COURSE STRUCTURE

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SYLLABUS

COURSE STRUCTURE

I Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Professional Communication – I	3+1*	-	3
2	Mathematics – I	3+1*	-	3
3	Mathematical Methods	3+1*	-	3
4	Engineering Chemistry	3+1*	-	3
5	Problem Solving Using C	3+1*	-	3
6	Engineering Drawing	1	3	3
7	Professional Communication Lab – I	-	3	2
8	Engineering Chemistry Lab	-	3	2
9	Programming Lab	-	3	2
	Total	**21**	**12**	**24**

I Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Professional Communication – II	3+1*	-	3
2	Mathematics – II	3+1*	-	3
3	Engineering Physics	3+1*	-	3
4	Environmental Studies	3+1*	-	3
5	Data Structures	3+1*	-	3
6	Network Analysis	3+1*	-	3
7	Professional Communication Lab – II	-	3	2
8	Engineering Physics Lab	-	3	2
9	Data Structures Lab	-	3	2
	Total	**24**	**9**	**24**

* **Tutorial**

II Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Electrical Technology	3+1*	-	3
2	Electronic Devices and Circuits	3+1*	-	3
3	Digital Circuits	3+1*	-	3
4	Signals and Systems	3+1*	-	3
5	Electromagnetic Field Theory	3+1*	-	3
6	Probalitity Theory and Random Variables	3+1*	-	3
7	Employability Skills	1	2	2
8	Electronic Devices and Circuits Lab	-	3	2
9	Networks and Electrical Technology Lab	-	3	2
	Total	**25**	**8**	**24**

II Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Managerial Economics and Financial Analysis	3+1*	-	3
2	Analog Circuits	3+1*	-	3
3	Pulse Circuits	3+1*	-	3
4	Analog Communications	3+1*	-	3
5	Transmission Lines and Waveguides	3+1*	-	3
6	Control Systems	3+1*	-	3
7	Professional Ethics and Patents	1	2	2
8	Analog Circuits Lab	-	3	2
9	Analog Communications Lab	-	3	2
	Total	**25**	**8**	**24**
10	Sports & Games / Creative Arts (Mandatory Non-Credit Course)	-	2	-

* **Tutorial**

III Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Linear and Digital ICs	3+1*	-	3
2	Computer Organization and Microprocessors	3+1*	-	3
3	Antennas and Wave Propagation	3+1*	-	3
4	Digital Communications	3+1*	-	3
5	Open Elective – I (see the list of Open Electives)	3+1*	-	3
6	Pulse and Digital Circuits Lab	-	3	2
7	Digital Communications Lab	-	3	2
8	Microprocessors and Interfacing Lab	-	3	2
	Total	**20**	**9**	**21**

III Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Digital Signal Processing	3+1*	-	3
2	VLSI Design	3+1*	-	3
3	Microwave and Optical Communications	3+1*	-	3
4	Elective – I i) Digital Switching and Multiplexing ii) Computer Networks iii) Artificial Neural Networks iv) Electronic System Design	3+1*	-	3
5	Open Elective – II (see the list of Open Electives)	3+1*	-	3
6	IC Applications Lab	-	3	2
7	ECAD Lab	-	3	2
8	Mini Project	-	3	2
	Total	**20**	**9**	**21**
9	NSS (Mandatory Non-Credit Course)	-	2	-

* **Tutorial**

IV Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Electronic Measurements and Instrumentation	3+1*	-	3
2	Microcontrollers and Embedded Systems	3+1*	-	3
3	Elective – II i) Cellular and Mobile Communications ii) Sensors and Instrumentation iii) Advanced Computer Architecture iv) DSP Architecture and Applications	3+1*	-	3
4	Elective – III i) FPGA Design ii) Digital TV Engineering iii) Digital Image Processing iv) Embedded Real Time Operating Systems	3+1*	-	3
5	Open Elective – III (see the list of Open Electives)	3+1*	-	3
6	Digital Signal Processing Lab	-	3	2
7	Microwave and Optical Communications Lab	-	3	2
8	VLSI and Embedded Systems Lab	-	3	2
	Total	**20**	**9**	**21**

IV Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Elective – IV i) Testing and Verification of VLSI Circuits ii) Speech Processing iii) Satellite Communications iv) Wireless Sensor Networks	3+1*	-	3
2	Elective – V i) Lower Power VLSI Design ii) Radar Engineering iii) Software Engineering iv) Biomedical Instrumentation	3+1*	-	3
3	Self Study Course (see the list of Self Study Courses)	-	-	2
4	Industrial / Practical Training	-	-	4
5	Project Work	-	9	9
	Total	**8**	**9**	**21**

* **Tutorial**

Open Elective - I

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Remote Sensing and GIS Techniques	CE	3+1*	-	3
2	Elements of Civil Engineering (other than CE)	CE	3+1*	-	3
3	Modeling and Simulation of Engineering Systems	EEE	3+1*	-	3
4	Renewable Energy Sources	ME	3+1*	-	3
5	Elements of Mechanical Engineering(other than ME)	ME	3+1*	-	3
6	Computer Networks (other than CSE & IT)	CSE	3+1*	-	3
7	Object Oriented Programming (other than CSE & IT)	CSE	3+1*	-	3
8	Data Structures Using C (other than EEE,ECE,CSE&IT)	CSE	3+1*	-	3
9	Cyber Laws	CSE	3+1*	-	3
10	Open Source Software	IT	3+1*	-	3
11	Fundamentals of Data Base Management Systems (other than CSE & IT)	IT	3+1*	-	3
12	Fuzzy Mathematics	Maths	3+1*	-	3

* **Tutorial**

Open Elective - II

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Disaster Management	CE	3+1*	-	3
2	Solid Waste Management (other than CE)	CE	3+1*	-	3
3	Energy Audit, Conservation and Management	EEE	3+1*	-	3
4	Material Science (other than ME)	ME	3+1*	-	3
5	Automotive Electronics	ECE	3+1*	-	3
6	Introduction to MP&MC (other than EEE, ECE, CSE & IT)	ECE	3+1*	-	3
7	Cloud Computing (other than CSE & IT)	CSE	3+1*	-	3
8	Web Technologies(other than CSE & IT)	CSE	3+1*	-	3
9	Virtual Reality	CSE	3+1*	-	3
10	Scripting Languages	IT	3+1*	-	3
11	Big Data (other than CSE & IT)	IT	3+1*	-	3
12	Multi-variate Analysis and Special Functions	Maths	3+1*	-	3

* **Tutorial**

Open Elective - III

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Building Services	CE	3+1*	-	3
2	Modern Optimization Techniques	EEE	3+1*	-	3
3	Electrical Power Utilization (other than EEE)	EEE	3+1*	-	3
4	Robotics (other than ME)	ME	3+1*	-	3
5	Assistive Technologies	ECE	3+1*	-	3
6	Introduction to Embedded Systems (other than ECE, CSE & IT)	ECE	3+1*	-	3
7	Social Networks	CSE	3+1*	-	3
8	Mobile Application Development (other than CSE & IT)	CSE	3+1*	-	3
9	Real-Time Systems	CSE	3+1*	-	3
10	Network Management Systems	IT	3+1*	-	3
11	Fundamentals of E-Commerce (other than CSE & IT)	IT	3+1*	-	3
12	Statistical Methods using R Software	Maths	3+1*	-	3

* **Tutorial**

Self Study Courses

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Credits
1	Global Positioning Systems	CE	2
2	Interior Design	CE	2
3	Electrical Safety Management	EEE	2
4	Green Engineering	ME	2
5	Managing Innovation & Entrepreneurship	ME	2
6	Internet of Things	ECE	2
7	Consumer Electronics	ECE	2
8	e-Waste Management	CSE	2
9	Management Information Systems	CSE	2
10	Information & Communication Technology	IT	2
11	Organizational Behaviour	MBA	2
12	MOOCs	--	2

SYLLABUS

PROFESSIONAL COMMUNICATIONS – I
(Common to All Branches)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To equip students for their present and future academic pursuits: to understand classroom lectures, read textbooks, do reference reading, participate in classroom discussions, and write assignments and examination answers.
- To develop in them the communication skills and social graces necessary for functioning effectively in the social and other situations in which they may be called upon to use English.

Learning Outcomes:

Students will be able to:

- Produce and process language for academic, professional and social life.
- Produce coherent spoken and written discourse of various kinds with attention to appropriate strategies and conventions of speaking and writing.

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – I:

- To transfer textual information to a table
- To introduce yourself
- To make polite conversations
- To comprehend subject-verb agreement

UNIT – II:

- To communicate well with your peers
- To express your views on a topic
- The present simple and present continuous tenses
- To write a text that has unity

UNIT – III:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- A Tale of Two Cities by Charles Dickens
- Treasure Island by R.L.Stevenson

Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Collocations 15
- Idioms 25
- One word substitutes 25

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – IV:

- To interact with your faculty members
- To express futurity
- To write a text that has cohesion
- To make your writing clutter-free

UNIT – V:

- To represent information in a diagram
- To make notes
- To offer your advice/suggestions
- To understand and use auxiliary verbs
- To write a letter to a company

UNIT – VI:

Extensive Reading

Simplified Classics from the series *Great Stories in Easy English*

- *Tales from Shakespeare by Charles and Mary Lamb*

Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Text Books:

1. Samson, T. (2010). Innovate with English. Hyderabad : Foundation **Great Stories in Easy English Published by S.Chand & Company Limited:**
2. Treasure Island by R.L. Stevenson
3. Tales From Shakespeare by Charles and Mary Lamb
4. A Tale of Two Cities by Charles Dickens
5. Vocabulary Builder: English in Contexts for students of Engineering and Technology

Reference Books:

1. Comfort, J. and others (2012). *Speaking Effectively.* U.K: Cambridge University Press.
2. Murphy, Raymond. *Intermediate English Grammar.* Cambridge University Press.
3. Lewis, N.(2005).*Word Power Made Easy.U.K: Bloomsbury.*
4. McCarthy and O'Dell. F (2008).*Test Your English Vocabulary in Use:* Upper – Intermediate U.K: Cambridge University Press
5. O'Dell. F and McCarthy (2010).*English Collocations in Advanced Use.* New Delhi :Cambridge University Press
6. Cambridge IELTS Examination Papers. New Delhi :Cambridge University Press.
7. TOEFL Examination Papers.
8. BEC Examination Papers.

Hornby.A.S. (2010). *Oxford Advanced Learner's Dictionary*. New Delhi: Oxford University Press.

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MATHEMATICS – I
(Common to All Branches)
I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To find the solutions of 1st and 2nd order Differential equations.
- To find the solutions of multiple integral problems using calculus and vector concepts.

Learning Outcomes:

Students will be able to

- apply 1st and 2nd order differential equations to various Engineering Problems.
- apply the techniques of partial differentiation to find maxima and minima of two variables.
- evaluate single and double integrals using various types of curves.
- apply the concepts of vector differentiation and integration to the surface and volume integrals.

UNIT – I: Linear Differential Equations of first order

Differential equations of first order – Exact – Equations reducible to Exact, Linear and Bernoulli.

Applications: Newton's law of cooling, law of natural growth and decay.

UNIT – II: Linear Differential Equations of Second and higher order

Linear differential equations of second and higher order with constant coefficients-Complete solution, Operator D, Rules for finding complementary function, Inverse operator for D, Rules for finding particular integral with Right hand side term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax} V(x), x.V(x). Applications: LCR circuits.

UNIT – III: Partial Differentiation

Introduction - Total derivative - Chain rule - Functional dependence – Jacobian. Application: Maxima and Minima of functions of two / three variables with or without constraints

UNIT – IV: Multiple Integrals

Introduction to Curve Tracing [Cartesian and Polar Curves]. Change of order of integration, Areas by double integrals, Volumes by triple integrals.

UNIT – V: Vector Differentiation

Vector Differentiation: Gradient- Divergence- Curl - Laplacian operator

UNIT – VI: Vector Integration

Line, surface and volume integrals. Integral theorems: Greens - Stokes - Gauss Divergence Theorems (Without proof) and related problems. Applications: Work done, flux across the surface.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012, New Delhi.
2. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I : 11th edition, S. Chand Publishers, 2012, New Delhi.

Reference Books:

1. B.V.Ramana, Engineering Mathematics: 4th Edition, Tata McGraw Hill, 2009, New Delhi.
2. U.M.Swamy, A Text Book of Engineering Mathematics – I & II: 2nd Edition, Excel Books, 2011, New Delhi.
3. Erwin Kreyszig, Advanced Engineering Mathematics : 8th edition, Maitrey Printech Pvt. Ltd, 2009, Noida.

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MATHEMATICAL METHODS
(Common to ECE, CSE & IT)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the various numerical techniques .
- To gain the knowledge of Laplace, z-transforms and their inverse transforms.

Learning Outcomes:

Students will be able to

- apply numerical techniques for solutions of Algebraic, transcendental and ordinary differential equations.
- transform ordinary function into Analytical function using Milne-Thompson Method.
- apply Laplace transforms to find the solutions of ordinary differential equations.
- apply Z–transforms to find solutions of difference equations.

UNIT – I: Algebraic and Transcendental Equations

Solution of Algebraic and Transcendental Equations- Introduction – Bisection Method – Method of False Position – Newton-Raphson Method.

UNIT – II: Interpolation

Interpolation- Introduction – Finite differences- Forward Differences –Back ward differences –Central differences – Symbolic relations – Newton formulae for interpolation – Lagranges interpolation.

UNIT – III: Numerical Solutions Of Ordinary Differential Equations

Solution by Taylors series – Euler and Modified Euler method – Picard method - 4^{th} order Runge-Kutta methods - Predictor and corrector method.

UNIT- IV: Introduction To Complex Variables

Continuity – Differentiability – Analyticity – Properties- Cauchy Riemann - Equations in Cartesian and Polar coordinates. Harmonic functions and conjugates : Milne Thomson method.

UNIT – V: Laplace Transforms and Inverse Laplace Transforms

Laplace transforms of standard functions – Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac Delta function. Applications : Evaluation of Improper Integrals. Inverse Laplace transforms – Convolution theorem. Application: Solution of ordinary differential equations.

UNIT – VI: Z- Transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z- transform using Partial fractions, Convolution theorem. Application: Solution of Difference equations by Z-transforms.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012 , New Delhi .
2. Ravindranath. V, and Vijayalaxmi. A. : 2nd edition, A Text Book on Mathematical Methods, Himalaya Publishing House, Bombay.

Reference Books:

1. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Mathematical Methods :6th edition, S. Chand Publications, 2011, New Delhi.
2. B.V.Ramana, Engineering Mathematics : 4th Edition, Tata McGraw Hill, 2009, New Delhi.
3. Erwin Kreyszig, Advanced Engineering Mathematics : 8th edition, Maitrey Printech Pvt. Ltd, 2009, Noida.

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ENGINEERING CHEMISTRY
(Common to ECE, CSE & IT)
I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To impart the knowledge of chemical and solar energy.
- To familiarize with various types of polymers, fuels and lubricants and their applications in engineering.

Learning Outcomes:

Students will be able to

- apply various methods of water treatment.
- understand the applications of chemical and solar energy in various engineering aspects.
- apply various chemical methods to prevent corrosion of metals.
- understand the process to prepare synthetic polymers used for various applications.
- know the characteristic features of lubricants and their applications.
- understand the need of green synthesis.

UNIT – I: Water and Its Treatment

Introduction, Hardness of water, types of hardness, Degree of hardness, Determination of hardness by EDTA Method, Numerical Problems on hardness of water by EDTA method. Softening of hard water by Permutit and Ion Exchange Processes, Treatment of brackish water by reverse osmosis, Potable Water, General Outline of municipal water treatment (Sedimentation, Filtration and chlorination).

UNIT – II: Energy Sources

Chemical Sources of Energy: Galvanic Cell - Single electrode potential – Electro chemical series-Problems on electrode potential using Nernst equation - Hydrogen and Calomel reference electrodes and measurement of pH by glass electrode – Leclanche cell, Lead **-** Acid accumulator, Hydrogen-Oxygen fuel cell and Methanol Fuel cell.

Solar Energy: Introduction–Harnessing of solar energy – Applications of solar energy - Photovoltaic cells-Solar reflectors (Parabolic trough, Solar dish and Solar tower) and Solar water heater.

UNIT – III: Corrosion and Its Prevention

Dry & wet corrosion – Mechanism – Pilling and Bedworth Rule - Factors influencing the rate of corrosion (Temperature, pH, Humidity of environment and position of metal in Galvanic series) - Types of Corrosion (galvanic corrosion, concentration

cell corrosion, pitting corrosion and stress corrosion) - Sacrificial Anodic method, Impressed voltage method – Metallic coatings (galvanization and tinning methods).

UNIT – IV: Polymers

Definitions of Polymer and Polymerization, Degree of polymerization and Functionality - Classification of polymers, Types of Polymerisation– Addition, Condensation and Co-polymerizations –Plastics – Thermoplastics – Thermosetting plastics, - Biodegradable polymers (PHBV & PHA). Preparation, properties and uses of poly styrene, PVC, PTFE, Bakelite, Buna-S rubber, Buna-N rubber, Thiokol rubber.

UNIT – V: Fuels & Lubricants

Fuels: Classification of fuels, calorific value, LCV & HCV and determination of calorific value of a solid fuel using Bomb calorimeter, Problems based on calorific values, Fischer-Tropsch Method and Bergius Method for preparation of Synthetic Petrol.

Lubricants: Definition and explanation of Lubrication-Types of Lubricants-Definition and significance of Viscosity, Flash and Fire Point, Pour and Cloud Point, Aniline point of a lubricant. - Engineering applications of lubricants.

UNIT – VI: Green Chemistry

Introduction- Principles of Green Chemistry, Methods of Green synthesis (aqueous phase, supercritical fluid extraction, green solvents and microwave induced methods), IWM (Integrated Waste Management), ZWT (Zero Waste Technology) Engineering Applications.

Text Books:

1. Text book of Engineering Chemistry by Jain & Jain. Dhanpat Rai Publishing Company.
2. Text book of Engineering Chemistry-II by Srinivasulu Doddaga, Ashima Srivastava, Roliverma. Parshva Publication.
3. Engineering Chemistry by Dr. Bharathi Kumari Yalamanchili,VGS Publication.

