”, New Age International (P) Ltd.
2. M.N. Avadhanulu and P.G. Kshirasagar, “A Text book of Engineering Physics” S. Chand and Company Ltd.

REFERENCE BOOKS:

1. A.J. Dekker, “Solid State Physics”, Macmillan India Ltd.
2. P.K. Palanisamy, “Engineering Physics”, SciTech Publications, India (P) Ltd.
3. M.R. Srinivasan, “Physics for Engineers”, New Age International (P) Ltd.
4. K.K. Gupta, “Solid State Physics”, New Age International (P) Ltd.

(BS106) ENVIRONMENTAL STUDIES

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	3	-	-	3	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Recall the importance of environment and its related issues.
2. Discuss about biogeochemical cycles and biodiversity.
3. Predict threats to the flora and fauna of biodiversity.
4. Evaluate environmental impact, its prediction methods.
5. Create awareness towards global environmental issues, population growth, and use of energy resources, sustainability and waste management.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Memorize the concept of environment and its related issues.
2. Paraphrase about components of ecosystem and environment cycles.
3. Compute loss of biodiversity.
4. Categorize the values and conservation of biodiversity.
5. Prioritize energy resources, sustainability, pollution and its types.
6. Estimate global environmental issues and waste management.
7. Recommend solutions to population growth, natural disasters and waste management.
8. Formulate the impacts of environment and its assessment.

UNIT-I: Ecosystems

Introduction to Environmental Studies. Concept of ecosystem: Introduction, Types of ecosystems- forest and aquatic ecosystems-lentic (pond), lotic (river) and estuaries, Structure-Biotic (Producers, Consumers and Decomposers) and Abiotic, Functions-energy flow in an ecosystem, Food chain- significance (bio magnification- pest and pest control-case study-DDT, Arsenicosis Disease), Food web, Ecological Pyramids-Pyramids of Energy, pyramid of number and pyramid of biomass, Bio-Geochemical Cycles- Hydrological Cycle, Carbon Cycle, Nitrogen Cycle, Evolution in the ecosystem: Ecological succession-xerosere and hydrosere.

UNIT-II: Biodiversity and Its Conservation

Definition, types, values-productive use, consumptive value, social value, ethical value, aesthetic value and option value, biodiversity Vs bio productivity, biodiversity Vs biotechnology, threats to biodiversity: Habitat loss, poaching of wildlife, Invasive species (Exotic), list of endangered and endemic species, Conservation of biodiversity- In situ and Ex situ with examples.

Field Work:

- Pond, river, hill slope ecosystems etc.
- Study of common plants, insects and birds etc.

UNIT-III: Renewable Energy

Energy resources-Growing energy needs, Renewable-Solar energy, hydroelectric power, wind energy, bio-energy (bio-ethanol, methane, hydrogen), tidal energy and geothermal energy.

Sustainable development

Concept, threats to sustainability, strategies for achieving sustainability, green building concept.

Population growth and Its Consequences

Health Consequences, Population growth in rich and poor Nations–Their problems and demographic transition.

UNIT-IV: Pollution

Pollution-Introduction, Types- air and water – causes, effects and control measures-Air pollution sampling techniques, waste water treatment-aerobic and anaerobic(treatment of sludge process-composting pasteurization), alternate treatment systems, septic system, composting, septic system.

Global Environmental Issues

Urban environmental problems, Global warming (Climate change- Carbon sequestration-Plants, soil and oceans, green house gases), Acid rain, Ozone layer depletion and Bio fuels Vs Food crisis, Fukushima Daiichi nuclear disaster, Ganga action plan, Protocols-Kyoto and Montreal.

UNIT-V: Waste Management

Wealth from the Waste-fly ash, Solid waste treatment methods-Composing, vermincomposting, incineration, pyrolysis, autoclaving, land filling and recycling, collection, handling rules and segregation of municipal solid waste, bio-medical waste and e-waste.

Environmental Impact Assessment (EIA)

Definition, Impact - Classification of impacts (positive and negative), prediction methods of EIA- adhoc and matrix method.

Field Work:

- Local area for documentation on Sustainable development and Population-Health Consequences.
- Local polluted site - Urban/ Rural / Industrial/ Agricultural.

Note: Field work - Visit to a local area to document environmental assets/ pollution sites.

TEXT BOOKS:

1. Richard T. Wright, Dorothy F. Boorse., "Environmental Science", Towards a sustainable Future12/E, PHI Learning Pvt. Ltd., M97, Ashok Goshal, Connaught circuit, New Delhi.
2. Erach Barucha, "Environmental Studies", UGC-India, Pune.

REFERENCE BOOKS:

1. Gilbert M. Masters and Ela Wendell P, Introduction to "Environmental Engineering and Science"- LPE Pearson educations.
2. Henry J.G. and Heinke G.W., "Environmental Science and Engineering", Prentice Hall of India, New Delhi.
3. M. Anji Reddy, "Text book of Environmental Science and Technology", BS Publications (2010).
4. Benny Joseph, "Environmental Studies", Tata McGraw Hill, New Delhi (2009).

(ES102) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(for CSE Branch)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Solve electrical circuits by using electric circuit laws and network theorems.
2. Illustrate the A.C circuits and D.C circuits and to sketch the phasor representation of A.C circuits.
3. Describe the constructional details and working principle of electrical machines (transformer and DC machines).
4. Recognize the semiconductor devices (PN junction diode and zener diode) and their applications.
5. Explain the operation of bipolar junction transistor in different configurations.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Solve the electrical circuits by using nodal and mesh analysis.
2. Implement the ohm's law and network theorems to the electrical circuits.
3. Calculate the alternating current, voltage, peak factor, form factor, active power and reactive power in A.C circuits.
4. Sketch the phasor diagrams for R-L, R-C and R-L-C A.C circuits.
5. Compute the efficiency and voltage regulation of Transformer and generated voltage of D.C generator.
6. Differentiate the operation of D.C machines in different modes (generator mode and motoring mode).
7. Describe the breakdown mechanism in semiconductor diodes (PN junction diodes and zener diodes).
8. Explain the operation of BJT in common base, common emitter and common collector configurations.

UNIT – I

Network Analysis: basic definitions, Ohm's law, basic circuit components- volt-ampere characteristics, Kirchhoff's laws, simple problems, types of sources, resistive networks, inductive networks, capacitive networks, series parallel circuits, star-delta and delta-star transformation, network theorems- superposition, Thevenin's, maximum power transfer theorems and simple problems.

UNIT – II

Alternating Quantities: Principle of ac voltages, waveforms and basic definitions, root mean square and average values of alternating currents and voltage, form factor and peak factor, phasor representation of alternating quantities, the J operator, analysis of ac circuits with single basic network element, series connection of R-L, R-C, R-L-C, concept of power factor- real and reactive powers.

UNIT – III

Transformers and DC Machine: Transformers - Principles of operation, constructional details, ideal transformer and practical transformers, losses, efficiency and regulation, transformer test (OC and SC) (all the above topics are only elementary treatment and simple problems). DC Machines - Construction and operation of DC generator, EMF equation, classification of DC generators, DC motor operation.

UNIT – IV

Diode and Rectifiers: Qualitative theory of p-n junction, p-n junction as a diode, diode equation, volt-ampere characteristics, temperature dependence of VI characteristics, resistance levels (Static and Dynamic), transition and diffusion capacitances, diode equivalent circuits, breakdown mechanisms in semiconductor diodes, Zener diode-characteristics, voltage regulation. Rectifiers- half wave rectifier, full wave rectifier and bridge rectifier, filter circuits (qualitative) - inductor filter, capacitor filter, L-section filter, π-section filter.

UNIT – V

Bipolar Junction Transistor: The junction transistor, transistor construction, BJT operation, transistor current components, transistor as an amplifier, common base, common emitter and common collector configurations, thermal runaway, limits of operation, BJT specifications, operating point, stabilization factors, stabilizations against variations in VBE and β, applications of transistors.

TEXT BOOKS:

1. Hughes, “Basic Electrical Engineering”, Pearson Publication.
2. J. Millman, C.C.Halkias, and Satyabrata Jit, “Millman’s Electronic Devices and Circuits”, TMH.

REFERENCE BOOKS:

1. A. Chakrabarthy, “Electric Circuits”, Dhanpat Rai and Sons
2. M.S. Naidu and S. Kamakshaiah, “Basic Electrical Engineering”, TMH publication
3. V.K. Mehta, “Principles of Electrical Engineering And Electronics”, S. Chand publication.

(ES110) DATA STRUCTURES

(Common to EEE, ECE and CSE Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recognize different data structure and their abstract data types (ADTs).
2. Implement STACK, QUEUE and LIST data structures.
3. Apply C in implementing the TREE ADTs and traverse the tree.
4. Understand different hashing functions.
5. Familiarize with different sorting techniques.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
2. Outline common applications for arrays, records, linked structures, stacks, queues, trees and graphs.
3. Compare and contrast the benefits of dynamic and static data structures implementations.
4. Evaluate programs that use arrays, records, linked structures, stacks, queues, trees and graphs.
5. Demonstrate different methods for traversing trees.
6. Analyze alternative implementations of data structures with respect to performance.
7. Design and implement an appropriate hashing function for an application.
8. Discuss the computational efficiency of the principal algorithms for sorting, searching and hashing.

UNIT- I

Basic concepts - Data types, Abstract Data Types, Data structures, Algorithms.
Searching- Linear Search, Binary Search
Sorting- Bubble Sort, Insertion Sort, Selection Sort, Quick sort, Merge sort, Comparison of Sorting methods.

UNIT- II

Stack ADT - Definitions, operations, array and linked implementations, applications-infix to postfix conversion, recursion implementation,

Queue ADT - Definitions and operations, array and linked Implementations, Applications of Queue Circular queues and operations

Linear data structures - Linear Lists, Sequential and Linked allocation ,The list ADT, array and linked Implementations, Singly Linked Lists-Operations-Insertion, Deletion, Doubly Linked Lists-Operations - Insertion, Deletion

UNIT- III

Non Linear data structures: Trees – Basic Terminology, Binary tree ADT, array and linked representations, traversals, threaded binary trees, Disjoint Sets, Union and Find algorithms, Priority Queues-Definition, ADT, Realizing a Priority Queue using Heap.

Search Trees-Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion and Deletion.

UNIT- IV

AVL Trees - Definition, Operations – Insertion and Searching,

B-Trees - Definition, B-Tree of order m, operations - insertion and deletion, Introduction to Red-Black and Splay Trees, Comparison of Search Trees.

UNIT -V

Graphs – Introduction, Basic Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Adjacency multilists, Graph traversals- DFS and BFS, Spanning Trees – Kruskals, prims algorithms.

Hashing - hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

TEXT BOOKS:

1. Mark Allen Weiss, "Data structures and Algorithm Analysis", 3rd edition, Pearson Education. Ltd.,
2. S.Sahani, "Data structures, Algorithms and Applications", Universities Press.

REFERENCE BOOKS:

1. Michael T.Goodrich, R.Tamassia and D.Mount, "Data structures and Algorithms", Wiley student edition, seventh edition, John Wiley and Sons.
2. Adam Drozdek, "Data structures and algorithms", 3rd Edition, Cengage Learning.
3. Langsam, Augenstein and Tanenbaum, "Data structures using C", PHI.
4. Alfred V. Aho, "Data Structures and Algorithms", Pearson.

(BS107) ENGINEERING PHYSICS LAB

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Illustrate the phenomenon of light such as interference and diffraction.
2. Evaluate the numerical aperture and losses in optical fibers.
3. Recall the basic concepts of mechanics.
4. Calculate the energy gap and Planck's constant.
5. Examine the characteristics of RC circuit and solar cell.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Compare the intensity distribution of interference and diffraction patterns.
2. Estimate the frequency of tuning forks and AC supply with the help of stretched strings.
3. Analyze the importance of resistors and capacitors in electrical and electronic circuits.
4. Sketch the variation of magnetic field along the axis of a current carrying coil.
5. Identify the semiconductor based on the estimated value of energy gap.
6. Illustrate the conversion of light energy to electrical energy.
7. Discriminate the different modulii of elasticity.
8. Assess the conditions for signal propagation through an optical fiber.

List of Experiments: (Any Ten Experiments Compulsory)

1. Determination of radius of curvature of a plano-convex lens using Newton's rings setup.
2. Determination of wavelength of a source (sodium vapour lamp) using diffraction grating.
3. Determination of wavelength of a laser source using diffraction grating.
4. Evaluation of numerical aperture and bending losses of an optical fiber.
5. Determination of rigidity modulus of a wire using torsional pendulum.
6. Determination of frequency of electrically driven tunning fork using melde's apparatus.
7. Determination of frequency of an a.c. supply using sonometer.
8. Determination of time constant of an R-C circuit.
9. Determination of magnetic field along the axis of current carrying coil using Stewart and Gees apparatus.
10. Determination of energy gap of the material of a p-n junction diode.
11. Study of characteristics of a solar cell.
12. Determination of Planck's constant.

TEXT BOOKS:

1. Y.Aparna and K.Venkateswara Rao, "Laboratory Manual of Engineering Physics", VGS Publishers.

(ES106) PRODUCT DESIGN STUDIO

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recognize the functioning of various mechanical and electrical tools.
2. Realize the connections of electrical and electronic components by means of wiring and soldering practice.
3. Analyze the characteristics of various circuits by using different sensors.
4. Catagorize the functioning of various measurung instruments.
5. Evaluate the disassembling and assembling of program-specific product.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Produce new products by using carpentary tools.
2. Create new products by using tinsmity tools.
3. Perform soldering with different circuit elements.
4. Evaluate the characteristics of components related to electrical and electronic systems.
5. Design circuit using various electronic components and sensors.
6. Compute various electrical parameters of various circuits using DMM.
7. Assess the characteristics of various signals using CRO.
8. Create a product using rapid prototyping technique.

I. Hand-Held Tools (3 sessions, 9hrs)

Familiarize and practice on using hand-held mechanical and electrically operated tools Identify parts and functions of each tool.

Assignment: *Students will make build small shapes using these tools.*

II. Soldering and Tin-Smithy (2 sessions, 6 hrs)

Familiarize and practice with trades - soldering and tin-smithy.

Assignment: *Students will make a comprehensive report on different trades by web-search*

III. Sensors, Electrical and Electronic Circuit Components (2 sessions, 6hrs)

Familiarize with a variety of sensors like pressure transducers, load cells, temperature sensors, sound, touch and distance sensors, used in different contexts. Learn how to connect, read and calibrate sourcing and sinking sensor outputs

Assignment: *Students will connect and read the digital output of at least two different types of sensors.*

IV. Measurement Devices and Instruments (2 sessions, 6hrs)

Familiarize with digital measurement devices andinstruments –multi-meter and oscilloscope.

Assignment: *Students will measure various parameters in a given circuit using multi-meter and oscilloscope*

V. Product Disassembly, Assembly and Development (3 sessions, 9 hrs)
Systematically disassemble a program-specific product, identify the parts and functions and carefully assemble the product. Use appropriate tools.
Design and develop a product using rapid prototyping technique
Assignment: *Students will prepare a comprehensive report of parts and functions by web-search. Include free-hand sketches where possible.*

TEXT BOOKS:
1. HS Kalsi, "Electronic Instrumentation", Tata McGraw Hill Publishing Company Limited.
2. S K Hajra Choudhury and A K. Hajra Choudhury, "Elements of Workshop Technology: Vol I: Manufacturing Processes", Media Promoters and Publishers Pvt. Ltd.

REFERENCE BOOKS:
1. William D. Cooper and Albert D. Helfrick, "Electronic Instrumentation and Measurement Techniques", Prentice Hall.
2. A.K. Sawhney and Puneeth Sawhney, "Mechanical Measurements and Instrumentation and Control", Dhanpat Rai and Company.

(ES111) DATA STRUCTURES LAB

(Common to EEE, ECE and CSE Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
I	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recognize and formulate the abstract data types (ADT) for different data structures.
2. Make an appropriate choice of data structure depending on the context of application.
3. Implement different data structures using a programming language (C).
4. Develop applications involving data structures in general engineering problems.
5. Explore data structures in domain specific engineering problems, civil, mechanical, etc.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
2. Outline common applications for arrays, records, linked structures, stacks, queues, trees and graphs.
3. Compare and contrast the benefits of dynamic and static data structures implementations.
4. Evaluate programs that use arrays, records, linked structures, stacks, queues, trees and graphs.
5. Demonstrate different methods for traversing trees.
6. Analyse alternative implementations of data structures with respect to performance.
7. Design and implement an appropriate hashing function for an application.
8. Discuss the computational efficiency of the principal algorithms for sorting, searching and hashing

Week- 1:

Develop C programs on Arrays, Pointers and Structures.

Week-2:

Write a C program to sort the Given set of elements using

i)Bubble sort ii) Merge sort

Week -3:

Write a C program to sort the Given set of elements using

i)Insertion sort ii) Quick sort iii)Heap sort

Week-4:

Write a C program that implement stack and Queues (its operations) using Arrays

Week- 5:

a) Write a C program that uses functions to perform the following operations on singly linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal

b) Write a C program that uses functions to perform the following operations on Circular linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week- 6:

a) Write a C program that uses functions to perform the following operations on Doubly linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways.

b) Write a C program that uses functions to perform the following operations on Circular Doubly linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal.

Week- 7:

Write a C program that implement stack and Queue (its operations) using Pointers

Week- 8:

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

Week- 9:

Write a C program to perform the following operations on Binary Search Tree

i) Insertion. ii) Deletion iii) Traversal (Recursive)

Week- 10:

Write a C program to perform the following operations on AVL Tree

i) Insertion. ii) Deletion iii) Traversal (Recursive)

Week- 11:

Write a C program to perform the following operations on B Tree

i) Insertion ii) Search

Week- 12:

Write a C program to implement BFS and DFS algorithms for a given graph.

Week- 13:

a) Write a C program to implement Kruskal's and Prim's algorithms to generate a minimum cost spanning tree.

b) Write a C program to implement the given hash function and explore hash table for fast data lookup

Week- 14:

a) Write a C program to Apply a suitable data structure to represent the given polynomial, eg., **5x10 + 3x5 + 1**

b) Write a C program to Apply a suitable data structure to implement trie/dictionary such as one found on a mobile
telephone.

TEXT BOOKS:

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education Asia.
2. Yashvant Kanetkar, “Understanding Pointers in C”, BPB Publications.

WEB LINKS:

1. www.nalanda.nitc.ac.in/libnew/book-13-05-05.html
2. http://nptel.iitm.ac.in
3. http://www.ebooks.com
4. http://www.suite101.com/reference/data_structure_tutorial

(ES112) FOUNDATIONS TO PRODUCT DESIGN

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	3	-	-	3	50	50	100

COURSE OBJECTIVES:

Students will learn

1. The overall design process and the various stages in the process.
2. Methods to identify and frame the needs from ethnography to functional decomposition.
3. Elements of value proposition from the point of view of different stakeholders.
4. Idea generation techniques, concept development methods based on appropriate experimentation, and concept selection method.
5. Project planning, cost estimation, managing intellectual property Rights, and report writing skills.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Describe and discriminate the design process and its stages.
2. Conduct an ethnographic study and frame a design need.
3. Decompose the need in terms of independent functions.
4. Formulate value proposition from the point of view of different stakeholders.
5. Conceive ideas, develop them into viable concepts through appropriate investigation, and select viable concept.
6. Plan a project and work towards implementation.
7. Produce a working prototype and create a design report.
8. Demonstrate the project / product and prepare cost estimates.

UNIT – I

The Engineering Design Process

Overview of the engineering design process, Stages of design – Identification – conceptualization – Exploration and refinement – Modeling – Commercialization.

UNIT - II

Identification and Analysis of Need

Ethnography, Framing the Need, Functional Analysis - Functions, Constraints, Functional Decomposition and Development of Requirements, Kano Model, Value Proposition from the Point of View of Different Stakeholders.

Assignment -1: Identification and analysis of customer needs

Assignment-2: Kano Model Application

UNIT – III

Conceptualization:

Concept Generation- Six Hats method, Concept Development through Appropriate Investigation, Concept Selection.

***Assignment-3*:** Concept Generation exercise.

UNIT – IV

Skill Development: Project Planning, Cost Estimation, Intellectual Property Rights**,** Effective Report Writing.

UNIT – V

Project work: An open-ended design project executed from opportunity to a working prototype culminating with an investor pitch, customer product unveiling, and report.

TEXT BOOKS:

1. Kevin Otto and Kristin Wood, "Product Design: Techniques in Reverse Engineering and New Product Development", Prentice Hall Edition, Jan 2013.
2. Jonathan Cagan, "Creating Breakthrough Products: Innovation from Product Planning to Program Approval", Publication FT Press ©2002, 2nd Edition.

REFERENCE BOOKS:

1. James H. Gilmore and B. Joseph Pine, "Markets of One: Creating Customer-Unique Value through Mass Customization" Feb 2000.
2. Eric Reis, "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses".
3. Karen Wilkinso, "The Art of Tinkering Hardcover use pre formatted date that complies with legal requirement from media matrix".

E-BOOKS:

1. Prashanth Kumar, "Product Design: Creativity, concepts and usability", PHI Publication.
2. Vijay kumar, "101 Design Methods: A structural Approach for Driving Innovation in your Organization", Wiley Publishers.
3. Mark Baskinger and William Bardel, "Drawing Ideas: A Hand Drawn Approach for Better Design", Watson-Guptill publication.

(CS101) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	4	1	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Interpreting the mathematical logic with concepts of truth tables, normal forms and quantifiers.
2. Inferring the predicates and rules of inference for automatic theorem proving, set theory and lattice systems.
3. Organizing the algebraic structures, elementary combinatory for making proofs for the mathematical principles.
4. Executing the recurrence relations and its characteristics.
5. Explaining the concepts of graph theory.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Analyze the problem and identify the structures required to generate the mathematical solution.
2. Apply the mathematical logic, predicate rules to design an abstract system for theorem proof.
3. Apply mathematical foundations, algorithmic principles in modeling and design in computer based system.
4. Find out the co-efficient for a polynomial.
5. Design and develop the logic based systems.
6. Apply the concepts of graph theory in solving practical engineering problems
7. Solve problems involving recurrence relations and generating functions
8. Visualize and simplify situations using graphs and trees as tools

UNIT – I

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

Predicates: Predicative logic, Free and Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving

UNIT - II

Set Theory: Introduction, Sets and Elements, Subsets, Venn Diagrams, Set Operations, Power Sets, Partitions

Relations: Introduction, Product Sets, Relations, Pictorial Representatives of Relations, Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, compatibility and Partial Ordering Relations

Ordered Sets: Ordered Sets, Hasse Diagrams of Partially Ordered Sets, Supremum and Infimum, Isomorphic (Similar) Ordered Sets, Well-Ordered Sets, Lattices and its Properties

UNIT – III

Functions: Introduction, Functions, One-to-One, Onto and Bijective Functions, Invertible Functions, Recursive Functions.

Techniques of Counting: Introduction, Basic Counting Principles, Permutations, Combinations, The Pigeonhole Principle and its applications, The Inclusion–Exclusion Principle, Combinations with Repetitions, Binomial and Multinomial Theorems

Algebraic Structures: Algebraic systems Examples and general properties, Semi groups, Monoids, Groups, Ring and Fields, sub groups' homomorphism, Isomorphism.

UNIT - IV

Recurrence Relation: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating functions. Characteristics roots solution of In homogeneous Recurrence Relations.

UNIT - V

Graph Theory: Representation of Graph, Basic Concepts, Basic types of Graphs and their properties, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers, DFS, BFS, Trees, Spanning Trees, Planar Graph, Prim's and Kruskal's Shortest Path.

TEXT BOOKS:

1. Seymour Lipschutz and Lipson Marc, "Discrete Mathematics", Tata McGraw Hill.
2. Trembly J.P. and Manohar P, "Discrete Mathematical Structures with Applications to Computer Science", TMH.

REFERENCE BOOKS:

1. Bernand Kolman, Roberty C. Busby and Sharn Cutter Ross, "Discrete Mathematical Structures", Pearson Education / PHI.
2. J.L. Mott and A. Kandel T.P. "Discrete Mathematics for Computer Scientists and Mathematicians", Baker Prentice Hall.
3. D. S. Chandrasekharaiah, "Mathematical Foundation of Computer Science", Prism Books Pvt. Ltd.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. http://www.math.northwestern.edu/~mlerma/courses/cs310-05s/
3. http://highered.mheducation.com/sites/0073383090/student_view0/applications_of_discrete_mathematics.html
4. http://www.mhhe.com/math/advmath/rosen/r5/student/ch01/weblinks.html

(CS102) COMPUTER ARCHITECTURE AND ORGANIZATION

(Common to EEE and CSE)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Discuss the basic concepts and structure of computers.
2. Understand concepts of register transfer logic and arithmetic operations.
3. Explain different types of addressing modes and memory organization.
4. Learn the different types of serial communication techniques.
5. Summarize the instruction execution stages.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Understand the theory and architecture of central processing unit.
2. Analyze some of the design issues in terms of speed, technology, cost, performance.
3. Design a simple CPU with applying the theory concepts.
4. Use appropriate tools to design verify and test the CPU architecture.
5. Learn the concepts of parallel processing, pipelining and interprocessor communication.
6. Understand the architecture and functionality of central processing unit.
7. Exemplify in a better way the I/O and memory organization.
8. Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.

UNIT – I

Digital Logic Circuits: Basic Logic Functions, Synthesis of Logic Functions Using AND, OR, and NOT Gates, Minimization of Logic Expression, Synthesis with NAND and NOR Gates, Flip-Flops, Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs).

Basic Structure of Computers: Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers.

UNIT – II

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation, Other binary codes, Error Detection codes.

Register and Micro Operations: Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

UNIT –III

Processing Unit: Instruction Codes, Computer Registers, Computer Instructions, Instruction Cycle, Memory Reference Instructions, Hardwired Control, Micro Programmed Control,

Register organisation, Stack organisation, Instruction formats, Addressing modes, Data Transfer and manipulations, RISC, CISC.

Computer Arithmetic: Addition, subtraction, multiplication and division operations, Floating point Arithmetic operations.

UNIT – IV

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access, Input-Output Processor , Serial communication.

Parallel and Vector Processing: Parallel and Vector Processing, Pipelining, Arithmetic pipeline, Instruction pipeline, RISC Pipeline, Vector Processing, Array Processors.

UNIT – V

Memory Organization: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Virtual memory, Cache memory, Memory management hardware.

TEXT BOOKS:

1. Car Hamacher, Zvonks Vranesic and Safwat Zaky, "Computer Organization", 5th Edition, McGraw Hill, 2002.
2. M. Moris Mano, "Computer System Architecture", 3rd Edition, PHI / Pearson, 2006.

REFERENCE BOOKS:

1. William Stallings, "Computer Organization and Architecture", 7th Edition, PHI / Pearson, 2006.
2. Hayes John, "Computer Architecture and Organisation", McGraw Hill
3. David A Patterson, "Computer Architecture and Organisation", TMH.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. http://computerscience.jbpub.com/ecoa/2e/student_resources.cfm

(CS103) DATABASE MANAGEMENT SYSTEMS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Describe the basic concepts of database systems, ER modeling.
2. Comprehend the concepts of relational model, relational algebra and relational calculus.
3. Apply SQL queries to perform various operations on databases.
4. Apply the concepts of normalization and analyze the concept of transaction management in databases.
5. Compare and contrast various file organization and indexing techniques.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Define the basic concepts of DBMS,
2. Design entity relationship models.
3. Explain relational model, integrity constraints.
4. Apply SQL to insert, delete and retrieve data from databases.
5. Convert entity relationship diagrams into RDBMS and formulate SQL queries on respective data.
6. Apply normalization to remove anomalies from databases.
7. Synthesize the concepts of transaction management, concurrency control and recovery.
8. Compare various file organization and indexing techniques.

UNIT – I

Introduction: Data base System Applications, data base System VS file System, View of Data, Data Abstraction, Instances and Schemas, data Models, Database Languages data base Users and Administrator, Transaction Management, Data base System Structure.

Data Base Design and ER Diagrams – Beyond ER Design Entities, Attributes and Entity sets Relationships and Relationship sets, Additional features of ER Model, Concept Design with the ER Model

UNIT – II

Introduction to the Relational Model – Integrity Constraint Over relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views, Destroying /altering Tables and Views.

Relational Algebra – Selection and projection set operations, renaming, Joins, Division, Examples of Algebra overviews, Relational calculus, Tuple relational Calculus, Domain relational calculus.

UNIT – III

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries – Set comparison operators – Aggregate Operators -

NULL values – Comparison using NULL values – Logical connectivity – AND,OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity constraints in SQL - Triggers and Active Data Bases

Introduction to Schema Refinement - Problems Caused by redundancy, Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms - BCNF - Properties of Decompositions - Loss less join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design - Multi valued Dependencies - FOURTH Normal Form.

UNIT – IV

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation-Based Protocols.

Recovery and Atomicity – Log - Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of non-volatile storage – Advanced Recovery systems – Remote Backup systems.

UNIT-V

Overview of Storage and Indexing: Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning - Intuitions for Tree Indexes, Indexed Sequential Access Methods(ISAM),B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible Vs Linear Hashing.

TEXT BOOKS:

1. Raghurama Krishnan and Johannes Gehrke, “Data Base Management Systems”, Tata McGraw Hill, 3rd Edition.
2. Silberschatz Korth, “Data Base System Concepts”, McGraw Hill, 5th Edition.