Reference Books:

1. A Text book of Engineering Chemistry by S.S.Dara. S.Chand&Company Ltd.
2. Engineering Chemistry by J.C.Kurisascose and J.Rajaram.Tata Mc Graw-Hill Publishing
3. A Text book of Engineering Chemistry by Balaram Pani.Galgotia Publications
4. A Text book of Engineering Chemistry by Shashi Chawla. Dhanpat Rai Publications
5. Industrial Chemistry by O.P.Veeramani and A.K.Narula. Galgotia Publications
6. Text book of Engineering Chemistry by Jain & Jain. Dhanpat Rai Publishing Company.

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PROBLEM SOLVING USING C
(Common to EEE, ECE, CSE & IT)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the steps of problem solving.
- To emphasize the role of logical flow charts and pseudo code in problem solving on computers.
- To impart skills for solving problems using C.

Learning Outcomes:

Students will be able to

- develop logical flow charts for solving problems.
- develop pseudo code for solving problems.
- solve simple to moderate problems on computer using C.
- self-learn advanced features of C.
- self-learn for solving complex problems on computers.

UNIT – I: Problem Solving Steps

Understanding problem, Formulating a mathematical model, Solving the mathematical model, Developing algorithm, Representingalgorithm as pseudo code or logical flow chart, Coding, Testing and Debugging.

General form of a C program, C Tokens – Constants, Identifiers, Operators, Punctuation and Keywords.

Basic data types, Data modifiers, Variable declaration statement, Console I/O statements, Assignment statement and Order of evaluation. Simple problems such as evaluating formulae.

UNIT – II: Control Statements

Selection Statements –if-else, nested if, switch, nested switch and ? Operator; Control Statements – For loop, while loop and do while loop; Jump Statements – return, goto, break, exit() and continue.

Problem Solving – Exchanging the values of two variables, Summation of a set of numbers, Factorial Computation, Sine function computation, Generation of Fibonacci sequence, reversing digits of an integer, Base conversion and Character to number conversion, LCM and GCD computation, Generating prime numbers, Computing prime factors of an integer, Raising a number to a large power, Computing the n^{th} Fibonacci number.

UNIT – III: Arrays

Declaring, initializing and accessing of one dimensional and two dimensional arrays and strings; and multidimensional arrays.

Problem Solving – Computing mean, range and variance of a set of numbers, Array order reversal, Histogramming, Removal of duplicates from an ordered array, Partitioning an array, Finding k^{th} smallest element and Longest monotone subsequence.

UNIT – IV: Pointers and functions

Pointers – Variables, Operators, Expressions and Multiple indirection. Functions – General form of functions, Passing parameters by value and Passing parameters by address, Dynamic memory allocation functions, Pointers and arrays, Pointers and functions, recursive functions and String handling functions, Problem solving using functions.

UNIT – V: Structures and Unions

Structures -Definition, declaration, initialization of structures, accessing structure members, nested structures, arrays of structures, array within structures, structures and functions. Unions - Bit-Fields and enumerations; Problem solving using structures, unions, Bit-fields and enumerations.

UNIT – VI: Files

File Handling- Text and binary files, commonly used C file system functions, File Processing Operations – inserting, deleting, searching and updating a record and displaying file contents. Random access files. Problem solving – Billing at Checkout counter of a supermarket, Preparing consolidated attendance / marks statements, and Performing banking operations.

Text Books:

1. R G Dromey, How to Solve it by Computer, Prentice-Hall of India, 1999.
2. Jeri R Hanly and Elliot B Koffman, Problem Solving and Program Design in C, Seventh Edition, Pearson, 2014.
3. Herbert Schildt, C: The Complete Reference, Tata McGraw-Hill, 2008.

Reference Books:

1. C Programming, E Balaguruswamy, 3rd edition, TMH.
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
3. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education.

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ENGINEERING DRAWING
(Common to CE, EEE & ECE)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To highlight the significance of universal language of engineers.
- To visualize and represent the 3-D objects in 2-D planes and pictorial views. with proper dimensioning and scaling.

Learning Outcomes:

Student will be able to

- apply principles of drawing in representing dimensions of an object.
- construct polygons, scales and curves.
- draw projections of points, lines and planes.
- draw projections of solids in different positions.
- convert orthographic views into isometric views and vice-versa.

UNIT – I: Introduction

Geometrical Construction,

Conic Sections: Ellipse, parabola, hyperbola – general method.

Scales: Plane, Vernier and Diagonal Scales.

UNIT – II: Orthographic Projections

Introduction to Orthographic Projections; Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT – III: Projections of Straight Lines

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces.

UNIT – IV: Projections of Planes

Regular Planes Perpendicular / Parallel to one Reference Plane and inclined to other Reference Plane; inclined to both the Reference Planes.

UNIT – V: Projections of Solids

Prisms, Cylinders, Pyramids and Cones with the axis inclined to one Plane.

UNIT – VI: Transfermation of Projections

Conversion of Isometric Views to Orthographic Views and Orthographic to Isometric Views.

Semester End Examination Pattern:

Semester end examination paper consists of eight questions out of which five questions are to be answered. All questions carry equal marks.

Text Books:

1. Engineering Drawing by N.D. Bhatt, Chariot Publications.
2. Engineering Drawing by K. Venugopal, V. Prabhu Raja, G. Sreekanjana, New Age International Publishers.

Reference Books:

1. Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers.
2. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill Publishers.
3. Engineering Graphics for Degree by K.C. John, PHI Publishers.

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PROFESSIONAL COMMUNICATION LAB - I
(Common to All Branches)

I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To strengthen the oral communication skills of the learners for communicative functions;
- To hone their pronunciation;
- To build confidence in them to communicate effectively in English.

Learning Outcomes:

Students will be able to

- enhance their basic communication skills to interact with people around them;
- shed their inhibition and take part in different speaking activities;
- respond in several contexts using the expressions they will have learned;
- speak English with reasonably good pronunciation.

UNIT – I:

- Greeting others
- Taking leave
- Introducing
- Identifying and pronouncing vowel sounds

UNIT – II:

- Asking for information
- Giving information
- Identifying and pronouncing diphthongs

UNIT – III:

- Inviting
- Accepting and declining invitations
- Identifying and pronouncing consonants

UNIT – IV:

- Giving commands or instructions
- Requesting
- Using accent on the appropriate syllable
- Speak rhythmically

UNIT – V:

- Giving suggestions
- Expressing opinions
- Using different tones in connected speech

Text Books:

1. Strengthen your communications skills by Maruthi Publications

Reference Books:

1. Strengthen your steps by Maruthi Publications
2. Speak well by Orient Blackswan.
3. Jones, D. English Pronunciation Dictionary.

ENGINEERING CHEMISTRY LAB
(Common to ECE, CSE & IT)

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To practice the titrations of chemical analysis for determining the quality of water.
- To know the preparation of Bakelite.

Learning Outcomes:

Students will be able to

- apply various titrations required for water quality analysis.
- understand the preparation of resin.

List of Experiments

Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions , Normality, Molarity, Molality etc and laboratory ware used, error ,accuracy, precision, Theory of indicators, use of volumetric titrations.

1. Practice experiment-Determination of the amount of HCl using standard Na_2CO_3.
2. Determination of alkalinity of water sample.
3. Determination of acidity of water sample.
4. Determination of Ferrous iron by permanganometric method.
5. Determination of Ferric Iron using standard $K_2Cr_2O_7$ solution.
6. Determination of Total hardness of the water sample by EDTA method.
7. pH metric titrations - Determination of concentration of HCl using glass electrode.
8. Determination of pH of the water sample by using pH meter.
9. Determination of conductivity of the water sample by using conductivity meter.
10. Conductometric titrations between strong acid and strong base
11. Determination of turbidity of the water sample by using turbidity meter.
12. Estimation of total dissolved salts in water sample.
13. Preparation of Phenol - Formaldehyde resin.

Lab Manual:

1. Engineering chemistry laboratory manual &record By Srinivasulu. D Parshva publications.
2. Engineering Chemistry Lab Manual by Dr. K.Anji Reddy. Tulip publication.
3. Engineering Chemistry Lab Manual by Dr. Jyotsna Cherukuri. V.G.S publication.
4. K.Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication.

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PROGRAMMING LAB
(Common to EEE, ECE, CSE & IT)
I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with the discrete components of computers and networking components.
- To familiarize with usage of MS Office Tools.
- To provide the practice of solving problems on computer using C.

Learning Outcomes:

Students will be able to

- identify discrete components of computers and networking components and describe their functions.
- employ MS Office Tools for documentation and presentations and making computations.
- use computer for solving problems.

Part- A

Exercise - 1: IT Workshop

a) Identifying the discrete components of a computer and networking components
b) Demonstration of assembling a computer
c) Demonstrating installation of OS and applications

Exercise - 2: IT Workshop

a) Creating a document using MS Word
b) Creating a document using LaTeX

Exercise - 3: IT Workshop

a) Familiarizing with the usage and applications of MS Excel Using Excel.
b) Creating a presentation using MS Power point.

Exercise - 4: IT Workshop

Familiarizing with the Integrated Development Environment (IDE) for eveloping C programs

Part – B

Exercise - 5: Write a C program for the following

a) Calculate the area of triangle using the formula area = $(s\,(s-a)\,(s-b)(s-c))^{1/2}$ where $s= (a+b+c)/2$
b) Find the largest of three numbers using ternary operator.
c) Find the roots of a quadratic equation.

Exercise - 6: Develop a C program for the following

a) Read two integer operands and one operator form the user, perform the operation and then print the result. (Consider the operators +,-,*, /, % and use Switch Statement)
b) Check whether given number is Prime (or) not
c) Display first N natural numbers.
d) Calculate electricity bill for the consumed units – assume suitable constraints.
e) Find the sum of individual digits of a positive integer and find the reverse of the given number.

Exercise - 7: Design a C program for the following

a) Find the largest and smallest numbers in the array.
b) Search whether the given element is in the array.
c) Perform Addition, subtraction and multiplication of Matrices
d) Delete n Characters from a given position in a given string.
e) Illustrate at least five string handling functions.

Exercise - 8: Implement a C program for the following

a) Calculate mean, standard deviation and variance for a given set of values using functions
b) Sort a given set of numbers in ascending order using functions
c) Both recursive and non-recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To generate Fibonacci sequence.

Exercise - 9: Prepare a C program for the following

a) To implement a structure to read and display the Name, date of Birth and salary of ten Employees.
b) To display the Name, Marks in five subjects and total marks of given number of students. (Using array of structures).
c) Functions to perform the following operations using Structure:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers

Exercise - 10: Develop C program for the following

a) Function to exchange (Swap) values of two integers using call by reference.
b) Illustrate the usage of dynamic memory management functions.
c) Develop a program to operations on a file.
d) To copy contents of one file to another.
e) To count the number of characters, words and lines in a file.

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PROFESSIONAL COMMUNICATION - II
(Common to All Branches)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To equip students for their present and future academic pursuits: to understand classroom lectures, read textbooks, do reference reading, participate in classroom discussions, and write assignments and examination answers.
- To develop in them the communication skills and social graces necessary for functioning effectively in the social and other situations in which they may be called upon to use English.
- To prepare them to secure employment and to function successfully in their career.

Learning Outcomes:

Students will be able to:

- Produce and process language for academic, professional and social life.
- Produce coherent spoken and written discourse of various kinds with attention to appropriate strategies and conventions of writing.
- To take part in job interviews with confidence and competence.

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – I:

- To make effective telephone conversations
- To use the modal auxiliaries *can* and *could*
- To write persuasive letters
- To write a winning resume

UNIT – II:

- To effectively participate in an informal meeting
- To use articles and other determiners
- To get some practice in composing professional emails
- To plan a professional presentation

UNIT – III:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- *Oliver Twist by Charles Dickens*
- *Robinson Crusoe by Daniel Defoe*

Vocabulary

'Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – IV:

- To effectively participate in an informal meeting
- To use passive voice
- To identify the structure of reader-oriented technical reports

UNIT – V:

- To use prepositions
- To use visual aids in a presentation

UNIT – VI:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- *Round the World in Eighty Days by Jules Verne*

Vocabulary

'Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Text Books:

1. Samson, T. (2010). *Innovate with English*. Hyderabad : Foundation

Great Stories in Easy English Published by S.Chand & Company Limited:

1. *Oliver Twist* by Charles Dickens
2. *Robinson Crusoe* by Daniel Defoe
3. *Round the World in Eighty Days* by Jules Verne
4. *Vocabulary Builder : English in Contexts for Students of Engineering and Technology*

Reference Books:

1. Comfort, J. and others (2012). *Speaking Effectively.* U.K: Cambridge University Press.
2. Murphy, Raymond. *Intermediate English Grammar.* Cambridge University Press.
3. Lewis, N.(2005).*Word Power Made Easy.U.K: Bloomsbury.*
4. McCarthy and O'Dell. F (2008).*Test Your English Vocabulary in Use: Advanced* U.K: Cambridge University Press.
5. O'Dell. F and McCarthy (2010).*English Collocations in Advanced Use.* New Delhi: Cambridge University Press
6. Cambridge IELTS Examination Papers. New Delhi :Cambridge University Press.
7. TOEFL Examination Papers.
8. BEC Examination Papers.
9. Hornby.A.S. (2010). *Oxford Advanced Learner's Dictionary*. New Delhi: Oxford University Press.

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MATHEMATICS - II
(Common to All Branches)
I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To determine the eigenvalues and eigenvectors.
- To understand the concepts of Fourier Series and Fourier Transforms.
- To solve partial differential equations of 1st and 2nd order.

Learning Outcomes:

Students will be able to

- use the concepts of eigenvalues and eigenvectors in Engineering problems.
- apply to transform a function into Fourier Series and Fourier Integral form.
- apply 1st and 2nd order partial differential equations to Engineering Problems.

UNIT – I: Matrices

Rank of Matrix- Echelon form, Normal form – System of Linear equations – Consistency-Gauss elimination Method. Applications to electrical circuits [Finding the current in an electric circuit].

UNIT – II: Eigenvalues & Eigenvectors

Eigenvalues - Eigenvectors – Properties – Cayley Hamilton Theorem (without proof) - Inverse and powers of a matrix using Cayley Hamilton theorem, Quadratic forms- Reduction of quadratic form to canonical form by Orthogonal Transformation– Rank - index – signature. Applications: Free vibration of a two mass system.

UNIT – III: Fourier Series

Fourier series: Determination of Fourier coefficients (without proof) – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

UNIT – IV: Fourier Transforms

Fourier integral theorem (only statement) – Fourier transform – sine and cosine transforms – properties – inverse Fourier transforms – Finite Fourier transforms.

UNIT – V: 1st order Partial Differential equations

Formation of partial differential equations by eliminating arbitrary functions – solutions of quasi linear equations using Lagrange's method, solutions of non-linear equations by 4 strandard forms and Charpit's method.

UNIT – VI: 2nd order Partial Differential equations

Method of Separation of Variables. One dimensional Heat, Wave and Laplace equations.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012 , New Delhi.
2. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Engineering Mathematics – II : 6th edition, S.Chand Publications, 2012, New Delhi.

Reference Books:

1. B.V.Ramana, Mathematical Methods: 4th Edition, Tata McGraw Hill, 2009,New Delhi.
2. Ravindranath, V. and Vijayalaxmi, A. : 2nd edition, A Text Book on Mathematical Methods, Himalaya Publishing House,2012, Bombay.
3. Dean G. Duffy, Advanced engineering mathematics with MatLab, CRC Press
4. Erwin Kreyszig, Advanced Engineering Mathematics:8th edition,Maitrey Printech Pvt. Ltd, 2009, Noida.

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ENGINEERING PHYSICS
(Common to ECE, CSE & IT)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand principles of solid state materials for use in the engineering applications.

Learning Outcomes:

Students will be able to

- apply the principles of light for optical communication.
- Identify the appropriate solid state materials for engineering applications.
- apply Quantum mechanics to study the behavior of a particle.

UNIT – I: Wave Optics

Interference: Introduction – Interference in thin films by reflection –Newton's rings.

Diffraction: Introduction – Fraunhofer diffraction - Fraunhofer diffraction at single slit– Diffraction grating – Resolving power of a grating

Polarization: Introduction – Types of Polarization – Double refraction – Quarter wave plate and Half Wave plate.

UNIT – II: Lasers & Fiber Optics

Lasers: Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients– Population inversion – Helium Neon laser – Co_2 laser – semi conductor lasers.

Fiber Optics : Introduction, Principle of Optical Fiber - Total Internal Reflection, Conditions for Light to Propagate - Numerical Aperture and Acceptance Angle, Optical Fiber Construction, Types of Optical Fibers - Step Index Fibers and Graded Index Fibers, Advantages of Optical Fibers in Communications.

UNIT – III: Introductory Solid State Physics

Crystal Structure: Introduction, Basic Terms - Lattice, Basis, Crystal Structure,CoordinationNumber, Atomic Radius, Packing Fraction, Free Volume, LatticeParameters, Unit Cell and Primitive Cell, Crystal Systems and Bravais Lattices, Structure and Packing Fractions of Simple Cubic, Body Centered Cubic and Face Centered Cubic Crystal Structures.

X-Ray Diffraction: Crystal Planes, Directions and Miller Indices, Distance of Separation between successive hkl Planes – Inter Planar Spacing, Diffraction of X-Rays by Crystal Planes – Bragg's Law

UNIT – IV: Essentials Of Materials Science

Magnetic Properties: Magnetic permeability – Magnetization – Orgin or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, Hysteresis curve.

Dielectric Properties: Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius –Mossotti equation

Superconductivity: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory – Penetration depth – DC and AC Josephson effects (Qualitative). Applications of Super conductors.

UNIT – V: Semiconductor

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein s equation – Hall Effect – direct & indirect band gap semiconductors

UNIT – VI: Preliminary Quantum Mechanics & Solid State Physics

Preliminary Quantum Mechanics:

Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

Free Electron Theory and Band Theory (Solid State Physics):

Classical free electron theory – electrical conductivity – Fermi energy (Qualitative) -Quantum free electron theory – Bloch theorem (qualitative) – Kronig – Penney model.

Text Books:

1. Engineering Physics by Mani Naidu, Pearson Publications Chennai
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G.Kshirasagar (S. Chand publications).
3. Engineering Physics by Gaur and Gupta.
4. Optics – 5th Edition – Ghatak (TMH Publications)

Reference Books:

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. Engineering Physics b;y M.R. Srinivasan (New Age international publishers)
3. Fundamental of Physics by Resnick, Halliday and Walker.

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ENVIRONMENTAL STUDIES
(Common to ECE, CSE & IT)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To know the multidisciplinary nature of Environment.
- To understand various measures of improvement & protection of Environment.

Learning Outcomes:

Students will be able to

- apply various mitigation measures to minimize environmental pollution.
- know the principles of Ecosystem.
- understand the various stages of Environmental Impact Assessment (EIA).

UNIT – I: Ecology & Environment

Multidisciplinary Nature of Environmental Studies:

Definition, Scope, Importance and public awareness of Environmental Studies - Concept of an Ecosystem – Components of an Ecosystem – Food Chain, Food Web, Ecological Pyramids – Energy flow – Bio-Geochemical Cycles – Ecological Succession – Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem.

UNIT – II: Natural Resource: **Classification and status**

Water Resources: Used and over utilization of surface & ground water – Conflicts over water – Big dams, Benefits and problems.

Land Resource: Land as a resource, Soil Erosion, Sources of Land degradation, Soil conservation practices – case studies.

Forest Resources:Use and over – Exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people – Case Studies related to deforestation.

Food & Fodder Resources: World food problems, changes caused by agriculture and overgrazing – effects of modern agriculture – fertilizer, pesticide related problems, water logging, Eutrophication, super pest, salinity, organic farming – Case studies.

Mineral Resources: Use and exploitation problems, environmental effects of extracting and using mineral resources – Case studies.

Energy Resources

UNIT – III: Biodiversity and its conservation

Introduction, Definition – genetic and ecosystem diversity – Biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, Aesthetic, option values and ecosystem service values – India as a mega diversity nation – Threats to biodiversity: habitat loss, poaching of wild life – man, wild life conflicts – Endangered and endemic species of India – conservation of biodiversity: In – situ and Ex-situ conservation of biodiversity.

UNIT – IV: Environmental pollution

Definition, cause, effects and control measures of

a) Air pollution b) Water pollution

c) Noise pollution d) Soil pollution

e) Environmental Impact Assessment (EIA) – Definition, Significance & Classification.

UNIT – V: Waste Management

Industrial solid waste – Municipal solid waste – Industrial waste waters – Solid waste – Biomedical waste – hazardous waste – e-waste – Green building – Green Development Mechanism – Carbon Credits – Carbon Trading.

UNIT – VI: Social Issues and Environment

Climate change: Global warming, Acid rains, Ozone layer depletion – case studies.

Sustainable development and unsustainability–Rain water harvesting, watershed management, water conservation–Environmental Ethics–environmental Law (Air, Water, Wild life, forest, Environmental protection act)

Text Books:

1. Environmental studies: Anubha Kaushik,C.P.Kaushik:New Age International Publishers
2. Society and Environment: Dr.Suresh K.Dhameja:S.K.Kataria and Sons
3. Environmental Studies: Benny Joseph:Tata Mc Graw-Hill Publishing Company Limited.

Reference Books:

1. A text of Environmental Studies: Shashi chawala:Tata Mc graw Hill Education Private Limited.
2. Environmental Science & Engineering: P.Anandan, R.Kumaravelan, Scitech Publications (India) Pvt. Ltd.
3. Environmental Studies by R. Rajagopalan 2nd Edition 2011, Oxford University Press
4. Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

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DATA STRUCTURES
(Common to ECE & IT)
I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of linear and non-liner data structures.
- To choose appropriate data and storage structures for solving problems.
- To impart the concepts of searching and sorting.

Learning Outcomes:

Students will be able to

- represent linear and nonlinear data structures using arrays and linked lists.
- perform insertion, deletion, searching, updating and traversal operation on linear and non-linear data structures.
- implement searching and internal sorting techniques on data sets.
- choose appropriate data and storage structures for solving problems.

UNIT – I: Concepts of Data Structures

Concepts of data structures, storage structures and file structures; Primitive data structures; Non-primitive data structures- Linear and Non-linear; Operations on data structures –Create, Insert, Delete, Search, Update and Traverse; Abstract Data Type (ADT)

Linear List – ADT, array representation and performing operations, linked list representation and performing operations, circular lists and doubly linked lists. Application of linear lists for performing operations on polynomials

UNIT – II: Stacks

Stacks – ADT, array representation and performing operations, linked representation and performing operations, conversion of infix expression into postfix expression, evaluation of postfix expression.

UNIT – III: Queues

Queues – ADT, array representation and performing operations, linked list representation and performing operations, circular queues and dequeues.

UNIT – IV: Binary Trees - Properties

Binary Trees- Properties, ADT, linked representation and performing operations; Binary search trees- Properties, ADT, linked representation and performing

operations ;Heap – Properties, ADT, array representation and performing operations, linked list representation and performing operations ; Applications - Expression trees, Priority queues and Histogramming.

UNIT – V: Internal Searching & Sorting

internal searching- Linear and binary Search methods

Internal sorting – Selection, insertion, bubble, quick, radix, merge and heap sorting methods

Introduction to external searching and sorting

UNIT – VI: Basic Concepts of Graphs

Graphs – Basic concepts, ADT, Representations of graphs – adjacency matrix and adjacency list, Graph traversals – Breadth First Search (BFS) and Depth First Search (DFS), Graph algorithms – Dijkstra's Prim's and Kruskal's algorithms.

Text Books:

1. Richard F. Gilberg and Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, Cengage Learning (India Edition), 2005
2. Sartaj Sahni, Data Structures, Algorithms and applications in C++, Second Edition, University Press, 2005.
3. Debasis Samanta, Classic Data structures, Second Edition, PHI, 2011.

Reference Books:

1. Jean-Paul Trembaly and Pau G Sorenson, An introduction to Data structures with Applications, Tata McGraw Hill, 2003.
2. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH.
3. Data Structure with C, Seymour Lipschutz, TMH

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NETWORK ANALYSIS

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand basic laws and theorems of Electrical circuits.
- To familiarize with the steady state behaviour of DC and single phase AC circuits.

Learning Outcomes:

Student will be able to

- apply various circuit laws to analyze the electrical circuits.
- analyze the steady state behavior of DC and AC circuits.
- apply network theorems to analyze and design the electrical and electronic circuits.
- apply the concepts of magnetic circuits to various electrical machines.
- analyze the behavior of electrical resonance.
- apply the concepts of two port network parameters for electronic circuit analysis.

UNIT – I: Introduction To Electrical Circuits

Network elements classification, Electric charge and current, Electric energy and potential - Circuit concepts –Resistor(R)-Inductor(L)-Capacitor(C)-Voltage and Current Sources (Ideal and Non-Ideal)- Independent and Dependent Sources-Source transformation-Voltage - Current relationship for passive bilateral elements (for different input signals-square, ramp, saw tooth, triangular)-Ohm's law - Kirchoff's laws – Network reduction techniques-Series, parallel, series parallel, star-to-delta or delta-to-star transformation, Nodal analysis, mesh analysis, super node and super mesh for D.C excitations.

UNIT – II: Single Phase A.C Circuits

Generation of alternating sinusoidal quantities - R.M.S, Average values and form factor for different periodic wave forms – sinusoidal alternating quantities – Phase and Phase difference – Complex and polar forms of representations, J-notation, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation-Concept of Reactance, Impedance, Susceptance and Admittance-Power Factor and significance-Real and Reactive power, Complex Power.

UNIT – III: Resonance And Magnetic Circuits

Resonance-series, parallel circuits, concept of band width and Q factor. Magnetic circuits-Basic definition of MMF, flux and reluctance-Analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction-concept of self and mutual inductance-dot convention-coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits.

UNIT – IV: Network Theorems

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's Tellegen's, substitution and compensation theorems for D.C and sinusoidal excitations.

UNIT – V: Two Port Networks

Two port network parameters Open Circuit Impedance (Z) Parameters, Short Circuit Admittance (Y) Parameters, Transmission (ABCD)Parameters, Inverse Transmission Parameters, Hybrid (H) Parameters, Inverse Hybrid (g) Parameters, Inter relationships of Different Parameters, Inter Connection of Two-Port Networks – Series, Parallel and Cascade.

UNIT – VI: Transient Analysis

Transient response of R-L, R-C, R-L-C series circuits for D.C excitation-Initial conditions-solution method using differential equation and Laplace transforms, Transient response of R-L, R-C, R-L-C series circuits for sinusoidal excitations-Initial conditions-Solution method using differential equations and Laplace transforms.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company, 6th Edition.
2. Network Analysis by N.C.Jagan, C.Lakshmi Narayana, BS publications 2nd edition.
3. Theory & Problems of Electric Circuits by Joseph A Edminister, 2nd edition.

Reference Books:

1. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw-Hill, 3rd edition.
2. Fundamentals of Electric Circuits by Alexander & Sadiku, McGraw- Hill 2nd edition.
3. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd, 2nd edition.

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PROFESSIONAL COMMUNICATION LAB – II
(Common to All Branches)

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To strengthen the oral communication skills of the learners for communicative functions at an advanced level;
- To train them in handling complex communication situation;
- To give them adequate practice for communication in professional situations like group discussions, presentations and interviews.

Learning Outcomes:

Student will be able to:

- enhance their oral communication skills to perform communicative functions;
- speak confidently in public and handle complex communication situation;
- face job interviews with confidence and competence.

UNIT – I:

- Body Language
- Know how body language is used in communication
- Interpret non-verbal symbols

UNIT – II:

- Dialogues
- Starting a conversation
- Useful functions
- Telephone Etiquette
- Making a small talk

UNIT – III:

- Presentation Skills
- Present information with confidence, clarity and conviction
- Use the language of presentations
- Evaluate presentations

UNIT – IV:

- Group Discussion
- Participate in a group discussion
- Expressing ideas logically
- Using appropriate language in group discussions

UNIT – V:

- Become aware of various types of interviews
- Be able to participate in interviews confidently

UNIT – VI:

- Debates
- Able to argue for or against something
- Able to participate in debates

Text Books:

1. Strengthen your communications skills by Maruthi Publications

Reference Books:

1. Strengthen your steps by Maruthi Publications
2. Speak well by Orient Blackswan.
3. Patnaik., Group Discussion and Interview Skills. by Foundation.

ENGINEERING PHYSICS LAB
(Common to ECE, CSE & IT)

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand Active and Passive Electronic Components.
- To measure magnetic field along the axis of circular coil.
- To learn waves and oscillations.
- To explore the nature of light.

Learning Outcomes:

Students will be able to

- calculate the time constant of RC circuit & Predict resonance frequency of LCR circuit.
- verify magnetic field along the axis of a circular coil.
- observe the regulatory nature of Zener diode & Identify energy gap of semiconductor.
- estimate rigidity modulus of a given wire.
- determine radius of curvature of a given Plano convex lens.

S.N.	Name of the experiment- Aim
	Electromagnetism and Electronics
1	Study the variation of Magnetic field along the axis of a Solenoid coil using Stewart-Gee's Apparatus.
2	Draw the frequency response curves of LCR Series and Parallel circuits
3	Determine the time constant for a CR Circuit
4	Determine the Band Gap of a semiconductor using a PN junction diode.
5	Study of characteristic curves (I/V) of a Zener diode to determine its breakdown voltage.
6	Determine the rigidity modulus of given wire
7	Determine the radius of curvature of given planoconvex lens
8	Determine the thickness of thin objects by optical wedge method
9	Determine the velocity of sound in air by using volume resonator
10	Determine the wave length of Y1 and Y2 lines by diffraction grating normal incidence

Reference Books:

(lab manuals, equipment user manuals, text books, data books, code books, etc.)

1. College lab manuals
2. Practical Physics for engineering students by Vijay Kumar & T. Radha Krishna.
3. Lab manual of Engineering Physics by Dr. Y.Aparna and Dr. K.Venkateswara Rao (VGS Books links, Vijayawada)

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DATA STRUCTURES LAB
(Common to ECE & IT)
I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To Familiarize with the implementation of linear and non-linear data structures.
- To Familiarize with choosing appropriate data and file structures for solving problems and implementing the same.

Learning Outcomes:

Students will be able to

- implement the basic operations of linear and non-linear data structures in C.
- apply the appropriate data and storage structures for solving problems.
- implement internal searching and sorting techniques on Data sets.

Exercise – I:

a) Write a C program that uses functions to
   (i) create a singly linked list
   (ii) Insert an element into a singly linked list
   (iii) delete an element from a singly linked list
b) Write a C program to reverse elements of a single linked list.
c) Write a C program that uses functions to
   (i) create a Doubly linked list
   (ii) Insert an element into a Doubly linked list
   (iii) delete an element from a Doubly linked list
d) Write a C program that uses functions to
   (i) create a circular linked list
   (ii) Insert an element into a circular linked list
   (iii) delete an element from a circular linked list

Exercise – II:

a) Write a C programs that implement stack (its operations) using arrays
b) Write a C programs that implement stack (its operations) using Linked list
c) Write a C program that uses Stack operations to evaluate postfix expression
d) Write a C program that uses Stack operations to Convert infix expression into postfix expression.

Exercise – III:

a) Write C programs that implement Queue (its operations) using arrays.
b) Write C programs that implement Queue (its operations) using linked lists

Exercise – IV:

a) Write a C program to create a Binary Search Tree of integers, insert, delete and search integers into (from) Binary search tree.
b) Write a C program using recursive functions to traverse a binary tree in preorder, inorder and post order.

Exercise – V:

a) Write C programs that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
b) Write C programs that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
c) Write C programs that implement following techniques to sort a given list of integers in ascending order
   i. Insertion sort, Bubble sort
   ii. Selection sort, Quick sort
   iii. Merge sort, Heap sort

Exercise - VI:

a) Write a C program to implement operations on graphs
   i. Vertex insertion
   ii. Vertex deletion
   iii. Finding vertex
   iv. Edge addition and deletion
b) Write a C program to implement Depth First Search of a graph.
c) Write a C program to implement Breadth First Search of a graph.

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ELECTRICAL TECHNOLOGY

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the constructional details, working principle and characteristics of DC machines and AC machines.
- To familiarize the students with the constructional details, working principle of Electrical instruments.

Learning Outcomes:

Students will be able to

- demonstrate the construction and working principle of DC machine and their characteristics.
- test, measure and provide valid conclusions on performance of Single-phase transformers.
- determine the torque-speed characteristics of Three-phase Induction motors.
- determine the performance characteristics of an alternator.
- demonstrate the construction and working principle of Measuring Instruments and their characteristics.

UNIT – I: D.C. Machines

Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators. DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT – II: Transformers

Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit-Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation.

UNIT – III: Three Phase Induction Motors

Principle of operation of three-phase induction motors –Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT – IV: Single Phase Induction Motors

Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Stepper Motors – Characteristics.

UNIT – IV: Alternators

Alternators – Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT – VI: Electrical Instruments

Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters)

Text Books:

1. P.S.Bimbra, "Electrical Machines", Khanna Publications.
2. Electrical Machines, J.B.Guptha, S.K.Kataria and Sons.

Reference Books:

1. D P.Kothari, I.J.Nagarth, "Electrical Machines", Mc Graw Hill Publications, 4th Edition.
2. M.S.Naidu and S.Kamaksiah , "Basic Electrical Engineering", TMH Publications.

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ELECTRONIC DEVICES AND CIRCUITS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the operation, characteristics, models, and applications of p-n junction diode, zener diode, FET, MOSFET, and BJT.
- To familiarize with the biasing of MOSFET and BJT.
- To perform analysis of MOSFET and BJT amplifiers at low frequencies.

Learning Outcomes:

Students will be able to

- understand the operation, characteristics, models, and applications of p-n junction diode, zener diode, FET, MOSFET, and BJT.
- design and analyze different rectifier circuits using p-n junction diodes, voltage regulator using zener diode, and biasing circuits for MOSFET and BJT.
- analyze MOSFET and BJT amplifiers at low frequencies.
- design and analyze common source and common emitter amplifiers at low frequencies.

UNIT – I: P - N Junctions

Equilibrium conditions, forward and reverse biased junctions-steady state conditions, reverse-bias breakdown, transient and A.C conditions, metal-semiconductor junctions, heterojunctions.

UNIT – II: Junction Diode

The ideal diode, terminal characteristics, modeling the diode forward characteristic, zener diode, rectifier circuits, special diodes, SPICE models for p-n junction and zener diodes.

UNIT – III: Field - Effect Transistors (FETs)

Transistor operation, the junction FET, the metal-semiconductor FET, the metal-insulator-semiconductor FET-basic operation and fabrication, the ideal MOS capacitor, threshold voltage, and current-voltage characteristics of MOS gate oxides.

UNIT – IV: MOS Field-Effect Transistors (MOSFETs)

Device structure and physical operation, current-voltage characteristics, depletion type MOSFET, MOSFET circuits at DC, MOSFET as an amplifier and as a switch, biasing in MOS amplifier circuits, small signal operation and models.

UNIT – V: Bipolar Junction Transistor

Device structure and physical operation, current-voltage characteristics, BJT circuits at DC, BJT as an amplifier and as a switch, biasing in BJT amplifier circuits, bias stability, small signal operation and models.

UNIT – VI: Single-Stage Amplifiers

Amplifiers- circuit models and frequency response; MOS and BJT amplifiers at low frequencies, frequency response of BJT CE and MOS CS amplifiers – the three frequency bands, low frequency response.

Text Books:

1. Ben G. Streetman and Sanjay Kumar Banerjee, "Solid State Electronic Devices", PHI Learning Private Limited, Sixth Edition, 2009 (Units- I & III).
2. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits", Oxford University Press Inc., 2004 (Units- II, IV, V & VI).