REFERENCE BOOKS:

1. Peter Rob and Carlos Coronel, “Data Base Systems Design, Implementation and Management”, 7th Edition, TMH.
2. Elmasri Navrate, “Fundamentals of Data Base Systems”, Pearson Education.
3. Alexis Leon and Mathews Leon, “Data Base Management Systems”, Vikas Publishing House.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. http://highered.mheducation.com/sites/0072465638/student_view0/index.html

(CS104) OBJECT ORIENTED PROGRAMMING CONCEPTS THROUGH JAVA

(Common to EEE, ME, ECE, CSE)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recall the various features of object oriented programming.
2. Identify the features of OOP specific to Java programming.
3. Apply exception handling mechanism to solve run time errors.
4. Discuss different inheritance techniques and multithreading.
5. Built user interfaces using swings and AWT controls.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. List all OOP features to design object oriented applications.
2. Explain design, compile, test and execute straightforward programs using a high level language.
3. Discuss the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
4. Analyze implementation, compilation, testing and run java programs comprising more than one class, to address a particular software problem.
5. Illustrate synchronization using multithreading.
6. Classify effective user interface applications through AWT controls and swings.
7. Examine use of members of classes in the Java API.
8. Summarize the framework and architecture for MVC's.

UNIT – I

Object Oriented Thinking: Need for OOP paradigm, OOP Principles, **Java Basics** History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT - II

Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes.

Packages and Interfaces: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. **I/O Streams.**

UNIT – III

Exception Handling and Multithreading: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT - IV

Applets: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scroll pane, dialogs, menubar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grib bag.

UNIT – V

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

1. Herbert Schildt, “Java the Complete Reference”, 7th Edition, TMH.
2. Y. Daniel Liang, “Introduction to Java Programming”, 6th Edition, Pearson Education.

REFERENCE BOOKS:

1. T. Budd, “Understanding OOP with Java”, Pearson Edition.
2. R.A. Johnson, “An Introduction to Java Programming and Object Oriented Application Development”, Thomson.
3. Hubbard John R, “Programming with Java”, McGraw Hill.
4. Deitel H.M and Deitel P.J, “Java - How to Program”, Pearson Edition.

WEB LINKS:

1. www.tatamcgrawhill.com/html/9780070636774.html
2. http://nptel.iitm.ac.in
3. https://www.cl.cam.ac.uk/teaching/0910/OOProg/OOP.pdf
4. www.java2s.com

(BS111) COMPUTATIONAL MATHEMATICS LAB

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Understand the basics of spreadsheet applications to engineering problem solving
2. Use Excel and MATLAB for engineering computing and data visualization
3. Apply skills of modeling and generate engineering models
4. Illustrate scientific documentation tools
5. Apply MATLAB for solving problems in numerical methods and curve fitting

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Create and format spreadsheets in Excel
2. Compare different solutions to engineering problems using the scenario analysis
3. Represent program modules in terms of a flowchart and psuedocode and use MATLAB for interactive computing
4. Write and test programs in MATLAB using flow controls (if-else, for, and while)
5. Manipulate matrices and perform matrix algebra in Excel and MATLAB
6. Solve simultaneous equations in Excel and MATLAB
7. Perform numerical integration and differentiation in Excel and MATLAB
8. Construct appropriate graphs or plots in Excel and MATLAB for data analysis and prediction.

EXCEL

Week 1: Introduction to Excel: Formatting and Layout, Page orientation, Size, Breaks, Header/Footer, Headings, Font, Height and Width, Color, Lines, Alignment, Merge, Wrap, Sheets titles, Fill, Sort, Absolute and Relative referencing.

Week 2: Simple plots, Graphing with error and trend lines.

Week 3: Solving system of equations using matrix methods and the solver.

Week 4: Numerical integration and differentiation from data and from equation.

Week 5: Finding roots of a polynomial - Goal seek, Finding maximum and minimum of function - solver, Finding the results for different scenarios.

MATLAB

Week 6: Flowcharting, Pseudocode and Documentation – Basic building blocks of flowchart, Translating flowchart to pseudocode, Basics of documentation.

Week 7: Introduction to MATLAB environment, Writing simple programs with branching and loop statements.

Week 8: Creating plots with MATLAB.

Week 9: Manipulating matrices and solving system of equations using matrix methods.

Week 10: Using programmer's toolbox (input/output/plotting..) - Finding roots, Maximum and minimum values of a function.

Week 11: Numerical integration and differentiation.

TEXT BOOKS:

1. Bernard Liengme, "A Guide to Microsoft Excel 2013 for Scientists and Engineers", Elsevier.
2. Kelly Bennett, "MATLAB Applications for the Practical Engineer", InTech, (2014).

REFERENCE BOOKS:

1. John Walkenbach, "Excel 2013 Bible",Wiley.
2. E.Joseph Billo, "Excel for Scientists and Engineers - Numerical Methods", Wiley, (2007).
3. Stormy Attaway, "MATLAB: A Practical Introduction to Programming and Problem Solving", Elsevier, (2009).
4. V. Rajaraman, "Computer Oriented Numerical Methods", PHI Learning Pvt. Ltd.
5. Amos Gilat, "MATLAB: An Introduction with Applications", Wiley, (2011).

SUGGESTED READINGS:

1. Ronald Larsen, "Engineering with Excel", Pearson, (2013).
2. Thomas J Quirk, "Excel 2010 for Engineering Statistics: A Guide to Solving Practical Problems", Springer, (2014).
3. MathWorks, "MATLAB Programming Fundamentals", the math works, Inc., (2017).
4. Holly Moore, "MATLAB for Engineers", Pearson, (2012).
5. Douglas C. Giancoli, "Physics Principles with Applications", Pearson, (2005).

WEB LINKS:

1. http://www.mcrhrdi.gov.in/Downloads/04.MS%20Excel.pdf
2. http://www.breezetree.com/articles/how-to-flow-chart-in-excel.htm
3. http://cheserver.ent.ohiou.edu/matlab/H-2.pdf
4. https://in.mathworks.com/help/stateflow/ug/creating-flow-graphs-with-the-pattern-wizard.html

(CS108) DATABASE MANAGEMENT SYSTEMS LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Define the basic concepts of database systems.
2. Develop ER diagrams for database design.
3. Apply various integrity constraints to develop relational model
4. Apply SQL queries, to perform various operations on databases.
5. Synthesize the development of procedures, cursors and triggers for effective database design.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Define the basic concepts of DBMS,
2. Design entity relationship models.
3. Apply various integrity constraints on the databases.
4. Apply SQL to insert, delete and retrieve data from databases.
5. Apply normalization to remove anomalies from databases.
6. Implement the concepts of procedures, cursors and triggers.
7. Implement other database objects such as views.
8. Design the real world database applications.

LIST OF EXCERCISES:

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
   Example**:** Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
5. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
   ii) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
11. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
12. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.

Roadway Travels Database
The student is expected to practice the designing, developing and querying a database in the context of example database “Roadway travel”. Students are expected to use “Mysql” database.

"Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad. The company wants to computerize its operations in the following areas:
• Reservations
• Ticketing
• Cancellations

RESERVATIONS:
Reservations are directly handled by booking office. Reservations can be made 60 days in advance in either cash or credit. In case the ticket is not available, a wait listed ticket is issued to the customer. This ticket is confirmed against the cancellation.

CANCELLATION AND MODIFICATIONS:
Cancellations are also directly handed at the booking office. Cancellation charges will be charged.
Wait listed tickets that do not get confirmed are fully refunded.

Task 1: E-R Model
Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.
Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Example: **Entities:**
1. BUS
2. Ticket
3. Passenger

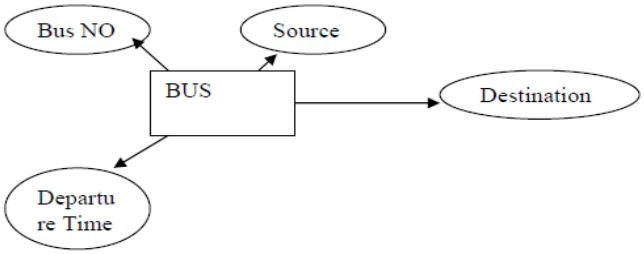
PRIMARY KEY ATTRIBUTES:
1. Ticket ID (Ticket Entity)
2. Passport ID (Passenger Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.

Task 2: Concept Design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.

Example: E-r diagram for bus



Task 3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion.Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attributes as columns in tables or as tables based on the requirement. Different types of attributes (Composite, Multivalued, and Derived) have different way of representation.

Example: The passenger tables look as below. This is an example. You can add more attributes based on your E-R model.

Passenger

Name	Age	Sex	Address	Passport ID

Task 4: Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

Task 5: practicing DDL, DML commands

In this task you will learn Creating databases, How to create tables, altering the database, dropping tables and databases If not required. You will also try truncate, rename commands etc.

Example for creation of a table.

```
CREATE TABLE Passenger (
Passport id INTEGER PRIMARY KEY,
Name CHAR (50) NULL,
Age Integer,
```

Sex Char
);

Note: Detailed creation of tables is given at the end.

Practicing DML commands

DML commands are used to for managing data within schema objects. Some examples:

• SELECT - retrieve data from the a database
• INSERT - insert data into a table
• UPDATE - updates existing data within a table
• DELETE - deletes all records from a table, the space for the records remain

Few more Examples of DML commands:

Select * from Bus; (selects all the attributes and display)
UPDATE BUS SET Bus No = 1 WHERE BUS NO=2;

Task 6: Querying

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Practice the following Queries:

1. Display unique PNR no of all passengers.
2. Display all the names of male passengers.
3. Display the ticket numbers and names of all the passengers.
4. Display the source and destination having journey time more than 10 hours.
5. Find the ticket numbers of the passengers whose name start with 'A' and ends with 'H'.
6. Find the names of passengers whose age is between 30 and 45.
7. Display all the passengers names beginning with 'A'
8. Display the sorted list of passengers names
9. Display the Bus numbers that travel on Sunday and Wednesday
10. Display the details of passengers who are traveling either in AC or NON_AC(Using only IN operator)

Task 7: Querying (continued…)

You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

• Write a Query to display the Information present in the Passenger and cancellation tables.

Hint: Use UNION Operator.

• Write a Query to display different travelling options available in British Airways.
• Display the number of days in a week on which the 9W01 bus is available.
• Find number of tickets booked for each PNR_no using GROUP BY CLAUSE. **Hint:** Use GROUP BY on PNR_No.
• Find the distinct PNR numbers that are present.
• Find the number of tickets booked in each class where the number of seats is greater than 1.

Hint: Use GROUP BY, WHERE and HAVING CLAUSES.

• Find the total number of cancelled seats.
• Write a Query to count the number of tickets for the buses, which travelled after the date '14/3/2009'. **Hint:** Use HAVING CLAUSES.

Tables
BUS
Bus No: Varchar: Pk
Source :Varchar
Destination :Varchar

Passenger
PNR_No : Numeric(9) : PK
Ticket_No: Numeric (9)
Name: Varchar(15)
Age :int (4)
Sex:Char(10) : Male / Female
PPNO: Varchar(15)

Reservation
PNR_No: Numeric(9) : FK
Journey_date :datetime(8)
No_of_seats :int (8)
Address :Varchar (50)
Contact_No: Numeric (9) -->Should not be less than 9 and Should not accept any other character other than Integer
Status: Char (2) : Yes / No

Cancellation
PNR_No: Numeric(9) : FK
Journey_date :datetime(8)
No_of_seats :int (8)
Address :Varchar (50)
Contact_No: Numeric (9) -->Should not be less than 9 and Should not accept any other character other than Integer
Status: Char (2) : Yes / No

Ticket
Ticket_No: Numeric (9): PK
Journey_date :datetime(8)
Age : int (4)
Sex: Char(10) : Male / Female
Source :Varchar
Destination : Varchar
Dep_time : Varchar

TEXT BOOKS:
1. Raghurama Krishnan and Johannes Gehrke, “Data Base Management Systems”, Tata McGraw Hill, 3rd Edition.
2. Silberschatz Korth, “Data Base System Concepts”, McGraw Hill, 5th Edition.

WEB LINKS:
1. http://nptel.iitm.ac.in

(CS109) OBJECT ORIENTED PROGRAMMING CONCEPTS THROUGH JAVA LAB

(Common to EEE, ME, ECE, CSE)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recall the various features of object oriented programming.
2. Identify the features of OOP specific to Java programming.
3. Apply exception handling mechanism to solve run time errors.
4. Discuss different inheritance techniques and multithreading.
5. Built user interfaces using swings and AWT controls.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. List all OOP features to design object oriented applications.
2. Explain design, compile, test and execute straightforward programs using a high level language.
3. Discuss the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
4. Analyze implementation, compilation, testing and run java programs comprising more than one class, to address a particular software problem.
5. Illustrate synchronization using multithreading.
6. Classify effective user interface applications through AWT controls and swings.
7. Examine use of members of classes in the Java API.
8. Summarize the framework and architecture for MVC's.

Week-1:

1. Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, c and use the quadratic formula. If the descriminent (b2 -4ac) is negative, display a message stating that there are no real solutions.
2. The Fibonacci sequence is defined by the following rule:

The fist two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.

Week-2:

1. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.
2. Write a Java program to multiply two given matrices.
3. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)

Week- 3:

1. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
2. Write a Java program for sorting a given list of names in ascending order.
3. Write a Java program to make frequency count of words in a given text

Week-4:

1. Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
2. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
3. Write a Java program that displays the number of characters, lines and words in a text file.

Week- 5:

1. Write a Java program that:
   i. Implements stack ADT.
   ii. Converts infix expression into Postfix form
   iii. Evaluates the postfix expression

Week-6:

1. Develop an applet that displays a simple message.
2. Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

Week-7:

Write a Java program that works as a simple calculator. Use a grid layout to arrange Buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

Week-8:

1. Write a Java program for handling mouse events.

Week-9:

1. Write a Java program that creates three threads. First thread displays “Good Morning”
2. every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
3. Write a Java program that correctly implements producer consumer problem using the
4. concept of inter thread communication.

Week-10:

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the textfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Week-11:

1. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts.
2. Write a Java program that allows the user to draw lines, rectangles and ovals.

Week-12

1. A demonstration of the ProgressMonitor toolbar. A timer is used to induce progress.
2. This example also shows how to use the UIManager properties associated with progress monitors.
3. sample Swing application that manages several internal frames. This is the main class
4. for working with the SiteFrame and PageFrame classes.

TEXT BOOK

1. Deitel, "Java How to Program (early objects)", 10th Edition, Pearson Education.

REFERENCE BOOKS:

1. Y. Daniel Liang, "Introduction to Java Programming", 6th Edition, Pearson Education.

WEB LINKS:

1. www.tatamcgrawhill.com/html/9780070636774.html
2. http://nptel.iitm.ac.in
3. www.roseindia.net
4. www.java2s.com

(MC102) GENDER SENSITIZATION

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	I	-	-	2	-	-	-	-

COURSE OBJECTIVES:

Students will be able to

1. Act sensibility to issues of gender in contemporary India.
2. Develop a critical perspective on the socialization of men and women.
3. Emphasize about biological aspects of genders.
4. Judge and reflect on gender violence.
5. Expose themselves to more egalitarian interactions between men and women.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Evaluate a better understanding of issues related to gender in contemporary India.
2. Sensitize to multi dimensionalities like biological, social, psychological and legal aspects of gender.
3. Attain an insight of gender discrimination in society.
4. Acquire insight into the gendered division of labour and its relation to politics and economics.
5. Ensure and equip them for professional equivalence.
6. Respond to gender violence and empower themselves with moral values.
7. Expose themselves to debates on the politics and economics of work.
8. Equip themselves with morality and ethics.

UNIT- I: Understanding Gender

Gender: Why should we study it? (Towards a World of Equals: Unit – 1)

Socialization: Making Women, Making Men (Towards a World of Equals: Unit – 2)

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Just Relationships: Being Together as Equals (Towards a World of Equals: Unit – 12)

Mary Kom and Onler. Love and Acid just do not Mix. Love letters. Mothers and Fathers. Further Reading: Rosa

Parks. The Brave Heart.

UNIT- II: Gender Biology

Missing Women: Sex selection and its consequences (Towards a World of Equals: Unit – 4)

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit – 10)

Two or Many? Struggles with Discrimination.

Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit – 13)

UNIT –III: Gender of Labour
House Work: the Invisible Labour (Towards a World of Equals: Unit – 3)
"My Mother doesn't work." Share the Load."
Women's Work: Its Politics and Economics (Towards a World of Equals: Unit – 7)
Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

UNIT –IV : Issues of Violence
Sexual Harassment: Say No! (Towards a World of Equals: Unit – 6)
Sexual Harassment, not Eve-teasing – Coping with Everyday Harassment –Further Reading. "Chupulu".
Domestic Violence: Speaking out (Towards a World of Equals: Unit – 8)
Is Home a Safe Place? When Women unite (Film). Rebuilding Lives. Further Reading New Forums for Justice.
Thinking about Sexual Violence (Towards a World of Equals: Unit – 11)
Blaming the Victim-"I Fought for my Life…" – Further Reading; The Caste Face of Violence.

UNIT –V: Gender Studies
Knowledge: Through the lens of Gender (Towards a World of Equals: Unit-5)

TEXT BOOKS:
1. Sumeetha, Uma Bhrugubanda, Duggitala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, "Towards a World of Equals: A Bilingual Textbook on Gender".
2. Jayaprabha, A. "Chupulu (Stares)". Women Writing in India: 600BC to the Present. Volume it. The 20th Century Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.

REFERENCE BOOKS:
1. Sen, Amartya. "More than One Million Women are Missing." New York review of Books 37.20(20th December 1990). Print. 'We Were Making History….' Life stories of Women in the Telangana People's struggle. New Delhi: Kali for Women, 1989.
2. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing Form South India, Dossier 2: Telugu And Kannada http://harpercollins.co.in/BookDetail.asp?Book_Code=3732

(BS110) PROBABILITY AND STATISTICS

(Common to ME and CSE Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Enumerate and explain the conditional probability by using Baye's theorem.
2. Apply the probability distributions, random variables to different engineering problems.
3. Construct and formulate the testing of hypothesis for small andlarge samples by using different distribution tests.
4. Test the hypothesis for several sample proportions (small and large) by using X^2 –test.
5. Apply the different statistical methods in estimating the rank correlation (linear) and regressions for practical problems.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Define various events, probability axioms and rules.
2. Solve the practical problems of' engineering using Baye's theorem.
3. Apply the binomial, poisson and normal distribution concepts to solve different practical problems.
4. Construct the null and alternate hypothesis for different samples using sampling distribution of means.
5. Solve different sample problems by using t, f and x^2-tests.
6. Test the hypothesis of different samples, using critical region.
7. Evaluate the testing of hypothesis for different samples (small and large) by using estimation of means and proportions.
8. Calculate the different rank correlation coefficients for simple linear regressions between two variables by using different correlation tests.

UNIT-I

Probability: Sample space – events – Probability – The axioms of probability – Some Elementary theorems - Conditional probability – Baye's theorem.

UNIT-II

Random Variables and Distributions: Discrete and continuous Random Variables – Distributions – Distribution function – Binomial, Poison and Normal distributions.

UNIT-III

Sampling Distribution and Testing of Hypothesis-I: Sampling distribution – Populations and samples – Sampling distributions of mean (known and unknown) – Proportions – Sums and Differences – t-distribution – F-distribution – χ^2-distribution – Test of Hypothesis – Null Hypothesis – Alternative Hypothesis – Type1 and Type2 errors – One tailed and two tailed tests – Critical Region – Testing of Hypothesis concerning one and two Means (small and large samples).

UNIT-IV

Testing of Hypothesis-II and Estimation: Testing of Hypothesis concerning one, two and several Proportions (small and large samples) – χ^2-test – Estimation: Point estimation – interval estimation – Estimation of Means and Proportions.

UNIT-V

Correlation and Regression: Definitions – Correlation co-efficient – Karl Pearson's coefficient of Correlation – Spearman's Rank correlation coefficient – Regression – Regression equation of X on Y – Regression equation of Y on X (only linear).

TEXT BOOKS:

1. Richard Arnold Johnson, Irwin Miller and John E.Freund, "Miller and Freund's Probability and Statistics for Engineers", Prentice Hall PTR, 2011.
2. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2-B Nath Market, Nai Sarak, Delhi-110006, India.

REFERENCE BOOKS:

1. Peebles JR and Peyton Z, "Probability Random Variables and Random Signal Principles", Tata McGraw Hill.
2. Murugesan K and Guruswamy P, "Probability and Statistics", Anuradha.
3. Iyengar TKV, MVSN Prasad, S. Ranganatham, Gandhi and B. Krishna, "Probability and Statistics," S Chand.

(EC149) MICROPROCESSOR AND EMBEDDED SYSTEMS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Examine the basic 8051 microcontroller architecture and programming.
2. Understand the assembly language programming process for 8051.
3. Develop programs for applications like blinking of LED, serial communications etc.
4. Understand concepts of RTOS and memory management in RTOS.
5. Acquire knowledge on advanced architectures like ARM.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Understand the design process of embedded systems
2. Analyze the hardware circuits of 8051 and their functionality
3. Design programs for various real time applications like elevator control etc.
4. Understand the concepts of serial data communications between 8051 and other devices
5. Differentiate between 8051 functionality and other advanced processes.
6. Understand the memory organization of ARM processor
7. Understand the various bus protocols like I2C bus and CAN bus
8. Analyze the concepts of RTOS and shared data problems in RTOS

UNIT – I

Embedded Computing: Introduction, Microprocessor, Microcontroller, Complex Systems & Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples.

The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts.

UNIT – II

Basic Assembly Language Programming Concepts: The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions.

Arithmetic Operations, Decimal Arithmetic, Jump and Call Instructions, Further Details on Interrupts.

UNIT –III

Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

UNIT – IV

Basic Design Using a Real-Time Operating System: Introduction to RTOS ,Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Memory Management, Interrupt Routines in an RTOS Environment An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines,

Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT – V

Introduction to Advanced Architectures: ARM Processor, memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

TEXT BOOKS:

1. Muhammed Ali Mazidi, "The 8051 Microcontrollers and Embedded Systems", Pearson, New Delhi.
2. Kenneth J. Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson.

REFERENCE BOOKS:

1. Wayne Wolf, "Computers as Components – Principles of Embedded Computing System Design", 2nd Edition, Elsevier.
2. Raj Kamal, "Embedded Systems", TMH.
3. Valvano Jonathan, "Introduction to Embedded Microcomputer Systems", Thomson.
4. D.V. Hall, "Micro Processor and Interfacing", Tata McGraw Hill.

WEB LINKS:

1. www.slideshare.net/bheemsainchhimpa/embedded-systems-by-raj-kamal
2. www.rajkamal.org/ppt.html

(CS105) OPERATING SYSTEMS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Summarize functionalities of computer system and the operating system.
2. Examine the various system calls, major key components of operating system.
3. Develop the dead lock prevention system and recovery process from the file structures.
4. Analyze the mass storage structure of an operating system.
5. Apply the mechanism for protecting the key components of an operating system.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Exemplify the basic principles used in the design of operating systems, and explain the objective and functions of operating systems.
2. Analyze critical-section problem.
3. Assess how computing resources (such as CPU and memory) are managed by the operating system.
4. Summarize techniques for achieving synchronization in an operation system
5. Compare and contrast the common algorithms used for both pre-emptive and non-pre-emptive scheduling of tasks in operating systems, such a priority, performance comparison, and fair-share schemes.
6. Explain memory hierarchy and cost-performance trade-offs.
7. Summarize the full range of considerations in the design of file systems.
8. Compare, contrast, and evaluate the key trade-offs between multiple approaches to operating system design, and identify and report appropriate design choices when solving real-world problems.

UNIT – I

Computer system overview-basic elements, Instruction execution, Interrupts, memory hierarchy, Multiprocessor and Multi-core organisation ,I/O communication techniques, operating system overview-objectives and functions, Evolution of OS, Virtual Machines, Microsoft windows overview, Linux VServer Virtual Machine Architecture. Process description and control - process states, process description, process control; Processes and Threads, Multi-core and multi-threading.

Case studies - Windows Thread and SMP Management, UNIX.

UNIT – II

Principles of concurrency - mutual exclusion, semaphores, monitors, Bounded buffer problem, Readers/Writers problem Deadlocks – prevention- avoidance – detection, Dining Philosophers problem. Scheduling: Types of scheduling – scheduling algorithms.

Case studies - Windows scheduling, Linux scheduling.

UNIT – III

Memory management requirements, partitioning, paging, and segmentation; Virtual memory -Hardware and control structures, Operating system software, Linux memory management **Case studies** - Windows memory management, UNIX .

UNIT – IV

I/O management and disk scheduling – I/O devices, organization of I/O functions; OS design issues, I/O buffering, disk scheduling, RAID, Disk cache.

UNIT – V

File management – organization, directories, file sharing, record blocking, and secondary storage management.

Case studies - UNIX File Management, Linux Virtual File System, and Windows File System.

Computer Security Concepts - Threats, Attacks, and Assets, Intruders, Malicious Software Overview - Viruses, Worms, and Bots

TEXT BOOKS:

1. William Stallings, "Operating Systems – Internals and Design Principle", Prentice Hall of India, 8th Edition, 2014.
2. Silberschatz and Peter Galvin, "Operating System Concepts", John Wiley & Sons, 9th Edition, 2013.

REFERENCE BOOKS:

1. Andrew S. Tannenbaum and Albert S. Woodhull, "Operating System Design and Implementation", Prentice Hall of India, 3rd Edition, 2009.
2. Dhamdhere, D.M, "Operating System", McGraw Hill, 2nd Edition.
3. Silberschatz Abraham, "Operating System Principles", John Wiley, 7th Edition.
4. Madnick Stuart and John J Donovan, "Operating Systems", Pearson Education, 4th Edition.

WEB LINKS:

1. http://nptel.ac.in/courses/106108101/
2. http://williamstallings.com/OperatingSystems/OS7e-Student/
3. http://williamstallings.com/OS/OS6e.html

(CS106) THEORY OF COMPUTATION

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	4	1	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Comprehend the fundamentals of theoretical foundations of computer science to build computable abstract systems.
2. Comprehend the grammar and languages to build effective computable automata systems.
3. Knowledge about the required grammar and eliminate ambiguity to develop optimized automata systems.
4. Synthesize various categories of automata systems.
5. Analyze the hypothesis and computable functions of turing machines.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Apply the grammars and languages to design abstract computer machines.
2. Model the logic and solutions to decidable and undecidable problems through compatibility theory.
3. Accomplish the Lemma's, hypothesis for various languages.
4. Synthesize deterministic and non-deterministic machines.
5. Prove results using proof by induction, proof by contradiction, proof by construction.
6. Know the basic kinds of finite automata and their capabilities.
7. Knowledge the regular and context-free languages.
8. Synthesize and transform regular expressions and grammars.

UNIT – I

Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automation and non deterministic finite automaton, transition diagrams and Language recognizers.

Finite Automata: NFA with Î transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without Î transitions, NFA to DFA conversion

UNIT – II

Minimisation: Minimisation of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.

Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

UNIT –III

Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings.

Context Free Grammars: Ambiguity in context free grammars. Minimisation of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted)

UNIT – IV

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, inter conversion. (Proofs not required). Introduction to DCFL and DPDA.

Turing Machine: Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required).

UNIT – V

Computability Theory: Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility, Definition of P and NP problems.

TEXT BOOKS:

1. Hopcroft H.E and Ullman J.D, "Introduction to Automata Theory Languages and Computation", Pearson Education.
2. Sipser, "Introduction to Theory of Computation", 2nd Edition, Thomson.

REFERENCES BOOKS:

1. Daniel I.A. Cohen, "Introduction to Computer Theory", John Wiley.
2. John C Martin, "Introduction to Languages and the Theory of Computation", TMH.
3. Mishra and Chandrashekar, "Theory of Computer Science-Automata Language and Computation", 3rd Edition, PHI.
4. Krishnamurthy, "Introductory Theory of Computer Science", East-West Press.

WEB LINKS:

1. http://nptel.ac.in/courses/106104028/
2. http://www.comp.nus.edu.sg/~sanjay/cs4232.html
3. http://www.cs.virginia.edu/~robins/cs3102/

(CS107) WEB TECHNOLOGIES

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Interpret the basic infrastructure and architecture of the internet, including the main protocols.
2. Interrelate tools to query parts of the internet infrastructure including name servers, individual machines, and web sites.
3. Memorize and describe contemporary internet applications, their purpose, internal architectures, and related security, commercial and social issues.
4. Originate simple database driven web applications using a server-side scripting language.
5. Given a screen shot or access to a web application, students will be able to apply for appropriate techniques and principals to evaluate its usability and accessibility.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Comprehend the principles of W3C WCAG 1.0 (as a minimum) and be able to write compliant HTML documents.
2. Summarize and apply Java Script, CSS & XHTML to create dynamic XHTML and XML.
3. Sketch Java Beans for reusability.
4. Produce JDBC applications for database interaction.
5. Choosing servlets for web development application.
6. Organizing JSP for dynamic web development applications.
7. Recite EJB and Struts' for web development applications.
8. Aware of emerging technologies and developing W3C recommendations.

UNIT-I

HTML Common Tags- List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script
XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

UNIT-II

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's

UNIT-III

Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues,

Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

UNIT-IV

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

UNIT V

Database Access: Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

TEXT BOOKS:

1. Chris Bates, "Web Programming, Building Internet Applications", 2nd Edition, JohnWiley.
2. Hans Bergsten, "Java Server Pages", SPD - O'Reilly.

REFERENCE BOOKS:

1. Pekowsky, "Java Server Pages", Pearson.
2. Dietel and Nieto, "Internet and World Wide Web – How to Program", PHI/Pearson Education Asia.
3. Marty Hall and Larry Brown, "Core Servlets and Java Server Pages Volume 1: Core Technologies", Pearson.
4. D.Flanagan, "Java Script", O'Reilly, SPD.