Reference Books:

1. J. Millman and A. Grabel, "Microelectronics", McGraw Hill, International, 1987.
2. Robert L Boylested and Louis Nashelsky, "Electronic Devices and Circuit Theory", 8th Edition, PHI, 2003.
3. D. A. Neamen, "Semiconductor Physics and Devices (IRWIN)", Times Mirror High Education Group, Chicago, 1997.
4. R.T. Howe and C.G. Sodini, "Microelectronics: An Integrated Approach", Prentice Hall International, 1997.

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DIGITAL CIRCUITS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the concepts of different number systems and Boolean algebra.
- To familiarize with the design of combinational and sequential logic circuits.

Learning Outcomes:

Students will be able to

- understand various number systems, Boolean algebra and codes.
- realize Boolean expressions.
- design combinational and sequential logic circuits.
- apply different models of Finite State Machines for design of sequential circuits.

UNIT – I: Number Systems

Representation of numbers, conversion of numbers from one radix to another radix, r-1's complement and r's complement of unsigned numbers subtraction, signed binary numbers, different forms, weighted and non-weighted codes, error detection and correction codes-parity checking, even parity, odd parity, Hamming code.

UNIT – II: **Logic Operations**

Basic logic operations-NOT, OR, AND, universal building blocks, EX-OR, EX-NOR gates, standard SOP & POS forms, two level NAND – NAND and NOR-NOR realizations, basic theorems and properties of Boolean Algebra.

Gate level Minimization: Minimization of logic functions using Boolean theorems, minimizations of switching functions using K-Maps(up to four variables), tabular minimization, design of code converters using K-maps.

UNIT – III: Combinational Logic Circuits

Introduction to combinational logic circuits, design of Half adder, full adder, half subtractor, full subtractor, 4-bit adder-subtractor circuit, BCD adder, Excess-3 adder, look-a-head carry adder, 2-bit Binary comparator,decoder, Demultiplexer, encoder, multiplexers, realization of Boolean functions using decoders and multiplexer, priority encoder.

UNIT – IV: **Programmable Logic Devices**

Introduction to PLDs, realization of switching functions using PROM, PLA and PAL, comparison of PROM, PLA and PAL.

Logic Families: Introduction to logic families, Bipolar logic, Transistor logic, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behaviour, other Emitter coupled logic, CMOS and TTL logic families, CMOS / TTL interfacing, Comparison of logic families.

UNIT – V: Sequential Circuits

Classification, basic latches and flip-flops, truth tables and excitation tables, Conversion of flip-flops, Design of ripple counters, synchronous counters, Johnson counters, ring counters, registers, Buffer register, control buffer register, shift register, universal shift register.

UNIT – VI: **Finite State Machines**

Capabilities and limitations of finite state machine, reduction of state tables using Partition technique and state assignment, Realization of circuits using various flip-flops. Mealy to Moore conversion and vice-versa.

Text Books:

1. M. Morris Mano , "Digital Design", 2nd Edition PHI.(Units -I to V).
2. John F. Wakerly, "Digital Design Principles & Practices", 3rd Edition updated, Pearson Education.(Unit- V).

Reference Books:

1. Charles H.Roth, Jr, "Fundamentals of Logic Design", 4th Edition, Jaico Publishers.
2. Thomas L. Floyd, "Digital Fundamentals", 3rd Edition, Universal Book Publishers.
3. Ala B. Marcovitz, "Introduction to Logic Design", Tata McGraw Hill Edition.(Unit- VI).

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SIGNALS AND SYSTEMS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of approximation of signals using orthogonal functions and their transformation techniques.
- To develop an understanding of Signal transmission through LTI systems.

Learning Outcomes:

Students will be able to

- understand different signals, operations and perform the signal approximation using orthogonal functions.
- analyze the signal transmission through linear systems.
- understand concepts of sampling and apply correlation and convolution techniques for different signals.
- perform transformations on signals.

UNIT – I: Signal Analysis

Classification of Signals, Basic Operations on Signals, Elementary Signals, Analogy between Vectors and Signals, Orthogonal Signal Space, Approximation of a function by a set of mutually orthogonal functions, Evaluation of mean square error, Representation of a function by a closed or complete set of mutually Orthogonal functions, Orthogonality in complex functions.

UNIT – II: **Fourier Series Representation of Continuous Time Signals**

Trigonometric and Exponential Fourier series, Relationship between Trigonometric and Exponential Fourier series, Representation of a periodic function by the Fourier series over the entire interval, Convergence of Fourier series, Alternate form of Trigonometric series, Symmetry conditions, Properties of Fourier Series, Complex Fourier spectrum.

UNIT – III: Fourier Transform

Representation of an arbitrary function over the entire interval - Fourier transform, Existence of Fourier transform, Fourier transform of some useful functions, Fourier transform of periodic function, Properties of Fourier transform, Energy Density spectrum, Parseval's Theorem.

Sampling: Sampling theorem for band limited signals- Explanation, reconstruction of signal from samples, Aliasing, Sampling Techniques- Impulse, Natural and Flat top sampling.

UNIT – IV: LTI Systems

Properties of systems, Linear Time Invariant (LTI) system, Response of LTI system- Convolution Integral, Graphical interpretation; Properties of LTI system, Transfer function and Frequency Response of LTI system.

Signal Transmission Through LTI Systems: Filter characteristics of LTI systems, distortionless transmission through LTI system, Signal bandwidth, System bandwidth, Ideal LP, HPF and BPF characteristics, Causality and Physical realizability- Paley-Wiener Criterion, Relationship between bandwidth and rise-time.

UNIT – V: **Correlation of Continuous Time Signals**

Cross correlation and auto correlation of continuous time signals (finite and non-finite energy signals), Relation between convolution and correlation, Properties of cross correlation and autocorrelation, Power density Spectrum, Relation between auto correlation function and energy/power spectral density function.

UNIT – VI: **Laplace Transform**

Laplace transform of signals, Convergence of Laplace transform, Properties of region of convergence (ROC), Unilateral Laplace transform, Properties of Unilateral Laplace transform, Inversion of unilateral and Bilateral Laplace transform, Relationship between Laplace transform and Fourier transform.

Text Books:

1. B.P.Lathi, "Signals, Systems and Communications", BS Publications, 2003 (Units - I to VI)
2. A.V. Oppenheim, A.S. Willsky and S.H.Nawab, "Signals and Systems", PHI, 2nd Edition (Units- I, III & VI).

Reference Books:

1. Simon Haykin and Van Veen, "Signals and Systems", Wiley, 2nd edition.
2. Michel J. Robert, "Fundamentals of Signals and Systems", MGH Int. Edition, 2008.
3. C.L.Philips, J.M. Parr and Eve A. Riskin, "Signals, Systems and Transforms", Pearson Education, 3rd Edition, 2004.

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ELECTROMAGNETIC FILED THEORY

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of Electrostatics and Magnetostatics.
- To develop an understanding of Electromagnetic Waves and their Propagation.

Learning Outcomes:

Students will be able to

- apply the concepts of Electric and Magnetic Fields in different applications.
- derive the Wave Equations in Perfect Dielectric and Conducting Media.
- understand wave propagation and reflection and refraction of Electromagnetic Waves in different media.
- determine the Power flow in Electromagnetic Waves.

UNIT – I: Electrostatics-I

Coulomb's Law, Electric field intensity, Electric fields due to Point Charge, line charge, surface charge and volume charge distributions, Electric Flux Density, Gauss's law, Applications of Gauss law: Point Charge, Infinite Line Charge, Infinite Sheet of Charge, Uniformly Charged Sphere, Divergence, Divergence Theorem.

UNIT – II: Electrostatics-II

Energy expended in moving a point charge in an electric field, Electric Potential difference and Potential, Potential due to different charge configurations, Potential gradient, Electric dipole and Energy density in electrostatic field. Conduction and Convection Current, Current density, Continuity Equation for Current and Relaxation time.

UNIT – III: Electrostatics-III

Conductor properties, Polarization in Dielectrics, Boundary conditions for Dielectric – Dielectric and Conductor - Dielectric Interfaces, Capacitance - Parallel Plate, Coaxial and Spherical Capacitors, Poisson's and Laplace's equations, Examples of the solution of Laplace's equation (Direct Integration Method for One dimensional Potential Variation Problems).

UNIT – IV: Magnetostatics-I

Biot-Savart's Law, Ampere's Circuital Law-Applications of Ampere's Circuital Law : Infinite Line Current, Infinite Sheet of Current, Infinitely long Coaxial Transmission line, Curl, Stokes's Theorem, Magnetic Flux and Magnetic Flux Density, Magnetic

Scalar and Vector Potentials, Force on a moving charge- Lorentz Force Equation, Force on a current element, Force between current elements.

UNIT – V: Magnetostatics-II

Force and torque on a closed circuit, Magnetic Dipole and Dipole Moment, Magnetization in Materials, Magnetic boundary conditions, Inductors and Inductances, Magnetic Energy.

Time Varying Fields and Maxwell's Equations: Faraday's law, Transformer EMF and Motional EMF, Inconsistency of Ampere's Law, Displacement current, Maxwell's equations, Time Harmonic Fields, Maxwell's Equations using Phasor Notation.

Electromagnetic waves-I: Wave Equations for Perfect Dielectrics and Conducting medium, Uniform plane wave propagation, Uniform Plane waves, Relation between E and H in a uniform Plane Wave.

UNIT – VI: Electromagnetic Waves-II

Wave Propagation in lossless medium and conducting medium, Conductors and Dielectrics-Characterization, Polarization, Direction Cosines of normal to the plane of wave, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for Perfect Conductor and Perfect Dielectrics- Horizontal and Vertical Polarization, Surface Impedance, Poynting's theorem and Poynting's Vector.

Text Books:

1. Mathew NO. Sadiku, "Elements of Electromagnetics",Oxford University Press, 2003. (Units- I to V).
2. EC Jordan and KG Balmain, "Electromagnetic Waves and Radiating Systems", PHI 2003. (Units -V &VI).

Reference Books:

1. W H Hayt and J A Buck, "Engineering Electromagnetics", 7th Edition TMH, 2006.
2. Joseph A Edminister, "Theory and Problems of Electromagnetics", Schaum's Outline Series, Mc-Graw Hill International.
3. Nathan Ida, "Engineering Electromagnetics",Springer (India) Pvt. Ltd., New Delhi, 2nd Ed., 2005.

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PROBABILITY THEORY AND RANDOM VARIABLES

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain the knowledge of the basic probability concepts and Acquire skills in handling situations involving more than one random variable and functions of random variables.
- To gain knowledge of standard distributions which can describe real life phenomena.

Learning Outcomes:

Students will be able to

- explain fundamentals of probability theory, random variables and random processes.
- understand the mathematical concepts related to probability theory and random processes.
- understand the characterization of random processes and their properties.
- formulate and solve the engineering problems involving random processes.

UNIT – I: Introduction to Probability

Definitions, scope and history; limitation of classical and relative frequency-based definitions, Sets, fields, sample space and events; axiomatic definition of probability, Probability on finite sample spaces, Joint and conditional probabilities, independence, total probability; Bayes' rule and applications.

UNIT – II: Random Variables

Definition of random variables, continuous and discrete random variables, cumulative distribution function (cdf) for discrete and continuous random variables; probability density functions (pdf) and properties, Expectation - mean, variance and moments of a random variable, Moment generating and characteristic functions and their properties; Binomial, Poisson, Uniform, Exponential, Gaussian and Rayleigh distributions, Transformations of random variable.

UNIT – III: Two Diemsional Random Variables

Jointly distributed random variables, conditional, joint density and distribution functions, Function of two random variables; Sum of two independent random variables, Central limit theorem (for IID random variables), Joint moments,

covariance and correlation; independent, uncorrelated and orthogonal random variables.

UNIT – IV: Classification of Random Processes

Definition and examples – first order, second order, strictly stationary, wide-sense stationary and ergodic processes, Examples of random processes: white noise, Gaussian and Poisson processes.

UNIT – V: Correlation and Spectral Densities

Auto correlation, Cross correlation– Properties, Power spectral density, Cross spectral density– Properties, Wiener-Khintchine relation, Relationship between cross power spectrum and cross correlation function.

UNIT – VI: Linear Systems with Random Inputs

Linear time invariant system, System transfer function, linear systems with random inputs, Auto correlation and cross correlation functions of input and output, Examples with white-noise as input.

Text Books:

1. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", Tata McGraw-Hill Publishers, 4th Edition, New Delhi, 2002.

Reference Books:

1. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw-Hill edition, New Delhi, 2004.
2. H. Stark and J.W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson Education (Asia), 3rd Edition, 2002.
3. A. Papoulis and S.U. Pillai, Probability Random Variables and Stochastic Processes, 4th Edition, McGraw-Hill, 2002.

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EMPLOYABILITY SKILLS
(Common to EEE, ME & ECE)
II Year – I Semester

Lecture	: 1 + 2	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To equip the learners to gain employability skills and to have successful careers.
- To enable them to use English in different socio-cultural and professional contexts.
- To assist them to communicate their ideas relevantly and coherently in globalized contexts.

Learning Outcomes:

Students will be able to

- gain employment and function successfully in their careers.
- use English successfully in different socio-cultural and professional contexts
- communicate their ideas coherently in globalized situations.

Syllabus:

Listening:

- Listening Comprehension- 4 exercises
- Active Listening

Reading:

- Reading Comprehension – 4 Passages
- Book Review-Any Novel among the list prescribed by the Department
- Cloze Test.

Speaking:

- Extempore
- One Act Plays
- Public Speaking
- Group Discussions
- Interpersonal skills
- Ad Making
- Poster presentation
- Mock Interviews
- Assertiveness

Writing:

- Information Transfer
- Report Writing
- Team building
- Paragraph Writing
- Project Work

Vocabulary:

- Business Vocabulary

Short Films:

- Creativity
- Leadership

Books Recommended:

1. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. Communication Skills by Leena Sen, Prentice-Hall of India, 2005.
3. Academic Writing- A Practical guide for students by Stephen Bailey, Rontledge Falmer, London & New York, 2004.
4. English Language Communication: A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai.
5. Body Language- Your Success Mantra by Dr. Shalini Verma, S. Chand, 2006.
6. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi.
7. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup.
8. IELTS series with CDs by Cambridge University Press.
9. Technical Report Writing Today by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.
10. Communication Skills for Engineers by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.
11. Objective English by Edgar Thorpe & Showick Thorpe, 2nd edition, Pearson Education, 2007.
12. Cambridge Preparation for the TOEFL Test by Jolene Gear & Robert Gear, 4th Edition.

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ELECTRONIC DEVICES AND CIRCUITS LAB

II Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To give orientation on electronic components and basic electronic lab instruments.
- To familiarize with basic connections to instrumentation such as power, input signal, voltage measurement, time domain measurements.
- To determine the characteristics of junction diode, FET, and BJT.
- To perform the analysis, design, and test of various electronic circuits.

Learning Outcomes:

Students will be able to

- make basic connections to instrumentation such as power, input signal, voltage measurement, time domain measurements.
- verify the current-voltage characteristics of junction diode, FET and BJT.
- analyze, design and test the zener voltage regulator.
- analyze, design and test the low frequency amplifier circuits using FET and BJT.
- obtain the switching characteristics of BJT.
- write and prepare a lab report that details design procedures and experimental results.
- work in a team using available resources to design circuits to meet a given specification.

List of Experiments:

1. Orientation of electronic components and basic electronic lab instruments.
2. Junction diode I-V characteristics.
3. Design, analysis and test of full wave rectifier without and with capacitor filter
4. Design, analysis and test of zener voltage regulator.
5. JFET drain and transfer static characteristics.
6. Common emitter input and output static characteristics.
7. Design, analysis and test of BJT self-bias circuit.
8. Design, analysis and test of FET common source amplifier at low frequencies
9. Design, analysis and test of common emitter amplifier at low frequencies
10. Switching characteristics of BJT

Note: Bias point, DC and AC analysis is to be carried out for experiments 8 and 9 using software tools.

Reference Books:

1. Ben G. Streetman and Sanjay Kumar Banerjee, “Solid State Electronic Devices”, PHI Learning Private Limited, Sixth Edition, 2009.
2. Adel S. Sedra and Kenneth C. Smith, “Microelectronic Circuits”, Oxford University Press Inc., 2004.
3. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill, International, 1987.
4. Robert L Boylested and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 8th Edition, PHI, 2003.
5. D. A. Neamen, “Semiconductor Physics and Devices (IRWIN)”, Times Mirror High Education Group, Chicago, 1997.
6. R.T. Howe and C.G. Sodini, “Microelectronics: An Integrated Approach”, Prentice Hall International, 1997.
7. User manuals for Basic Electronic Lab equipment.
8. Data sheets for Electronic Components.

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NETWORKS AND ELECTRICAL TECHNOLOGY LAB

II Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- The ability to conduct testing and experimental procedures on Circuits.
- The capability to analyze the behavior of circuits.
- The ability to conduct testing and experimental procedures on Machine.

Learning Outcomes:

Students will be able to

- explain the concepts of Thévenin-equivalent circuits and linear superposition and apply them to laboratory measurements.
- design and test RLC series and parallel resonant circuits.
- predict and measure the transient response of simple RC and RL circuits.
- predict the efficiency of DC Shunt motor by conducting No-Load Test.

List of Experiments:

1. Serial and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z, Y Parameters.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
7. Magnetization characteristics of DC Shunt generator. Determination of critical field resistance.
8. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
9. Brake test on DC shunt motor. Determination of performance characteristics.
10. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
11. Brake test on 3-phase Induction motor (performance characteristics).
12. Regulation of alternator by synchronous impedance method.

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to EEE & ECE)

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about various types of business organizations.
- To access the demand for a particular product.
- To study the various types of cost concepts.
- To have an idea about the types of markets.
- To make the students expertise in account principles and concepts.

Learning Outcomes:

Students will be able to

- know the various factors that influence demand of particular product.
- forecast the future demand using various tools & techniques.
- take the further decisions based on the demand.
- aware of costs incurred in the production.
- alter the combination of inputs to attain the desired results.
- Access the minimum level of production that a firm should carry by using BEP.
- understand which market is suitable to introduce the product.
- ability to know various methods to determine the pricing.

UNIT – I: Introduction to Managerial Economics

Definition, Nature and Scope of Managerial Economics– Relation of Managerial Economics with other disciplines.

Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Significance & Types of Elasticity of Demand. Factors governing demand forecasting- Methods of Demand forecasting.

UNIT – II: Theory of Production and Cost Analysis

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas production function. Production function, Laws of Returns, Internal and External Economies of Scale.**Cost Analysis**: Cost concepts & BEP Analysis Break-Even Point (simple problems)

UNIT – III: Introduction to Markets & Pricing strategies

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price & output determination under Perfect Competition

Pricing strategies: Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT – IV: Introduction to Business Organizations

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario & Phases of Business Cycle.

UNIT – V: Introduction to accountancy

Introduction to Accountancy, Types of Accounts, Ledgers, Maintenance of Ledgers & Trial Balance, Introduction to Final Accounts, Problems on Trading , Profit & Loss Account and Balance sheet, Problems with simple adjustments

UNIT – VI: Ratio Analysis & Capital Budgeting

Ratio Analysis: Introduction to financial Analysis; analysis& Interpretation of financial statements through Liquidity ratios, Profitability & Solvency ratios, turnover ratios

Capital budgeting: capital & its significance, estimation of fixed & working capital requirements, methods of raising capital, introduction to capital budgeting, traditional methods of capital budgeting & discounted cash flow methods(simple problems)

Text Books:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

References:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.

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ANALOG CIRCUITS

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the MOSFET and BJT high frequency models.
- To perform analysis of single stage CS and CE amplifiers at high frequencies.
- To perform analysis of differential, cascode, darlington, tuned and power amplifiers, oscillators.
- To familiarize with the feedback concept in amplifiers and stability issues, filters.

Learning Outcomes:

Students will be able to

- analyze CS and CE amplifiers at high frequencies.
- analyze differential, cascode, darlington, tuned, and power amplifiers.
- design and analyze oscillators and filters.
- design power amplifiers.

UNIT – I: Amplifiers at High Frequencies

High frequency response- general considerations, MOSFET and BJT internal capacitances and high frequency models, high frequency response of CS and CE amplifiers.

UNIT – II: Multistage and Tuned Amplifiers

Cascode amplifier - the MOS cascode, frequency response of the MOS cascode, BJT cascade, darlington configuration, tuned amplifiers.

UNIT – III: Differential Amplifiers and Current Mirrors

The MOS differential pair, small signal operation of the MOS differential pair, BJT differential pair, current sources, current mirrors, and current steering circuits.

UNIT – IV: Feedback Amplifiers

General feedback structure, some properties of negative feedback, basic feedback topologies; series-shunt, series-series, shunt-shunt, and shunt-series feedback amplifiers, determining the loop gain, the stability problem, effect of feedback on the amplifier poles, stability study using Bode plots, frequency compensation.

UNIT – V: Oscillators

Basic principles of sinusoidal oscillators using BJTs, RC oscillator circuits, LC and crystal oscillators.

UNIT – VI: Output Stages and Power Amplifiers

Classification of output stage; class A, class B and class AB output stages; biasing the class AB circuit, power BJTs.

Text Books:

1. Adel S. Sedra and Kenneth C. Smith, " Microelectronic Circuits", Oxford University Press Inc., 2004

Reference Books:

1. J. Millman and A. Grabel, "Microelectronics", 2nd Edition, Mc Graw Hill, 1988.
2. P. Horowitz and W. Hill, "The Art of Electronics", 2nd Edition, Cambridge University Press, 1989.
3. Gray and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley, 3rd Edition.

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PULSE CIRCUITS

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the characteristics of linear and non- linear wave shaping circuits for various inputs.
- To familiarize with the operation and characteristics of multivibrators, voltage time base generators and sampling gates.

Learning Outcomes:

Students will be able to

- design different RC differentiator and integrator circuits.
- design clipper and clamper circuits.
- analyze the various multivibrator circuits.
- understand the principles of voltage time base generator circuits and sampling gates.

UNIT – I: Linear Wave Shaping

Response of High pass and Low pass RC Circuits for sine, step, pulse and square wave inputs. High pass RC circuit as a differentiator, low pass RC circuit as an integrator.

UNIT – II: Non-Linear Wave Shaping

Clipping circuits, Diode clippers, the transistor clipper, clipping at two independent levels, comparators. The clamping operation, clamping circuits taking source and diode resistances into account, clamping circuit theorem, practical clamping circuits.

UNIT – III: Bistable Multi-vibrators

The Stable states of a binary, fixed bias transistor binary, self biased transistor binary, commutating capacitors, methods of improving resolution, unsymmetrical triggering of the binary, symmetrical triggering, direct connected binary circuit, Schmitt trigger circuit.

UNIT – IV: Monostable and Astable Multi-Vibrators

The monostable multivibrator, gate width and wave forms of a collector-coupled monostable multivibrator, triggering of the monostable multivibrator, the astable collector-coupled multivibrator.

UNIT – V: Voltage Time Base Generators

General features of a time base signal, methods of generating a time-base waveform, exponential sweep circuit, negative resistance switches, a transistor constant current sweep, Miller and Bootstrap time base generators general considerations.

UNIT – VI: Sampling Gates

Basic operating principles of sampling gates, unidirectional gates, Bi-directional gates- Two diode sampling gate, four diode sampling gate, sampling oscilloscope.

Text Books:

1. Jacob Millman and Herbert Taub, "Pulse, Digital and Switching Waveforms", TMH 1st Edition. (All Units).
2. David A.Bell, "Solid State Pulse Circuits", PHI, 1st Edition. (Units - I to III).

Reference Books:

1. "Fundamentals of Pulse and Digital Circuits", Ronald J.Tocci, PHI 3rd Edition.
2. "Semiconductor Pulse Circuits" Briton B.Ritcheel, Holt Rinehart & Winston, 1st Edition.

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ANALOG COMMUNICATIONS

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the fundamentals of analog communication systems and various techniques for modulation and demodulation of signals.
- To describe the effect of noise on analog modulated signals.

Learning Outcomes:

Students will able to

- analyze AM, DSB-SC, SSB, VSB, FM, PM and Pulse modulation systems.
- determine power for various modulation schemes and analyze the effect of noise in AM and FM waves.
- understand various blocks in AM and FM transmitters and receivers.
- compare TDM and FDM techniques.

UNIT – I: Linear Modulation

Introduction, Need for modulation, Amplitude Modulation- Definition, Time domain and frequency domain description, power relations in AM waves, Generation and detection of AM Waves; DSBSC MODULATION**-** Time domain and frequency domain description, Generation of DSBSC Waves, Coherent detection of DSB-SC Modulated waves, Costas loop.

UNIT – II: SSB Modulation

Time domain description, Frequency domain description, generations of AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope Detection of a VSB Wave, Comparison of AM techniques.

UNIT – III: AM Transmitters and Receivers

Classification of Transmitters, AM Transmitters: high level and low level AM transmitters, Receiver Types- Tuned radio frequency receiver, Super heterodyne receiver; image frequency and rejection ratio, RF section and Receiver Characteristics, AGC.

UNIT – IV: Angle Modulation

Introduction to Angle modulation, Relation between frequency Modulation and phase modulation, Single tone frequency modulation, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave, Generation of FM Waves: Direct FM and Armstrong method, Detection of FM

Waves: Balanced Frequency discriminator, FM Transmitter, frequency stability in FM Transmitter, FM Receiver.

UNIT – V: Noise

Noise in Analog communication System, Noise in DSB and SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis in FM.

UNIT – VI: Pulse Modulation

TDM Vs FDM, Types of Pulse modulation, PAM (Single polarity, double polarity), PWM: Generation and demodulation of PWM and PPM.

Text Books:

1. Simon Haykin, John Wiley, "Principles of Communication Systems", 2ndEdition. (All Units).
2. George Kennedy and Bernard Davis, "Electronics & Communication Systems", TMH 2004. (Units -III & IV).

Reference Books**:**

1. H Taub & D. Schilling, Gautam Sahe, "Principles of Communication Systems", TMH, 2007 3rd Edition.
2. B.P. Lathi, "Communication Systems", BS Publication, 2006.(units 1 to 5).
3. John G. Proakis, Masond, Salehi, "Fundamentals of Communication Systems", PEA, 2006.

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TRANSMISSION LINES AND WAVEGUIDES

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To familiarize with the transmission line concepts.
- To introduce the concepts of various wave guides for practical applications.

Learning Outcomes:

Students will be able to

- apply the knowledge of network theory in analyzing the concepts of transmissions lines.
- measure the transmission line parameters using Smith chart.
- demonstrate the knowledge and understanding of the fundamental principles of wave guides.
- select an appropriate Wave guide to meet specified requirements.

UNIT – I: Transmission Line - I

Types, Transmission Line parameters ,Transmission Line Equations, Primary and Secondary Constants, infinite line, Characteristic Impedance, Attenuation constant ,Phase shift constant, Propagation Constant, Phase and Group Velocities, Wave length.

UNIT – II: Transmission Lines - II

Lossless line Concepts, Distortion in Transmission Lines. Loading-Types of loading, Distortionless line, Telephone cable, Inductance loading of telephone cables. Input Impedance, Short circuit and Open Circuit, $\lambda/4$, $\lambda/2$, $\lambda/8$ Transmission lines. Voltage and current variations, line with any termination, reflection Coefficient, Voltage Standing Wave Ratio, T and π equivalent sections of lines.

UNIT – III: Transmission Line at Higher Frequencies

Parameters of open wire line at higher frequencies, Secondary Constants, Characteristic Impedance at higher frequencies. Location of voltage maxima and minima. Smith Chart – Configuration. Calculation of Reflection coefficient, VSWR, Input impedance using Smith Chart. Single Stub Matching Design and Double Stub Matching (designing not required).

UNIT – IV: Guided Waves

Waves between parallel planes, Transverse Electric waves, Transverse Magnetic waves. Characteristics of TE, TM, TEM waves- Modes, Cut-off Frequencies, Phase,

Group velocities, Free space, cutoff, guided Wavelengths, Transverse Electric, Magnetic Wave Impedances.

UNIT – V: Rectangular Wave Guides

Rectangular waveguide- Impossibility of TEM waves, Transverse Electric waves (TE), Transverse Magnetic (TM) waves. Characteristics of TE, TM waves- Modes, Cut-off Frequencies, Phase, Group velocities, Free space, cutoff, guided Wavelengths, Wave Impedances.

UNIT – VI: Circular Wave Guides

Solution of the field equations in cylindrical co-ordinates, Transverse Electric waves (TE), Transverse Magnetic (TM) waves. Characteristics of TE, TM waves- Modes, velocities, Wavelengths, Wave Impedance, Characteristic Impedance and their Field distributions.

Text Books:

1. John D Ryder, "Networks Lines and Fields", PHI, 1995. (Units- I to III).
2. E.C Jordan and K.G Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2003. (Units- IV to VI).

Reference Books:

1. M. N. O. Sadiku, "Elements of Electromagnetics", 3rd Edition, Oxford University Press, 2003.
2. Joseph Edminister, "Electromagnetics", Schaum's Series TMH, 2007.
3. Samuel Y.Liauo,"Microwave Devices and Circuits" 3rd Edition, Pearson Publications.

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CONTROL SYSTEMS

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the analysis of linear control systems in time domain and frequency domain.
- To familiarize with the concepts of stability and state space analysis of linear systems.

Learning Outcomes:

Students will be able to

- develop mathematical models for physical systems.
- describe various time and frequency domain tools for analysis and design of linear control systems.
- analyze the stability of systems from transfer function forms.
- understand the issues faced in sampling and discrete time systems.

UNIT – I: Control System Modeling

Basic Elements of Control System, Open loop and Closed loop systems, Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph.

UNIT – II: Time Response Analysis

First Order Systems, Impulse and Step Response analysis of second order systems, Steady state errors, Compensation-P, PI, PD and PID.

UNIT– III: Stability Analysis

Stability, Routh-Hurwitz Criterion, Root Locus Technique- Construction of Root Locus, Stability, Dominant Poles.

UNIT – IV: Frequency Response Analysis

Frequency Response-Bode Plot, Polar Plot, Nyquist Plot; Compensators- Lead, Lag, and Lead Lag Compensators.

UNIT – V: State Variable Analysis

State space representation of Continuous Time systems, State equations, Transfer function from State Variable Representation, Solutions of the state equations, Concepts of Controllability and observability, State space representation for Discrete time systems.

UNIT – VI: Introduction to Digital Control Systems

Sampled Data control systems, Sampling Theorem, Sample and Hold, Open loop and Closed loop sampled data systems.

Text Books:

1. K.Ogata, "Modern Control Engineering", Prentice Hall India, 2006. (Units- I to V).
2. B. C.Kuo, "Digital Control Systems", Oxford University Press, 2nd, Indian Edition, 2007. (Unit- VI).

Reference Books:

1. G. F. Franklin, J. D. Powell and A. E. Emami-Naeini, "Feedback Control of Dynamic Systems", Prentice Hall, 2006.
2. Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition,1995.
3. J.Nagrath and M.Gopal, " Control System Engineering", New Age International Publishers, 5th Edition, 2007

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PROFESSIONAL ETHICS AND PATENTS
(Common to EEE, ME & ECE)

II Year – II Semester

Lecture	: 2	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the basic concepts of Ethics and Human values.
- To enable the students understand the role and importance of ethics in Engineering.
- To familiarize the rights and responsibilities of Engineers.
- To know the laws and protect author's rights.
- To understand the legal aspects present in intellectual property law.

Learning Outcomes:

Students will be able to

- comprehend different Moral Perspectives and enabling him to frame one's own Ethical standards.
- find solutions for issues related to growth with reference to absolute ethical tenets.
- resolve Professional/Moral Dilemmas and be able to guide productivity.
- analyze the likelihood of confusion in Trademark Claims.
- understand different forms of infringement of Intellectual Property Rights.
- recognize the relevant criteria for protecting Creativity.

UNIT – I: Human Values

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue -Value time – Co-operation – Commitment – Empathy – Self-confidence – Character.

Ethics- Types of Inquiry – Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma.

UNIT – II: Engineers' Responsibilities and Rights

Safety and Risk – Types of Risks – Voluntary vs. Involuntary Risk- Short Term vs Long Term Consequences - Expected Probability - Reversible Effects - Threshold Levels for Risk - Delayed vs Immediate. Risk Collegiality – Techniques for achieving Collegiality – Group / Team – Two Senses of Loyalty, Rights – Professional Responsibilities – Confidential and Proprietary information – Conflict of Interest – Conflict resolution – Self-interest.

UNIT – III: Patent Law, Trade Marks and Copyrights

Introduction – Rights and Limitations – Application process – Patent requirements – Ownership – Transfer – Infringement – Litigation – International Patent Law – Double Patenting – New development in Patent Law.

Trade Mark and Copyrights: Introduction – Registration Process – Transfer – Infringement – Dilution of Ownership – Imitation – Litigations.

UNIT – IV: Cyber Law

Introduction to Cyber Law – Cyber Crime and E-Commerce – Online Crime – Innovations and Inventions in Trade Related Intellectual Property Rights.

Text Books:

1. "Principia Ethica" by Goerge Edward Moore, Cambridge University Press, 11-Nov-1993, Cambridge.
2. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
3. Deborah E.Bouchoux: "Intellectual Property", Cengage Learning, New Delhi

Reference Books:

1. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
2. R.Radha Krishnan, S.Balasubramanian: "Intellectual Property Rights",Excel Books, New Delhi.
3. Prabhuddha Ganguli: "Intellectual Property Rights" Tata Mc-Graw- Hill, New Delhi.

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ANALOG CIRCUITS LAB

II Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with the analysis, design, and test of various electronic circuits.

Learning Outcomes:

Students will be able to

- make basic connections to instrumentation such as power, input signal, voltage measurement, time and frequency domain measurements.
- analyze and test differential, cascode, darlington, series-shunt feedback, and single tuned amplifiers using BJTs
- analyze and test opamp Wien-bridge oscillator.
- analyze, design and test Colpitts and Hartley oscillators, Butterworth filter, class A and complementary symmetry class B power amplifiers.
- write and prepare a lab report that details design procedures and experimental results.
- work in a team using available resources to design circuits to meet a given specification.

List of Experiments:

1. Analysis and test of CE-CB cascode amplifier.
2. Analysis and test of darlington amplifier.
3. Analysis and test of single tuned amplifier.
4. Analysis and test of BJT differential amplifier.
5. Analysis and test of BJT current mirror.
6. Analysis and test of BJT feedback amplifier.
7. Design, analysis and test of RC oscillator.
8. Design, analysis and test of LC oscillator.
9. Design, analysis and test of class A power amplifier.
10. Design, analysis and test of complementary symmetry class B power amplifier.

Note: Bias point, DC and AC analysis is to be carried out for all experiments using software tools.

Reference Books:

1. Adel S. Sedra and Kenneth C. Smith, " Microelectronic Circuits", Oxford University Press Inc., 2004**.**
2. J. Millman and A. Grabel, "Microelectronics", 2nd Edition, McGraw Hill, 1988.
3. P. Horowitz and W. Hill, "The Art of Electronics", 2nd Edition, Cambridge University Press, 1989.
4. Gray and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley, 3rd Edition.
5. User manuals for Basic Electronic Lab equipment.
6. Data sheets for electronic components.

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ANALOG COMMUNICATIONS LAB

II Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To implement and test the various analog modulation schemes.
- To observe sampling process practically under different sampling rates

Learning Outcomes:

Students will be able to

- make basic connections to instrumentation such as power, input signal, voltage measurement, time domain measurements.
- verify the sampling process with different sampling rates.
- verify the operation of various modulation schemes.
- write and prepare a lab report that details experimental procedures and results.
- work in a team using available resources to analyze and test circuits to meet a given specification.

List of Experiments:

1. Analyze and test AM- Modulation and Demodulation.
2. Analyze and test AM - DSB SC - Modulation and Demodulation.
3. Analyze and test FM - Modulation and Demodulation.
4. Power Analysis of AM and FM signals using Spectrum Analyzer.
5. Pre-emphasis and De-emphasis.
6. Sampling Theorem verification.
7. Analyze and test Pulse Amplitude Modulation and Demodulation.
8. Analyze and test Pulse position Modulation and Demodulation.
9. Analyze and test Pulse Width modulation and Demodulation.
10. Characteristics of Mixer circuit.