(EC150) MICROPROCESSOR AND EMBEDDED SYSTEMS LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Understand basic assembly language programming process.
2. Program the 8051 microcontroller using assembly language.
3. Analyze the interfacing of 8051 with LEDs, LCDs, SSDs etc.
4. Implement serial data communication between 8051 and PC.
5. Acquire knowledge on uC-OS.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Define the various port pin configurations and functionalities of 8051.
2. Analyze various assembly language programs for 8051.
3. Analyze the interfacing of 8051 with input devices like keyboards etc.
4. Implement serial data transmission and reception using 8051.
5. Apply language programming skills to solve real time problems.
6. Create programs to interface 8051 with output devices like LCDs SSDs etc.
7. Create programs to control inputs and outputs by using switches.
8. Apply programming skills to develop elevator control program considering RTOS problems.

LIST OF EXPERIMENTS:

Write the Programs in Assembly language for the Following Experiments:

1. Acquire knowledge on KEIL, PROLOAD and simulation using KEIL.
2. Blink a single LED; blink multiple LEDs, controlling LEDs using switches.
3. Displaying a message in a 2 line * 16 characters LCD display.
4. Displaying a number on a seven segment Display, multiple displays.
5. Serial data Transmission to PC from Kit.
6. Serial data reception from PC using Serial Port to Multi Digit SSD or LCD.
7. ADC and Temperature sensor.
8. X * Y Matrix Keyboard interfacing.
9. Encryption and Decryption of messages.

RTOS Based Experiments:

10. Blinking two different LEDs.
11. Program for traffic lights interface.
12. Program for Elevator control.

(CS110) OPERATING SYSTEMS LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Examine basic UNIX commands.
2. Examine the various system calls, major key components of operating system.
3. Develop various file allocation strategies.
4. Analyze the mass storage structure of an operating system.
5. Design a system free from deadlock situation.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Design a solution to producer-consumer problem.
2. Summarize the various UNIX commands.
3. Execute various system calls in operating system.
4. Apply and implement the design techniques for disk scheduling.
5. Apply, analyze, design and implement the file contiguous technique.
6. Design the memory management scheme.
7. Analyze the page replacement technique.
8. Analyze the reasons for deadlock situation.

Week-1

Implementation of

a) Basic Unix Commands: man, list, date, calendar, echo, banner, who, tty, binary calculator, clear, manipulation (tput) .
b) Directory Related Commands: pwd, mkdir, cd, rmdir.

Week-2

Implementation of

a) File Related Commands: cat ,sort ,cp ,my , rm ,wc ,lp ,pg ,df ,free, filters and pipe.
b) Communication Through UNIX Commands: mesg, write, wall, mail, reply.

Week-3

a) Write a program to implement System Calls--(Fork, Exec, Sleep….)
b) Create a process in UNIX environment.
c) Write a program to illustrate exec ().
d) Create child with sleep ().
e) Write a program to demonstrate signal handling in UNIX (Kill).

Week-4

Implement CPU Scheduling algorithms

a) First Come First Serve.
b) Shortest Job First.

Week-5
Implement CPU Scheduling algorithms
a) Round Robin.
b) Priority.

Week-6
Producer Consumer Problem Using Semaphore
Implement the solution for Bounded Buffer (Producer-Consumer) Problem Using Inter Process Communication Technique – Semaphores.

Week-7
Memory Management Scheme
a) Write a Program to implement Memory Management scheme like Paging.
b) Write a Program to implement Memory Management scheme like Segmentation.

Week-8
Implementation of Contiguous allocation techniques:
a) Worst-Fit
b) Best-Fit
c) First-Fit

Week-9
Simulate all Page Re-Placement Algorithms.

Week-10
Simulate Banker's algorithm for Deadlock Avoidance.

Week-11
Simulate all Disk scheduling algorithms

Week -12
Simulate file storage allocation techniques:
a) Contiguous (Using Array)
b) Linked –List (Using Linked List)
c) Indirect Allocation (Indexing)

TEXT BOOKS:
1. William Stallings, "Operating Systems – Internals and Design Principle", Prentice Hall of India, 8th Edition, 2014.
2. Silberschatz and Peter Galvin, "Operating System Concepts", 9th Edition, 2013.

REFERENCE BOOKS:
1. Sumitabha Das,"UNIX Concepts and Applications", Tata McGraw Hill, 4th Edition, 2008.
2. Yashwant Kanetkar,"Unix Shell Programming", BPB Publications, 2nd Edition, 2003.
3. Vijay Mukhi , "The C Odyssey: UNIX", BPB Publications , 3rd Edition, 2010.

(CS111) WEB TECHNOLOGIES LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Interpret the basic infrastructure and architecture of the Internet, including the main protocols.
2. Interrelate tools to query parts of the internet infrastructure including name servers, individual machines, and web sites.
3. Memorize and describe contemporary internet applications, their purpose, internal architectures, and related security, commercial and social issues.
4. Originate simple database driven web applications using a server-side scripting language.
5. Given a screen shot or access to a web application, students will be able to apply for appropriate techniques and principals to evaluate its usability and accessibility.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Comprehend the principles of W3C WCAG 1.0 (as a minimum) and be able to write compliant HTML documents.
2. Summarize and apply Java script, CSS & XHTML to create dynamic XHTML and XML.
3. Sketch java beans for reusability.
4. Produce JDBC applications for database interaction.
5. Choosing servlets for web development application.
6. Organizing JSP for dynamic web development applications.
7. Recite EJB and Struts' for web development applications.
8. Be aware of emerging technologies and developing W3C recommendations.

Week-1:

Design the following static web pages required for an online book store web site.

HOME PAGE:

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to home page, Login page, Registration page,

Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link **"CSE"** the catalogue for **CSE** Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains

Description of the web site. Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

The following fields
1) Name (Text field) 2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

Week-2:
CART PAGE:
The cart page contains the details about the books which are added to the cart.

The cart page should look like this: Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	**Book name Price Quantity Amount** Java 2 $35.5 2 $70 XML bible $40.5 1 $40.5 **Total amount** - $130.5			

Week- 3:
VALIDATION:
Write *JavaScript* to validate the following fields of the above registration page.
1. Name (Name should contains alphabets and the length should not be less than 6 characters).
2. Password (Password should not be less than 6 characters length).
3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
4. Phone number (Phone number should contain 10 digits only).
   Note: You can also validate the login page with these parameters.

Week-4:
Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:
1) Use different font, styles:
In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.
2) Set a background image for both the page and single elements on the page.
3) Control the repetition of the image with the background-repeat property.
As background-repeat: repeat Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.
4) Define styles for links as

A: link A: visited A: active A: hover
Example:
<style type="text/css"> A:link {text-decoration: none} A:visited {text-decoration: none} A:active {text-decoration: none}
A: hover {text-decoration: underline; color: red;} </style>
5) Work with layers:
For example:
LAYER 1 ON TOP: LAYER 1 LAYER 2 LAYER 2 ON TOP: LAYER 1 LAYER 2
6) Add a customized cursor:
Selector {cursor: value}

Week-5:
Write an XML file which will display the Book information which includes the following:
1) Title of the book
2) Author Name
3) ISBN number
4) Publisher name
5) Edition
6) Price
Write a Document Type Definition (DTD) to validate the above XML file.
Display the XML file as follows.
The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.
Use XML schemas XSL and CSS for the above purpose.
Note: Give at least for 4 books. It should be valid syntactically.
Hint: You can use some xml editors like XML-spy

Week-6:
VISUAL BEANS:
Create a simple visual bean with a area filled with a color.
The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false.
The color of the area should be changed dynamically for every mouse click. The color should also be changed if we change the color in the “property window “.

Week-7:
1) Install TOMCAT web server and APACHE.
While installation assign port number 4040 to TOMCAT and 8080 to APACHE. Make sure that these ports are available i.e., no other process is using this port.
2) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.

Access the pages by using the urls : http://localhost:4040/rama/books.html (for tomcat)
http://localhost:8080/books.html (for Apache)

Week-8:

User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a serve let for doing the following.

1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".

Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInitParameters() method.

Week-9:

Install a database(Mysql or Oracle).

Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).

Practice 'JDBC' connectivity.

Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

Week-10:

Write a JSP which does the following job:

Insert the details of the 3 or 4 users who register with the web site (week9) by using registration

form. Authenticate the user when he submits the login form using the user name and password

from the database (similar to week8 instead of cookies).

Week-11:

Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount)) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC.

Week-12:

HTTP is a stateless protocol. Session is required to maintain the state.

The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of localhost). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate()).

Modify your catalogue and cart JSP pages to achieve the above mentioned functionality using sessions.

TEXT BOOKS:

1. Horstman and Cornell, "Core Java, Volume 1", 8th Edition, Pearson Education, 2008.
2. Bergsten Hans, "Java Server Pages", 3rd Edition, Shroff.

REFERENCE BOOKS:

1. Pekowsky Larne, "Java Server Pages", 3rd Edition, Shroff.
2. Brown Larry and Hall Marty, "Core Servlets and Java Server Pages", 2nd Edition, Pearson Education.
3. Goodwill James, "Pure Java Server Pages", Pearson Education.

(MC101) BUSINESS COMMUNICATION AND PUBLIC SPEAKING

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
II	II	1	-	1	-	-	-	-

COURSE OBJECTIVES:

The student will be able to

1. Recall essentials of communication methods.
2. Paraphrase the business communication process.
3. Distinguish the various types of public speaking techniques.
4. Prioritize the importance of various speaking methods as per situations.
5. Construct professional communication as per the requirement.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recognize the importance of professional communication.
2. Paraphrase and construct a standard speech.
3. Distinguish the various structures of speech.
4. Compile techniques of drafting a document for effective speech.
5. Construct the documents according to the industrial needs.
6. Evaluate the significance of business communication.
7. Design speeches as per the requirement.
8. Design and deliver speeches for public utility.

UNIT- I

Human Resources

Getting the right job (Chapter 3)
Making Contact (Chapter 4)

UNIT- II

Marketing

Breaking into the market (Chapter 5)
Launching a product (Chapter 6)
A stand at trade fare (Chapter 7)
Communication with customers (Chapter 22)
Corresponding with customers (Chapter 23)

UNIT- III

Entrepreneurship

Starting a business (Chapter 9)
Financing a start up (Chapter 10)
Presenting your business idea (Chapter 12)

UNIT- IV

Introduction-Topic, Purpose, types

What Is Public Speaking and Why Do I Need to Do It?

Types of Speeches: Informative, Persuasive, and Special Occasion
Understanding Reasons for a Public Speaking Event
General Purpose vs. Specific Purpose of a Speech
Developing a Thesis Statement from Your Speech Topic
Informative Speaking: Purpose and Types
Helping Your Audience Learn During Informative Speeches: Strategies and Tips
Persuasive Speaking: Purpose and Types

UNIT-V

Organizing and Outlining, Preparing For an Impromptu Speech -Speech Delivery

Developing and Selecting the Main Ideas of a Speech
Supporting Ideas of a Speech: Development, Selection and Characteristics
Patterns of Organization for Informative Speeches, Persuasive Speech
Developing the Body of a Speech: Outline and Principles
Speech Conclusions: Role and Components
Preparing an Impromptu Speech: Topic Choice, Outline Preparation and Practice
Developing an Impromptu Persuasive Speech
Developing an Impromptu Informative Speech
Four Types of Speech Delivery: Impromptu, Extemporaneous, Manuscript and Memorized
The Role of Nonverbal Communication during Speech Delivery

TEXT BOOKS:

1. Guy Brook-Hart, "Business Benchmark", Cambridge University Press, 2nd Edition.
2. Stephen Lucas, "The Art of Public Speaking", McGraw-Hill Higher Education, 11th Edition.

REFERENCE BOOKS:

1. Sudha Rani D, "Business Communication and Soft Skills", Pearson.
2. Farhatullah TM, "Communications Skills for Technical Students", Orient Longman.
3. Dan O'Hair, Hannah Rubenstein and Rob Stewart, "A Pocket Guide to Public Speaking", Bedford / St. Martin's Publisher, 4th Edition.
4. Quentin J. Schultze, "An Essential Guide to Public Speaking: Serving Your Audience with Faith, Skill, and Virtue", Baker Publishing Group, 1st Edition.

SUGGESTED WEB SITES:

1. http://www.myspeechclass.com/fresh-public-speech-topics-ideas.html.
2. https://englishclassminds.wordpress.com/public-speaking-tips-speech-topics.
3. http://www.ljlseminars.com/monthtip.htm.

(HS104) ECONOMICS AND FINANCE FOR ENGINEERS

(Common to all branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Explain importance of economics and its application into business practice.
2. Develop least cost combination of inputs in production
3. Formulate suitable pricing policy pricing method
4. Apply the concepts of accounting in calculating the profits of business
5. Identify relevant capital budgeting techniques and appraise the projects

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Forecast the demand for product / service for a profitable business administration.
2. Apply the demand forecasting techniques to estimate the demand
3. Minimize the cost incurred in production and estimate the profit zone.
4. Recognize the time value in cash flows
5. Evaluate various investment opportunities and select best project
6. Select least cost combination of inputs in production
7. Analyze capital budgeting techniques.
8. Build financial reports and evaluate financial status of the organization.

Note: Present value tables need to be permitted into the examination hall.

UNIT–I

Introduction to Economics: Definition, Nature and Scope – Demand Determinants, Law of Demand and its exceptions - Elasticity of Demand: Definition, Types, Measurement and Significance, Demand forecasting: factors and methods

UNIT–II

Theory of Production and Cost Analysis: Production Function - Least Cost Combination of Inputs. Break-Even Analysis (BEA) - Cost Concepts - Determination of Break-Even Point (Simple problems)

UNIT–III

Introduction to Markets and Pricing: Types of Market - Price-Output Determination in case of Perfect Competition, Monopoly and monopolistic – Pricing objectives and Methods

UNIT–IV

Financial Accounting and analysis: Double-Entry Book Keeping, Journal, Ledger, and Trial Balance – Final Accounts (Trading, Profit and Loss Account and Balance Sheet) with simple adjustments). Financial Analysis: Liquidity, Activity, Capital structure and Profitability ratios.

UNIT–V

Capital Budgeting: Time Value of Money – Simple and Compound techniques. Nature and scope of Capital Budgeting, Payback Method, Accounting Rate of Return (ARR), Net Present Value and IRR Methods (simple problems).

TEXT BOOKS:

1. EWilliam G. Sullivan , "Engineering Economy", Pearson.
2. V.S. Bagad, "Managerial Economics and Financial Analysis", Technical Publications, Pune.

REFERENCE BOOKS:

1. Sasmita Mishra , "Engineering Economics and Costing" , PHI.
2. M.Kasi Reddy and S.Saraswathi, "Managerial Economics and Financial Accounting", PHI.

(HS105) ENGINEERING ETHICS

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	I	2	-	-	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Instill the moral values that ought to guide their profession.
2. Resolve the moral issues in the profession.
3. Infer moral judgment concerning the profession.
4. Correlate the concepts in addressing the ethical dilemmas.
5. Judge a global issue by presenting an optimum solution.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Distinguish between ethical and non ethical situations.
2. Practice moral judgment in conditions of dilemma.
3. Relate the code of ethics to social experimentation.
4. Explain concepts based on moral issues and enquiry.
5. Resolve moral responsibilities in complications.
6. Defend one's views in supporting the moral concerns.
7. Apply risk and safety measures in various engineering fields.
8. Prioritize cognitive skills in solving social problems.

UNIT – I

Introduction : Scope, Human Values: Morals, Values and Ethics – Integrity – Work Ethic-Honesty – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Courage -Empathy – Self-Confidence – Character – Spirituality, Engineering as social experimentation – Responsibilities to engineers - Code of ethics for engineers.

UNIT – II

Engineering Ethics, Moral Reasoning and Ethical Theories : Engineering Ethics - variety of moral issues – Deontology, Consequentialism, Utilitarian, Virtue Theory- Kohlberg's Theory - Gilligan's Theory - Consensus and Controversy – Models of Professional Roles - uses of ethical theories. Valuing Time – Co-operation – Commitment-Case study about above theories.

UNIT – III

The Engineer's Responsibility for Safety: Safety and Risk –Road, Rail, Electric, fire – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Case Studies on recent issues related to safety.

UNIT – IV

Responsibility to Employer's and Rights of Engineer's: Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest –

Occupation Crime, Rights of Engineer's - Professional Rights – Employee Rights – Whistle blowing, Intellectual Property Rights (IPR) – Plagiarism.

UNIT – V

Global Issues and Responsibility as Engineer : Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Weapons Development, Role of Engineer as Manager – Expert Witnesses and Advisors - Case Studies .

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005. (Reprint 2013)
2. Ibo Van de Poel and Lamber Royakkers "Ethics, Technology, and Engineering – An Introduction", John wiley publication, 2011.

REFERENCE BOOKS:

1. Edmund G. Seebauer and Robert L. Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2014.
2. Caraline whitbeck, "Ethics in Engineering practice and Research", Cambridge University Press, 2012.

(ES113) MECHATRONICS

(Common to EEE, ME, ECE and CSE)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	I	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Define mechatronics and discuss basic building elements and network.
2. Analyze various sensors, mechanisms and their applications to engineering.
3. Discuss microcontroller fundamentals and arduino controller.
4. Explain interfacing of devices with controllers.
5. Summarize signal conditioning circuits and electrical actuating systems.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Analyze electrical and mechanical systems and their interconnection.
2. Produce the signal conditioning circuits.
3. Discuss importance of mechanical, and electronics in the design of mechatronics system.
4. Build a mechatronic system for a set of specifications.
5. Proficient in the programming of microcontrollers.
6. Design circuits for interfacing various components used for power control.
7. Construct a electrical actuating systems.
8. Differentiate ac and dc motor.

UNIT – I

Introduction:

Introduction to Mechatronics, key elements of mechatronics, Microcontroller fundamentals, introduction to Arduino controller, block diagram, pin map, Procedural and basic embedded programming.

UNIT – II

Sensors:

Characteristics of Sensors – static and dynamic, classification – Analog sensors: displacement, force, temperature; Digital sensors: proximity, photo sensors.

UNIT – III

Actuators:

Mechanical drives – gears, belt and chain drives, bearings.

Electrical Actuation Systems

Relays, solid state switches – diodes, transistors, MOSFET, thyristors and triacs; solenoids, fundamentals of dc and ac motors, stepper motor.

UNIT – IV

Signal Processing and Conditioning:

Rectifiers, filters, regulators, amplifying signals using OP Amps, comparator, fundamentals of ADC and DAC.

UNIT - V

Power and Speed Control:

Power control of DC and AC motors using SCR, triac, speed control of DC motor using PWM technique, stepper motor control.

TEXT BOOKS

1. Clarence W.de Silva, "Sensors and Actuators" CRC Press, 2016.
2. W.Bolton, "Mechatronics: Electronic Control System in Mechanical and Electrical Engineering," Pearson Education Asia.

REFERENCE BOOKS

1. D. Patranabi, "Sensors and Transducers" PHI Learning pvt Ltd, 2003.
2. Muhammad H. Rashid, "Power Electronics Hand Book", Academic Press, 2011
3. Ramakanth A. Gayakwad, "Operational Amplifiers and Linear Intermitted Circuits", PHI, 1987.
4. Mario Bohmer, "Beginning Android ADK with Arduino", A press (2012)
5. D.G. Alciatore and M.B. Histand, "Introduction to Mechatronics and Measurement System," Tata McGraw Hill, 4th edition, 2012.

(CS112) DESIGN AND ANALYSIS OF ALGORITHMS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	I	3	1	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Analyze the asymptotic performance of algorithms.
2. Build rigorous correctness proofs for algorithms.
3. Apply important algorithmic design paradigms and methods of analysis.
4. Demonstrate a familiarity with major algorithms and data structures.
5. Synthesize efficient algorithms in common engineering design situations.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Outline the basic problem types and summarize the algorithm analysis framework.
2. Use notations to find time-complexity of algorithms for simple problems.
3. Design algorithms using brute force, divide and conquer for different types of sorting and searching problems and analyze its complexity.
4. Discuss greedy method and dynamic programming.
5. Solve various problems using algorithmic techniques and analyze them.
6. Apply backtracking strategy for simple problems.
7. Calculate upper bound and lower bound for the problems using branch & bound strategy.
8. Analyze the complexities of simple and hard problems.

UNIT – I

Introduction to algorithms and its importance, Fundamentals of the analysis of algorithm efficiency - analysis frame work - Asymptotic notations – Big Oh Notation, Omega Notation, Theta Notation and Little Oh Notation , sorting algorithms design and analysis: Insertion sort, selection sort.

UNIT – II

Divide and Conquer - General method, applications – binary search, quick sort, merge sort, - Strassen's matrix multiplication.

Greedy Method – General method, applications – job sequencing with deadlines, Knapsack problem, minimum cost spanning trees, single source shortest path problem.

UNIT – III

Dynamic Programming - General method, applications, matrix chain multiplication, optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, traveling sales person problem, reliability design.

UNIT – IV

Backtracking – General method, applications – n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound - General method, applications – travelling salesperson problem, 0/1 knapsack problem – LC Branch and bound solutions, FIFO branch and bound solutions.

UNIT – V

String Matching: Robin – Karp algorithm, Knuth – Morris Pratt algorithm, Algorithm for parallel computers, parallelism, the PRAM models, simple PRAM algorithms.

P and NP Class, some NP – complete problems.

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamental of Computer Algorithms", 2nd Edition, Universities Press.
2. Sara Baase and Allen Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", Pearson Education (Singapore) Pvt. Ltd, New Delhi.

REFERENCE BOOKS:

1. Anany V. Levitin, "Introduction to the Design and Analysis of Algorithms", Villanova University ©2003.
2. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein C, "Introduction to Algorithms", 3rd Edition, Prentice Hall of India Pvt. Ltd.
3. Aho, A.V., Hopcroft J.E. and Ullman, J.D., "The Design and Analysis of Computer Algorithms", Pearson Education.
4. Robert Sedgewick, Kevin Wayne, "Algorithms", 4th Edition, Addison-Wesley Professional.
5. Sanjoy Dasguptha, Christos Papadimitriou and Umesh Vazirani, "Algorithms", 1st Edition, McGraw Hill.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. www.aw-bc.com/info/levitin
3. https://parasol.tamu.edu
4. https://cse.unl.edu
5. http://engineeringppt.net

(CS113) COMPUTER NETWORKS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Introduce the concept, terminologies, and technologies used in modern data communication and computer networking.
2. Identify importance of OSI and TCP/IP models.
3. Make students to get familiarized with different protocols and network components.
4. Analyse the concept of local area networks, their topologies, protocols and applications.
5. Evaluate the performance of competing network technologies and protocols.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Illustrate of the working principle of different protocols at different layers.
2. Installs and configures workstations, servers and networked printers, internet working devices such as switches and routers.
3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
4. Practice and building the skills of subnetting and routing mechanisms.
5. Familiar with contemporary issues in networking technologies, network tools and network programming.
6. Gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
7. Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.
8. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.

UNIT – I

Introduction – network architecture - protocol implementation issues - Quantitative performance metrics - network design. Reference models- The OSI Reference Model- The TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models.

Low –level network technologies-Ethernet to token ring to wireless-Issues wit data link protocols-Encoding framing and error detection and correction-sliding window protocol-Medium access control sub layer-Basic models of switched networks-Datagrams versus virtual circuits-Switching technologies-Switched Ethernet and ATM- The design of hardware based switches

UNIT –II

Network Layer – network layer design issues-Touting algorithms-Congestion control algorithms-Internetworking- The network layer in the internet-Internet Protocol (IP).- Unicast, multicast, and inter domain routing

UNIT – III

Transport Layer - Elements of transport protocol-Congestion control – Performance issues-The Internet's Trans-mission Control Protocol (TCP)- Remote Procedure Call (RPC)- – Implementation semantics of RPC -client-server applications- The Real-time Transport Protocol(RTP) - Multimedia applications- Congestion control and resource allocation.-congestion control in TCP –UDP –Quality of service in IP.

UNIT – IV

Application Layer - Domain name server-World wide web-Hyper text transfer protocol-Presentation formatting and data compression- Network security- crypto graphic tools- the problems of key distribution – Geveral authentication techniques - Pretty Good Privacy (PGP)- Secure Shell (SSH),- IP Security architecture(IPSEC).-Firewalls .

UNIT – V

Network Applications and the Protocols - File transfer protocol - email and the Web, multimedia applications such as IP telephony and video streaming- Overlay networks like peer-to-peer file sharing and content distribution networks- Web Services architectures for developing new application protocols.

TEXT BOOKS:

1. Larry L Peterson and Bruce S Davis, "Computer Networks", 5th Edition, Elsevier, 2012.
2. Andrew S. Tanenbaum and David J Wetherall, "Computer Networks", 5th Edition, Pearson Education, 2010.
3. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 6th Edition, Pearson Education, 2013.

REFERENCE BOOKS:

1. William Stallings, "Data and Computer Communications", 8th Edition, Pearson Education, 2011.
2. Nader F. Mir, "Computer and Communication Networks", 1st Edition, Pearson Education, 2007.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2011.
4. Behrouz A. Forouzan, "Data Communication and Networking", Tata McGraw Hill, 2004.

WEB LINKS:

1. http://nptel.ac.in/video.php?subjectId=106105081
2. http://wps.pearsoned.com/ecs_kurose_compnetw_6/216/55463/14198700.cw/

(ES114) MECHATRONICS LAB

(Common to EEE, ME, ECE and CSE)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Study the arduino and its importance to engineering.
2. Study the applications such as interfacing RC components, DC and AC motor control using arduino.
3. Study and develop the load measurement of strain gage, conveyer belt and mechatronic systerm.
4. Construct various circuits using OP Amp.
5. Choose various methods of stepper motor control using arduino.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Demonstrate the importance of arduino
2. Assess the controlling of output and input base circuits using arduino
3. Design an RC circuit and interface with arduino
4. Interpret the bidirectional control of DC motor using arduino
5. Examine the control of DC and AC motors using arduino
6. Construct a circuit with stepper motor drive using arduino
7. Build various circuits using OP amps an interface with arduino
8. Construct circuits for load measurement, speed control using conveyer belt using arduino and build a mechatronic system

LIST OF EXPERIMENTS:

1. Study of Arduino
2. Controlling output LEDs based on inputs (toggle switches) and light-controlled switch using arduino.
3. Design and build circuits using RC components interfacing them to arduino.
4. Bi-directional control of DC motor using arduino
5. Speed control of DC motor using arduino
6. Position control of DC motor using PWM technique.
7. Speed control of AC motor using arduino.
8. Control of unipolar, bipolar, and full-step stepper motor drive using arduino
9. Study and calibration of load measurement using strain gauge.
10. Configure and test different types of operational amplifiers and interface with arduino
11. Build a small conveyer belt with adjustable speed control.
12. Design a complete mechatronic system incorporating sensors, signal conditioning, amplification, actuation and drives.

(CS121) COMPUTER NETWORKS LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Introduce the concept, terminologies, and technologies used in modern data communication and computer networking.
2. Make students to get familiarized with TCP communication in client and server model.
3. Develop a wired and wireless topology in computer networks and compute communication in networks using NS2.
4. Provide students with a theoretical and practical base in computer networks issues.
5. Sketch and understand model of unified library applications.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Demonstrate of the working principle of different protocols at different layers.
2. Installs and configures workstations, servers and networked printers, internetworking devices such as switches and routers.
3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
4. Practice the basic concepts of link layer properties; including error-detection and correction techniques, multiple access protocols, point to pint protocols, and characteristics of link layer media (including wireless links).
5. Familiar with simulation tool NS2.
6. Demonstrate the networking models.
7. Have a working knowledge of datagram and internet socket programming.
8. Gain experience in design and develop effective applications using CASE tools.

WEEK 1:

a) NIC Installation & Configuration (Windows/Linux)
b) Familiarization with Networking cables (CAT5, UTP) Connectors (RJ45, T-connector), Switches, and Routers.

Week 2:

Programs to implement error correction and detection

WEEK 2:

a) Implementation of CRC -CCITT (16-bits)

WEEK 3:

a) Implementation of Routing algorithms

WEEK 4:

a) Implementation of Stop and Wait Protocol and Sliding Window Protocol

WEEK 5:

- Connection oriented Client server applications with TCP

WEEK 6:

a) Connectionless Client server applications with UDP

WEEK 7:

a) Assignment-6 Programs using RPC remote procedure call

WEEK 8:

a) Simulate using Ns2 which consist of a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped and plot graphs using XGRAPH.

WEEK 9:

a) Simulate using Ns2 which consist of a four node point-to-point network, and connect the links as follows: n0-n2, n1- n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP/UDP and plot graphs using XGRAPH.

WEEK 10:

a) Simulate using Ns2 which consist of the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion and plot graphs using XGRAPH..

WEEK 11:

a) Design TCP iterative Client and server application to count the number of vowels present in given input sentence
b) Design TCP client and server application to transfer file

WEEK 12:

a) client server applications using Multi protocol server

WEEK 13

a) Implement a chat and mail server

TEXT BOOKS:

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 6th Edition, Pearson Education, 2013.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", 5th Edition, Morgan Kaufmann Publishers Inc., 2011.

REFERENCE BOOK:

1. Elliotte Rusty Harold, "Java Network Programming", 3rd Edition, O'Relly Publication.

WEB LINKS:

1. http://slogix.in/ns2-wireless-sample-programs/index.html
2. http://enggedu.com/source_code/ns2/ns2_wireless_network__samples.php

(HS106) TECHNICAL WRITING

(Common to all Branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	2	-	-	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recall basics of communication and correspondence methods.
2. Paraphrase the technical writing process.
3. Distinguish and the various types of correspondence techniques.
4. Prioritize the importance of various presentation techniques.
5. Construct professional documents as per the requirement of forthcoming technology.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recognize the importance of professional documents.
2. Paraphrase an idea and construct a standard document.
3. Distinguish the various structures of drafting professional documents.
4. Compile techniques of drafting various documents as per the needs of industry.
5. Construct the documents according to the industrial needs.
6. Evaluate the significance of inter personal and intrapersonal communication.
7. Design various reports as per the requirement.
8. Design professional documents according to the situation.