Note: Analysis is to be carried out using simulation tools.

Reference Books:

1. Simon Haykin, John Wiley, "Principles of Communication Systems", 2nd Edition.
2. George Kennedy and Bernard Davis, "Electronics & Communication Systems", TMH 2004.
3. H Taub & D. Schilling, Gautam Sahe, "Principles of Communication Systems", TMH, 2007 3rd Edition.
4. B.P. Lathi, "Communication Systems", BS Publication, 2006.
5. John G. Proakis, Masond, Salehi, "Fundamentals of Communication Systems", PEA, 2006.

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LINEAR AND DIGITAL ICs

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the functioning of various Linear ICs such as OP-AMP, Timer, Voltage Controlled Oscillator and Phase Locked Loop.
- To introduce different digital MSI ICs and memories.

Learning Outcomes:

Students will be able to

- analyze the characteristics of op-amps.
- use op-amps for various applications.
- understand A to D and D to A Conversion techniques.
- understand the basic concepts of VCO, 555 Timer and Phase Locked Loop.
- design various combinational and sequential circuits using MSI ICs.
- understand different types of memories and timing signals.

UNIT – I: Operational Amplifier

The Operational Amplifier- Block Diagram, Schematic symbol, Equivalent circuit, ideal and practical Op-amp specifications, DC and AC characteristics, compensation techniques, IC 741-Pin diagram, Specifications, Electrical Characteristics.

UNIT – II: Applications of OP- AMP

Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, V to I, I to V converters. Instrumentation amplifier, Log and Anti log amplifiers, Precision rectifiers, Comparator, Schmitt trigger, Triangular wave generator.

UNIT – III: D to A and A to D Converters

Need for Analog to Digital and Digital to Analog conversion, Basic DAC techniques-Weighted Resistor DAC, R-2R Ladder DAC and Inverted R-2R Ladder DAC, DAC 0800; Direct Type ADCs – The parallel comparator (FLASH) type ADC, The Counter type ADC, The successive approximation ADC, Indirect Type ADCs- The Dual-Slope ADC. ADC 0808/ADC 0809 (8-bit). DAC/ADC Specifications.

UNIT – IV: 555 IC Timer, VCO and Phase Locked Loop

555 IC Timer- Pin diagram, functional description, Monostable and Astable operation; Voltage controlled oscillator (VCO) IC 566- Pin diagram, Block diagram Description; 565 IC PLL- Pin diagram, block schematic, basic principle of operation, frequency multiplication, frequency translation.

UNIT – V: MSI Combinational and Sequential Logic Circuits

Design of combinational and sequential circuits using Decoders-74x139,138; Priority encoders 74x148; Multiplexers and Demultiplexers 74x151,153,157,155; Parity circuits 74x280, Comparators 74x85,682; Ripple adders and subtractors 74x999,283; Counters 74x163, Shift registers 74x95, Universal shift registers 74x194/195.

UNIT – VI: Memories

ROM- Internal structure, types, timing and applications. Static RAM-Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS. Dynamic RAM: Internal structure, timing, synchronous DRAMs.

Text Books:

1. Ramakanth A. Gayakwad, "OP-Amps & Linear ICs", PHI, 1987. (Units - I, II, III & IV).
2. John F. Wakerly, "Digital Design Principles & Practices", PHI/ Pearson Education Asia, 3rd Edition, 2005 (Units –V & VI).

Reference Books:

1. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd, 2nd Edition, 2003.
2. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits", McGraw Hill, 1988.
3. C.G. Clayton, "Operational Amplifiers", Butterworth & Company Publ. Ltd. Elsevier, 1971.
4. Mano, "Digital Logic and Computer Design", Pearson Education, 1979.

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COMPUTER ORGANIZATION AND MICROPROCESSORS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the computer system.
- To familiarize with the architecture and instruction set of 8086 microprocessor.
- To introduce the assembly language programming concepts and interfacing with 8086 processor.
- To introduce the concepts of interrupt mechanism and serial communication standards.

Learning Outcomes:

Students will be able to

- understand the basic structure and operation of a digital computer.
- understand the architecture and instruction set of 8086 microprocessor.
- interface various peripherals with 8086 using 8255.
- understand the concepts of interrupt mechanism and serial communication standards.

UNIT – I: Computer System

Top level view of computer function and interconnection: Computer components, computer function, interconnection structures, Bus interconnection, **Introduction to computer Arithmetic**: Arithmetic and Logic Unit (ALU), Integer representation, Integer arithmetic, fixed point representation, floating point representation.

UNIT – II: Central Processing Unit

Instruction Set Characteristics and addressing modes: Machine instruction characteristics, types of operands and operators, addressing modes, instruction formats, assembly language.

Processor Structure and Functions: Processor organization, register organization, instruction cycle, instruction pipelining.

UNIT – III: 8086 Microprocessor

Architecture, functional diagram, register organization, memory segmentation, physical memory organization;signal descriptions of 8086- common function signals, minimum and maximum mode signals; Timing diagrams.

UNIT – IV: Instruction Set and Assembly Language Programming of 8086
Instruction formats, addressing modes, instruction set, assembler directives, macros, programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT – IV: **Basic Peripherals and Their Interfacing to 8086**
8255 PPI various modes of operation; interfacing of 8255, keyboard, display, stepper motor, D/A and A/D converters, Memory, and DMA controller 8257 to 8086.

UNIT – VI: **Interrupt Structure and Serial Communication**
Interrupt structure of 8086, Vector interrupt table, Interrupt service routine, Interfacing Interrupt Controller 8259, Serial communication standards, Serial data transfer schemes, 8251 USART architecture and interfacing, RS-232.

Text Books:
1. William Stallings, "Computer Organization and Architecture", 7th Edition , Pearson. ((I & II Units)
2. D. V. Hall, "Microprocessors and Interfacing", TMGH,2nd Edition 2006.(III to VI Units)

Reference Books:
1. M. Morris Mano, "Computer System Architecture", 3/e, Pearson.
2. Ramesh.S.Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Prentice Hall, 4th Edition, 2002.
3. Barry B.Brey , "The Intel Microprocessors", PHI, 7th Edition 2006.
4. Intel Data sheets or URLs

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ANTENNAS AND WAVE PROPAGATION

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce radiation mechanism for understanding various forms of Antennas.
- To familiarize with the concepts of wave propagation and its characteristics in atmospheric conditions.

Learning Outcomes:

Students will be able to

- describe the working of various types of antennas.
- describe the need of various forms of Antenna Arrays.
- measure various parameters of antenna.
- understand the mechanism of wave propagation and atmospheric effects on radio wave propagation.

UNIT – I: Antenna Fundamentals

Definition and function of Antenna, characteristics of Antenna- radiation pattern, radiation intensity, beam solid angle, directivity, gain, polarization, efficiency, equivalent areas, radiation resistance, effective length, antenna temperature; relation between maximum directivity and effective area.

UNIT – II: Linear Wire Antenna

Potential function- Maxwell's equation approach, Helmholtz theorem; Heartz dipole, half wave dipole- power radiated, radiation resistance, directivity; comparative variations of radiation, induction and near fields of Heartz dipole, effect of earth on vertical patterns.

UNIT – III: Antenna Arrays

Various forms of Antenna Arrays, Arrays of Two Point Sources- Equal amplitude and phase, Equal amplitude and opposite phase; Arrays of N isotropic point sources of equal amplitude and spacing- Broad-side array and End-Fire array; Principle of pattern multiplication, Binomial and Phased array.

UNIT – IV: HF, VHF and UHF Antennas

V-Antenna, Rhombic Antenna, Helical Antenna, Folded Dipole, Yagi-Uda Antenna, Reflector antennas, parabolic antennas, Horn Antenna, Lens Antenna.

UNIT – V: Antenna Measurements

Antenna measurement Range, Radiation pattern, Gain transfer method, Absolute measurement, Input impendence and reflection coefficient.

UNIT – VI: Wave Propagation

Friss Free space Equation for wave Propagation. Ground wave Propagation, Space wave Propagation- Field strength calculation, Line of Sight, Duct Propagation; Sky wave Propagation-Critical frequency, Maximum Usable Frequency, Skip Distance, virtual height.

Text Books:

1. J. D. Kraus, R. J. Marhefka, "Antennas", McGraw-Hill, 3rd Edition, 2001(Units-I to V)
2. Constantine A.Balanis, "Antenna Theory: Analysis and Design", John Wiley & Sons (Unit-VI)

Reference Books:

1. E.C.Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2007.
2. Hubert J. Visser "Antenna Theory and Applications", John Wiley & Sons

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DIGITAL COMMUNICATIONS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of different pulse modulation and digital modulation techniques.
- To familiarize with the error detection and correction techniques.

Learning Outcomes:

Students will be able to

- distinguish various pulse Digital modulation Techniques and calculate Signal to Quantization Noise Ratio.
- calculate Probability of error of various digital modulation techniques.
- derive the transfer function of the Matched and Optimum filters.
- determine the error correction and detection capabilities of Linear block and Convolution codes.

UNIT – I: Pulse Digital Modulation

Elements of digital communication systems, Elements of PCM, Companding in PCM systems. Differential PCM systems (DPCM), Delta Modulation, Noise in PCM and DM Systems, Comparison of PCM and DM Systems.

UNIT – II: Digital Modulation Techniques

Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Differential Phase Shift Keying, Differentially Encoded Phase Shift Keying , Qudrature Phase Shift Keying, M-ary Phase Shift Keying and Frequency Shift Keying, similarity of BFSK and BPSK.

UNIT – III: Data Transmission

Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, calculation of error probability of ASK, BPSK, BFSK.

UNIT – IV: Information Theory and Source Coding

Discrete messages, concept of amount of information and its properties, Entropy and its properties. Information rate, Mutual information and its properties, Shannon's theorem, Shanon-Fano coding, Huffman coding, Discrete Communication Channels, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT – V: Linear Block codes

Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.

UNIT – VI: Convolution Codes

Encoding of convolution codes-time domain approach, transform domain approach, Graphical approach- state, tree and trellis diagram; Viterbi decoding algorithm, Exhaustive search decoding algorithm.

Text Books:

1. Simon Haykin , "Digital communications" John Wiley, 2005. (Units - I, II,V & VI).
2. H. Taub and D. Schilling , "Principles of Communication Systems" , TMH, 2003. (Units -II, III & IV).

Reference Books:

1. Sam Shanmugam, "Digital and Analog Communication Systems",John Wiley, 2005.
2. John Proakis, "Digital Communications",TMH, 1983.
3. B.P.Lathi, "Modern Analog and Digital Communication", Oxford reprint, 3rd edition, 2004.

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Open Elective - I

REMOTE SENSING AND GIS TECHNIQUES

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To introduce the students to the basic concepts and principles of various components of remote sensin.
- To provide an exposure to GIS and its practical applications in civil engineering.
- To demonstrate the process of remote sensing and theories related to EMR.
- To establish the interpretation of spatial data in various platforms.

Learning Outcomes:

StudentS will be able to

- Identify various satellites, which are advantage for managing the resources available on earth.
- Develop thematic maps with the help of raster and vector data.
- Employ the analysis and interpretation techniques in the data models.
- Apply the strategies of GIS in land information highway system.

UNIT – I: EMR and Its Interaction with Atmosphere & Earth Material

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzmann and Wien's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT – II: Platforms and Sensors

Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

UNIT – III: Image Interpretation and Analysis

Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT – IV: Geographic Information System

Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software's – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems(DBMS).

UNIT – V: Data Entry, Stprage amd Analysis

Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

UNIT VI: RS and GIS Applications

Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications, hydrology- flood zone delineation and mapping, groundwater prospects and recharge, reservoir storage estimation.

Text Books:

1. Remote sensing by Basudeb Bhatta, Oxford University Press.
2. Anji Reddy, M. (2001). Textbook of Remote Sensing and Geographical Information System. Second edn. BS Publications, Hyderabad.

Reference Books:

1. Remote sensing and its applications by LRA Narayana University Press 1999.
2. Basics of Remote Sensing & GIS by S.Kumar, Laxmi Publications.
3. Lo. C.P.and A.K.W.Yeung (2002). Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi. Pp:492.
4. Peter A.Burrough, Rachael A.McDonnell (2000). Principles of GIS. Oxford University Press.
5. Ian Heywood (2000). An Introduction to GIS. Pearson Education Asia

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Open Elective - I

ELEMENTS OF CIVIL ENGINEERING
(Other than CE)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand different methods of surveying for various applications.
- To familiarize with various types of building materials, structures and transport systems.

Learning Outcomes:

Students will be able to

- carry out simple land survey and prepare maps showing the existing details.
- find out area of irregular shaped plane areas.
- understand building plan, elevation and section.
- get acquainted with construction materials and transportation systems

UNIT – I: Introduction

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT – II: Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying – introduction, chain and compass traversing, closing error and adjustments. Leveling – introduction, types of leveling instruments, dumpy level, adjustment of level, leveling staff.

UNIT – III: Building Materials and Construction

Materials: Introduction to construction materials like ferrous and non ferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen.**Construction:**Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT – IV: Fire and Earthquake Protection in Building

Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials,

fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT – V: Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

UNIT – VI: Highway Engineering

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

Text Books:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

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Open Elective - I

MODELING AND SIMULATION OF ENGINEERING SYSTEMS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Familiarize with programming skills in Equation Solving Software.
- To build Graphic user interface.

Learning Outcomes:

Students will be able to

- develop a Model of a Physical System.
- develop a systematic method to simulate engineering system and asses its performance.

UNIT – I: **Variables, scripts, and operations**

Getting Started, Scripts, Making Variables, Manipulating Variables, Basic Plotting

UNIT – II: Visualization and programming

Functions, Flow Control, Line Plots, Image/Surface Plots, Vectorization

UNIT – III: Solving equations and curve fitting

Linear Algebra, Polynomials, Optimization, Differentiation/Integration, Differential Equations

UNIT – IV: Advanced methods

Probability and Statistics, Data Structures, Images and Animation, Debugging, Online Resources

UNIT – V: Symbolics, Simulink®, file I/O, building GUIs

Symbolic Math, Simulink, File I/O, Graphical User Interfaces

UNIT – VI:

Examples on statistics, optimization, plots

Text Books:

1. "Getting started with MATLAB" by Rudra pratap, Oxford University, 2002.
2. MATLAB and SIMULINK for Engineers by Agam Kumar Tyagi,OUP 2011

Reference Books:

1. Spencer, R.L. and Ware, M (2008), Introduction to MAT Lab, Brigham Young Unviersity, available online, accessed, 7, 2008.
2. David F.Griffiths, October (2012) "An introduction to MAT Lab" the Unviersity of Dundee, available online, Acessed, October 2012..

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Open Elective - I

RENEWABLE ENERGY SOURCES

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To study various types of non-conventional sources of energy and techniques used in exploiting solar, wind, tidal and geothermal sources of energy and bio-fuels.

Learning Outcomes:

StudentS will be able to

- analyze the significance of renewable energy.
- understand the principles of solar radiation and design the solar collectors.
- know the functioning of basic components of wind energy and understand the utilization of biomass in power generation.
- understand the working principles of geothermal, ocean, tidal and wave energy techniques.
- know the functioning of direct energy conversion techniques.

UNIT – I:

Introduction: Energy Sources and their availability, Role and potential of renewable source.

Principles of Solar Radiation: The solar constant, Solar Radiation outside the Earth's atmosphere, Solar Radiation at the Earth's surface, instruments for measuring solar radiation and sun shine, solar radiation data, solar radiation Geometry, solar radiation on titled surfaces with numerical problems.

UNIT – II:

Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications-solar heating/cooling technique, solar distillation, drying, photovoltaic energy conversion. Solar central power tower concept and solar Chimney

UNIT – III:

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: Bio fuels, Methods for obtaining energy from Biomass, 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. Thermal gasification of Biomass.

UNIT – IV:

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: 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, limitations, principles of DEC. Thermo-electric Power – See-beck, Peltier, joule, Thomson effects, Thermo-electric Power generators, Figure of merit, Selection of materials, applications.

UNIT – VI:

MHD power Generation: 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 law's, thermodynamic aspects, selection of fuels and operating conditions.

Text Books:

1. Tiwari and Ghosal, "Renewable energy resources", Narosa.
2. G.D. Rai, "Non-Conventional Energy Sources", Dhanpat Rai and Sons

Reference Books:

1. Twidell & Weir, "Renewable Energy Sources "
2. Sukhatme, "Solar Energy", Tata McGraw-Hill Education.
3. B.S Magal Frank Kreith & J.F Kreith, "Solar Power Engineering "
4. Frank Krieth & John F Kreider, "Principles of Solar Energy"

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Open Elective - I

ELEMENTS OF MECHANCIAL ENGINEERING
(Other than ME)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objective:

- To familiarize with the basic principles of Mechanical Engineering required in various fields of engineering.

Learning Outcomes:

Students will be able to

- understand the fundamentals of mechanical systems.
- understand and appreciate significance of mechanical engineering in different fields of engineering.

UNIT – I: Simple stress and strains

Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic Moduli & the relationship between them.

UNIT – II: Power Transmission Devices

Introduction to power transmission, belt, rope, chain and gear drives, couplings, clutches (Theoretical treatment only)

Power Transmission through Shafts: Introduction, Torsion of Circular Shafts, Torsion equation, Hollow Circular Shafts, Torsional Rigidity, Power Transmitted by the Shaft (simple Problems).

UNIT – III: Basic Manufacturing Methods

Principles of casting , green sand moulds , Advantages and applications of casting ; Principles of gas welding and arc welding, Soldering and Brazing ; Hot working – hot rolling , Cold working – cold rolling ;

UNIT – IV: Basics of Machine Tools and Engineering Materials

Basics of Machine Tools: Description of basic machine tools- Lathe – operations – turning, threading, taper turning and drilling ;

Engineering Materials : Classification of engineering material, Composition of cast iron and carbon steels on Iron-Carbon diagram and their mechanical properties. Alloy steels and their application

UNIT – V: IC Engines

Introduction , Main components of IC engines , working of 4-stroke petrol engine and diesel engine , working of 2- stroke petrol engine and diesel engine , differences between petrol and diesel engines, differences between 4- stroke and 2- stroke engines. (Theoretical treatment only)

Steam Boilers: Function, classification, differences between water and fire tube boilers, mountings and accessories with their functions, construction and working of cochran, vertical, Lancashire and Babcock & Wilcox boiler (Theoretical treatment only).