UNIT- I

Introduction to Communication and Correspondence

Basics of Communication-Types-Barriers to communication
Overview of Technical Writing Process-Stages of Technical Writing
Effective Writing-Paraphrasing-Note Making-Note Taking

UNIT- II

Drafting Professional Documents-I

Basics of Professional Documents
Office Correspondence-Letters-Types and Styles Drafting Official and Business Letters

UNIT -III

Drafting Professional Documents-II

Drafting Notice-Circular-Agenda-Minutes of Meeting-Memo-Emails-Proposals
Building Resume-Contrast between Resume and Curriculum Vitae

UNIT –IV

Report writing and Research Papers

Types-Drafting Technical Reports-Business Reports-Project Reports
Overview of Research Papers-Dissertations-Drafting Techniques

UNIT –V

Business Presentation and Interpersonal Communication

Defining situation-Designing Presentation-Opening and closing thoughts
Use of Visual Aids
Introduction and Importance of Techniques in Interpersonal Communication
Communication techniques in Professional life
Public Speaking Techniques

REFERENCE BOOKS:

1. Alred Gerald J, Brusaw Charles T and Oliu Walter E, “Hand Book of Technical Writing”, St. Martin's.
2. Barry J Rosenberg, “Spring in Technical Writing”, Pearson.
3. Shorn J Gerson, “Technical Writing Process”, PHI.
4. Basu BN, “Technical Writing”, PHI.
5. Karol Rosenblum Perry, “The fine art of Technical Writing”, Scientific.

SUGGESTED READING:

1. Gerald J. Alred, “The Business Writer's Companion”, Bedford / St. Martin's, 7th Edition, 2005.
2. Philip C. Kolin, “Successful Writing at Work”, Concise Edition (Paperback), University of Southern Mississippi, Cengage learning.
3. M. Ashraf Rizvi, “Effective Technical Communication”, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. RC Sharma Krishna Mohan, “Business Correspondence and Report Writing”, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

(CS114) SOFTWARE ENGINEERING

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Outline the software engineering process and planning.
2. Analyze the software requirements.
3. Sketch the design modules.
4. Develop the programming for modules.
5. Assess the product by testing and predict the improvements can be applied.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Define a plan to the software product by adopting suitable process model.
2. Summarize requirements of the software product.
3. Produce design modules from analyzed requirements.
4. Create the programs according to programming standards.
5. Apply various testing strategies on the product.
6. Evaluate the product performance.
7. Recommend the changes to the system for improvement or rejuvenation.
8. Illustrate the entire process with the help of documentation.

UNIT I

Why Software Engineering? What Is Software Engineering, How Successful Have We Been, What Is Good Software, Who Does Software Engineering, A Systems Approach, An Engineering Approach, Members of the Development Team, How Has Software Engineering Changed?

Modeling the Process and Life Cycle: The Meaning of Process, Software Process Models, Tools and Techniques for Process Modeling, Practical Process Modeling

Planning and Managing the Project: Tracking Progress, Project Personnel, Effort Estimation, Risk Management, The Project Plan, Process Models and Project Management.

UNIT II

Capturing the Requirements: The Requirements Process, Requirements Elicitation, Types of Requirements, Characteristics of Requirements, Modeling Notations, Requirements and Specification Languages, Prototyping Requirements, Requirements Documentation, Validation and Verification, Measuring Requirements, Choosing a Specification Technique.

Designing the Architecture: The Design Process, Decomposition and Views, Modeling Architectures, Architectural Styles and Strategies, Achieving Quality Attributes, Collaborative Design, Architecture Evaluation and Refinement, Documenting Software Architectures, Architecture Design Review, Software Product Lines.

Designing the Modules: Design Methodology, Design Principles, Object-Oriented Design, Representing Object-Oriented Designs in the UML, Object-Oriented Design Patterns, Other Design Considerations, Object-Oriented Measurement, Design Documentation.

UNIT III

Writing the Programs: Programming Standards and Procedures, Programming Guidelines, Documentation, The Programming Proces.

Testing the Programs: Software Faults and Failures, Testing Issues, Unit Testing, Integration Testing, Testing Object-Oriented Systems, Test Planning, Automated Testing Tools, When to Stop Testing.

Testing the System: Principles of System Testing, Function Testing, Performance Testing, Reliability, Availability, and Maintainability, Acceptance Testing, Installation Testing, Automated System Testing, Test Documentation, Testing Safety-Critical Systems.

UNIT IV

Delivering the System: Training, Documentation

Maintaining the System: The Changing System, The Nature of Maintenance, Maintenance Problems, Measuring Maintenance Characteristics, Maintenance Techniques and Tools, Software Rejuvenation.

UNIT V

Evaluating Products, Processes, and Resources: Approaches to Evaluation, Selecting an Evaluation Technique, Assessment vs. Prediction, Evaluating Products, Evaluating Processes, Evaluating Resources.

Improving Predictions, Products, Processes, and Resources: Improving Prediction, Improving Products, Improving Processes, Improving Resources, General Improvement Guidelines.

The Future of Software Engineering: How Have We Done?, Technology Transfer, Decision-Making in Software Engineering, The Professionalization of Software Engineering: Licensing, Certification, and Ethics.

TEXT BOOKS:

1. Roger S Pressman, “Software Engineering: A Practitioner's Approach”, 6th Edition, TMH.
2. Ian Sommerville, “Software Engineering” 7th Edition, TMH.

REFERENCES BOOKS:

1. Shari Lawrence P Fleeger and Joanne M. Atlee, “Software Engineering: Theory and Practice”, 4th Edition, Pearson Education.
2. Pedrycz Witold and Peters James F, “Software Engineering”, John Wiley.
3. Hans van Vliet, “Software Engineering: Principles and Practice” ,3rd Edition, TMH.

WEB LINKS:

1. http://wps.prenhall.com/esm_pfleeger_softengtp_4/

(CS115) COMPILER DESIGN

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Understand the different phases of compilation.
2. Understand, design and implement a lexical analyzer.
3. Know about the different parsing techniques of compiler.
4. Identify the different types of runtime environment of the compiler.
5. Understand different types of code optimization techniques.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Understand the design of a compiler given features of the languages.
2. Implement practical aspects of automata theory.
3. Gain knowledge of powerful compiler generation tools.
4. Apply the knowledge of different phases of a compiler to design to an effective compiler.
5. Apply the syntax and semantic rules to design an error free compiler.
6. Enhance the issues on source languages and storage allocation strategies for dynamic storage system.
7. Acquire the skills to design and program various kinds of compilers.
8. Enhance the code generation and optimization technology.

UNIT – I

Introduction to Compiling : Compiler, Analysis of the source program, The phases of a compiler, Cousins of the compiler, Concepts of Loaders, Linker, Interpreter, Assembler, The grouping of phases, Compiler writing tools.

Lexical Analysis: The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A Language for specifying lexical Analyzers, Finite automata, Design of a lexical analyzer, Optimization of DFA-based pattern matchers .

UNIT – II

Syntax Analysis: The role of a parser, Context-free grammars, Writing a grammar, Parsing, Ambiguous grammar, Elimination of Ambiguity, Classification of parsing techniques – Top down parsing –Back Tracking, Recursive Descent parsing, First and Follow- LL(1) Grammars, Non-Recursive descent parsing – Error recovery in predictive parsing. LR grammars, Bottom Up parsing – LR Parsers – Model of an LR Parsers – SR parsing, Operator Precedence Parsing, SLR parsing, CLR parsing, LALR parsing, Error recovery in LR Parsing, handling ambiguous grammars.

UNIT –III

Syntax Directed Translation: Syntax-directed definitions, S-attributed definitions, L-attributed definitions, Top-Down translation, Attribute grammar, S-attributed grammar, L-attributed grammar, Bottom-up evaluation of inherited attributes, Bottom-up evaluation of inherited attributes.

Semantic Analysis: Type Checking, Type systems, Type expressions, Specification of a simple type checker, Equivalence of type expressions, Type Conversions.

UNIT – IV

Intermediate Code Generation: Construction of syntax trees, Directed acyclic graph, three address codes, Translation of Declarations, Assignment statements, Boolean Expressions, Back patching.

Runtime Environments: Source language issues, Storage organization, Storage-allocation strategies, Symbol tables, Activation records, Dynamic storage allocation techniques.

UNIT – V

Code Optimization: Introduction, The principal sources of optimization, Optimization of basic blocks, Basic blocks and Flow graphs, Loops in flow graphs, data-flow analysis of flow graphs, DAG representation of flow graphs.

Code Generation: Issues in the design of a code generator, the target machine code, Next-use information, a simple code generator, Code-generation algorithm.

TEXT BOOKS:

1. Alfred V Aho, Ravi Sethi and Jeffry D. Ullman, "Compiler Principles, Techniques and Tools", 16th Indian Reprint, Pearson Education Asia, 2004.
2. D M Dhamdere, "Compiler Construction", 2nd Edition, Mac Mellon India Ltd.

REFERENCE BOOKS:

1. Donovan, "Systems Programming", McGraw Hill.
2. Kenneth C Louden, "Compiler Construction", Vikas.
3. Leland L. Beck, "System Software : An Introduction to Systems Programming", Addison Wesley.

WEB LINKS:

1. books.google.co.in Computers Programming General
2. ww.amazon.com Books Computers and Technology
3. http://nptel.iitm.ac.in

(CS116) CRYPTOGRAPHY AND NETWORK SECURITY

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Analyze security concepts in network security.
2. Comprehend and apply relevant cryptographic techniques.
3. Identify and apply authentication services and mechanisms
4. Analyze email and web security mechanisms
5. Know the different types of firewalls.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Explore to the different system attacks and viruses.
2. Apply the concepts of private and public encryption techniques.
3. Design and develop an efficient security system.
4. Explain the key management and authentication services.
5. Explain the IP security and web security concepts.
6. Apply the protocols encapsulation, payload, SSL, TLS and SET to design and develop efficient online secure systems.
7. Explain and generation the hash function using different techniques.
8. Design an effective intrusion detection systems and trusted systems through firewall architecture.

UNIT – I

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 – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.

UNIT – II

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

UNIT –III

Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange. Authentication applications – Kerberos – X.509

UNIT – IV

Authentication services - E-mail security (Pretty Good Privacy (PGP) and S/MIME).

IP security - IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Web security- Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT – V

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

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security", Pearson Education, 4th Edition, 2010.
2. Behrouz A. Forouzan, "Cryptography and Network Security", TMH, 2007.

REFERENCE BOOKS:

1. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security, Private Communication in Public World", PHI, 2nd Edition, 2002.
2. Bruce Schneier and Neils Ferguson, "Practical Cryptography", Wiley Dreamtech India Pvt. Ltd., 2003.
3. Douglas R Simson "Cryptography - Theory and Practice", CRC Press, 1995.
4. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", PHI, 2008.

Web Links:

1. www.williamstallings.com/Security2e.html
2. http://nptel.iitm.ac.in

(CS117) PRINCIPLES OF PROGRAMMING LANGUAGES
(Professional Elective – 1)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Understand the preliminary concepts of principles of programming languages.
2. Learn the syntax, semantics and control structures as building blocks of programming languages.
3. Aware ADT's for various kinds of programming languages.
4. Understand the elements, logic and applications of logic programming.
5. Learn the key concepts of functional, imperative and scripting languages.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Apply the building blocks to model a programming languages.
2. Apply data types, syntax and semantics, sub programming and blocks, ADT's.
3. Have an exposure to implement the applications of various programming languages.
4. Obtain the model and design the programming constructs of various programming languages.
5. Have an exposure the major key components as building blocks for various kinds of programming languages.
6. Design and develop various kinds of programming languages.
7. Know the various design issues of programming languages.
8. Know the functional part of the programming languages.

UNIT - I

Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms: Imperative, Object Oriented, functional Programming, Logic Programming. Programming Language Implementation, Compilation and Virtual Machines, Programming environments. Syntax and Semantics: general Problem of describing Syntax and Semantics, formal methods of describing syntax, BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, Denotation semantics and axiomatic semantics for common programming language features.

UNIT - II

Data Types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization. Expressions and Statements: Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures: Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands.

UNIT - III

Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

UNIT - IV

Abstract Data Types: Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95, Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads. Exception handling: Exceptions, exception Propagation, Exception handler in Ada, C++ and Java. Logic Programming Language: Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

UNIT - V

Functional Programming Languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages. Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.

TEXT BOOKS:

1. Robert W. Sebesta, “Concepts of Programming Languages”, 8th Edition, Pearson Education, 2008.
2. D. A. Watt, “Programming Language Design Concepts”, Wiley Dreamtech, 2007.

REFERENCE BOOKS:

1. A.B. Tucker and R.E. Noonan, “Programming Languages”, 2nd Edition, TMH.
2. K. C Louden, “Programming Languages”, 2nd Edition, Thomson, 2003.

WEB LINKS:

1. https://www.pearsonhighered.com/product/Sebesta-Concepts-of-Programming-Languages-8th-Edition/9780321493620.html
2. www.wileyindia.com/upload_catalog/pdf/1219751436_pt.pdf,
3. http://nptel.iitm.ac.in

(CS118) ARTIFICIAL INTELLIGENCE
(Professional Elective – 1)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	4	-	-	4	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Introduce the concept attitude towards intelligence and human artefacts.
2. Identify importance and usage of state space search and different heuristics search techniques.
3. Get familiarized with different implementation of state space search techniques.
4. Know the expert systems and reasoning in uncertain situations.
5. Know the machine learning strategies and natural language processing.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Illustrate of the working principle of different AI application areas.
2. Solve the problems efficiently using the state space search and heuristic techniques.
3. Practice and builds the knowledge representation skills.
4. Analyze the requirements for a given knowledge and its usage and implementation.
5. Familiar with contemporary issues in knowledge representation.
6. Gain the knowledge in different expert systems.
7. Make reasoning in certain and uncertain situations.
8. Understand the process of natural languages by humans.

UNIT -I

Introduction: Attitude towards Intelligence, Knowledge and Human Artefacts, Overview of AI Application Areas.

Predicate Calculus: Introduction, Propositional Calculus, Predicate Calculus, Inference Rules to produce Calculus Expression, Application: A Logic Based Financial Advisor

UNIT – II

Structures and Strategies for State Space Search: Introduction, Graph Theory, Strategies for State Space Search, Using the state Space to represent reasoning with the predicate calculus

Heuristic Search: Introduction, An algorithm for Heuristic Search, Admissibility, Monotonicity and Informedness, Heuristic in games, Complexity issues

UNIT – III

Control and Implementation of State Space Search: Introduction, Recursion Based Search, Pattern Directed Search, Production Systems, Blackboard Architecture for problem solving.

Knowledge Representation: Issues, AI Representational systems, Conceptual Graphs, Explicit Representation, Agent Based and Distributed Problem Solving

UNIT – IV

Strong Method Problem Solving: Introduction, Overview of Expert System, Rule Based Expert System, Model, Case Based and Hybrid Systems, Planning

Reasoning in Uncertain Situations: Introduction, Logic based abductive Inference, Abduction – Alternate Logic, The stochastic Approach to Uncertainty

UNIT – V

Machine Learning: Introduction, Framework for Symbol based Learning, ID3 Decision Tree Induction Algorithm, Knowledge and Learning, Unsupervised Learning.

Understanding Natural Language: Role of Knowledge in Language Understanding, Symbolic analysis, Syntax, Syntax and Knowledge with ATN Parsers, Natural Language Applications

TEXT BOOK:

1. George F Lugar, "Artificial Intelligence: Structures and Strategies for Complex Problem Solving", 4th Edition, Pearson Education.
2. Rich and Knight, "Artificial Intelligence", McGraw Hill Publication.

REFERENCE BOOKS:

1. Stuart Russell, "Artificial Intelligence A Modern Approach", 2nd Edition, Peter Norvig, PHI/ Pearson Education.
2. Patric Henry Winston, "Artificial Intelligence and Expert Systems", Patterson-PHI.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. http://www.aaai.org/Resources/resources.php

(CS119) COMPUTER GRAPHICS AND MULTIMEDIA
(Professional Elective – 1)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Apply computer graphics, two dimensional transformations.
2. Illustrate windowing, clipping and three dimensional graphics.
3. Develop the projection and animation of graphics.
4. Analyse MIDI software and speech analysis.
5. Build the different multimedia applications.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Apply the transformation principles.
2. Demonstrate segmentation and windowing.
3. Construct clipping algorithms.
4. Design the effective graphical system.
5. Build the 3D graphics, projections to evaluate the graphical system.
6. Generate sound, data streams.
7. Implement MIDI s/w's to analyze the speech system.
8. Illustrates effective multimedia application.

UNIT – I

Introduction to Computer Graphics: Application of Computer Graphics, Pixel, Frame buffer, Graphics standards, Image representation, DDA and Bresenham line generation algorithms, Graphics primitive operations, Character generation methods, Aliasing and Anti-aliasing.

Polygons: Polygon representation, Inside test methods, Seed filling and Scanline filling algorithms.

Two Dimensional Transformations: Scaling, Translation and Rotation transformations, Rotation about arbitrary point, Homogenous coordinates, Inverse transformations, Transformation routines, Reflection and Shearing transformations, Instance transformations.

UNIT – II

Segments: Segment creation algorithm, Segment closing algorithm, Segment deletion and Segment renaming algorithms, Image transformation.

Windowing and Clipping: Window and View port, Viewing transformation matrix, Implementation of viewing transformation, Multiple windowing, Cohen-Sutherland Outcode clipping algorithm , Sutherland Hodgman clipping algorithm, Midpoint subdivision clipping algorithm, Generalized clipping

UNIT –III

Three Dimensional Graphics: 3D Primitives, 3D Transformations, Rotation about arbitary axis, 3D Viewing, Viewing parameters.

Projections: Parallel projection, Perspective projection, Derivation of parallel projection matrix, Derivation of perspective projection matrix.

UNIT – IV

Hidden Surface and Lines Removal Algorithms: Z-Buffer algorithm, Painters algorithm, Wornock algorithm, Franklin algorithm and Backface removal algorithm. **Animation:** Types of animations, Animation languages, Methods of controlling animation.

UNIT – V

Multimedia: Media and Data streams**,** Main properties of Multimedia systems, Traditional data stream characteristics, Asynchronous transfer mode, Synchronous transfer mode.

Sound / Audio: Basic sound concepts, Computer representation of sound, Audio formats, Music, MIDI concepts, MIDI devices, MIDI messages, MIDI software, Music and Speech, Speech generation, Speech analysis, Speech transmission.

Applications: Media preparation, Media composition, Media integration, Media communication, Media consumption, Media entertainment.

TEXT BOOKS:

1. Steven Harrington, "Computer Graphics", 2nd Edition, McGraw Hill, 1987.
2. Ralf Steinmetz and Klara Nahrstedt, "Multimedia: Computing, Communications and Applications", Addison Wesley, 2001.

REFERENCE BOOKS:

1. Donad Hearn and Pauline Baker, "Computer Graphics", 2nd Edition, Pearson Education Asia.
2. James D. Foley, Andries van Dam, Steven K. Feiner and John F. Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education Asia, 2002.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. www.wits.ac.in/pdf
3. http://www.tutorialspoint.com/computer_graphics/

(CS120) ADVANCED DATABASE MANAGEMENT SYSTEMS
(Professional Elective – 1)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Describe the concepts of ER and EER Model.
2. Demonstrate the overview of object oriented databases.
3. Compare RDBMS, OODBMS, ORDBMS.
4. Synthesize the concepts of parallel and distributed databases, client server architecture.
5. Summarize the concepts of various types of databases and their application.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Analyze basic database concepts and ER modeling.
2. Apply Inheritance concepts to develop EER model.
3. Apply object oriented concepts in developing OODBMS.
4. Identify the query processing, optimization techniques in ORDBMS.
5. Compare and contrast RDBMS, OODBMS, ORDBMS**.**
6. Comprehend the concepts of parallel and distributed databases.
7. Analyze the query processing, concurrency control and recovery mechanisms in DDB.
8. Compare and contrast various types of databases and their application.

UNIT-I

The Extended ER Model and Object Model: Introduction, The ER Model Revisited, Motivation for Complex data types, User Defined abstract data types and structured types, Subclasses, Super Classes, Inheritance, Specialization and generalization, Constraints and characteristics of Specialization and generalization Relationship types of degree higher than two.

UNIT-II

Object Oriented Databases: Introduction, Overview of Object Oriented Concepts, Object Identity, Object Structure, type constructors, Encapsulation of operations, Methods, Persistence, Type Hierarchies and Inheritance, Type Extents, Queries, Complex Objects ,Database Schema design for OODBMS,OQL, Persistent Programming Languages, OODBMS architecture, Storage Issues, Transactions Concurrency Control, Example of ODBMS.

UNIT-III

Object Relational and Extended Relational Databases : Introduction , Database design for an ORDBMS, Nested Relations, Collections, Storage Methods, Access Method, Query Processing, Optimization, An Overview of SQL3,Impelementation Issues for Extended types, Systems Comparison of RDBMS, OODBMS, ORDBMS**.**

UNIT-IV

Parallel and Distributed Databases and Client Server Architecture : Introduction, Architecture for parallel databases Parallel Query evaluation, Parallelizing individual operations, Sorting, Joins, Distributed database concepts, Data fragmentation, Replication, Allocation techniques for distributed database design, Query Processing in distributed databases, Concurrency control in distributed databases, Recovery in distributed databases, An Overview of Client Server Architecture.

UNIT-V

Databases on the Web and Semi Structured Data: Introduction, Web Interfaces to the Web, Overview of XML, Structure of XML Data, XML Applications, The Semi Structured Data Model, Implementation Issues, Indexes OF text data, Enhanced Data Models for Advanced Application-Introduction, Active database concepts, Temporal database concepts, Spatial databases, Concepts and Architecture, Deductive databases, Query Processing, Mobile Databases, Geographic Information Systems.

TEXT BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Education.
2. Raghu Ramakrishnan and Johannes Gehrke, “Data Base Management Systems”, McGraw Hill.

REFERENCES BOOKS:

1. A.Silberschatz, HF Korth and S.Sudarshan, “Data Base System Concepts”, McGraw Hill.
2. Peter Rob and Coronel, “Database Systems, Design, Implementation and Management”, Thomson Learning.
3. C J Date, “Introduction to Database Systems”, Pearson Education.
4. Leon Alexis, “Database Management Systems”, Vikas.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. www.pearsoned.co.in>....>Engineering and Computer Science.

(CS122) SOFTWARE ENGINEERING LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Comprehend and synthesize the software problems.
2. Awareness on different types of diagrams.
3. Aware the designing faces of the software problems.
4. Understand and model the unified library applications.
5. Select the problem and model it.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Comprehends the process to be followed in the software development life cycle.
2. Analyse practical solutions to the problems.
3. Solve specific problems alone or in teams.
4. Manage a project from beginning to end.
5. Work independently as well as in teams.
6. Define, formulate and analyse a problems.
7. Synthesize different case studies.
8. Usage of UML for synthesizing the various diagrams.

Week-1: Identifying the Requirements from Problem Statements

Requirements | Characteristics of Requirements | Categorization of Requirements | Identifying Functional and Non Functional Requirements

Week-2: Modeling UML Use Case Diagrams and Capturing Use Case Scenarios

Use case diagrams | Actor | Use Case | Graphical Representation | Association between Actors and Use Cases | Use Case Relationships | Include Relationship | Extend Relationship | Generalization Relationship | Identifying Actors | Identifying Use cases | Guidelines for drawing Use Case diagrams

Week-3: E-R Modeling from the Problem Statements

Entity Relationship Model | Entity Set and Relationship Set | Attributes of Entity | Keys | Weak Entity | Entity Generalization and Specialization | Mapping Cardinalities | ER Diagram | Graphical Notations for ER Diagram | Importance of ER modelling

Week-4 : Modeling of Statechart Diagram

Statechart Diagrams | Building Blocks of a Statechart Diagram | State | Transition | Action | Guidelines for drawing Statechart Diagrams

Week-5: Modeling of Activity Modeling

Activity Diagrams | Components of an Activity Diagram | Activity | Flow | Decision | Merge | Fork | Join | Partition | A Simple Example | Guidelines for drawing an Activity Diagram.

Week-6 : Modeling UML table designing with Class Diagrams
Structural and Behavioural aspects | Class diagram | Elements in class diagram | Class | Relationships

Week-7: Modeling Sequence diagrams
Sequence diagram | Elements in sequence diagram | Object | Life-line bar | Messages

Week-8: Modeling Data Flow Diagrams
Data Flow Diagram | Graphical notations for Data Flow Diagram | Explanation of Symbols used in DFD | Context diagram and leveling DFD

Week-9: Modeling Component and Depolyment Algorithms
Component Diagrams | Building Blocks of a Component Diagram | Guidelines for drawing Component and Deployment Diagrams

Week-10: Designing Test Suite
Software Testing | Standards for Software Test Documentation | Need for Software Testing | Test Cases and Test Suite |

Week-11: Discussion of case studies. A batch of students can do any of the following experiment. Passport automation system.

1. Book bank.
2. Exam Registration.
3. Stock maintenance system.
4. Online course reservation system.
5. E-ticketing.
6. Software personnel management system.
7. Credit card processing.
8. e-book management system.
9. Recruitment system.
10. Foreign trading system.
11. Conference Management System.
12. BPO Management System.
13. ATM System.
14. Online Quiz System.
15. Library Management System.

Week-12: Developing the Front-end for the done project.

TEXT BOOKS:
1. Roger S. Pressman, "Software Engineering, A Practitioner's Approach", 6th Edition, McGraw Hill International Edition.
2. Sommerville, "Software Engineering", 7th Edition, Pearson Education.
3. Grady Booch, James Rambaugh and Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education.

(CS123) COMPILER DESIGN LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III	II	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Understand the working environment of Lex Tool.
2. Check the sentence validity and evaluate the expressions using YACC tool.
3. Know the symbol table, SLR and LALR parser.
4. Acquire the skills how to design and program various kinds of compilers.
5. Understand different types of code optimizations.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Apply tools, design the compiler
2. Expose the different parsing paradigms
3. Enhance the code optimization techniques
4. Design the symbol tables.
5. Implement practical aspects of automata theory.
6. Gain knowledge of powerful compiler generation tools.
7. Apply the syntax and semantic rules to design an error free compiler.
8. Enhance the issues on source languages and storage allocation strategies for dynamic storage system.

LIST OF EXPERIMENTS:

1. Programs using Lex Tool
   a. Lex specification to demonstrate different regular expressions.
   b. Lex specification to print two digit numbers in words.
   c. Lex specification to check the validity of given date.

2. Programs using Lex Tool
   a. Lex specification to convert given octal number into decimal equivalent.
   b. Lex specification to count no of vowels, consonants, characters, words and lines in afile.

3. Programs using Yacc Tool
   a. Yacc specification to demonstrate different grammars.
   b. Yacc specification to find sentence validity.
   c. Yacc specification to evaluate expressions using precedence.

4. Programs using Yacc Tool
   a. Yacc specification to convert binary numbers to decimal numbers
   b. Yacc specification to check the validity of given date.

5. Program to find all meaningful words and generate the tokens for the given input program.
6. Implementing lexical analyzer using C.
7. Implementing Symbol Table for given HLL.
8. Implementing Shift reduce parser.
9. Implementing Simple LR parser.
10. Implementing LALR Parser.
11. Write a program to generate machine code for restricted programming expressions.
12. Experiments on code optimization of programming expressions.

TEXT BOOKS:

1. Dhamdhere, “System Programming and Operating Systems”, McGraw Hill.
2. Aho A.V and Ullman, “Principles of Compiler Design”, Narosa Publications.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. www.amazon.com› Books › Computers and Technologybooks.google.co.in
3. ›Computers › Programming › General.

(HS107) PROJECT MANAGEMENT

(Common to all branches)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Identify the various elements of the project management life cycle.
2. Comprehend and become familiar with the use of basic tools and techniques in managing a project.
3. Optimize results while managing the triple constraints.
4. Manage stakeholder communications and demonstrate the principles and practice of team leadership.
5. Describe the career paths in the project management profession.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Describe the importance of project management in the context of various organizational cultures and strategies, and summarize the typical components of the project management system.
2. Evaluate factors important to project selection and prioritization.
3. Select and describe an appropriate project management strategy for a new project.
4. List and describe the project phases that make up a typical project, and summarize the project management processes that occur within each.
5. Describe the typical project management process documentation and the project management deliverables in each project phase.
6. Categorize project management processes and activities that will meet stakeholder expectations.
7. Design a life cycle for a specific project in a specific industry and develop a project charter.
8. Describe the interaction of the various components of the project management system.

UNIT-I

Project Management Foundations: Define a project, project management, and the role of the project manager - Program management and portfolio management - Project sponsorship and the project office - Project organizational structures.

UNIT–II

Understanding the PM context - Project lifecycle: sample life cycles, along with traditional vs. agile - Project management processes - Project initiation: creating a charter and identifying stakeholders.

UNIT–III

Project planning: creating a scope statement; building a WBS; identifying resources, and building a project budget; basic scheduling, networks, and critical path; and creating a PM

plan along with key subsidiary plans – Project execution: problem solving and decision making.

UNIT–IV

Project monitoring and controlling: managing changes to scope, cost, and schedule; understanding team dynamics and managing resources effectively – Project closing: gaining customer acceptance and documenting lessons learned.

UNIT–V

Global issues in PM - Introduction to the importance of people-oriented skills, such as communications management, human resources, and leadership - Product-based planning: PM documents that need to be produced at each stage in the process (artifacts of project control).

TEXT BOOKS:

1. Harold R.Kerzner, "Project Management: A Systems Approach to Planning, Scheduling, and Controlling", Wiley Publications, 11th Edition.
2. Garold (Gary) Oberlender**, "**Project Management for Engineering and Construction", McGraw Hill Education, 3rd Edition.