UNIT – VI:

Power Plants: Introduction, working principle of steam and gas turbine power plant, working of hydraulic turbines and pumps (Theoretical treatment only).

Refrigeration & Air conditioning: Definition – COP, Unit of Refrigeration, Applications of refrigeration system, vapour compression refrigeration system , simple layout of summer and winter air conditioning system (Theoretical treatment only).

Text Books:

1. Elements of Mechanical Engineering – R.K.Rajput, Lakmi Pub., Delhi.
2. Elements of Mechanical Engineering – D.S.Kumar, S.K. Kataria and Sons

Reference Books:

1. Elements of Mechanical Engineering – K.R.Golala Krishnan, S.Gopala Krishnana, S.C.Sharma, Subhas Stores.
2. Elements of Mechanical Engineering – S.Tryambaka Murthy, I.K. International publishing house pvt. Ltd.

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Open Elective - I

COMPUTER NETWORKS
(Other than CSE & IT)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with different transmission media.
- To gain knowledge of various protocols used for efficient transmission of data over network.

Learning Outcomes:

Students will be able to

- understand basic network topologies.
- choose appropriate transmission media for establishing a network.
- differentiate various data link layer protocols.
- choose appropriate routing algorithm suitable for the network for an organization.
- differentiate various transport layer protocols.
- analyze the type of network used in an organization.

UNIT – I: Introduction

OSI, TCP/IP, Examples of Networks: Novel Networks, Arpanet, Internet, Network Topologies, Classification of networks: LAN, MAN, WAN.

UNIT – II: Physical Layer

Transmission media- copper, twisted pair, wireless, switching and encoding asynchronous communications, Narrow band, broad band ISDN.

UNIT – III: Data link layer & Medium Access sub layer

Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Data link layer in HDLC, Slip, and PPP.

Medium Access sub layer: ALOHA, Carrier sense multiple access. IEEE 802.x Standards, wireless LANs. Bridges

UNIT – IV: Network Layer

Virtual circuit and Datagram subnets, Routing algorithms- shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing, congestion control algorithms.

UNIT –V: Transport Layer

Transport Services, TCP, SCTP and UDP protocols.

UNIT – VI: Application Layer

Domain name system, SNMP, Electronic Mail, WWW

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/ PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

Refence Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

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Open Elective - I

OBJECT ORIENTED PROGRAMMING
(Other than CSE & IT)

III Year – I Semester

Lecture	: 2 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To get acquainted with the concepts of object-oriented programming.
- To create GUI using AWT components

Learning Outcomes:

Students will be able to

- understand the programming constructs of JAVA.
- apply concepts of inheritance.
- implement interfaces and packages through JAVA.
- simulate the concept of multi threading.
- handle run time errors.
- design and implement an effective GUI for various applications.

UNIT – I: Fundamentals of OOP and Java

Need of OOP, Principles of OOP Languages, Procedural Languages vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features.

Java Programming constructs: variables, primitive data types, identifiers, keywords, literals, operators, arrays, type conversion and casting,

UNIT – II: Class Fundamentals and Inheritance

Class fundamentals, declaring objects, methods, constructors, this keyword, garbage collection, overloading methods and constructors, argument passing, recursion, access control.

Inheritance- Basics, types, using super keyword, method overriding, dynamic method dispatch, abstract classes, using final with inheritance, object class, string class.

UNIT – III: Interfaces and Packages

Interfaces: Defining an interface, implementing interfaces, nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Packages: Defining, creating and accessing a package.

UNIT – IV: Exception Handling and Multithreading

Exception Handling- exception-handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, java's built-in exceptions, user-defined exception sub classes.

MultiThreading- differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT – V: Applets and Event Handling

Applets- Concepts of Applets, differences between applets and applications, life cycle of an applet, creating applets.

Event Handling- Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

UNIT – VI: AWT

The AWT class hierarchy, user interface components- label, button, checkbox, checkboxgroup, choice, list, scrollbar, menubar, layout managers –Flow, Border, Grid, Card, GridBag.

Text Books:

1. Herbert schildt, Java The complete reference, TMH, 7th edition.
2. Sachin Malhotra, Saurabh choudhary, Programming in JAVA, Oxford.

Reference Books:

1. Joyce Farrel, Ankit R.Bhavsar, JAVA for Beginners, Cengage Learning, 4th edition.
2. Y.Daniel Liang, Introduction to Java Programming, Pearson, 7th edition.
3. P.Radha Krishna, Object Oriented Programming Through Java, Universities Press.

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Open Elective - I

DATA STRUCTURES USING C
(Other than EEE, ECE, CSE & IT)
III Year – I Semester

Lecture	: 2 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of linear and non-linear data structures.
- To familiarize with different sorting and searching techniques.

Learning Outcomes:

Students will be able to

- implement single, circular and double linked list.
- implement stacks and queues using arrays and linked lists.
- implement various operations on binary trees.
- apply appropriate sorting and searching techniques for the given data.
- implement various operations on Graphs.

UNIT – I: Linked lists

Introduction- Concept of data structures, overview of data structures, implementation of data structures.

Linked Lists- Single linked list, Circularlinked list, Double linked list, Circular double linked list.

UNIT – II: Stacks

Representation using Arrays and Linked List, operations on stack, factorial calculation, evaluation of arithmetic expression.

UNIT – III: Queues

Representation using Arrays and Linked List, operations on queue, circular queue, queue using stack.

UNIT - IV: Trees

Binary Trees: Basic tree concepts, Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, threaded binary tree.

Binary search trees: Basic concepts, BST operations: Search, insertion, deletion and traversals, Creation of binary search tree from in-order and pre (post)order traversals.

UNIT - V: Sorting and Searching

Searching: Linear Search, Binary Search, Fibonacci search.

Sorting (Internal): Basic concepts, Sorting by: insertion (Insertion sort), selection (selection sort), exchange (Bubble sort, quick sort), distribution (radix sort) and merging (merge sort).

UNIT - VI: Graphs

Basic concepts, representations of graphs, operations on graphs- vertex insertion, vertex deletion, find vertex, edge addition, edge deletion, graph traversals (BFS & DFS).

Text Books:

1. Debasis samanta, Classic Data Structures, PHI, 2nd edition, 2011.
2. Richard F, Gilberg , Forouzan, Data Structures, 2nd edition, , Cengage.

Reference Books:

1. Seymour Lipschutz, Data Structure with C, TMH.
2. G. A. V. Pai, Data Structures and Algorithms, TMH, 2008.
3. Horowitz, Sahni, Anderson Freed, Fundamentals of Data Structure in C, University Press, 2nd edition.

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Open Elective - I

CYBER LAWS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To expose the need of cyber laws to prosecutecybercrimes in the society.
- To understand the IT ACT 2000 for Cyber Crime and Cyber Justice.
- To introduce the Criminal Activities based on Internet.
- To familiarize various Licensing Issues Authorities for Digital Signatures.

Learning Outcomes:

Student will be able to

- outline the pros and cons of Internet.
- operate on Confidential data in a precautious manner.
- demonstrate about the Criminal Justice in India and its Implications.
- define the Cyber Consumers under the consumer Protection Act.
- devise the legal framework for Confidential Information.
- outline e-commerce issue for copyright protection and Defend Personal Data from being hacked.

UNIT – I: The IT Act, 2000- A Ccritique

Crimes in this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce?, Forgetting the Line between Cognizable and Non - Cognizable Officers, Arrest for "About to Commit" an Offence Under the IT Act, A Tribute to Darco, Arrest But No Punishment.

UNIT – II: Cyber Crime and Criminal Justice

Penalties, Adjudication and Appeals Under the IT Act, 2000: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber fraud and Cyber Cheating, Virus on Internet Deformation, Harassment and E- mail Abuse

UNIT – III: Cyber Pornography

Cyber Pornography, Other IT Offences, Monetary Penalties, Adjudication and Appeals Under IT Act 2000, Network Service Providers, Jurisdiction and Cyber Crimes, Nature of Cyber Criminality Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications.

UNIT – IV: Digital Signatures, Certifying Authorities and e-Governance

Introduction to Digital Signatures, Certifying Authorities and Liability in the Event of Digital Signature compromise, E - Governance in the India. A Warming to

Babudom, Are Cyber Consumers Covered under the Consumer Protection, Goods and Services, Consumer Complaint Defect in Goods and Deficiency in Services Restrictive and Unfair Trade Practices

UNIT – V: Traditional Computer Crime

Early Hacker and Theft of Components Traditional problems, Recognizing and Defining Computer Crime, Phreakers: Yesterday's Hackers, Hacking, Computers as Commodities, Theft of intellectual Property

UNIT – VI: Web Based Criminal Activity

Interference with Lawful Use of Computers, Malware, DoS (Denial of Service) and DDoS (Distributed Denial of Service) Attacks, Spam ,Ransomware and Kidnapping of Information, Theft of Information, Data Manipulation, and Web Encroachment Online Gambling Online Fraud, Securities Fraud and stock Manipulation, Ancillary crimes

Text Books:

1. Vivek Sood, " Cyber Law Simplefied", Tata McGraw Hill.
2. Marjie T. Britz, "Computer Forensics and Cyber Crime", Pearson

Reference Book:

1. Cyber Laws Texts and Cases, Ferrera, CENGAGE.

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Open Elective - I

OPEN SOURCE SOFTWARE

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the opportunities for open source software in the global market.
- To familiarize the different steps in implementing the open source.

Learning Outcomes:

Students will be able to

- analyze the open source software need and applications.
- explain LINUX operating systems concepts.
- work with MySQL database.
- design and develop a web application using PHP.

UNIT – I: Introduction

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources–Application of Open Sources.

UNIT – II: LINUX

LINUX Introduction – General Overview – Kernel Mode and user mode , Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux.

UNIT – III: Introduction to MySQL

MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time

UNIT – IV: Working with MySQL

Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web.

UNIT – V: Open Source Programming Languages

PHP- Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage

UNIT – VI: PHP and SQL

PHP and SQL database –PHP and LDAP – PHP Connectivity – Sending and receiving E-mails –Debugging and error handling – Security – Templates.

Text Books:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications,2003.
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002

Reference Books:

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002.
1. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
3. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw –Hill Publishing Company Limited, Indian Reprint 2009.

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Open Elective - I

FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS
(Other than CSE & IT)

III Year – I Semester

Lecture	: 2 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To introduce the database management systems and applications, Database System Architectures.
- To expose E- R Modeling and Design.
- To explain Relational Data Model and Relational Algebra.
- To demonstrate Structured Query Language and apply different operations on Database.
- To explain Transaction management.

Learning Outcomes:

Students will be able to

- develop Conceptual(ER- modeling) and Logical models specified requirements of data base.
- describe the basics of SQL. Can construct tables and answer queries using SQL.
- perform Schema refinement.
- interpret the basic issues of transaction processing.

UNIT – I: Introduction to Database

Purpose of Database Systems Vs File System, Data Models, Schema and instances, DBMS Architecture, E- R Model- Attributes and Keys, Relationship Types, Weak Entity set, Strong Entity Set.
(Practice: Execute DDL, DML, DCL and TCL Commands.)

UNIT – II: Enhanced E–R Modeling

Specialization and Generalization, Database design for Banking Enterprise, Relational model concepts, constraints.
(Practice:. Execute basic SELECT operations.)

UNIT – III:SQL

DDL, DML, DCL, Set operations, Aggregate Functions, Null values, Nested queries. Defining different constraints on a table, apply joins on tables, Creating Views and Indices.
(Practice: Execute a single line and group functions for a table, set operations on various Relations.)

UNIT – IV: Database Bottom Up Design

Functional Dependencies and Normalization for Relational Databases: Informal design guidelines for relation schemes, Functional dependencies,
(Practice: Execute Orderby, Groupby clause on various Relations)

UNIT – V: Normal forms

First, second and third normal forms, Boyce- Cod normal form, Multi valued & Join Dependencies, 4th & 5th Normal forms.
(Practice: Implement the following Integrity Constraints
a. Primary Key b. Foreign Key c. Unique d. Not NULL and Check.)

UNIT – VI: Transaction Management

Transaction concept, ACID properties, Concurrent execution of transactions
(Practice: Execute Nested Queries)

Text Books

1. Korth & Sudarshan *Database system concept*, TMH.
2. Raghu Ramakrishnan, Johannes Gehrke *Database Management Systems,* TMH

Reference Books

1. Peter Rob & C Coronel *Database Systems design, Implementation, and Management*, 7th Edition.
2. Elmasri Navrate *Fundamentals of Database Systems* , Pearson Education.
3. C.J.Date *Introduction to Database Systems,* Pearson Education.

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Open Elective - I

FUZZY MATHEMATICS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To know the fundamentals of fuzzy algebra.
- To know the basic definitions of fuzzy theory.
- To know the applications of fuzzy Technology.

Learning Outcomes:

Students will be able to

- understand the fundamentals of fuzzy algebra.
- apply fuzzy logic.

UNIT – I:

Introduction – Fuzzy subsets – Lattices and Boolean Algebras – L fuzzy sets.

UNIT – II:

Operations on fuzzy - α levels sets – properties of fuzzy subsets of a set. Sections 1.1-1.10.

UNIT – III:

Algebraic product and sum of two fuzzy subsets – properties satisfied by addition and product – Cartesian product of fuzzy subsets. Sections 1.11 -1.13.

UNIT – IV:

Introduction – Algebra of fuzzy relations – logic – connectives. Sections 2.1-2.4.

UNIT – V:

Some more connectives – introduction – fuzzy subgroup – homomorphic image and Pre-image of subgroupoid. Sections 2.5,3.1-3.3.

UNIT – VI:

Fuzzy invariant subgroups - fuzzy subrings. Section 3.4 and 3.5.

Text Books:

1. Recommended Text S.Nanda and N.R.Das "Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

Reference Books:

1. Fuzzy Logic with Engineering Applications, Second Edition, Wiley Publications, Timothy J.Ross.
2. Fuzzy Set Theory and Its Applications, Fourth Edition,Yes Dee Publishing Pvt. Ltd., Springer, H.-J. Zimmermann.

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PULSE AND DIGITAL CIRCUITS LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the working non linear circuits for different input waveforms.
- To familiarize the students with functional verification of various digital circuits

Learning Outcomes:

Students will be able to

- design different RC differentiator and integrator circuits.
- understand the application of clippers, clampers and Multivibrator.
- familiarize with the various basic and universal logic gates.
- understand the functionality of various combinational digital circuits.

List of Experiments:

1. Analysis, design and test low pass and high pass RC circuits for the given cut-off frequency.
2. Analysis, design and test Clipper circuits.
3. Analysis, design and test Clamper circuits.
4. Design of Astable Multivibrator for the given specifications.
5. Design of MonoMultivibrator for the given specifications.
6. Identify stable states in Bistable Multivibrator.
7. Implement the given logic expression by using universal GATES.
8. Design and verify truth table of full adder using two half adders.
9. Implement the given logic expression by using multiplexer.

Reference Books:

1. Jacob Millman and Herbert Taub, “Pulse, Digital and Switching Waveforms”, TMH, 1st Edition.
2. David A.Bell, “Solid State Pulse Circuits”, PHI, 1st Edition.
3. Ronald J.Tocci, “Fundamentals of Pulse and Digital Circuits”, PHI 3rd Edition.
4. Briton B.Ritcheel, Holt Rinehart and Winston,”Semiconductor Pulse Circuits”, 1st Edition.
5. M. Morris Mano, “Digital design”, 2nd edition PHI.
6. John F. Wakerly, “Digital design Principles & Practices”,3rd Edition updated, Pearson Education.

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DIGITAL COMMUNICATIONS LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with A/D conversion and Digital Modulation techniques.
- To find the error detection & correction capabilities of linear block, cyclic and Convolution codes.

Learning Outcomes:

Students will be able to

- verify PCM and calculate analog to digital conversion error.
- verify Frequency Shift Keying and Phase Shift Keying functionality in time domain, companding scheme.
- design, analyze and test linear block, cyclic and convolution encoders and decoders.
- write and prepare a lab report that details experimental procedures and results.
- work in a team using available resources to test various circuits.

List of Experiments:

1. Time division multiplexing.
2. Pulse code modulation.
3. Delta modulation.
4. Phase shift keying.
5. Analyze and test of Differential Pulse Code Modulation.
6. Frequency Shift Keying.
7. Differential phase shift keying.
8. Source Encoding & Decoding.
9. Design, analyze and test Linear Block Encoder and Decoder.
10. Design, analyze and test Binary Cyclic Encoder and Decoder

Reference Books:

1. Simon Haykin , “Digital Communications” John Wiley, 2005.
2. H. Taub and D. Schilling , “Principles of Communication Systems” , TMH, 2003.
3. Sam Shanmugam, “Digital and Analog Communication Systems”, John Wiley, 2005.
4. John Proakis, “Digital Communications”,TMH, 1983.
5. B.P.Lathi, “Modern Analog and Digital Communication”, Oxford reprint, 3rd Edition, 2004.

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MICROPROCESSORS AND INTERFACING LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objective:

- To introduce the assembly language programming concepts and interfacing with 8086 processor.

Learning Outcomes:

Students will be able to

- perform various arithmetic and shift operations with 8086 based system.
- perform various string operations using 8086.
- interface various I/O modules with 8086 based system.

List of Experiments:

1. Write an ALP in 8086 for arithmetic operations-addition, subtraction, multiplication and division on multi-byte numbers.
2. Write an ALP in 8086 to find the factorial of an 8-bit number.
3. Write an ALP in 8086 to sort an array of 8-bit numbers using bubblesort algorithm.
4. Write an ALP in 8086 to convert BCD number to ASCII number and Vice-versa.
5. Write an ALP in 8086 for string operations like string concatenation, comparison,swapping.
6. Write an ALP in 8086 to count even and odd numbers in a given series of 16-bit numbers.
7. DOS Programming-Reading the characters from keyboard,Display the characters on CRT screen.
8. Write an ALP for interfacing ADC module with 8086.
9. Implement the functionalities of 2's complement, 3x8 decoder by interfacing DIDO module with 8086.
10. Write an ALP for square wave generation, with different frequencies and duty cycles.
11. Interfacing Stepper motor to 8086 and rotating it as per the given requirements.