REFERENCE BOOKS:

1. Prasanna Chandra, "Projects: Planning, Analysis, Selection, Financing, Implementation, and Review", McGraw Hill Education, 8th Edition.
2. Erik Larson (Author) and Clifford Gray, "Project Management: The Managerial Process", McGraw Hill Higher Education, 5th Revised Edition.

(CS125) DATA WAREHOUSING AND DATA MINING

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Knowledge the concepts of knowledge discovery in databases.
2. Comprehend the concept of data warehousing focusing on architecture and design.
3. Analyze the concepts of classification, clustering and association rules for the OLAP technology.
4. Synthesize about the mining patterns and predictions.
5. Knowledge on multi-dimensional data analysis.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Have an exposure of OLAP technology on data.
2. Analyze and design the data warehouses.
3. Apply the patterns, associations, classifications, correlations and predictions for effective retrieval of data from the warehouse.
4. Analyze the multi-dimensional data using various data mining techniques.
5. Design a data mart or data warehouse for any organization.
6. Write queries using DMQL.
7. Adapt to new data mining tools.
8. Explore recent trends in data mining such as web mining, spatial-temporal mining.

UNIT – I

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

UNIT – II

Data Mining: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Data Pre-processing: Need for Pre-processing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT –III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods (Apriori, FP-Growth), Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

UNIT-IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification (Forming of IF-Then Rules from Decision tress), Classification by Back-propagation: A Multi –Layer Feed-Forward Network, Lazy Learners-KNN Classifiers, Prediction-Linear Regression, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

UNIT – IV

Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid Based Methods, Model-Based Clustering Methods, Outlier Analysis

UNIT-V

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data.

Data Mining Applications: Data Mining For Financial Data Analysis, Retail Industry, Telecommunication Industry, **Social Impacts on Data Mining**.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, "Data Mining – Concepts and Techniques", Morgan Kaufmann Publishers, 2nd Edition, 2006.
2. Sam Aanhory and Dennis Murray, "Data Warehousing in the Real World", Pearson Education Asia.

REFERENCE BOOKS:

1. Arun K Pujari, "Data Mining Techniques", Universities Press.
2. Alex Berson and Stephen J Smith, "Data Warehousing, Data Mining and OLAP", McGraw Hill.

WEB LINKS:

1. http://nptel.iitm.ac.in

(CS126) GRID AND CLOUD COMPUTING

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Provides a comprehensive study of grid and cloud computing.
2. Know the different models of distributed system.
3. Know the design issues of cloud computing platforms.
4. Understands the workflow of service oriented architectures.
5. Analyze the different cloud computing resource management.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Ability to understand various service delivery models of a cloud computing architecture.
2. Knows the design issues of cloud computing platforms.
3. Understand the concepts of service oriented architecture.
4. Analyze the different workflows of service oriented architecture.
5. Ability to understand the security challenges and address the challenges.
6. Understand the ways in which the cloud can be programmed and deployed.
7. Understand the grid computing resource management.
8. Apply the grid computing in solving large scale scientific problems.

UNIT - I

Distributed System Models and Enabling Technologies: scalable computing services over the Internet, technologies for network-based computing, system models for distributed and cloud computing, software environments for distributed systems and clouds, performance, security, and energy-efficiency.

UNIT - II

Design of Cloud Computing Platforms: cloud computing and service models, data center design and interconnection networks, architecture design of compute and storage clouds, public cloud platforms, cloud resource management and exchanges, cloud security and trust management

UNIT - III

Service Oriented Architectures: message-oriented middleware, portals and science gateways, discover, registries, metadata, and databases, workflow in service-oriented architectures

UNIT - IV

Cloud Programming and Software Environments: features of cloud and grid platforms, parallel and distributed programming paradigms, programming support of Google App engine, Amazon Web Services programming, Microsoft Azure programming support, emerging cloud software environments.

UNIT - V

Grid Computing and Resource Management: grid architecture and service modeling, case studies of grid computing systems, grid resource management and brokering, middleware support for grid resource management, grid security infrastructure in GT4.

TEXT BOOKS:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", 1st Edition, Morgan Kaufman Publisher, an imprint of Elsevier, 2012.

REFERENCE BOOKS:

1. Tom White, "Hadoop The Definitive Guide", 1st Edition. O'Reilly, 2009.
2. Ian Foster, and Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann.
3. Joshy Jospeph, "Grid Computing", Prentice Hall.
4. John W. Rittinghouse, "Cloud Computing: Implementation Management and SE", CRC Press.

(CS127) SOFTWARE TESTING
(Professional Elective – 2)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Summarize the purpose of testing.
2. Comprehend different phases of domain testing.
3. Analyse working model of logical testing.
4. Perform the software testing using testing tools.
5. Analyze state, state graphs and transition testing.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Design and conduct a software test process for a software testing project.
2. Apply software testing knowledge and engineering methods.
3. Explore the flow graphs and path testing.
4. Analyze, transaction flow testing and domain testing.
5. Enhance the testing tools for effective debugging.
6. Analyze the graph matrices and application.
7. Identify the needs of software test automation, and define and develop a test tool to support test automation.
8. Knowledge of contemporary issues in software testing, such as component-based software testing problems.

UNIT – I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

Flow Graphs and Path Testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing: Transaction flows, transaction flow testing techniques. **Dataflow testing:** Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

Domain Testing: Domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT - III

Paths, Path Products and Regular Expressions: Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing: Overview, decision tables, path expressions, kv charts, specifications.

UNIT - IV

State, State Graphs and Transition Testing: State graphs, good & bad state graphs, state testing, Testability tips.

UNIT - V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.

Usage of JMeter and Winrunner tools for functional / Regression testing, creation of test script for unattended testing, synchronization of test case, Rapid testing, Performance testing of a data base application and HTTP connection for website access.

TEXT BOOKS:

1. Baris Beizer, "Software Testing Techniques", Dreamtech, 2nd Edition.
2. Dr.K.V.K.K. Prasad, "Software Testing Tools", Dreamtech.

REFERENCE BOOKS:

1. Brian Marick, "The Craft of Software Testing", Pearson Education.
2. Oreille, "Software Testing Techniques", SPD.
3. Edward Kit, "Software Testing in the Real World", Pearson.
4. Perry, "Effective Methods of Software Testing", John Wiley.
5. Meyers, "Art of Software Testing", John Wiley.

WEB LINKS:

1. www.dreamtechpress.com/authors.aspx
2. http://www.dl4all.com/oft/tag/Software Testing Techniques Baris Beizer Dreamtech 2nd Edition.html

(CS128) SIMULATION AND MODELING
(Professional Elective – 2)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Provide an understanding of methods, techniques and tools for modeling.
2. Understand the simulation and performance analysis of complex systems.
3. Know the importance of simulation of continuous and discrete systems.
4. Know the simulation of queuing systems and pert networks.
5. Provides the practical knowledge of simulation experimentation and introduces simulation languages.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Acquire proficiency in constructing a model for a given system/set of data.
2. Know the system concepts and the behavior of a dynamic system.
3. Ability to generate and test random number variants.
4. Employ the random number generation in developing simulation models.
5. Apply functional modeling method to model the activities of a static system.
6. Create an analogous model for a dynamic system.
7. Simulate the operation of a dynamic system and make improvement according to the simulation results.
8. Ability to infer from the model and apply the results to resolve issues in a real world environment.

UNIT-I

System Models: Concepts of a System, System Environment, Stochastic Activities, Continuous and Discrete Systems, System Modeling, Types of Models, Static Physical Models, Dynamic Physical Models, Static Mathematical Models, Dynamic Mathematical Models, and Principles Used in Modeling.

System Studies: Subsystems, A Corporate Model, Environment Segment, Production Segment, Management Segment, The Full Corporate Model, Types of System Study, System Analysis, System Design, System Postulation.

UNIT-II

Random Number Generation: Properties, Generation of Pseudo-Random Numbers, Techniques of generating random numbers, tests for random numbers.

Random-Variate Generation: Inverse-Transform Technique, Acceptance-Rejection Technique, Special Properties.

UNIT-III

Simulation of Continuous Systems: A chemical reactor, Numerical integration vs. continuous system simulation, Selection of an integration formula, Runge-Kutta integration formulas, Simulation of a servo system, Simulation of a water reservoir system, Analog vs. digital simulation.

Discrete System Simulation: Fixed time-step vs. event-to-event model, On simulating randomness, Generation of random numbers, Generation of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

UNIT-IV

Simulation of Queuing Systems: Rudiments of queuing theory, Simulation of a single-server queue, Simulation of a two-server queue, Simulation of more general queues.
Simulation of a Pert Network: Network model of a project, Analysis of activity network, Critical path computation, Uncertainties in activity durations, Simulation of activity network, Computer program for simulation, Resource allocation and cost considerations.

UNIT-V

Design and Evaluation of Simulation Experiments: Length of simulation runs, Variance reduction techniques, Experimental layout, Validation.
Simulation Languages: Continuous and discrete simulation languages, Continuous simulation languages, Block-structured continuous simulation languages, Expression-based languages, Discrete-system simulation languages, GPSS.

TEXT BOOKS:

1. Geoffrey Gordon, "System Simulation", Prentice Hall of India Private Limited, 2nd Edition, 1978. *(for Unit-I: Chapters 1 and 2)*
2. Jerry Banks, John S. Carson II, Barry L. Nelson and David M. Nicol, "Discrete-Event System Simulation", Pearson, 5th Edition, 2010. *(for Unit-II: Chapters 7 and 8)*
3. Narsingh Deo, "System Simulation with Digital Computer", Prentice Hall of India Private Limited, 1979. *(for Unit-III to V: Chapters 2 to 5 and 7,8).*

REFERENCE BOOKS:

1. Frank L. Severance, "System Modeling and Simulation: An Introduction", Wiley Publisher, 2005.

(CS129) HUMAN COMPUTER INTERACTION
(Professional Elective - 2)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Learn the foundations of human computer interaction.
2. Identify the human components functions.
3. Gather data in the context of developing a simple interactive product using suitable techniques.
4. Evaluate an interactive product using suitable techniques.
5. Practice in designing, conducting, and analyzing usability evaluations.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Explain the human components functions regarding interaction with computer.
2. Define key terms used in interaction design.
3. Demonstrate understanding of Interaction between the human and computer components.
4. Implement Interaction design basics.
5. Apply design rules.
6. Produce Implementation supports.
7. Use evaluation techniques.
8. Demonstrate universal design.

UNIT - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The Graphical User Interface: Popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - II

Design Process: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT – III

Screen Designing : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT - IV

Windows: New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT - V

Software Tools: Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:

1. Wilbert O Galitz, "The Essential Guide to User Interface Design", Wiley Dreamtech, 2007.
2. Ben Shneidermann, "Designing the User Interface", 3rd Edition, Pearson Education Asia, 2008.

REFERENCE BOOKS:

1. Alan Dix, Janet Fincay, Gregory D Abowd and Russell Beale, "Human – Computer Interaction", Pearson, 2005.
2. Sharps, Rogers and Preece, "Interaction Design", Wiley Dreamtech, 2011.
3. Soren Lauesen, "User Interface Design", Pearson Education, 2005.
4. Ben Shneiderman, "Designing the User Interface", Pearson.

WEB LINKS:

1. http://www.scis.nova.edu/nova/hci/notes.html
2. http://courses.iicm.tugraz.at/hci/hci.pdf
3. http://www.ida.liu.se/~miker/hci/course.html
4. http://www.hcibook.com/

(CS130) IMAGE PROCESSING AND PATTERN RECOGNITION
(Professional Elective - 2)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Familiar with Image model, sensing and acquisition, digital image representation, properties of human visual system, various applications.
2. Outline different image processing operations for improving image quality through enhancement, restoration and filtering etc.,
3. Elaborate various affine transformation and registration compressing data to save storage and channel capacity during transmission.
4. Analyse Image segmentation for partitioning into objects and background.
5. Extraction of image features, quantifying shapes, pattern recognition, image analysis.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Acquire basics on digital image processing system and various formats of digital images.
2. Articulate background knowledge about image processing.
3. Explain various geometrical and radiometric errors and their correction procedures, and pre-processing methods for image.
4. List the importance of pattern recognition methods.
5. Experiment image processing tools on various images.
6. Expand practical knowledge and skills about pattern recognition tools.
7. Illustrate necessary knowledge to design and implement a prototype of an image processing and pattern recognition application.
8. Identify difficulties in current existing image and pattern recognition and propose new methods for it.

UNIT-I

The Digitized Image and its Properties: Applications of image processing, image function, image representation, sampling, quantization, color images, metrics and topological properties of digital images, histograms, image quality, noise image.

UNIT-II

Image Pre-processing: Pixel brightness transformation, position dependent brightness correction, gray scale transformation; geometric transformation, local pre-processing image smoothening, edge detectors, zero-crossing, scale in image processing, canny edge detection, parametric edge models, edges in multi spectral images.

UNIT-III

Image Segmentation: Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation-edge image thresholding, edge relaxation, border tracing, border detection.

UNIT-IV

Mathematical Morphology: Basic morphological concepts, four morphological principles, binary dilation, erosion, Hit or miss transformation, opening and closing; thinning and skeleton algorithms; Morphological segmentation -particles segmentation and watersheds, particle segmentation.

UNIT-V

Pattern Recognition Fundamentals: Basic concepts of pattern recognition, fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model.

TEXT BOOKS:

1. Millan sonka, Vaclav Hiavac, and Roger Boyle, "Image Processing Analysis and Machine Vision", 3rd Edition, Cengage Learning - Engineering, 2013.
2. Rafel C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2008.

REFERENCE BOOKS

1. Julus T. Tou and Rafel C. Gonzalez, "Pattern Recognition Principles", 1st Edition, Addision Wesley Publishing Company.
2. Earl Gose and Richard Johnsonbaugh, "Pattern Recognition and Image Analysis", 1st Edition, Prentice Hall of India Private limited, 2009.

WEB LINKS:

1. http://nptel.iitm.ac.in/courses/106108057

(CS131) MACHINE LEARNING
(Professional Elective - 3)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Illustrate a range of machine learning algorithms along with their strengths and weaknesses.
2. Comprehend Bayesian techniques and instant based learning.
3. Emphasize the basic theory underlying machine learning.
4. Apply machine learning algorithms to solve problems of moderate complexity.
5. Apply the neural networks and genetic algorithms to various applications.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Familiar with specific, widely used machine learning algorithms.
2. Analyse the learning techniques with this basic knowledge.
3. Apply effectively neural networks and genetic algorithms for appropriate applications.
4. Use bayesian techniques and derive effectively learning rules.
5. Choose and differentiate reinforcement and analytical learning techniques.
6. Determine which learning techniques are appropriate to a particular problem domain.
7. Evaluate different machine learning techniques (e.g., robustness, sensitivity, specificity, advantages, limitations, etc.) by comparing and assessing their computational results.
8. learn methodology and tools to apply machine learning algorithms to real data and evaluate their performance.

UNIT-I

Introduction, Concept Learning And Decision Trees Learning Problems – Designing Learning systems, Perspectives and Issues – Concept Learning – Version Spaces and Candidate Elimination Algorithm – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT-II

Neural Networks And Genetic Algorithms- Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning.

UNIT-III

Bayesian And Computational Learning- Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probably Learning – Sample Complexity for Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT- IV

Instant Based Learning And Learning Set Of Rules -K- Nearest Neighbor Learning – Locally Weighted Regression – Radial Basis Functions – Case-Based Reasoning – Sequential Covering Algorithms – Learning Rule Sets – Learning First Order Rules – Learning Sets of First Order Rules – Induction as Inverted Deduction – Inverting Resolution.

UNIT-V

Analytical Learning And Reinforced Learning-Perfect Domain Theories – Explanation Based Learning – Inductive-Analytical Approaches - FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

TEXT BOOKS:

1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education, 2013.

REFERENCE BOOKS:

1. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Edition, PHI Learning Pvt. Ltd., 2013.
2. T. Hastie, R. Tibshirani, J.H. Friedman, "The Elements of Statistical Learning", Springer, 1st Edition, 2001.

(CS132) DESIGN PATTERNS
(Professional Elective - 3)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Learn how to apply a fundamental set of design patterns utilizing object oriented principles to solve real world software design problems.
2. Learn about the user interfaces, standards of designing a document editor.
3. Understand the creational, structural and behavioural Patterns and explain how each pattern participants collaborate to carry out their responsibilities.
4. List the consequences of applying each pattern to the overall software quality of a system.
5. Implement the pattern in java or c# to a real world problem.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Apply formal notations of C++, design and develop pattern of user choice.
2. Design a pattern or software which is the blueprint of the software system.
3. Accomplish UI and design an efficient editor.
4. Design tools which make the more effective with the help of design patterns.
5. Determine the prototypes, abstract factory to design and develop catalog pattern.
6. Enhance frameworks using structural, creational and behavioral patterns to make design-reuse.
7. Apply structural, creational and behavioral patterns and use them to give effective software solutions.
8. Appreciate the benefits of a patterns approach to programming design.

UNIT – I

Introduction to Design Patterns: Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing The Catalog, Solving of Design Problems Using Design Patterns, Selection of A Design Pattern, Use of Design Patterns.

UNIT - II

Designing a Document Editor: A Case Study: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

UNIT - III

Design Patterns Catalog: Creational Patterns, Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns. Structural Patterns-1: Adapter, Bridge, Composite, Decorator.

UNIT - IV

Structural Patterns-2 and Behavioral Patterns-1: Structural Patterns: Façade, Flyweight, Proxy, Discuss of Structural Patterns

Behavioral Patterns: Chain of Responsibility Command, Interpreter.

UNIT - V

Behavioral Patterns-2: Iterator, Mediator, Observer.

Behavioral Patterns-3: State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns, Expectations from Design Patterns.

TEXT BOOKS:

1. Gamma, Helm and Johnson, "Design Patterns: Elements of Reusable Object Oriented Software", Pearson Education,1995.
2. Eric Freeman, "Head First Design Patterns", O'Reilly - SPD.

REFERENCE BOOKS:

1. Cooper, "Java Design Patterns", Pearson Education.
2. Horstmann, "Object Oriented Design and Patterns", Wiley.
3. Mark Grand, "Pattern's in JAVA", Vol - I, Wiley Dreamteach.

WEB LINKS:

1. shop.oreilly.com/product/9780596007126.do
2. ww.amazon.com/Design-Patterns-Elements.../dp/0201633612

(CS133) EXPERT SYSTEMS AND NEURAL NETWORKS
(Professional Elective - 3)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Expose the students to the concepts of expert systems.
2. Summarize the concepts of expert system architecture and methodologies for building expert systems.
3. Discuss adequate knowledge about feed forward and feedback neural network.
4. Expose knowledge of supervised learning in neural networks.
5. Provide knowledge of unsupervised learning using neural networks.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Assess the concepts of expert systems.
2. Analyze the architecture of expert system and methodologies for building expert systems.
3. Comprehend the concepts of feed forward neural networks.
4. Analyze the various feedback networks.
5. Examine the feed-forward neural networks of increasing complexity, gradient descent learning and extensions, learning and generalization theory.
6. Apply neural networks to particular applications, and to know what steps to take to improve performance.
7. Recognize the knowledge of sufficient theoretical background to be able to reason about the behavior of neural networks.
8. Evaluate whether neural networks are appropriate to a particular application.

UNIT – I

The Nature of Expert Systems: Types of applications of Expert Systems; relationship of Expert Systems to Artificial Intelligence and to Knowledge-Based Systems. Distinguishing features of Expert Systems. Benefits of using an Expert System. Choosing an application. Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT – II

Basic Forms of Inference: abduction; deduction; induction. The representation and manipulation of knowledge in a computer. Rule-based representations (with backward and forward reasoning); logic-based representations (with resolution refutation); taxonomies; meronomies; frames (with inheritance and exceptions); semantic and partitioned nets (query handling). Basic components of an expert system. Generation of explanations. Handling of uncertainties. Truth Maintenance Systems.

Expert System Architectures: An analysis of some classic expert systems. Limitations of first generation expert systems. Deep expert systems. Co-operating expert systems and the blackboard model.· Building Expert Systems. Methodologies for building expert systems:

knowledge acquisition and elicitation; formalisation; representation and evaluation. Knowledge Engineering tools.

UNIT – III

Introduction to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT–IV

Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

UNIT- V

Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

Multilayer Feed forward Neural Networks and Associative Memories: Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

TEXT BOOKS:

1. P Jackson, “Introduction to Expert Systems”, Addison Wesley, 1990.
2. S.N.Sivanandam, S.Sumathi and S.N.Deepa, “Introduction to Neural Networks Using MATLAB 6.0”, TMH, 2006.

REFERENCE BOOKS:

1. James A Freeman and Davis Skapura, “Neural Networks”, Pearson Education, 2002.
2. Simon Hakins,“Neural Networks”, Pearson Education.
3. C. Eliasmith and C H. Anderson, “Neural Engineering”, PHI.
4. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw Hill, Inc, 1991.

WEB LINKS:

1. https://www.coursera.org/course/neuralnets
2. http://nptel.ac.in/video.php?subjectId=108104049

(EC144) INTERNET OF THINGS
(Common to ECE and CSE)
(Professional Elective - 3)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:
Students will able to
1. Introduce the terminology, technology and its applications
2. Understand the fundamentals of internet of things.
3. Build a small low cost embedded system using arduino / raspberry Pi or equivalent boards.
4. Initiate the implementation of web based services on IoT devices
5. Apply the concept of internet of things in the real world scenario

COURSE OUTCOMES:
At the end of the course, the students will develop ability to
1. Understand the new computing technologies.
2. Able to apply the latest computing technologies like cloud computing technology and big data.
3. Ability to introduce the concept of M2M (machine to machine) with necessary protocols.
4. Ability to learn the design flow of IoT.
5. Design a portable IoT using Arduino / equivalent boards and relevant protocols.
6. Design and Build web services to access / control IoT devices.
7. Deploy an IoT application and connect to the cloud.
8. Analyze applications of IoT in real time scenario.

UNIT- I
Fundamentals of Internet of Things (IoT):
Introduction – Characteristics - Physical design – Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

UNIT- II
IOT Design Methodology:
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT- III
Building IOT with Raspberry PI:
Physical device – Raspberry Pi Interfaces – Programming – APIs/Packages – Web services.

UNIT -IV
Buildingiot with Galileo / Arduino:
Intel Galileo Gen2 with Arduino – Interfaces - Arduino IDE – Programming - APIs and Hacks.

UNIT -V

Case Studies and Advanced Topics:

Various Real time applications of IoT - Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software and Management Tools for IoT.

TEXT BOOKS:

1. Arshdeep Bahga and Vijay Madisetti, “Internet of Things – A Hands on Approach”, Universities Press, 2015.
2. Matt Richardson and Shawn Wallace, “Getting Started with Raspberry Pi”, O'Reilly (SPD)/ Prentice Hall.

REFERENCE BOOKS:

1. Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, New York, Apress, 2014.
2. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014.

(CS134) PARALLEL PROGRAMMING
(Professional Elective – 4)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Memorize various parallel programming concepts.
2. Illustrate the two popular parallel programming paradigms (message passing and shared memory).
3. Solve a complex problem with message passing model and programming with message passing interface (MPI).
4. Analyze complex problems with shared memory programming with open MPI.
5. Learn parallel algorithms development techniques for shared memory and MPI models.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recall fundamental concepts of parallelism.
2. Message-passing parallel programs with MPI.
3. Apply shared memory parallel program concepts with Java threads and Open MPI.
4. Illustrate multi-threaded and message passing parallel algorithms.
5. Design and analyse the parallel algorithms for real world problems and implement them on available parallel computer systems.
6. Reconstruction of emerging parallel algorithms with MPI.
7. Compare and contrast various parallel algorithms using shared memory and MPI.
8. Compute contemporary parallel algorithms.

UNIT – I

Parallel Programming: Introduction to parallel programming – data parallelism – functional parallelism– pipelining – Flynn's taxonomy – parallel algorithm design – task/channel model – Foster's design methodology – case studies: boundary value problem – finding the maximum – n-body problem – Speedup and efficiency – Amdahl's law – Gustafson-Barsis's Law – Karp-Flatt Metric – Isoefficiency metric.

UNIT-II

Message-Passing Programming: The message-passing model – the message-passing interface (MPI) – MPI standard – basic concepts of MPI: MPI_Init, MPI_Comm_size, MPI_Comm_rank, MPI_Send, MPI_Recv, MPI_Finalize – timing the MPI programs: MPI_Wtime, MPI_Wtick – collective communication: MPI_Reduce, MPI_Barrier, MPI_Bcast, MPI_Gather, MPI_Scatter – case studies: the sieve of Eratosthenes, Floyd's algorithm, Matrix-vector multiplication.

UNIT-III

Shared-Memory Programming: Shared-memory model – OpenMP standard – parallel for loops – parallel for pragma – private variables – critical sections – reductions – parallel loop optimizations – general data parallelism – functional parallelism – case studies: the sieve of

Eratosthenes, Floyd's algorithm, matrix-vector multiplication – distributed shared-memory programming – DSM primitives.

UNIT-IV

Parallel Algorithms – I: Monte Carlo methods – parallel random number generators – random number distributions – case studies – Matrix multiplication – row wise block-stripped algorithm – Cannon's algorithm – solving linear systems – back substitution – Gaussian elimination –iterative methods – conjugate gradient method.

UNIT-V

Parallel algorithms – II: Sorting algorithms – quicksort – parallel quicksort – hyperquicksort – sorting by regular sampling – Fast fourier transform – combinatorial search – divide and conquer – parallel backtrack search – parallel branch and bound – parallel alpha-beta search.

TEXT BOOKS:

1. Michael J. Quinn, "Parallel Programming in C with MPI and Open MPI", Tata McGraw Hill Publishing Company Ltd., 2003.
2. Ananth Grama, Anshal Gupta, Greoge Karypis and Vipin Kumar, "Introduction to Parallell, Computing", 2nd Edition, Pearson Education.

REFERENCE BOOKS:

1. B. Wilkinson and M. Allen, "Parallel Programming – Techniques and Applications Using Networked Workstations and Parallel Computers", 2nd Edition, Pearson Education, 2005.
2. M. J. Quinn, "Parallel Computing – Theory and Practice", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., 2002.
3. David E. Culler and Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/ Software Approach", Morgan Kaufman Publishers, 1999.

WEB LINKS:

1. http://grid.hust.edu.cn/courses/parallel/
2. https://www.clear.rice.edu/comp422/lecture-notes/

(CS135) SOFTWARE PROJECT MANAGEMENT
(Professional Elective – 4)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:
Students will be able to
1. Summarize the conventional and evaluation of software.
2. Comprehend the process of managing software from conventional to modern.
3. Explain architecture of a model based software and the process flow.
4. Analyze the process automation, process management and its discriminants.
5. Plan and manage projects at each stage of the software development life cycle (SDLC).

COURSE OUTCOMES:
At the end of the course, the students will develop ability to
1. Build the model from the conventional software product to the modern.
2. Discuss and evaluate the software architecture.
3. Have an exposure for organising and managing a software project.
4. Apply, analyze, design and develop the software system / process.
5. Know the economics for the next generation software.
6. Acquire the knowledge of managing, economics for conventional, modern and future software projects.
7. Build the successful software projects that support organization's strategic goals.
8. Create project plans that address real-world management challenge.

UNIT – I
Conventional Software Management: The waterfall model, conventional software Management performance.
Evolution of Software Economics: Software Economics, pragmatic software cost estimation.
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT – II
The Old Way and The New: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.
Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT – III
Model Based Software Architectures: A Management perspective and technical perspective.
Work Flows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments.
Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT – IV
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation: Automation Building blocks, The Project Environment.
Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

UNIT – V
Tailoring the Process: Process discriminates.
Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.
Case Study: The command Center Processing and Display system- Replacement (CCPDS-R)

TEXT BOOKS:
1. Walker Royce, "Software Project Management", Pearson Education, 2005.
2. Bob Hughes and Mike Cotterell, "Software Project Management", Tata McGraw Hill.

REFERENCE BOOKS:
1. Joel Henry, "Software Project Management", Pearson Education.
2. Pankaj Jalote, "Software Project Management in Practice", Pearson Education, 2005.

(CS136) WIRELESS SENSOR NETWORKS
(Professional Elective - 4)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Outline the basics of ad-hoc and sensor networks.
2. Discuss various fundamental and emerging protocols of all layers in ad-hoc network.
3. Analyse the issues pertaining to major obstacles in establishment and efficient management of ad-hoc and sensor networks.
4. Analyse the nature and applications of ad-hoc and sensor networks.
5. Elaborate various security practices and protocols of ad-hoc and sensor networks.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Work with existing ad-hoc and sensor network protocols and standards.
2. Create a Sensor network environment for different type of applications.
3. Design ad-hoc and sensor network architectures using QoS and congestion control mechanisms.
4. Interpret the various control fields of the protocol in each layer.
5. Select appropriate routing algorithms for different network environments.
6. Program ad-hoc and sensor network for various applications.
7. Deploy security mechanisms in the wireless ad-hoc and sensor networks.
8. Evaluate the QoS related performance measurements of ad-hoc and sensor networks.

UNIT – I

Introduction: Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques,multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.

UNIT – II

Introduction to Ad-hoc / Sensor Networks: Key definitions of adhoc/sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.

UNIT –III

MAC Protocols : Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.

UNIT – IV

Routing Protocols: Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols.

UNIT – V

QoS and Energy Management : Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.

TEXT BOOKS:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad-hoc Wireless Networks", Pearson Education, 2008.
2. Carlos De Morais Cordeiro and Dharma Prakash Agrawal, "Ad-hoc and Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.

REFERENCE BOOKS:

1. Holger Karl and Andreas willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Inc., 2005.
2. C.K.Toh, "Ad-hoc Mobile Wireless Networks", Pearson Education, 2002.
3. Erdal Cayirci and Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009.
4. Charles E.Perkins, "Ad-hoc Networking", Pearson Education, 2001.
5. Shih-Lin Wu and Yu-Chee Tseng, "Wireless Ad-hoc Networking", Auerbach Publications, Taylor & Francis Group, 2007.

WEB LINKS:

1. http://nptel.iitm.ac.in
2. books.google.com › ... › Hardware › Personal Computers › General
3. www.pearsonhighered.com › ... › Mobile Communications.

(CS137) SPEECH PROCESSING
(Professional Elective - 4)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Familiarize students with the basic characteristics of the speech signal.
2. Know the production and perception of speech by humans.
3. Describe the basic techniques and practical aspects of speech analysis.
4. Present an overview of speech processing applications.
5. Includes the topics such as speech production, speech analysis, speech enhancement, speech and speaker recognition.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Know the basic characteristics of speech signal in relation to production and hearing of speech by humans.
2. Understand and describe the mechanisms of speech production.
3. Determine speech sound from the acoustic characteristics.
4. Analyze the speech signal in time and frequency domains, and in terms of the parameters of a source-filter model.
5. Understand basic algorithms of speech analysis common to many applications.
6. Describe and implement methods for speech enhancement.
7. Design a simple speech processing system that recognizes a limited number of isolated words; and a speaker recognition system.
8. Apply the concepts to design a simple system for speech processing.

UNIT-I

Fundamentals of Digital Speech Processing: Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform Lossless Tube Model, Effect of Losses In Vocal Tract, Effect of Radiation at Lips, Digital Models for Speech

UNIT-II

Time Domain Models for Speech Processing: Introduction, Window Considerations, Short-Time-Energy and Average Magnitude Short Time Average Zero Crossing Rate, Speech Vs Silence Discrimination Using Energy and Zero Crossing, Pitch Period Estimation using a Parallel Processing Approach, The Short Time Autocorrelation Function, The Short Time Average Magnitude Difference Function, Pitch Period Estimation using The Autocorrelation Function.

UNIT-III

Linear Predictive Coding (LPC) Analysis: Basic Principles of Linear Predictive Analysis, The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky

Decomposition Solution for Covariance Method, Durbin's Recursive Solution For the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection Using LPC Parameters, Formant Analysis Using LPC Parameters.

UNIT-IV

Homomorphic Speech Processing: Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

Speech Enhancement: Nature of Interfering Sounds, Speech Enhancement Techniques: Single Microphone Approach: Spectral Subtraction, Enhancement by Re-synthesis, Combo Filter, Wiener Filter, Multi Microphone Approach.

UNIT-V

Automatic Speech and Speaker Recognition: Basic Pattern Recognition Approaches, Parametric Representation of Speech, Evaluating the Similarity of Speech Patterns, Isolated Digit Recognition System, Continuous Digit Recognition System.

Hidden Markov Model (HMM) For Speech: Hidden Markov Model (HMM) for Speech Recognition, Viterbi algorithm, Training and Testing using HMMS.

Speaker Recognition: Recognition techniques, Features That Distinguish Speaker, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXT BOOKS:

1. L.R Rabiner and R.W Jhaung, "Digital Processing of Speech Signals", Pearson Education, 1978.
2. L.R. Rabiner and S.W. Schafer**,** "Digital Processing of Speech Signals", Pearson Education.
3. Douglas O'Shaughnessy, "Speech Communications: Human and Machine", 2nd Edition, Wiley India, 2000.

REFERENCE BOOKS:

1. Thomas F. Quateri, "Discrete Time Speech Signal Processing: Principles and Practice", 1st Edition, Pearson Education.
2. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing", 1st Edition, Wiley.

(CS145) GRID AND CLOUD COMPUTING LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Provides a comprehensive study of Grid and cloud computing.
2. Know the different models of distributed system.
3. Know the design issues of cloud computing platforms.
4. Understands the workflow of service oriented architectures.
5. Analyze the different cloud computing resource management.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Ability to understand various service delivery models of a cloud computing architecture.
2. Knows the design issues of cloud computing platforms.
3. Understand the concepts of service oriented architecture.
4. Analyze the different workflows of service oriented architecture.
5. Ability to understand the security challenges and address the challenges.
6. Understand the ways in which the cloud can be programmed and deployed.
7. Understand the grid computing resource management.
8. Apply the grid computing in solving large scale scientific problems.

LIST OF EXERCISES:

1. Installation and configuration of Hadoop
2. Using Hadoop for counting word frequency using map reduce
3. Create an Amazon EC2 instance and set up a web-server on the instance and associate an IP address with the instance.
4. Repeat Exercise-3 using Google Compute Engine.
5. Repeat Exercise-3 using Windows Azure Virtual Machine.
6. Create a database instance in the cloud using Amazon RDS.
7. Create a database instance in the cloud using Google Cloud SQL
8. Installation and Configuration of Globus Toolkit
9. Build and deploy a grid server, then build the client and execute the application

TEXT BOOKS:

1. Arshadeep Bahga and Vijay Madisetti, “Cloud Computing: A Hands-on Approach”, University Press.

REFERENCE BOOKS:

1. B Sotomayor, “The Globus Toolkit -3: Programmers’s Tutorial”, http://www.casasotomayor.net/gt3-tutorial/.
2. Berstis, Viktors, et al., “Introduction To Grid Computing With Globus”, IBM Corporation, International Technical Support Organization, 2003.

(CS146) MOBILE APPLICATION DEVELOPMENT LAB

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	I	-	-	3	2	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Analyse system requirements for mobile applications.
2. Generate suitable design using specific mobile development frameworks.
3. Generate mobile application design.
4. Implement the design using specific mobile development frame.
5. Implement the design using Android and iOS.

CORSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Apply the key technological principles and methods for delivering and maintaining mobile applications,
2. Evaluate and contrast requirements for mobile platforms to establish appropriate strategies for development and deployment,
3. Apply current standard-compliant scripting / programming techniques for the successful deployment of mobile applications targeting a variety of platforms,
4. Carry out appropriate formative and summative evaluation and testing utilising a range of mobile platforms,
5. Interpret a scenario, plan, design and develop a prototype hybrid and native mobile application,
6. Investigate the leading edge developments in mobile application development and use these to inform the design process.
7. Implement the design using android SDK and objective C
8. Deploy mobile applications in android and i phone marketplace for distribution

Week -1

1. Java Android Program to Build a Simple Android Application
2. Java Andorid Program to Demonstrate Activity Life Cycle
3. Java Android Program to Change the Background of your Activity

Week-2

1. Java Android Program to Demonstrate Action Button by Implementing on Click Listener
2. Java Andorid Program to Perform all Operations using Calculators
3. Java Android Program to Change the Image Displayed on the Screen
4. Java Android Program to Create Multiple Activities within an Application

Week-3

1. Java Android Program to Demonstrate the Sound Button Application
2. Java Android Program to Demonstrate the use of Scroll View
3. Java Android Program to Demonstrate Radio Group Application.

Week-4

1. Java Android Program to Demonstrate the Menu Application
2. Java Android Program to Demonstrate List View Activity

3. Java Android Program to Demonstrate an Advanced Xml Layout

Week-5

1. Java Android Program to Demonstrate Layouts in an Activity and Nesting of Layouts
2. Java Android Program to Demonstrate Motion Event on Android screen with the help of an Image
3. Java Android Program to Demonstrate a Simple Video View

Week-6

1. Java Android Program to Demonstrate Explicit Intent
2. Java Android Program to Demonstrate Implicit Intent
3. Java Android Program to Demonstrate Broadcast Receiver
4. Java Android Program to Demonstrate BroadCast Receiver to Intercept Custom Intent.

Week-7

1. Java Android Program to Demonstrate Reading and Writing to a File in Android
2. Java Android Program to Write to a SQLite Database in Android
3. Java Android Program to Read and Write to a SQLite Database in Android
4. Java Android Program to Read Write and Delete to a SQLite Database in Android

Week-8

1. Hello World! Build Your First iPhone App
2. Create a Simple Table View App
3. Customize Table View Cells for UITableView
4. Delete a Row from UITableView and Model-View-Controller

Week-9

1. Use Storyboards to Design User Interface
2. Pass Data Between View Controller Using Storyboard Segue
3. Create Tab Bar Controller and Web View

Week-10

1. Add Header and Footer in UICollectionView (Flow Layout)
2. Handling Single and Multiple Selection in Collection View
3. Build a Simple Camera App Using UIImagePickerController

Week-11

1. Build a Simple App for Video Recording and Playback
2. Adding Local Notification to iOS Apps

Week-12

1. How to Use UIPageViewController
2. How to Create a Slide-out Sidebar Menu like the one in Facebook app

TEXT BOOKS:

1. Reto Meier, “Professional Android 4 Application Development”, Wrox Publication.
2. Pradeep Kothari, “Android Application Development (With Kitkat Support) Black Book”, Dream Tech Press, 2014.

REFERENCE BOOK:

1. Rick Boyer and Kyle Mew, “Android Application Development Cookbook”, 2nd Edition, Packt Publishing.

(EC132) PLC AND ROBOTICS
(Common to EEE, ECE and CSE)
(Professional Elective - 5)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:
Students will be able to
1. Recall the factory automation.
2. State programmable logic controls.
3. Discuss PLC program.
4. Explain about robotic programming.
5. List the applications of robotics.

COURSE OUTCOMES:
At the end of the course, the student will develop ability to
1. Explain programmable logic controls.
2. Design a PLC and interface with sensors.
3. Illustrate various types of robots and their applications.
4. Identify the importance of robot dynamics.
5. Illustrate the robotic programming.
6. Identify the suitable sensor and actuator for a control system.
7. Design complex robotics engineering projects.
8. Select a suitable robot for a specific application.

UNIT – I
Programmable Logic Controllers: Basic Structure, Input / Output Processing, Ladder Logic Programming (Examine If Closed, Examine If Open, Output Energize, Output Latch, Output Unlatch), Data Handling, Selection of a PLC, Interfacing sourcing and sinking sensors , Interfacing actuators

UNIT – II
Ladder Logic Programming for Real-World Applications: Timers (Timer on Delay, Timer off Delay) and counters (Count Up, Count Down) with applications, Bit Shift with Applications (Bit shift left and right), Analog I/O, PID Servo Motor Control, Stepper Motor Control

UNIT – III
Introduction to Robotics: Robotics, Classification of Robots, Fundamentals about Robot Technology, Factors related to use Robot Performance, Robot programming – teaching positions, different types of move command, different types of pick and place tasks, stacking and palletizing using the robot, using I/O operations to interface PLC to Robot Controller

UNIT – IV

Machine Vision: Machine Vision System, Description, Sensing, Digitizing, Image Processing and Analysis and Application of Machine Vision System, Edge detection, shape, feature and color recognition.

UNIT - V

Design of Mechatronics Systems: Steps in designing Mechatronics Systems. Integrating PLCs, Robotics and Vision Systems in factory automation.

TEXT BOOKS:

1 Deb S. R. and Deb S, "Robotics Technology and Flexible Automation", Tata McGraw Hill Education Pvt. Ltd, 2010.
2 John J Craig, "Introduction to Robotics", Pearson, 2009.

REFERENCE BOOKS:

1. Gary Anderson, "PLC Programming using RS Logix 500: Basic Concepts of Ladder Logic Programming", Create Space Independent Publishing, 2015.
2. Maxrabiee, "Programmable Logic Controllers", 3rd Edition, Oxford University Press, 2013.
3. R.K. Mittal and I.J. Nagrath, "Robotics and Control", TMH, New Delhi, 2008.

(CS138) BIG DATA AND ANALYTICS
(Professional Elective - 5)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Describe the 5V paradigm of big data and categorizing digital data.
2. Apply analytics to gain insights into the big data.
3. Comprehend the Hadoop architecture for storage and processing the big data.
4. Explore NoSQL databases and differentiating from SQL.
5. Analyze the tools available for big data analytics.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recognize the importance of big data for business intelligence.
2. Demonstrate the hadoop ecosystem and its applications for data analytics.
3. Acquire skills in map reduce analytics using Hadoop.
4. Operate the big data environment and manage data without SQL.
5. Identify the current applications that need big data usage for analysis.
6. Summarize the importance of hadoop for business analytics.
7. Acquire programming skills in hadoop echo system.
8. Demonstrate hadoop ecosystem for data analytics.

UNIT – I

Types of Digital Data: Structured, Semi-structured and Un-structured. Big data definition: volume, velocity, variety, veracity and value. Big data analytics skills: analytics classification, In-memory analytics, parallel processing and distributed systems. CAP theorem. The big data technology landscape: Sql and NoSql. Introduction to Hadoop.

UNIT – II

Exploring Hadoop Architecture: HDFS:The hadoop distributed file system. Basic concepts, namenode, datanode, The design of HDFS, Interaces Basic commands for file sytem operations, Hadoop I/O.

UNIT –III

Introduction to Map Reduce Programming: Mapper, Reducer, Combiner, Partitioner, Searching, Sortitng, Compression. Devoloping a MapReduce application(programming language is not binding), Mapreduce workflows, MapReduce Types & Formats, Features of MapReduce.

UNIT – IV

Introduction to HIVE: Architecture, File Format, Hive Query Language(HQL).
Programmig with Hive.

Introduction to Pig: Pig Latin Overview, data types, Running Pig, Execution models, Pig Commands, Application development using Pig. Pig vs Hive.

UNIT – V

Introduction to H Base: NoSQL a column oriented database. Example schemas & comparisons with RDBMS. Introduction to ZooKeeper: Installing & running zookeeper. Zookeeper service. Introduction to sqoop: A sample import using sqoop. Importing large objects. Working with imported data. A deeper look at sqoop export.

TEXT BOOKS:

1. Seema Acharya and Subhashini Chellappan,"Big Data and Analytics", Wiley India Publishers, 2011.
2. Tom White, "Hadoop the Definitive Guide", O' Reilly Publishers, 2015.

REFERENCE BOOKS:

1. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", SPD, 2013.
2. Eric Sammer, " Hadoop Operations", O'Relley, 2012.

WEB LINKS:

1. http://hadoop.apache.org
2. www.cloudera.com
3. http://hortonworks.com
4. http://www.edureka.com

(CS139) DISTRIBUTED SYSTEMS
(Professional Elective - 5)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Understand the components of distributed systems.
2. Learn about the synchronization and fault tolerance of distributed systems.
3. Understand the design and implementation of different distributed file systems.
4. Know the memory management systems of distributed file systems.
5. Understand the different case studies of distributed systems.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Apply, analyze and design effective distributed system.
2. Accomplish the fault and it's tolerance.
3. Design the distributed file systems through shared variable, object based and bus based multi processors.
4. Have an exposure of differentiating the file systems in the real world.
5. Design and usage of distributed file systems in the real world.
6. Recognize the feasibilities and the impossibilities in managing resources.
7. Acquire trends in distributed system.
8. Identify the problems in developing distributed applications.

UNIT - I

Introduction to Distributed Systems: Distributed systems: Goals Hardware Concepts Software - design Communication distributed systems: Layered Protocol: ATM Networks client server model - remote procedure call - group communication.

UNIT - II

Synchronization: Clock synchronization - mutual exclusion - election atomic transactions - dead locks. Process and Processors: Threads - System models processor allocation - scheduling fault tolerance

UNIT - III

Real time distributed systems, Distributed file systems: File system design and implementation - trends in distributed file systems.

UNIT - IV

Shared Memory: Introduction - bus based multi processors ring based multiprocessors switched. Multiprocessors - NUMA comparison of shared memory systems - consistency models - page based distributed shared memory.

UNIT - V

Shared variable distributed shared memory; object based distributed shared memory, Case studies: MACH and CHORUS

TEXT BOOKS:

1. Andrew S.Tanenbaum, "Distributed Operating System", Prentice Hall International Inc.1995.
2. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems: Concepts and Design", Wesley Pearson Education, 2001.

REFERENCE BOOKS

1. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, "Distributed Systems: Concepts and Design", 5th Edition, Wesley, 2011.
2. Paolo Sivilotti, "Introduction to Distributed Systems", Addison-Wesley, 2005.

WEB LINKS:

1. http://www.gmrit.org/resources/syllabus_mca.pdf
2. books.google.co.in/books?isbn=3540401962.

(CS140) SEMANTIC WEB AND SOCIAL NETWORKS
(Professional Elective - 5)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Summarize the overview of semantic web.
2. Learn the knowledge representation for semantic web.
3. Analyse the importance of semantic web services.
4. Learn about the different semantic web tools.
5. Apply social network analysis and semantic web.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Differentiate semantic web from others.
2. Use ontology and inference engines in semantic web development.
3. Build semantic web applications with social network features.
4. Use the role of ontology and inference engines in semantic web.
5. Apply RDF schema on XML.
6. Demonstrate working of semantic web software tools.
7. Implement OWL on web ontology.
8. Build semantic desktop related applications.

UNIT – I

The Future of the Internet: Introduction, The Syntactic Web, The Semantic Web, How the Semantic Web Will Work.

Ontology in Computer Science: Defining the Term Ontology, Differences Among Taxonomies, Thesauri, and Ontologies, Classifying Ontologies, Web Ontologies, Web Ontology Description Languages, Ontology, Categories, and Intelligence.

UNIT – II

Knowledge Representation in Description Logic: Introduction, An Informal Example, The Family of Attributive Languages, Inference Problems.

RDF and RDF Schema: Introduction, XML Essentials, RDF, RDF Schema, A Summary of the RDF/RDF Schema Vocabulary. OWL: Introduction, Requirements for Web Ontology Description Languages, Header Information, Versioning, and Annotation Properties, Properties, Classes, Individuals, Data types, A Summary of the OWL Vocabulary.

UNIT –III

Rule Languages: Introduction, Usage Scenarios for Rule Languages, Datalog, RuleML, SWRL, TRIPLE. Semantic Web Services: Introduction, Web Service Essentials, OWL-S Service Ontology, An OWL-S Example

UNIT – IV

Methods for Ontology Development: Introduction, Uschold and King Ontology Development Method, Toronto Virtual Enterprise Method, Methontology, KACTUS Project Ontology Development Method, Lexicon-Based Ontology Development Method, Simplified Methods. Ontology Sources: Introduction, Metadata, Upper Ontologies, Other Ontologic of Interest, Ontology Libraries.

UNIT – V

Semantic Web Software Tools: Introduction, Metadata and Ontology Editors, Reasoners, Other tools. Software Agents: Introduction, Agent Forms, Agent Architecture, Agents in the Semantic web Context. Semantic Desktop: Introduction, Semantic Desktop Metadata, Semantic Desktop Ontologies, Semantic Desktop Architecture, Semantic Desktop Related Applications. Ontology Application in Art: Introduction, Ontologies for the Description of Works of Art, Metadata Schemas for The Description of Works of Art, Semantic Annotation of Art Images.

TEXT BOOKS:

1. Karin K. Breitman, Marco Antonio Casanova and Walter Truszowski, "Semantic Web-Concepts, Technologies and Applications", Springer, 2007.
2. Peter Mika, "Social Networks and the Semantic Web", Springer, 2007.

REFERENCE BOOKS:

1. Heiner Stuckenschmidt, Frank van Harmelen, "Information Sharing on the Semanting Web", Springer, 2006.
2. Grigoris Antoniou and Frank Van Harmelen "Semantic Web Primer", MIT Press, 2012.
3. Rudi Studer, Stephan Grimm and Andrees Abeker, "Semantic Web Services: Concepts, Technologies and Applications", Springer, 2007.
4. John Davis, Dieter Fensal and Frank Van Harmelen, "Towards the Semantic Web: Ontology Driven Knowledge Management", John Wiley, 2003.

WEB LINKS:

1. www.amazon.com › ... › Information Management
2. ebookmaterials.blogspot.com/.../semantic-web-syllabus.... - United States

(CS141) INFORMATION RETRIEVAL SYSTEMS
(Professional Elective – 6)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:
Students will be able to
1. Knowledge the fundamentals of information retrieval systems(IRS).
2. Comprehend the capabilities of IRS.
3. Analyze skills on indexing structure.
4. Synthesize the different types of data structures.
5. Develop knowledge on text retrieval systems.

COURSE OUTCOMES:
At the end of the course, the students will develop ability to
1. Comprehend and apply the basic concepts of information retrieval.
2. Apply the catalogue, indexing, the student should design effective information.
3. Accomplish the data structure and automatic indexing for the hypertext.
4. Applying searching procedure for user-text, designs and implement the system.
5. Accomplish the procedure relates to document and term oriented visualization technologies.
6. Synthesize programs to implement search engines.
7. Build skills in problem solving using systematic approaches.
8. Analyze the limitations of different information retrieval techniques.

UNIT – I
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

UNIT – II
Information Retrieval System Capabilities: Search, Browse, Miscellaneous
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.

UNIT –III
Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.
Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

UNIT – IV
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.
User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of

Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

UNIT – V

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

TEXT BOOKS:

1. Kowalski, Gerald and Mark T Maybury, "Information Retrieval Systems: Theory and Implementation", Kluwer Academic Press, 2006.
2. Robert Korfhage, "Modern Information Retrieval byYates Pearson Education Information Storage and Retrieval", John Wiley & Sons, 1997.

REFERENCE BOOKS:

1. W.B. Frakes and Ricardo Baeza-Yates, "Information Retrieval Data Structures and Algorithms", Prentice Hall, 1992.
2. Gobinda B Chowdhury, "Information to Modern Information Retrieval", Library Accusation Publication.
3. Kowalski, Gerald and Mark T Maybury, "Information Storage and Retrieval Systems: Theory and Implementation", Kluwer Academic Press.

WEB LINKS:

1. frakes.cs.vt.edu/frakespubs.html
2. books.google.co.in › Computers › Database Management › General

(CS142) HIGH PERFORMANCE COMPUTING
(Professional Elective - 6)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Summarize the parallel algorithms of real world and their implementation.
2. Analyze the performance of parallel programs.
3. Learn to write programs using accelerator technologies.
4. Practice the designing process of algorithms for multicore processor systems.
5. Acquire the concepts of interconnection networking algorithms.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Measure, analyze and assess the performance of HPC applications and their supporting hardware.
2. Design and analyze the parallel algorithms for real world problems and implement them on available parallel computer systems.
3. Optimize the performance of a parallel program to suit a particular hardware and software environment.
4. Implement the programs using accelerator technologies of GPGPUs with CUDA, Open CL.
5. Design algorithms suited for multi core processor systems using Open CL, Open MP, threading techniques.
6. Analyze the communication overhead of interconnection networks and modify the algorithms to meet the requirements.
7. Run parallel programs on different hardware architectures and software environments
8. Analyze the performance of implementations.

UNIT – I

Introduction: Implicit parallelism, Limitations of memory system performance, control structure, communication model, physical organization, communication costs of parallel platforms, Routing mechanisms for interconnection networks, mapping techniques.

Parallel Algorithm Design: Preliminaries, decomposition techniques, tasks and interactions, mapping techniques for load balancing, methods for reducing interaction overheads, parallel algorithm models.

UNIT – II

Basic Communication Operations: Meaning of all-to-all, all-reduce, scatter, gather, circular shift and splitting routing messages in parts. Analytical modelling of parallel programs: sources of overhead, performance metrics, the effect of granularity on performance, scalability of parallel systems, minimum execution time, minimum cost-optimal execution time, asymptotic analysis of parallel programs.

UNIT –III

Programming Using Message Passing Paradigm: Principles, building blocks, MPI, Topologies and embedding, Overlapping communication and computation, collective communication operations, Groups and communicators.

UNIT – IV

Programming Shared Address Space Platforms: Threads, POSIX threads, Synchronization primitives, attributes of threads, mutex and condition variables, Composite synchronization constructs, OpenMP Threading Building blocks; An Overview of Memory Allocators, An overview of Intel Threading building blocks;

UNIT – V

An Overview of Brief History of GPUs: An Overview of GPU Programming; An Overview of GPU Memory Hierarchy Features; Introduction to Heterogeneous Computing – OpenCL; The OpenCL Kernel, The OpenCL Memory Model, The OpenCL Execution Model; OpenCL Platform and Devices; OpenCL Execution Environment, An Overview of OpenCL API; Heterogeneous Programming in OpenCL An Overview of CUDA enabled NVIDIA GPUs, Introduction to CUDA C, Parallel Programming in CUDA C; Dense Matrix Algorithms: matrix vector multiplication, matrix -matrix multiplication, solving system of linear equations.

TEXT BOOKS:

1. Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, "Introduction to Parallel Computing", 2nd Edition, Pearson Education, 2007.
2. Benedict R Gaster, Lee Howes, David R Kaeli, Perhaad Mistry and Dana Schaa, "Heterogeneous Computing with Open CL", McGraw Hill, Inc. New York , 2011.

REFERENCE BOOKS:

1. Michael J. Quinn, "Parallel Programming in C with MPI and Open MP", McGraw Hill International Editions, 2004.
2. Jason Sanders and Edward Kandrot, "CUDA by Example : An Introduction to General-Purpose GPU Programming", Addison Wesley, 2011.

WEB LINKS:

1. nptel.ac.in/courses/106108055/
2. http://www.nvidia.com/object/SC09_Tutorial.html.
3. http://www.icrar.org/research/postgraduate/high-performance-computing-honours-course

(CS143) NATURAL LANGUAGE PROCESSING
(Professional Elective - 6)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Know the fundamental concepts and ideas in natural language processing (NLP).
2. Understand the algorithms available for the processing of linguistic information .
3. Know the underlying computational properties of natural languages.
4. Design the methods for parsing and semantic interpretation.
5. Apply the practical engineering tasks like part-of-speech tagging, word sense disambiguation, etc.,

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Know the knowledge in speech processing.
2. Understands the human morphological processing.
3. Know the parts-of-speech tagging types.
4. Know the spoken language grammar and its equivalence
5. Understand the parsing with context free grammar.
6. Understand the unification feature structures.
7. Understand the mathematical and linguistic concepts of NLP.
8. Design and implement algorithms for NLP problems.

UNIT - I

Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding.

Regular Expressions and Automata: Regular expressions - Finite-State automata.

Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - Lexicon-Free FSTs: The porter stammer - Human morphological processing

UNIT - II

Word Classes and Part-of-Speech Tagging: English word classes – Tag sets for English - Part-of-speech tagging - Rule-based part-of-speech tagging - Stochastic part-of-speech tagging - Transformation-based tagging - Other issues.

Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase - Coordination - Agreement - The verb phase and sub categorization - Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - Finite-State and Context-Free grammars - Grammars and human processing.

Parsing with Context - Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

UNIT - III

Features and Unification: Feature structures - Unification of feature structures - Features structures in the grammar - Implementing unification - Parsing with unification constraints - Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar - problems with PCFGs - Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

UNIT – IV

Representing Meaning: Computational desiderata for representations - Meaning structure of language - First order predicate calculus - Some linguistically relevant concepts - Related representational approaches - Alternative approaches to meaning.

Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis.

Lexical Semantics: relational among lexemes and their senses - WordNet: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

UNIT - V

Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation - Robust word sense disambiguation - Information retrieval - other information retrieval tasks.

Natural Language Generation: Introduction to language generation - Architecture for generation - Surface realization - Discourse planning - Other issues.

Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques - Usability and system development.

TEXT BOOKS:

1. Daniel Jurafsky and James H.Martin, “Speech and Language Processing", Pearson Education (Singapore) Pvt. Ltd., 2002.

REFERENCE BOOKS:

1. James Allen, “Natural Language Understanding”, Pearson Education, 2003.

(CS144) WEB MINING

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
IV	II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Know the foundations of web data mining.
2. Introduce the concepts of extracting knowledge from web data.
3. Know the mechanisms for effective web search.
4. Understand the architecture of web mining.
5. Understand the different human language technologies for web content retrieval.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Identify and differentiate among application areas for web content mining, web structure mining and web usage mining.
2. Describe key concepts such as deep web, surface web, semantic web, web log, hypertext, social network, information synthesis.
3. Discuss the use of methods and techniques such as word frequency and co-occurrence statistics, normalization of data, machine learning, clustering, vector space models and lexical semantics.
4. Know the architecture and main algorithms commonly used by web mining applications,
5. Know the different approaches and techniques of web mining.
6. Apply human language technology tools on different types of web content.
7. Compare and assess the quality of existing web mining tools.
8. Analyze web mining problems.

UNIT - I

Introduction to Web Data Mining and Data Mining Foundations: Introduction – World Wide Web (WWW), A Brief History of the Web and the Internet, Web Data Mining-Data Mining, Web Mining.

Data Mining Foundations – Association Rules and Sequential Patterns – Basic Concepts of Association Rules, Apriori Algorithm- Frequent Item set Generation, Association Rule Generation, Data Formats for Association Rule Mining, Mining with multiple minimum supports – Extended Model, Mining Algorithm, Rule Generation, Mining Class Association Rules, Basic Concepts of Sequential Patterns, Mining Sequential Patterns on GSP, Mining Sequential Patterns on Prefix Span, Generating Rules from Sequential Patterns.

UNIT - II

Supervised and Unsupervised Learning: Supervised Learning - Basic Concepts, Decision Tree Induction – Learning Algorithm, Impurity Function, Handling of Continuous Attributes, Classifier Evaluation, Rule Induction – Sequential Covering, Rule Learning, Classification Based on Associations, Naïve Bayesian Classification , Naïve Bayesian Text Classification - Probabilistic Framework, Naïve Bayesian Model .

Unsupervised Learning – Basic Concepts , K-means Clustering – K-means Algorithm, Representation of Clusters, Hierarchical Clustering – Single link method , Complete link Method, Average link method, Strength and Weakness.

UNIT - III

Information Retrieval and Web Search: Basic Concepts of Information Retrieval, Information Retrieval Methods - Boolean Model, Vector Space Model and Statistical Language Model, Relevance Feedback, Evaluation Measures, Text and Web Page Preprocessing – Stop word Removal, Stemming, Web Page Preprocessing, Duplicate Detection, Inverted Index and Its Compression – Inverted Index, Search using Inverted Index, Index Construction, Index Compression, Latent Semantic Indexing – Singular Value Decomposition, Query and Retrieval, Web Search, Meta Search, Web Spamming.

UNIT - IV

Link Analysis and Web Crawling: Link Analysis - Social Network Analysis, Co-Citation and Bibliographic Coupling, Page Rank Algorithm, HITS Algorithm, Community Discovery- Problem Definition, Bipartite Core Communities, Maximum Flow Communities, Email Communities.

Web Crawling – A Basic Crawler Algorithm- Breadth First Crawlers, Preferential Crawlers, Implementation Issues – Fetching, Parsing, Stop word Removal, Link Extraction, Spider Traps, Page Repository, Universal Crawlers, Focused Crawlers, Topical Crawlers, Crawler Ethics and Conflicts.

UNIT – V

Opinion Mining and Web Usage Mining: Opinion Mining - Sentiment Classification – Classification based on Sentiment Phrases, Classification Using Text Classification Methods , Feature based Opinion Mining and Summarization – Problem Definition, Object feature extraction, Feature Extraction from Pros and Cons of Format1, Feature Extraction from Reviews of Format 2 and 3, Comparative Sentence and Relation Mining, Opinion Search and Opinion Spam.

Web Usage Mining - Data Collection and Pre-processing- Sources and Types of Data, Key Elements of Web usage Data Pre-processing, Data Modeling for Web Usage Mining, Discovery and Analysis of Web usage Patterns -Session and Visitor Analysis, Cluster Analysis and Visitor Segmentation, Association and Correlation Analysis, Analysis of Sequential and Navigation Patterns.

TEXT BOOKS:

1. Bing Liu, “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data”, Springer Publications.

REFERENCE BOOKS:

1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques”, 2nd Edition, Elsevier Publications.
2. Anthony Scime, “Web Mining: Applications and Techniques”, Idea Group Publishing.
3. Soumen Chakrabarti, “Mining the Web: Discovering Knowledge from Hypertext Data”, Morgan Kaufmann.

LIST OF OPEN ELECTIVES - CSE

S. No.	Course Code	Course	Offered by the department
1	OE101	Philosophy	H&Sc
2	OE102	Psychology*	H&Sc
3	OE103	Sociology	H&Sc
4	OE104	Design Thinking and Innovation*	Business Management
5	OE105	Technology Entrepreneurship*	Business Management
6	OE106	Marketing for Engineers	Business Management
7	OE107	Business Analytics	Business Management
8	OE108	Engineering Project in Community Services (EPICS)*	CE, ME, EEE, ECE, CSE
9	OE109	Smart Cities	CE, ME, EEE, ECE, CSE
10	OE110	Cognitive Engineering*	CE, ME, EEE, ECE, CSE
11	OE111	Intellectual Property Rights	CE, ME, EEE, ECE, CSE
12	OE112	Disaster Management	CE
13	OE113	Pollution and Control Engineering	CE
14	OE114	Scripting Languages	CSE
15	OE115	Cyber Laws	CSE
16	OE118	Hybrid Electric Vehicles	EEE
17	OE120	Fundamentals of Electrical Machines	EEE
18	OE121	Introduction to Control Systems	EEE
19	OE122	Basics of Thermodynamics	ME
20	ME111	Operations Research	ME / MATHS
21	ME138	Renewable Energy Sources	ME / EEE

Activity based course (CIE & SEE are assessed with 50 marks each)

(OE101) PHILOSOPHY

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. What is philosophy?
2. Why is philosophy important to us?
3. How is it related to our lives?
4. Why should we apply basic principles in life?
5. How philosophy can improve our living and behavior in life?

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Describe how philosophy makes man wise.
2. Differentiate between attitude and principles.
3. Make wise decisions as principles of life.
4. Adopt a path of liberalism, fraternity and secular to make the world a better place to live.
5. Call themselves as global citizens rather than particular nationals.
6. Respect all the religious people in the world.
7. Differentiate how eastern philosophy is more religious oriented than the western one is on morality.
8. Identify the distinction between orthodoxy and heterodoxy systems.

UNIT – I

Introduction to Philosophy, nature, scope and significance of philosophy, western philosophy, philosophic thought, history of philosophy, the pre Socratic philosophers, the Sophists and Socrates, Plato and Aristotle.

UNIT - II

Introduction to Indian Philosophy, the ancient Vedas, the Upanishads, the epics and the treatises of the Heterodox and Orthodox systems, Buddhism, Advaitha, Jainism, and Sikhism

UNIT – III

The classification of Philosophy - The main divisions of Philosophy, Logic, the Philosophy of mathematics, Philosophy of nature, philosophy and the special science, philosophy of art: ethics philosophy and theology, philosophy and Common Sense.

UNIT – IV

Criticism (Epistemology), Ontology: Essence, Substance and Accident, Act and Potentiality.

UNIT – V

Modern Philosophy: Political Philosophy, Religious Philosophy, Western or European Philosophy, Eastern Philosophy.

TEXT BOOKS:

3. Jacques Maritain, "An Introduction to Philosophy", Rowman and Littlefield Pub Inc., 2005.
4. John Cottingham, "Western Philosophy: An Anthology", 2nd Edition, Wiley-Blackwell, 2008.

REFERENCE BOOKS:

4. Sarvepalli Radha Krishnan and Charles A. Moore, "A Source Book in Indian Philosophy", Princeton University Press.
5. Bertrand Russell, "A History of Western Philosophy", Taylor and Francis Ltd.

(OE102) PSYCHOLOGY

(Activity based course)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. What is psychology, its origin from the branch of philosophy as an independent subject.
2. The field of psychology both historic and current by scientific methods and examine the benefits and limitations of this method of inquiry as it relates to developmental psychology.
3. Exemplify the biological bases of behavior.
4. Categorize the dynamics of intelligence and also the hereditary and environmental influence on personality and his intelligence.
5. Prioritize the major areas of psychology, including cognition (thought, memory and perception), learning, personality, social and environmental influences, development, and physiology of behavior and design theories concerning psychological health and disorders.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Differentiate between the ***Pure*** and ***Applied*** psychology and their major fields of study and theoretical perspectives.
2. Illustrate the major observational and quasi-experimental designs used by developmental Psychologists and articulate the benefits and summarize various studies and theories based on the information.
3. Distinguish the different domains of psychology (e.g., biological, clinical, cognitive, counseling, developmental, educational, experimental, human factors, industrial–organizational, personality, psychometric, social).
4. Show the biological basis of behavior on both the micro and macro level.
5. Analyze the basic principles, major theories, and research concerning learning and cognition.
6. Evaluate the impact of the various methods and approaches to understanding the concept of intelligence and discuss the potential individual. Elaborate on the various proposed types of intelligence.
7. Assess psychology as a science of human behavior, cognition, emotions and relationships.
8. Formulate the different sources of stress and analyze the potential effects of adjustment strategies for physical and psychological health.

UNIT-I

Introduction to psychology – origin, nature, scope and significance, Early pioneers, Contemporary perspectives and areas of specialization, The vehicle for psychological discovery: Is psychology just common sense?

UNIT-II

Neurological and genetic basis of behavior, the neuron, neural and hormonal systems, the brain, Genetic influences on behavior.

Emotions: Love, hate, and Anger – Sensations: Vision, Hearing, Taste, Smell and touch

Memory - Nature of memory, Constitutes to long-term memory, organizing information in memory - Retrieve information from memory – Reasons for forgetting - Biological basis for memories.

UNIT-II

Language and thinking - Intelligence, Measuring Intelligence, Intelligence: one thing or many-The dynamics of intelligence -Hereditary and environmental influences on intelligence.

UNIT-IV

Personality - The nature of personality - the psychoanalytic perspective, the humanistic perspective, the trait perspective, the social-cognitive perspective - measuring personality, the biologic basis of personality.

UNIT-V

Stress – Causes for stress - Abnormal psychology disorders, psychosis, depression, anxiety disorders Adjustment substance abuse, Coping and Health - moderate stress –Behaviors that hurt or help our health Counseling, Types of counseling, stages in counseling.

TEXT BOOKS:

1. Dennis Coon and John O Mitterer, “Introduction to Psychology”, Wadsworth, 2007.
2. The International Classification of Diseases (ICD-10) - Classification of Mental and Behavioral Disorders WHO, Geneva, 2002.

REFERENCE BOOKS:

1. Franzoi, Stephen L “Psychology: A journey of Discovery”, Atomic Dog Publication, 3rd Edition, 2007.
2. “Comprehensive Text Book of Psychiatry”.
3. “Diagnostic and Statistical Manual of Mental Disorders”, DSM5 American Psychiatric Association, CBS Publications, 5th Edition.

(OE103) SOCIOLOGY

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. What is sociology – in a wider perspective – a study of society in all aspects.
2. The origin of society – how Vedas helped societies develop in eastern part of the world while western societies developed on the basis of Christianity.
3. Evaluate the need of social institutions to develop an individual's integrity.
4. Classify the methodologies in social research.
5. Judge the needs of the society based on case study.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. That sociology is the basic structure of the contemporary society, which enlightens the society to see it past and learn from its glory such as social achievements, customary values, etc.
2. How family help achieve set goals.
3. How communication is necessary to resolve the social and political issues in the International scenario.
4. How the new trends would take the society to downfall and how the society can be saved from it.
5. Recognize qualitative and quantitative research survey.
6. Prioritize the social institutions in the process of evolving into a holistic individual.
7. Identify the essential requirements of sociability.
8. Assess the strategies for women empowerment initiated by the state and central governments in India.

UNIT – I

Introduction to Sociology: Sociology - Meaning, Nature, Scope and significance, Basic Concepts of Society – Society, community, Role and Status, Norms and Value, Institution, Association. Social Groups - Meaning, Type of Groups – Primary, Secondary, In Group, Out Group, Reference Group.

UNIT - II

Social Processes and Social Interaction: Social Processes – Meaning, Socialization - Meaning, Socialization Theories; Social Interaction - Verbal - Non Verbal Communication, Forms of Social Interaction - Cooperation, Competition, Conflict, Accommodation, Exchange – Virtual Networking.

UNIT – III

Social Institutions: Social Institutions – Marriage, Family, Kinship, Class, Caste, Religion, their function and features.

UNIT – IV

Social Research, Method and Techniques: Social Research – Definition, Steps in social research, Research Method, Observation method, Interview method, Questionnaire method, Case Study method, and Social Survey.

UNIT – V

Social Problems, Issues and Development Programmes: Social Problem – Meaning and Definition, Importance of the study of Social Problems; Social Issues – Equality of caste, Class gender, Communalism, Problems of Minorities; Development Programs – Development Programmes in India; Community Development Programmes, Panchayat Raj; Impact of new Panchayati Raj on Women Empowerment.

TEXT BOOKS:

1. Giddens and Anthony, "Sociology", Polity Press, 2005.
2. Applerouth Scott and Edles Laura, "Sociological Theory" in the Contemporary Era, Sage publication, 2011.
3. Patricia Uberoi, "Family, Kinship and Marriage in India", Oxford University Press, New York, 1997.
4. Goode, W.J. and P.K.Hatt, "Methods in Social Research", McGraw Hill International, 1952.
5. Bernd, Hamns and Pandurang K. Mutagi, "Sustainable Development and Future of Cities", Intermediate Technology Publication, UNESCO, 1998.
6. Ahuja, Ram, "Social Problems in India", Rawat Publications, New Delhi, 2000.

REFERENCE BOOKS:

1. Fulcher and Scott, "Sociology", Oxford University Press, New York, 2003.
2. Gisbert, "Fundamentals of Sociology", Orient Blackswan, New Delhi, 2010.
3. Thakur, Devender, "Research Methodology in Social Science", Delhi Deep and Deep Publication, 2003.
4. N Long, "An Introduction to the Sociology of Rural Development", Tavistock Publications, London, 1977.
5. Albrow, Martin and Elizabeth King, "Globalization, Knowledge and Society", Sage publication, London, 1990.
6. Inkeles, Alex, "What is Sociology?", Prentice Hall of India, New Delhi, 1987.
7. Dube, Leela, "Women and Kinship, Comparative Perspectives on Gender in South and Southeast Asia", Sage Publication, New Delhi, 1997.

(OE104) DESIGN THINKING AND INNOVATION

(Activity based Course)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Define need for creative and design thinking.
2. Recognize various discovery phases and insights in idea generation.
3. Prepare the Idea generation concept.
4. Experiment the group project work by using various techniques.
5. Evaluate the delivery phase and prototyping.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Recall various creative and design thinking models.
2. Convert ideas into future products / services.
3. Discover new ideas by team workshops.
4. Compare the difference between concept visualization and prototyping.
5. Produce prototypes based on design thinking.
6. Setup new stranded in converting raw ideas in to reality.
7. Define how to build the customer relations.
8. Summarize the importance and need for creative and design thinking.

UNIT-I

Introduction to Design Thinking: Meaning of design thinking - Design thinkers personality profile - The overall process of design thinking – Inspiration, Ideation and Implementation - Steps in design thinking – What is? What if? What wows? What works?

UNIT-II

Understanding Design Thinking: Understanding the Context – Conducting user research - Identifying insights - Establishing design requirements - Journey mapping, Mind mapping and Value chain analysis - Emergence of a new concept – Concept generation and development - Creating idea pitches.

UNIT-III

Tools for Design Thinking: An instrument real time Design interaction capture and Analysis - Tele-Board – Enabling efficient collaboration in Digital Design.

UNIT-IV

Testing Hypothesis and Prototyping: Creating and testing hypotheses /assumptions - Avoiding confirmation bias and group think – Experimentation - Rapid prototyping - Story telling - Pivoting or Plan B.

UNIT-V

Building Customer Relations: Customer co-creation, Building blocks of interaction – Dialogue, Access, Risk - Benefits, and Transparency, Interaction between firms and consumers. Implications.

TEXT BOOKS:

1. Liedtka J. and Ogilvie T, "Designing for Growth", Columbia University Press, New York (2011).
2. Walter Brenner and Falk Uebernickel, "Design Thinking for Innovation: Research and Practice", Spinger publication, 2016.

REFERENCE BOOKS:

1. Hasso Plattener, Christopher Meiniel and Larry, "Design Thinking - Understand - Improve – Apply", Springer Publications.
2. Tom Kelley, "The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm", Broadway Business Publications.
3. Thomas Lockwood, "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value", Allworth Press, 2010.
4. Roger Martin and Harvard, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Business Review Press.

(OE105) TECHNOLOGY ENTREPRENEURSHIP

(Activity based Course)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Define technology entrepreneurship and outline the framework of technology entrepreneurship.
2. Explain financial elements and cash flows of business.
3. Build ideas and design marketable products.
4. Sketch a business model canvas.
5. Develop a business plan.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Apply innovation tools to identify a market opportunity and create a product concept.
2. Evaluate the marketability of a product concept in terms of efficiency, economy, elegance and education.
3. Evaluate various business models and patterns.
4. Define how to use of business model canvas for effective product development.
5. Design a clear value proposition for the product concept.
6. Sketch the business model canvas.
7. Apply business model generation process to create a business model canvas.
8. Create a preliminary marketing plan and master budget.

UNIT-I

Self Discovery and Opportunity to Concept

Self Discovery: Finding your flow – Effectuation.

Opportunity Scanning: What is an opportunity - Finding vs creating opportunities - Evaluating opportunities in terms of efficiency, economy, elegance, and education. Creating a viable product concept.

UNIT-II

Idea Generation and Evaluation

Idea Generation: DISRUPT a model for innovation-lets ID8- mind mapping for ideas-let's create a mind map- let's brainstorm-assignment: build your own idea-quiz.

Idea Evaluation: Decision matrix analysis-concept-paired comparison analysis-concept-the 5Q frame work-apply 5Q frame work-1 minute elevator pitch-assignment-back of the envelop calculation-quiz time.

UNIT-III

Customer Discovery and Value Proposition

Customer Discovery: Segmentation and targeting-niche marketing-find your niche-mapping the consumption chain-drawing the consumption map.
Value proposition: Meaning - Types of value proposition, creating effective value propositions.

UNIT-IV

Business Model Canvas and Prototyping:

Business Model Canvas: Business model - Its importance and use in the start-up process - 9 building blocks of the business model - Overview of the business model canvas.
Patterns – Types of business models. Long tail, multi-sided, FREE as a Business, and Open business models, evaluating models, and use of Blue ocean strategy.
Prototyping: What is prototyping – Designing the MVP.

UNIT-V

Marketing Plan and Master Budget

Marketing plan: 4Ps (Product – Price – Promotion – Place) - Competition analysis and product positioning, Market segmentation.
Master budget: Small business accounting (income statement, balance sheet, and cash flow) - Creating comprehensive budget plan.

TEXT BOOKS:

1. Thomas Byers, Richard Dorf and Andrew Nelson, "Technology Ventures: From Idea to Enterprise", McGraw Hill Publications, 4th Edition, 2015.
2. Thomas Duening, Robert Hisrich and Michael Lechter, "Technology Entrepreneurship - Taking Innovation to the Marketplace", Academic Press, 2nd Edition.

REFERENCE BOOKS:

1. Osterwalder A and Pigneur Y, "Business Model Generation: A Handbook For Visionaries, Game Changers, and Challengers", John Wiley and Sons, 2010.
2. Katz J A and Green R P, "Entrepreneurial Small Business", McGraw Hill / Irwin, 2009.
3. Neck H, Neck C P and Murray E, "Entrepreneurship: The Practice and Mindset", Sage Publications, 2017.

WEBLINKS:

1. www.wfnen.org
2. https://lmswise.wfglobal.org

(OE106) MARKETING FOR ENGINEERS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Outline the understanding of various marketing concepts.
2. Gain a better appreciation of the challenges inherent in developing and implementing marketing decisions in a complex environment.
3. Understand the process for segmenting markets and to recognize differences in consumer needs.
4. Customer input in designing new products and services.
5. Estimate sales of new technologies and likelihood of successful launch.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Understand the concept of marketing and its environment.
2. Distinguish between product and service.
3. Exemplify marketing research process.
4. Explain steps in new product development.
5. Evaluate different pricing decisions to design pricing strategies.
6. Create different marketing promotional tools.
7. Sketch distribution channel design.
8. Analyze marketing cases and solve marketing problems in real world.

UNIT–I

Introduction to Marketing: Marketing Concept Vs Product Concept, Service Concept, Experience Concept, and Green Marketing - Creating Customer Value – Satisfaction and loyalty - Evolution of marketing concept - Marketing Environment – Customer value proposition - Distinctive characteristics of services – Customer relationship management

Cases: Mahindra Scooters – Santoor.

UNIT–II

Marketing Research: Definition and Need for Marketing Research - Marketing Process Research - Segmentation and Market Entry – Target market selection – Positioning - Consumer buying decision process.

Case: (Segmentation) Zee TV - (Targeting) Kellogg's - (Positioning) Dalda.

UNIT–III

Product and Pricing: – Product Management –Types of Products – Product line and Product mix — Product Life Cycle (PLC) – New Product Development - Branding – Packaging - Labeling. Pricing strategy - Methods of Pricing - Factors influencing Pricing decision – Pricing cues – Price Sensitivity - Initiating Price Change – Price wars – Skimming, Penetration and Product mix pricing.

Cases: Coca Cola - I phone - Akash Tablet (lamb, Hair – page no: 112, 534, and 557).

UNIT–IV

Distribution and Promotion: – Distribution Designing – Marketing Channel – Role of marketing channels – Channel design decisions – Retailing – Wholesaling – Logistics. Role of Marketing Communication – Marketing Communication Mix – Advertising – Public Relations – Sales Promotion Techniques.

Cases: Barista - Nano Car - Indigo - TESCO.

UNIT-V

Managing Personal Communication: Word of mouth – Personal selling - Designing Sales force – Direct Marketing Techniques – Internet Marketing – Tapping Global markets – Managing a Holistic Marketing Organization - Socially responsible Marketing - Rural Marketing - Rural Consumer Behaviour.

Case: Hero Motor Corp - Avon Cosmetics (lamb, Hair Page no: 446 and 497) – Eureka - Home Shop (Arun – page no: 711 and 639).

TEXT BOOKS:

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithleshwar Jha, "Marketing Management", Pearson Education, 13th Edition, 2009.
2. Joel R. Eans and Barry Berman, "Marketing Management", Cengage, 2008.

REFERENCE BOOKS:

1. Peter Chevton, "Key Marketing Skills", Kogan Page, 2009.
2. V. S. Ramaswamy and S. Nama Kumari, "Marketing Management", Macmillan, 4th Edition, 2009.
3. David Jobber and John Fathy, "Foundations of Marketing", TMH, 2009.

(OE107) BUSINESS ANALYTICS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:
Students will be able to
1. Discuss how managers use business analytics to formulate and solve business problems and to support managerial decision making.
2. Draw processes needed to develop, report, and analyze business data.
3. Explain popular statistical tools such as regression and forecasting and where they can be applied.
4. Evaluate various models with a strong understanding of each model's strengths and weaknesses.
5. Execute business analytics software.

COURSE OUTCOMES:
At the end of the course, the student will develop ability to
1. Describe and interpret the basic concepts of business analytics.
2. Describe basic principles of data mining as a basic tool of business analytics.
3. Evaluate business problems and determine suitable analytical methods.
4. Organize raw data for business analytics, including partitioning data and imputing missing values.
5. Compare and contrast different business analytics techniques.
6. Interpret, analyze and validate the results.
7. Synthesis the types of questions business analytics using data mining can be answered.
8. Execute business analytics software.

UNIT – I
Descriptive Statistics: Measures of central tendency - Problems on measures of dispersion – Karl Pearson correlation, Spearman's Rank correlation, simple and multiple regression (problems on simple regression only) - **Probability Distribution:** Concept and definition - Rules of probability – Random variables - Concept of probability distribution – Theoretical probability distributions: Binomial, Poisson, Normal and Exponential – Baye's theorem (No derivation) (Problems only on Binomial, Poisson and Normal).

UNIT – II
Decision Theory: Introduction – Steps of decision-making process – types of decision making.
environments – Decision-making under uncertainty – Decision-making under Risk – Decision tree analysis (only theory) - **Design of Experiments:** Introduction – Simple comparative experiments – Single factor experiments – Introduction to factorial designs.

UNIT – III

Cluster Analysis: Introduction – Visualization techniques – Principal components – Multidimensional scaling – Hierarchical clustering – Optimization techniques **Factor Analysis:** Introduction – Exploratory factor analysis – Confirmatory factor analysis - **Discriminant Analysis:** Introduction – Linear discriminant analysis **- Foundations of Analytics:** Introduction – Evolution – Scope – Data for Analytics – Decision models – Descriptive, Predictive, Prescriptive – Introduction to data warehousing – Dashboards and reporting – Master data management(only theory).

UNIT – IV

Linear Programming: structure, advantages, disadvantages, formulation of LPP, solution using graphical method. Transportation problem: Basic feasible solution using NWCM, LCM and VAM, optimization using MODI method.

Assignment Model: Hungarian method – Multiple solution problems – Maximization case – Unbalanced – Restricted.

UNIT – V

Project Management: Introduction – Basic difference between PERT and CPM – Network components and precedence relationships – Critical path analysis – Project scheduling – Project time-cost trade off – Resource allocation.

Instruction: Equal weightage is given for both theory and problems in the ratio of 60:40.

Practical Component:

1. Students are expected to have a basic excel classes.
2. Students should be able to categorize the data and find out the basic statistical values.

TEXT BOOKS:

1. James R. Evans, “Business Analytics – Methods, Models and Decisions”, Prentice Hall, 1st Edition, 2013.

REFERENCE BOOKS:

1. James Lattin, Douglas Carroll and Paul Green, “Analyzing Multivariate Data”, Thomson Learning, 2003.
2. E. Turban, R. Sharda, J. Aronson, and D. King, “Business Intelligence: A Managerial Approach”, Pearson Prentice Hall, 2008.

(OE108) ENGINEERING PROJECTS IN COMMUNITY SERVICE (EPICS)

(Activity based Course)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Apply domain knowledge to the design of community based projects.
2. Identify and acquire new knowledge as a part of the problem solving / design process.
3. Design products on multidisciplinary concepts and an appreciation for the contributions from individuals from multiple disciplines.
4. Create an awareness of professional ethics.
5. Build a role that their discipline can play in social contexts.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Apply disciplinary knowledge to real and possibly ill-defined problems.
2. Collaborate with people from other disciplines and develop an appreciation for cross-disciplinary contributions in design.
3. Build the broad set of skills needed to be successful in the changing global workplace and world.
4. Provide significant service to the community while learning; gain an understanding of the role that engineering (and their discipline) can play in society.
5. Learn design as a start-to-finish process.
6. Acquire knowledge regarding project management.
7. Be aware of customer requirements and social responsibility.
8. Communicate effectively with widely- varying backgrounds.

UNIT - I

Project Survey and Identification: Introduction to Epics, importance of multi disciplinary projects, rural area Survey (societal issues), interaction with NGOs, Idea Generation and Group Discussions. Identification of objectives and outcome deliverables of the project and need of the community partner.

UNIT – II

Project Initiation and Specification: Market Survey (similar products), Customer Requirements, Design Constraints, Engineering Specifications of the product, Design Skill development Sessions - Different kinds of design thinking and its challenges, overall understanding of design processes.

UNIT – III

Design Skill Development for Implementation: Basics of design process, Concept Design Process, problem solving and Mathematical Analysis, Concept Testing, Design fixation, Design start- to- finish process, proposed methodology, and prototype Design activity.

UNIT – IV

Project / Product Design for Deployment: code of ethics**,** Create Prototype, model refinement, product development, testing with Customer, Design documentation, identifying delivery phases of the design process and model demonstration.

UNIT – V

Product Delivery and Review: Effective delivery, Design review Presentations**,** Making Projects User-Ready**,** feedback from community partners, and extension of the product for consultancy work.

REFERENCE BOOKS:

1. Dahir, M., "Educating Engineers for the Real World", Technology Review, Aug/Sept. 1993, pp. 14-16.
2. Govindarajan M, Natarajan S, Senthil Kumar V.S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
3. https://engineering.purdue.edu/EPICS/Resources/Lectures.

(OE109) SMART CITIES

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Recognize the vision behind smart cities and its goals.
2. Assess the technology behind smart transportation system.
3. Summarize the importance of natural resource and waste management.
4. Judge the importance of power, need of power storage and find solutions.
5. Prioritize for user friendly environment and cost effective steps and governance.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Judge the needs and cause behind the vision to transform into smart cities.
2. Identify the issues and challenges for urban development, at par with the international scenario.
3. Select and demonstrate new technologies for urban development.
4. Interpret the importance of technology and implementation to have smart transportation.
5. Examine the importance of natural resource (water) and use intelligent concepts for preserving it.
6. Study the various disasters and services rendered towards process wastage.
7. Identify the importance of electricity, their importance and apply various measures for preserving it.
8. Appraise and educate the public for user friendly environment and governance to make the county smarter.

UNIT – I

Introduction: Vision and goals of smart city, concept of smart city and its features, issues and challenges of urbanization in India, international scenario, issues and probable solutions, need for smarter approaches process of selection of smart cities, developing and demonstrating new technologies, smart city strategies, digital and information technologies, urban planning best practices.

UNIT – II

Smart Transportation: Importance and significance of mobility, data collections, smart sensors, role of geographic information system, integration of GIS and ITS, related air quality; accidents and safety analysis; advanced traffic management systems, commercial vehicle operations, advanced transportation systems, advanced vehicle control systems, case studies, public transportation management; electronic payment, connected vehicle technology and application, mobile applications.

UNIT – III

Water and Waste Management: Reminded of water's importance, challenges for water use and intelligent water system concept, trends and issues for water use management, specific technologies for smart water use, strategic prioritization and allocation, water quality,

flooding, drought and aging infrastructure, leakage and pressure management, municipal services, smart solutions and emerging in the solid waste management, technologies to process waste, garbage collection.

UNIT – IV

Power Grids: Smart grid concepts, development of innovative next-generation technologies and tools in the areas of transmission, distribution, energy storage, power electronics, measures of certain parameters of the electric grid, innovative digital technologies for electricity delivery, intensive application of demand-side technologies, Electric Reliability Technology Solutions (CERTS).

UNIT – V

Smart Payments and E-Governance: People participation, accountability and transparency, user-friendly process, removal of hierarchal process barriers and red tape, service delivery Payments and finance concepts, city governments and citizen benefits, economic growth, global GDP, population growth, inadequate infrastructure, operational costs and concepts of e-administration, e-services, e-governance and e-democracy.

TEXT BOOKS:

1. Bob Williams, "Intelligent Transport Systems Standards", Artech House Publishers, 2008
2. Ronald A. Beaulieu, "National Smart Water Grid, Integrated Solutions for Sustainable Fresh Water Supply Flexi Bound", 2010.

REFERENCE BOOKS:

1. Austroads, "The Implication of Intelligent Transport Systems for Road Safety", Austroads Incorporated, 1999.
2. Chowdhury, M. A. and Sadek, A, "Fundamentals of Intelligent Transportation Systems Planning", Artech House, 2003.
3. Pernille Ingildsen and Gustaf Olsson, "Smart Water Utilities: Complexity Made Simple", 1st Edition, IWA Publishing.
4. Keyhani, Ali, Marwali and Muhammad, "Smart Power Grids", Springer, 2011.

(OE110) COGNITIVE ENGINEERING

(Activity based course)

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	50	50	100

COURSE OBJECTIVES:

Students will be able to

1. Understand the interdisciplinary nature of cognitive science and its permeation to engineering.
2. Assess the knowledge representation in humans with the help of different theories.
3. Examine the different models of learning and their application to education and consumer behavior.
4. Identify the different types of reasoning and understand the decision making process.
5. Evaluate the impact of design fixation on innovation.

COURSE OUTCOMES

At the end of the course, students will develop ability to

1. Realize the significance of cognition in the field of engineering.
2. Identify the different cognitive traits and learning styles and their contribution to the make-up of an individual.
3. Apply different cognitive analysis techniques to assess how people think and learn.
4. Analyze a variety of user-centered design principles to design products.
5. Conduct critical evaluation while designing new products.
6. Foster usability, usefulness, sustainability and feasibility through human-centered approach.
7. Extend personal skills and knowledge acquired to interdisciplinary areas.
8. Learn to work with others.

UNIT - I

Introduction to Cognitive Science: Cognition and Cognitive Processes – Recognition, Memorization and Recall, Learning and Memory, Thinking and Reasoning, Language, Perception; Interdisciplinary Nature – Anthropology, Artificial Intelligence, Education, Language, Engineering and Neuroscience; Personality Traits; History of Cognitive Science and its Permeation to Engineering

UNIT - II

Knowledge Representation: Human Knowledge in Representation; Need for Categorization; Different Theories – Definitional, Prototype and Exemplar; Models of Semantic Memory - Semantic Networks; Design Fixation

UNIT - III

Learning: Different Models of Learning, Behavioral and Cognitive Learning Theories; Learning Applied to Education and Consumer Behavior

UNIT - IV

Reasoning and Decision Making: Different Types of Reasoning – Deductive, Inductive, Abductive, Reductive and Fallacious; Effectuation**;** Human Decision Making Process,

Influence of Cognition on Consumer Decision Making Process; User-centered Design Principles and Guidelines

UNIT – V

Phenomenon and Applications: Impact of - Cognition on User Interface Design and Usability; Design Fixation on Innovation; and Effectuation on Entrepreneurial Thinking

TEXT BOOKS:

1. John R. Anderson, "Cognitive Psychology and Its Implications", Worth Publishers, 2015.
2. Donald A Norman, "The Design of Everyday Things", Basic Books, 2013.

REFERENCE BOOKS:

1. Bruce Goldstein E, "Cognitive Psychology-Connecting Mind, Research, and Everyday Experience", Wadsworth, 2011.
2. Michael W. Eysenck and Mark Keane, "Cognitive Psychology: A Student's Handbook", Psychology Press, 2003.
3. Micheal Orey, "Emerging Perspectives on Learning, Teaching and Technology", Global Text Project, Switzerland, 2010.
4. Norman, Donald A, "Emotional Design: Why we Love (or Hate) Everyday Things", Basic Books, 2004.

SUGGESTED READING:

1. Jay Friedenberg and Gordon Silverman, "An Introduction to the Study of Mind", Sage Publications, 2006.
2. Edward E. Smith and Stephen M. Kosslyn, "Cognitive Psychology (Mind and Brain)", Prentice Hall of India (P) Ltd, 2008.
3. Donald A Norman, "Living with Complexity", The MIT Press, 2010.
4. John D. Bransford, Ann L. Brown and Rodney R. Cocking, "How People Learn", National Academies Press, 2000.
5. Casey, S. M, "Set Phasers on Stun - And Other True Tales of Design Technology and Human Error", Aegean, 1998.
6. Isaacs Ellen and Walendowski Alan, "Designing from Both Sides of the Screen: How Designers and Engineers Can Collaborate to Build Cooperative Technology", Sams, 2001.

WEBLINKS:

1. http://techdigest.jhuapl.edu/TD/td2604/Gersh.pdf
2. http://brainimaging.waisman.wisc.edu/~perlman/papers/CognitiveEngineering/2%20woods%20cognitive%20engineering%20human%20problem%20solving%201988.pdf
3. http://www.psicothema.es/pdf/3906.pdf
4. https://en.wikipedia.org/wiki/Big_Five_personality_traits
5. http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=1823A0B0E7A5BD7ED5F331ADCC92953D?doi=10.1.1.600.5434andrep=rep1andtype=pdf
6. http://www.effectuation.org/sites/default/files/documents/effectuation-3-pager.pdf
7. http://projectsfinal.interactionivrea.org/2004-2005/SYMPOSIUM%202005/communication%20 material/DESIGNERS%20AND%20USERS_Norman.pdf
8. https://confluence.ucop.edu/download/attachments/34668692/Representation+still+matters+cognitive+engineering+and+user+interface++design.pdf
9. https://tamu.edu/faculty/stevesmith/SmithCreativity/SmithLinsey2011.pdf

(OE111) INTELLECTUAL PROPERTY RIGHTS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Discuss the importance of intellectual property rights.
2. Explain the importance of trade mark and registration processes.
3. State the laws of copy right and patents.
4. Recognize the status of trade secrets.
5. Summarize the new developments of intellectual property.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Illustrate various types of intellectual property.
2. Describe the importance of intellectual property rights.
3. Outline the procedure for selection and evaluation of trade mark.
4. Identify the rights to perform the work publicly.
5. Memorize the law of patents and also patent searching process.
6. Explain the concept of trade secrete law.
7. Recall the misappropriation right of publicity.
8. Describe the international overview on intellectual property.

UNIT – I

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of Copy Rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of Patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair Competition: Misappropriation right of publicity, false advertising.

UNIT – V

New Development of Intellectual Property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS:

1. Deborah, E. Bouchoux, "Intellectual Property Right", Cengage Learning.
2. M Murray and M.J. Mehlman, "Encyclopedia of Ethical, Legal and Policy Issues in Biotechnology", John Wiley and Sons, 2000.

REFERENCE BOOKS:

1. Prabuddha ganguli, "Intellectual Property Right - Unleashing the Knowledge Economy", Tata McGraw Hill Publishing Company Ltd.
2. P.Narayanan; "Law of Copyright and Industrial Designs", Eastern Law House, Delhi, 2010.
3. P.N. Cheremisinoff, R.P. Ouellette and R.M.Bartholomew, "Biotechnology Applications and Research", Technomic Publishing Co. Inc., USA, 1985.
4. D. Balasubramaniam, C.F.A.Bryce, K. Dharmalingam, J. Green and K. Jayaraman, "Concepts in Biotechnology", University Press (Orient Longman Ltd.), 2002.

(OE112) DISASTER MANAGEMENT

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Define and list out hazards and disaster explain the cause of occurrence of hazard.
2. Explain and illustrate the natural and manmade disasters, causes leading to progression of vulnerability.
3. Discuss to predict the climate changes and apply appropriate technique for disaster risk reduction.
4. Examine the community involved and classify the type of inter venison in emergency phase through IEC campaign.
5. Access the vulnerability of environmental losses and create hazard mapping in India.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Identify and recognize the cause and effect of disaster.
2. Design management cycle to minimize the risk.
3. Distinguish natural and manmade disaster and preparedness in mitigating the disaster.
4. Analyze the assessment of vulnerability and local / district / state / national level inter venison and allocation of grants.
5. Evaluate the disaster management teams capacity building, community based disaster management.
6. Estimate the damages and justify the rehabilitation and reconstruction activity.
7. Design and compose necessary GIS and remote sensing technology for identification slow and rapid onset of disasters, and formulate a mitigation project.
8. Create capacity to analyze and evaluate research work on the field of emergencies and disaster while demonstrating insights into the potential and limitation of science, its role in society and peoples responsibility for how it is used.

UNIT- I

Introduction: Overview of Disaster Management(DM) - Concepts and definitions - Disaster, hazard, vulnerability, risk, capacity, impact, prevention, mitigation - Disaster classification-natural, manmade.

UNIT- II

Natural Disasters: Meaning and nature of natural Disasters, their types and effects- floods, Drought, Cyclone, Earth Quakes, Tsunami, Volcanoes, Coastal erosion, Climate Change-Global warming, Sea level rise, Ozone depletion.

UNIT- III

Manmade Disasters: Nuclear disaster, Chemical disaster, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, Deforestation, Industrial waste water pollution, Road accidents, Rail accidents, Air accidents, Sea accidents.

UNIT- IV

Disaster Risk Reduction: Effects to migrate natural disaster at national and global level - International strategy for disaster reduction- Concept of disaster management - National disaster management framework - Financial agreements - Role and responsibilities of NGO's - Community based organization and media Central - State - District and local administration - Armed forces in disaster response- Police and other organizations.

UNIT- V

Project Work: Project work for students to understand vulnerabilities and to work in reducing disaster risks and to build a culture of safety. E.g. remote sensing and GIS/GPS for disaster management, dams, urbanization. Projects must be conceived creatively based on the geographic location and hazard profile of a region.

Some examples could be- identifying how a large dam, road/ highway or an embankment or the location of an industry affects local environment, resources or how displacement of large sections of people creates severe vulnerabilities, remote sensing and GIS/GPS etc. may be mapped by student project work.

TEXT BOOKS:

1. Pradepe Sahni, "Disaster Mitigation: Experiences and Reflections", 2013.
2. R.B. Singh, "Environmental Geography", Heritage Publishers, New Delhi, 1990.

REFERENCE BOOKS

1. R.B. Singh, "Disaster Management", Rawat Publications, New Delhi, 2000.
2. H.K. Gupta, "Disaster Management", Universities Press, India, 2013.

(OE113) POLLUTION CONTROL AND ENGINEERING

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Attain basic knowledge of the various pollutants, their sources and effects on the environment.
2. Understand the techniques employed on mitigation of the air pollutants.
3. Analyze the various stages of water treatment procedure.
4. Introduce the students to various biological methods to mitigate water pollution.
5. Understand the different ways to curb land / soil pollution.
6. Introduce the students to various noise pollution control methods.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Identify the sources of air, water, land and noise pollution.
2. Understand air pollution sampling and measurement.
3. Distinguish between the pollution abatement systems for particulate matter and gaseous constituents.
4. Build knowledge on water quality analysis and management.
5. Fundamentals of urban water supply and sanitation infrastructure.
6. Design of waste-water and industrial effluent treatment.
7. Evaluate hazardous solid waste treatment and disposal techniques.
8. Estimate low cost treatment technologies.

UNIT – I

Introduction to atmosphere, chemistry in the atmosphere. Air pollutants, Sources of air pollutants, Effects on human beings and environment. Pollutant concentration and emission measurements. Dispersion of pollutants in the atmosphere.

UNIT - II

Air Pollution Control: Particulate emission control by mechanical separation and electrostatic precipitation, wet gas scrubbing, gaseous emission control by absorption and adsorption, Design of cyclones, ESP, fabric filters and absorbers.

UNIT - III

Water Pollution Control: Physical treatment, pre-treatment, solids removal by setting and sedimentation, filtration centrifugation, coagulation and flocculation, trickling filter, activated sludge and lagoons, septic tanks, aeration systems.

UNIT - IV

Soil and Control: Soil contamination by chemical pollutants: sources and fate. Remediation by plants, bioremediation by microorganisms; contamination by inorganic (including heavy metals) and organic pollutants; factors affecting uptake of contaminants, prevention and

elimination of contamination; Solids waste disposal - composting, landfill, briquetting / gasification and incineration.

UNIT –V

Noise Pollution Control: Basics of Sound, Sound Propagation, Directionality,Reverberation, SEL, LAeq,T, L90, L10, SIL, Noise Control at source, Noise Control along the source-receiver pathway, Noise Control at Receiver, Assessing and Predicting Noise.

TEXT BOOKS:

1. C.S.Rao. “Environmental Pollution Control Engineering”, New Age Publications, 2015.
2. S.K.Garg Sewage, “Disposal and Air Pollution Engineering (Environmental Engineering Vol. II)”, Khanna Publishers, 2010.

REFERENCE BOOKS:

1. Manahan, Stanley E, “Environmental Science, Technology and Chemistry".
2. Boca Raton, “Environmental Chemistry”, CRC Press LLC, 2000.
3. Metcalf and Eddy, “Wastewater Engineering: Treatment and Reuse”, McGraw Hill Higher Education Publisher, 2002.

(OE114) SCRIPTING LANGUAGES

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES :

Students will be able to

1. Understand the preliminaries of PERL script.
2. Know the basics of PHP.
3. Know the TCL programming concepts.
4. Understand the python language.
5. Acquire knowledge in integrated web applications.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Design and develop basic web application using PERL.
2. Apply, analyze the scripts to design and develop web applications through PERL languages.
3. Apply the PHP program fundamentals design and implement scripts for web based system.
4. Apply, analyze the scripts to design and develop web applications through python.
5. Model, design applications using python.
6. Design the web application using advanced concepts of python.
7. Design and implement security issues through internet programming.
8. Debugging the scripts and web application.

UNIT – I

Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines, advance perl - finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT – II

PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT – III

Advanced PHP Programming PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World –Translating Websites- Updating Web sites

Scripts, Creating the Localization Repository, Translating Files, text, Generate Binary Files, Set the desired language within your scripts, Localizing Dates, Numbers and Times.

UNIT – IV

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures , strings , patterns, files, Advance TCL-eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

UNIT – V

Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling, Integrated Web Applications in Python – Building Small, Efficient Python Web Systems ,Web Application Framework.

TEXT BOOKS:

1. David Barron,"The World of Scripting Languages", Wiley Publications.
2. Julie Meloni and Matt Telles, "PHP 6 Fast and Easy Web Development", Cengage Learning Publications.

REFERENCE BOOKS:

1. I. Bayross and S.Shah, "PHP 5.1", The X Team, SPD.
2. Jason Gilmore, "Beginning PHP and MySQL", Apress Publications (Dreamtech), 3rd Edition.

WEB LINKS:

1. eu.wiley.com/WileyCDA/Section/id-350340.html?filter...sort
2. www.apress.com/9781590598627

(OE115) CYBER LAWS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Describe internet, e-commerce and e-governance with reference to free market economy.
2. Exemplify international efforts relating to cyberspace laws and cyber crimes.
3. Summarize law relating to electronic records and intellectual property rights in India.
4. Estimate penalties, compensation and offences under the cyberspace and internet in India.
5. Explain miscellaneous provisions of it act and conclusions.

COURSE OUTCOMES:

At the end of the course, the student will develop ability to

1. Discuss and evaluate the current trends and technologies such as e-commerce and e-governance with reference to free market economy.
2. Sketch the importance of digital signature in electronic records.
3. Formulate the importance and role of cyberspace laws and cyber crimes.
4. Design and motivate law relating to electronic records and intellectual property rights in India.
5. Conclude the miscellaneous provisions of it act and conclusions.
6. Summarize about the IT act in India and generate the new IT acts for current cyber space.
7. Compare and contrast cyber laws in India and cyber laws in council of Europe.
8. Describe the importance role of electronic evidence in cyber-crimes.

UNIT-I

Internet, E-Commerce and E-Governance with reference to Free Market Economy: Understanding Computers, Internet and Cyber laws, Conceptual Framework of E-commerce: E-Governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

UNIT-II

Law Relating to Electronic Records and Intellectual Property Rights in India: Legal aspects of Electronic records / Digital signatures, The roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

UNIT-III

International Efforts Relating to Cyberspace Laws and Cyber Crimes: International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

UNIT-IV

Penalties, Compensation and Offences Under the Cyberspace and Internet in India: Penalties, Compensation and Adjunction of violations of provisions of IT Act and Judicial review, some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India.

UNIT-V

Miscellaneous Provisions of IT Act and Conclusions: The role of Electronic Evidence and miscellaneous provisions of the IT Act.

TEXT BOOK:

1. Harish Chander, "Cyber Laws and IT Protection", PHI, 2012.

REFERENCE BOOKS:

1. George Kostopoulos, "Cyberspace and Cyber Security", Auerbach Publications, 2012.
2. Albert Marcella, Jr., Doug Menendez, "Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes", Auerbach Publications, 2nd Edition, 2007.

(OE118) HYBRID ELECTRIC VEHICLES

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Reproduce the fundamental concepts of electrical vehicles.
2. Explain the principle of electrical vehicles as well as hybrid electrical vehicles.
3. Examine the conventional vehicles and hybrid drive train topologies like electric drive train-traction.
4. Analyze the design of hybrid, electric vehicles, energy storage.
5. Evaluate the energy management strategies.

COURSE OUTCOMES:

At the end of the course, students will develop ability to

1. Recall the history of hybrid and electric vehicles, its social and environmental importance.
2. Discuss the basics of vehicle performance, mathematical models for good vehicles performance.
3. Illustrate the impact of modern drive trains on energy supplies.
4. Assess the electric propulsion unit configuration and control of various drives.
5. Analyze the basic concepts of hybrid traction, electric drive train topologies, electric vehicles.
6. Analyze the energy storage requirements in hybrid, electric vehicles and various energy storage devices.
7. Evaluate the whole performance of hybrid electric vehicles and their application.
8. Apply the knowledge of energy management strategies which are used in hybrid and electric vehicles with different strategies for good efficiency design and performance.

UNIT-I

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

UNIT-II

Hybrid Electric Drive-Trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Drive-Trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

UNIT-III

Electric Propulsion Unit: 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: 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.

Sizing the Drive System: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

UNIT-V

Energy Management Strategies: 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.

TEXT BOOKS:

1. Chrismi, M. Abul Masrur and David Wenzhang Gao, “Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives,” Wiley, 2011.
2. Yang Sheng Xu, Huihuan Qian, Jingyu Yan and Tin Cun Lam, “Hybrid Electric Vehicle Design and Control: Intelligent Omnidirectional Hybrids”, IET, 2014.

REFERENCE BOOKS:

1. Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2004.
3. James Larminie, John Lowry, “Electric Vehicle Technology Explained”, Wiley, 2003.

(OE120) FUNDAMENTALS OF ELECTRICAL MACHINES

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Describe the constructional details and operating principles of electrical machines.
2. Explain the operating principle of single phase transformer.
3. Recognize the various parts of electrical machines.
4. Explain about equivalent circuits of electrical machines.
5. Analyze the voltage regulation and efficiency at various loads and power factors.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Compare the energy conversion principles of DC machines.
2. Classify the various types of DC machines.
3. Produce the equivalent circuits of electrical machines.
4. Define voltage regulation and efficiency of single phase transformer.
5. Sketch the performance characteristics of electrical machines.
6. Calculate the efficiency and voltage regulation of single transformers and 3-Phase alternators.
7. Draw the open circuit and short circuit characteristics of synchronous generator.
8. Explain the starting methods of synchronous motors.

UNIT – I

DC Generators: construction, operation and EMF equation of DC generators, Types of DC Generators, Electrical equivalent circuits of shunt, series and compound generators and problems. Load characteristics of DC generators and Applications.

UNIT- II

DC Motors: Operating principle, Back EMF and Torque equation of DC motors. Characteristics and applications of shunt, series and compound motors. Speed control of DC motors: Armature voltage and field control methods.

UNIT- III

Single Phase Transformers: Construction, operation and EMF equation of single phase transformer, operation on no-load and on-load phasor diagrams. Equivalent circuit, losses, efficiency and voltage regulation at various power factors. Predetermination of efficiency and voltage regulation by open circuit and short circuit tests.

UNIT – IV

Three Phase Induction Motors: Constructional details, production of rotating magnetic field, operating principle, rotor emf and rotor frequency-rotor reactance, rotor current and pf at standstill during operation. Rotor power input, rotor copper loss and mechanical power developed, their interrelation-Torque equation-Torque slip characteristics.

UNIT – V

Synchronous Machines: Synchronous Generators: constructional features of wound rotor and salient pole machines-Distribution and pitch factors-EMF equation-Predetermination of voltage regulation by synchronous impedance method.

Synchronous Motors: Constructional features –starting methods.

TEXT BOOKS:

1. Clayton and Hancock, "Performance and Design of D.C Machines", BPB Publishers, 2nd Ed., 2004.
2. A. E. Fritzgerald, C. Kingsley and S. Umans, "Electric Machinery", McGraw Hill Companies, 6th Ed., 2003.

REFERENCE BOOKS:

1. I.J. Nagrath and D.P. Kothari, "Electric Machines", 4th Ed., Tata McGraw Hill Publishers, 2011.
2. S. Kamakshaiah, "Electromechanics -I", Hi-Tech Publishers, 2nd Ed., 2012.
3. P. S. Bimbra, "Electrical Machines", Khanna Publishers, 6th Ed., 2003.
4. S.K. Bhattacharya, "Electrical Machines", TMH, 6th Ed., 2014.

(OE121) INTRODUCTION TO CONTROL SYSTEMS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Produce the basic idea of different control systems.
2. Understand block diagram reduction and signal flow graph methods.
3. Analyze system stability in frequency and time domain.
4. Understand about compensation techniques.
5. Describe the concepts of state space analysis.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Identify the basic elements and structures of feedback control systems.
2. Illustrate pole-zero configurations of transfer function and their time domain response with different test signals.
3. Apply Routh-Hurwitz's criterion, root-locus, bode plot and nyquist plot to determine the stability of linear time invariant systems.
4. Design and select the suitable controller for the given system.
5. Evaluate the steady state response and errors of stable control systems.
6. Design compensators to achieve the desired performances.
7. Summarize control systems models on state space models.
8. Calculate state variables, controllability and observability of system.

UNIT – I

Modelling of Physical Systems: Introduction of Process – Need for Process Control – Feedback control concept- control systems for multi disciplinary engineering - Open Loop and closed loop control systems and their differences. Mathematical models of mechanical, electrical and electronics elements– Translational and Rotational mechanical systems. Differential equations and transfer function approach, Block diagram algebra.

UNIT II

Time Domain Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

UNIT-III

Stability Analysis in S-Domain and Frequency Domain: The concept of stability – Routh's stability criterion –qualitative stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci.

Introduction to frequency domain analysis, Frequency domain specifications-Bode diagrams-Determination of frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT – IV

Three Term Controllers: P, PI, PD, PID Controller Basic control action - Design of Proportional controller – Derivative, Integral controllers - Effects of Derivative, Integral control actions.

System Compensation: Classical design Examples - Realization of compensating networks - Lead, Lag, Lag-Lead networks.

UNIT – V

Modelling and Analysis Using State Space: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. B. C. Kuo, "Automatic Control Systems", John Wiley and Sons, 8th Edition, 2003.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P) Limited, 2nd Edition.

REFERENCE BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
2. N.K. Sinha, "Control Systems", New Age International (P) Limited, 3rd Edition, 1998.
3. Narciso F. Macia, George J. Thaler, "Modelling and Control of Dynamic Systems", Thomson Publishers.

(OE122) BASICS OF THERMODYNAMICS

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Illustrate various thermodynamic properties.
2. Discuss the basic principles of thermodynamics.
3. State the properties of pure substance.
4. Explain vapour power cycle.
5. Summarize various gas power cycles.

COURSE OUTCOMES:

At the end of the course, students will develop ability to

1. Memorize the basic thermodynamics principles and their applications.
2. Apply the laws of thermodynamics to analyze boilers, heat pumps, refrigerators, heat engines, compressors and nozzles.
3. Explain the concept of entropy.
4. Evaluate the properties of pure substance.
5. Solve the problems using mollier chart.
6. Evaluate the performance of vapour power cycles.
7. Analyze various gas power cycles.
8. Illustrate various types of boilers.

UNIT-I

Basic Concepts and Definition : Thermodynamic System, Surrounding and Universe, Phase, Microscopic and Microscopic Point of View, Thermodynamic Equilibrium, Property, state, Path, Quasi-static Process, Reversible and Irreversible process. Heat and work – Forms of work during quasi-static or reversible process, work as a path function, Heat, various thermodynamic processes. Temperature and Zeroth law of thermodynamics, First law of thermodynamics- first law of thermodynamics undergoing cyclic process, first law of thermodynamics undergoing a process, Internal energy of a perfect gas, Application of first law to a closed system, First law of thermodynamics for flow process- flow processes and control volume, flow energy and flow work, first law of thermodynamics applied to open system, General study flow energy equation, application of study flow energy equation

UNIT-II

Second Law of Thermodynamics: Limitation of first law and essence of second law, thermal reservoir, heat engine, thermal efficiency of heat engine, heat pump and co-efficient of performance, statement of second law, equivalence of Kelvin and Clausius statement, types of Irreversibility, Carnot cycle, Corollary 1 and 2, Entropy - Clausius inequality, Entropy Principle, temperature and entropy diagram, application of entropy principle.

UNIT-III

Properties of Pure Substance: Properties of steam – types of steam, wet, saturated and superheated steam, phase transformation at constant pressure, T-S and H-S diagram, sensible heat, latent heat, superheat, internal energy, enthalpy, dryness fraction. Steam Processes – Constant volume, adiabatic, isothermal, polytropic, entropy of steam.

UNIT- IV

Vapour Power Cycle: Carnot vapour cycle, rankine cycle , effect of operating conditions on ranking efficiency, principle and method of increasing the thermal efficiency, deviation of actual cycle from theoretical cycle, thermal efficiencies and specific steam consumptions, requirement of an ideal working fluid, the reheat cycle, binary vapour cycle.

UNIT-V

Gas Power Cycles and Boilers: Air Standard Cycle- Otto, Diesel and Dual, Comparison among cycles, Boilers, Types, Requirements of boiler, boiler efficiency, boiler mountings and accessories.

TEXT BOOKS:

1. PK Nag, “Engineering Thermodynamics”, TMH, 3rd Edition.
2. Yunus Cengel, “Thermodynamics – An Engineering Approach”, TMH.

REFERENCE BOOKS:

1. YVC Rao, “An Introduction to Thermodynamics”, University Press.
2. Jones and Dugan, “Engineering Thermodynamics”, Prentice Hall.
3. R. Yadav, “Fundamentals of Engineering Thermodynamics”, C.P. House.
4. Rajput, “Thermal Engineering” Lakshmi Publications, 9th Edition, 2013.

(ME111) OPERATIONS RESEARCH

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Define scientific approach to problem solving for executive management.
2. Illustrate modern methods to complex problems.
3. Solve the assignment problem helps us to maximize our profit or minimize the cost.
4. Develop game theory in which ones choice of action is determined after taking into account all possible alternatives.
5. Build inventory models for solving the inventory problems.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. List out various operation research models.
2. Illustrate linear programming problem.
3. Calculate transportation cost for a various transportation models.
4. Examine various possible path of a travelling salesmen problem.
5. Assess the inventory requirements.
6. Estimate the best replacement period for machines under different conditions.
7. Construct a dynamic programming model.
8. Decide the number of servers to minimize waiting time of customers and idle time of a server.

UNIT – I

Development: History, Definition, OR Models, OR Techniques and phases of implementing OR in practice.

Allocation: Introduction to linear programming formulation, graphical solution, Simplex method, artificial variable technique, Un restricted Variables, Duality principle, Dual Simplex method.

UNIT – II

Transportation Problem: Formulation – Optimal solution, unbalanced transportation problem – Degeneracy. **Assignment problem** – Formulation – Optimal solution - Variants of Assignment Problem- Traveling Salesman problem.

UNIT – III

Sequencing: Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines

Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely- Group Replacement.

UNIT – IV

Theory of Games: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games – dominance principle – m x 2 and 2 x n games -graphical method.

Inventory: Introduction – Single item, Deterministic models – Purchase inventory models with finite and infinite with one price break and multiple price breaks ,Models with shortages –Stochastic models – demand may be discrete variable or continuous variable – Single Period model and no setup cost.

UNIT – V

Queuing Theory: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multi channel – Poisson arrivals and exponential service times with infinite population. Machine Repair Model, Networks of Queues.

Dynamic Programming: Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming- shortest path problem – linear programming problem.

TEXT BOOKS:

1. J.K.Sharma, "Operations Research", MacMilan, 4th Edition, 2009.
2. S.D Sharma, "Operations Research", Kedar Nath and Ram Nath.

REFERENCE BOOKS:

1. R.Pannerselvam, "Operations Research", PHI Publications, 2nd Edition, 2006.
2. Hamdy A. Taha, "Operations Research an Introduction", Pearson Education, 17th Edition, 2002.

(ME138) RENEWABLE ENERGY SOURCES

Year	Semester	Hours / Week			C	Marks		
		L	T	P/D		CIE	SEE	Total
III or IV	I or II	3	-	-	3	30	70	100

COURSE OBJECTIVES:

Students will be able to

1. Discuss the fundamentals concerned with alternative ways of producing power.
2. Illustrate various types of collectors to store solar energy.
3. List out the importance of solar energy, its radiation, collection, storage and application.
4. Explain the importance of wind energy, biomass energy, geothermal energy and ocean energy.
5. Discuss the concept of direct energy conversion.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Outline the energy demand of world, nation and available resources to fulfill the demand.
2. Classify solar energy collectors.
3. Categorize the technologies that are used to harness the power of solar energy
4. Illustrate the applications of solar energy.
5. Identify the importance of wind energy and biomass energy.
6. State the importance of geothermal energy and ocean energy.
7. Define the principles of direct energy conversion.
8. List out various types of fuel cells.

UNIT – I

Principles of Solar Radiation: Role and potential of new and renewable energy sources. Environmental impact of solar energy, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface.

Solar Energy Collectors: Flat plate and concentrating collectors; classification of concentrating collectors.

UNIT – II

Solar Energy Storage and Applications: Different methods of storage - Sensible, latent heat, stratified and solar ponds. Solar Applications- solar heating and cooling techniques, solar distillation and drying, photovoltaic energy conversion.

UNIT - III

Wind Energy: Sources and potential, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Bio-Mass Energy: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

UNIT - IV

Geothermal Energy and Ocean Energy: Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT - V

Direct Energy Conversion : Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, Hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, Faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Tiwari and Ghosal, "Renewable Energy Resources", 1st Edition, Narosa Publications, 2007.
2. G.D. Rai, "Non-Conventional Energy Sources", 2nd Edition, Standards Publishers, 2004.

REFERENCE BOOKS:

1. Sukhatme, "Solar Energy", 3rd Edition, Tata McGraw Hill, 2008.
2. Ashok V Desai, "Non-Conventional Energy", 2nd Edition, New Age International, 2008.
3. B.H. Khan, "Non Conventional Energy Sources", 1st Edition, Tata McGraw Hill, 2009.
4. J.A. Duffie and W.A. Beckman, "Solar Energy- Thermal Processes", John Wiley, 2001.