Reference Books:

1. D. V. Hall, "Microprocessors and Interfacing", TMGH,2nd Edition 2006.
2. Barry B.Brey , "The Intel Microprocessors", PHI, 7th Edition 2006.

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DIGITAL SIGNAL PROCESSING

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of frequency domain representation of discrete time signals.
- To familiarize with the designing of digital filters and their realization.

Learning Outcomes:

Students will be able to

- understand discrete time signals and sytems and apply Convolution and Correlation techniques on discrete time signals.
- represent the discrete time signals in frequency domain.
- apply FFT algorithms to different signal processing applications.
- apply Z-Transform for different signals and design and realize digital filters.

UNIT – I: Discrete Time Signals and Systems

Introduction to Digital Signal Processing, Discrete time signals- Classification, Elementary discrete time signals, Basic operations on Sequences; Discrete time Systems-Classification, Discrete time Linear Time Invariant Systems and their Properties.

UNIT – II: Convolution And Correlation and Discrete Fourier Series

Convolution And Correlation: Convolution sum, Cross Correlation and auto correlation of discrete time signals and their properties.

Discrete Fourier Series: Fourier Series for discrete time periodic signals, Properties, Power Density Spectrum, Fourier Transform for discrete time aperiodic signals, Properties, Convergence, Energy Density Spectrum, Relationship of Fourier transform to Z transform, Frequency Response.

UNIT – III: Discrete Fourier Transform

Frequency Sampling- Discrete Fourier Transform (DFT), DFT as a Linear Transformation, Properties of DFT, Linear Convolution of sequences using DFT, Relationship between DFT and Z transform.

UNIT – IV: **Fast Fourier Transforms (FFT)**

Fast Fourier Transform-Radix-2 decimation in time and in frequency FFT algorithms, IDFT using FFT algorithms, FFT for composite N.

UNIT – V: Z-Transform and Design of IIR Filters

Z-TRANSFORM: Z-Transform of sequence, Properties of ROC, Properties of Z transform, Inverse Z transform- Long division, residue, partial fraction and convolution methods; Relationship between S- and Z-planes.

Design of IIR Filters: Analog filter approximation-Butterworth and Chebyshev (Type-I) filters, Design of IIR filters from analog filters- Approximation of derivatives, Impulse Invariant technique, Bilinear transformation, Matched Z transform.

UNIT – VI: Design of FIR Filters and Realization of Digital Filters

Design of FIR Filters: Linear Phase FIR filters-Frequency Response, Fourier Series Method of designing FIR filter, Design of FIR filters using Windows (Rectangular, Bartlett, Raised Cosine, Hamming, Hanning and Blackman), Frequency Sampling Method of designing FIR filters (Type I).

Realization of Digital Filters: Realization of IIR Filters**-** Direct form I, II, Transposed form, Parallel form, Realization of FIR Filters**-** Transversal Structure, Cascade Realization, Linear Phase Realization

Text Books:

1. John G. Proakis,Dimitris G.Manolakis, “Digital Signal Processing, Principles, Algorithms, and Applications”, Pearson Education / PHI, 2013.

Reference Books:

1. A.V.Oppenheim and R.W. Schaffer, “Discrete Time Signal Processing”, PHI.
2. Andreas Antoniou, “Digital Signal Processing”, TATA McGraw Hill, 2006.
3. MH Hayes, “Digital Signal Processing”, Schaum’s Outline series, TATA Mc-Graw Hill, 2007.

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VLSI DESIGN

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce about Planar technology, electrical properties of MOS, CMOS and BiCMOS circuits.
- To familiarize with VLSI design steps and chip design methodologies.

Learning Outcomes:

Students will be able to

- understand about IC fabrication technology and various electrical properties of MOS, CMOS and BiCMOS circuits.
- design various logic circuits using MOS and CMOS transistors.
- understand chip design methods.
- synthesize digital circuits using VHDL.

UNIT – I: Introduction to IC Technology

IC Era, An overview of silicon semiconductor technology, Fabrication processing steps for Bipolar and MOS transistors (NMOS, PMOS, CMOS and BiCMOS).

UNIT – II: Basic Electrical Properties of MOS, CMOS and BICMOS Circuits

Threshold Voltage Vt, I_{ds} -V_{ds} relationship, Transconductance g_m, Output conductance g_{ds}, Figure of merit ω_0; MOS, CMOS and BiCMOS inverters, Z_{pu}/Z_{pd} ratios of inverters, Latch-up in CMOS circuits.

UNIT – III: MOS and BICMOS Circuit Design Processes

VLSI circuit design process, MOS layers, Stick and layout representations of layers, Lambda and Micron based Design rules, Stick and Layout diagrams.

UNIT – IV: Basic Circuit Concepts and Scaling of MOS Circuits

Sheet resistance, R_s concept applied to MOS transistors and inverters, Area capacitance of layers, Standard unit of capacitance, Wiring capacitances, Delay unit and Inverter delays, scaling models and factors, scaling factors for device parameters, limitations of scaling.

UNIT – V: Sub System Design and Chip Design Methodologies

Switch logic, General considerations of design process, General arrangement of a 4-bit arithmetic processor, Design of a 4-bit shifter, Full custom Design, Semicustom Design-Standard cells, Gate arrays; Programmable designs- Basic structures of CPLD and FPGA.

UNIT – VI: High Level Design Flow

Design flow, RTL simulation, Logic synthesis, Functional gate level verification, Place and Route, Post layout timing simulation, Static timing, VHDL synthesis programming approach, Design example for Voice mail controller.

Text Books:

1. Kamran Eshraghian, Douglas A Pucknell and Sholeh Eshraghian, "Essentials of VLSI Circuits and Systems", Prentice-Hall of India, 2005 Edition. (Units- I to V)
2. Douglas L Perry, "VHDL Programming by Example", 4th Edition, TMH Publishers, 2003. (Unit-VI)

Reference Books:

1. Carver Mead, Lynn Conway, "Introduction to VLSI Systems", Addison-Wesley, 1978.
2. Weste, Neil H.E, "Principles of CMOS VLSI Design", 2nd Edition.
3. John F.Wakerly, "Digital Design Principles and Practice", 3rd Edition.

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MICROWAVE AND OPTICAL COMMUNICATIONS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives :

- To introduce the microwave components and measurement of power, attenuation, frequency and VSWR using microwave bench.
- To familiarize with different types of optical fibers, light sources and detectors.

Learning Outcomes:

Students will be able to

- understand the principles and characteristics of various microwave components.
- demonstrate the use of microwave bench for calculating power, attenuation, frequency and VSWR.
- understand the basic concepts of fiber optics.
- understand the principles, structures and characteristics of light sources and detectors.

UNIT – I: Introduction to Microwave Components

Microwave frequencies and Applications, Waveguide Attenuators – Resistive Card and Rotary Vane types; Calculation of scattering matrix for E plane, H plane, Magic Tee and Directional Coupler; Ferrite Components – Gyrator, Isolator, Circulator.

UNIT – II: Microwave Tubes

Classification of Microwave Tubes, Two Cavity Klystron – Structure, Velocity Modulation Equation, Applegate Diagram; Reflex Klystron – Structure, Applegate Diagram; Travelling Wave Tube – Structure, Amplification Process; 8-Cavity Cylindrical Travelling Wave Magnetron operation.

UNIT – III: Microwave Solid State Devices and Measurements

Gunn Diode – Principle, RWH Theory; IMPATT Diode, Description of Microwave Bench, Measurement of Attenuation, Frequency, VSWR and Power using Microwave Bench.

UNIT – IV: Overview of Optical Fibers

The evolution of fiber optic systems, elements of an optical fiber transmission link, Optical Fiber **s**tructures, Nature of light, Basic optical laws and definitions, optical fiber modes and configurations.

UNIT – V: Optical Sources

LEDs- structures, quantum efficiency, modulation capability; Laser diodes- principle, threshold conditions, external quantum efficiency, resonant frequencies, structures.

UNIT – VI: Photo Deterctors

Photodiodes – Principle, PIN and avalanche photo diodes; comparison of photo detectors, noise in photo detectors.

Text Books:

1. Samuel Y. Liao, "Microwave Devices and Circuits", PHI, 3rd Edition,1994.(Units - I to III).
2. Gerd Keiser, "Optical fiber communications ",3rded.,MGH. (Units -IV to VI).

Reference Books:

1. R.E. Collin, "Foundations for Microwave Engineering", IEEE Press, John Wiley, 2nd Edition, 2002.
2. Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, "Microwave Principles", CBS Publishers and Distributors, New Delhi, 2004.
3. Djafar K. Mynbaev and Lowell L. Scheiner, "Fiber Optic Communication Technology", Pearson Education Asia.

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Elective - I

DIGITAL SWITCHING AND MULTIPLEXING

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the operational characteristics of switching techniques.
- To introduce the concepts of working of different Switching types and networks, Digital Subscriber Access.
- To familiarize with the digital transmission systems.

Learning Outcomes

Students will be able to

- understand the operational characteristics of switching techniques.
- understand the working concept of Digital Subscriber Access and transmission systems.
- analyze digital network traffic.

UNIT – I: Introduction to Switching and Transmission Systems

Analog network Hierarchy, Switching systems, Transmission systems, Signaling, analog interfaces, Digital network evolution, Advantages and disadvantages of digital voice networks.

UNIT – II: Digital Transmission and Multipexing

Pulse Transmission, Asynchronous versus synchronous transmission, Time Division Multiplexing, Time Division Multiplex loops and rings.

UNIT – III: Digital Switching

Switching functions, space division switching, Time division switching, 2-D switching, Digital switching in an analog environment.

UNIT – IV: Fiber Optic Transmission Systems

Fiber optic transmission system elements, Wavelength division Multiplexing, SONET/SDH multiplexing, SONET frame format, payload framing, virtual tributaries, SONET optical standards, SONET networks, SONET rings.

UNIT – V: Digital Subscriber Access

ISDN basic rate access architecture, S/T interface, ISDN U interface, ISDN D interface, digital subscriber loops, Digital loop carrier systems, Hybrid fiber Coax systems, Voice band Modems.

UNIT – VI: Digital Mobile Telephony and Traffic Analysis

Digital cellular, Global system for mobile communications, CDMA cellular, Traffic characterization, Network blocking probabilities.

Text Books:

1. Jhon C Bellamy, "Digital telephony", 3rd edition, Wiley 2009. (All units).
2. Marion cole,"Introduction to Telecommunications Voice, Data and the Internet" ,2nd Edition, (Unit -I).

Referene Books:

1. Wayne Tomasi, "Advanced electronic communication systems", PHI,2004.
2. Tarmo Anttalainen , "Introduction to Telecommunications Network Engineering", 2nd Edition, Artech house, INC. 2003.

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Elective - I

COMPUTER NETWORKS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the principles and functionality of layered network architecture in computer networking.
- To familiarize with the ethical, legal, security, and social issues related to computer networking.

Learning Outcomes:

Students will be able to

- identify the issues and challenges in the architecture of a computer network.
- understand the ISO/OSI layers in a network.
- apply protocols to different layers of a network hierarchy.
- recognize security issues in a network.

UNIT – I: Physical Layer

Introduction to computer networks; Network Topologies- WAN, LAN, MAN; Network software- Protocol Hierarchies, Design issues for the layers, connection oriented and connection less services, Service primitives, relationship of services to protocols; Reference models- OSI, TCP/IP, ATM; Switching- circuit, message, packet; guided transmission media.

UNIT – II: Ddata Link Layer

Design issues- services provided to the network layer, framing, error control, flow control; Error detection and correction, Elementary data link protocols- simplex, stop and wait (two versions), Sliding Window Protocols- A one bit, Go back N, Selective repeat; HDLC, PPP.

UNIT – III: MAC Sub Layer

Multiple access protocols- ALOHA, carrier sense multiple access, IEEE 802.3(Ethernet), IEEE 802.4(Token Bus), IEEE 802.5(Token Ring); networking devices- Repeaters, Bridges; Internetworking Devices- Routers, Gateways.

UNIT – IV: Network Layer

Network layer design issues, routing algorithms- shortest path, flooding, distance vector, link state protocol, hierarchical, broadcast and multicast; Congestion control algorithms- principles, prevention policies, congestion control in virtual-circuit

subnets and datagram subnets; Quality of service- requirements, techniques for good QoS, integrated and differentiated services.

UNIT – V: Dynamic Routing

Internet working, The network layer in the internet- IP protocol (both versions), IP addresses, CIDR, NAT; Internet control protocols- ICMP, ARP.

Transport Layer- services provided to the upper layers, transport service primitives; Elements of transport protocols- addressing, connection establishment, connection release, flow control and buffering, multiplexing, crash recovery; the internet transport protocols- UDP, TCP; ATM and AAL Layer Protocols.

UNIT – VI: Application Layer

Domain name system, SNMP, Electronic Mail, Cryptography- substitution ciphers, transposition ciphers, fundamental cryptographic principles; Symmetric key algorithm- data encryption standard (DES); Public key algorithm- RSA.

Text Books:

1. Andrew S Tanenbaum, “Computer Networks”, 4th Edition, PHI.

Reference Books:

1. Behrouz A. Forouzan, “Data Communications and Networking”, 5th Edition TMH.
2. W.A. Shay, Thomson,”Understanding communications and Networks”, 3rd Edition.

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Elective - I

ARTIFICIAL NEURAL NETWORKS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with concepts of neural networks.
- To introduce supervised and unsupervised learning and associative models of neural networks.

Learning Outcomes:

Students will be able to

- understand architecture and functions of neural networks
- perform supervised and unsupervised learning of neural networks in different applications.
- understand associative memories of neural networks.
- apply neural networks in optimization methods

UNIT – I: Introduction to Neural Networks

Structure and functions of biological and artificial neuron, Neural network architectures, Learning methods, evaluation of neural networks.

UNIT – II: Supervised Learning - Single Layer Networks

Perceptrons, Linear separability, Perceptron training algorithm, Termination criterion, Choice of learning rate, non numeric inputs, Guarantee of Success, Modifications-Pocket algorithm, Adalines, Multi class discrimination.

UNIT – III: Supervised Learning - Multi Layer Networks - I

Multilevel discrimination, Architectures, Objectives, Back propagation algorithm, Setting the parameter values: Initialization of weights, Frequency of weight updates, Choice of learning rate, momentum, Generalizability, Number of hidden layers and nodes, Number of Samples.

UNIT – IV: Supervised Learning - Multi Layer Networks - II

Madalines, Adaptive multilayer networks-Network pruning algorithm, Marchanos algorithm, prediction networks- recurrent networks and feed forward networks, Radial basis functions, Polynomial networks.

UNIT – V: Unsupervised Learning

Winner–Take- All networks - Hamming network, Max Net; learning vector quantizers , Counter propagation networks, adaptive resonance theory.

UNIT – VI: Associative Models

Non interactive procedures for associate, Hopfield networks-discrete hop field network storage capacity of hop field network, Continuous hop filed network, Brain state in a box network, Boltzman machines. Optimization using Hopfield network-Travelling Salesman problem, solving simultaneous linear equations.

Text Books:

1. J.M. Zurada, " Introduction to Artificial Neural Systems", Jaico Publications. (Unit-I).
2. Kishan Mehrotra, Chelkuri K. Mohan, Sanjav Ranka, "Elements of Artificial Neural Networks", Penram International. (Units- II to VI).

Reference Books:

1. B. Yegnanarayana, "Artificial Neural Networks", PHI, New Delhi.
2. Waserman, "Neural Computing – Theory and Practice".

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Elective - I

ELECTRONIC SYSTEM DESIGN

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the design issues and techniques of practical electronic systems.
- To familiarize with the packaging, ESD protection, and Heat sink requirements.

Learning Outcomes:

Students will be able to

- understand the design issues of instrumentation amplifier and Interface ADC and DACs with Microcontroller.
- understand the Electrical characteristics and interfacing issues of TTL and CMOS logic families.
- understand the ESD protection and Packaging issues and Electromagnetic Compatibility and Heat sink requirements.
- design active filters.

UNIT – I: Analog and Mixed Signal Circuit Design Issues and Techniques- I

ADCs and DACs- Selecting an ADC and DAC, interfacing to microcontrollers, Power supplies: Characteristics, design of regulated power supply using IC 723.

UNIT – II: Analog and Mixed Signal Circuit Design Issues and Techniques- II

Review of op-amp characteristics, Properties of a high quality instrumentation amplifier using op-amp, Design issues affecting dc accuracy and error budget analysis in instrumentation amplifier applications, Isolation amplifier basics.

UNIT – III: Logic Circuit Design Issues and Techniques

Electrical behavior (steady state and dynamic) of CMOS and BiCMOS family logic devices, Benefits and issues on migration of 5-volt and 3.3 volt logic to lower voltage supplies, CMOS/TTL Interfacing, Basic design considerations for live insertion, JTAG/IEEE1149.1 design considerations.

UNIT – IV: Introduction to Protection against Electrostatic Discharges (ESD) and Packaging

Static generation, human body model, static discharge, ESD protection in equipment design, software and ESD protection, ESD versus EMC, Packaging and Enclosures of Electronic System- Effect of environmental factors on electronic

system (environmental specifications), nature of environment and safety measures; Packaging influence and its factors.

UNIT – V: Introduction to Electromagnetic Compatibility (EMC) and Cooling in Electronic System

Capacitive coupling, effect of shield on capacitive coupling, inductive coupling, effect of shield on inductive coupling, effect of shield on magnetic coupling, magnetic coupling between shield and inner conductor, shielding to prevent magnetic radiation, Heat transfer, approach to thermal management, mechanisms for cooling, operating range, basic thermal calculations, cooling choices, heat sink selection.

UNIT – VI: Filtering in Electronic Systems

Balancing, power line filtering, power supply decoupling, decoupling filters, high frequency filtering, system bandwidth, Active filers- design of low pass, high pass and band pass filters.

Text Books:

1. Robert F.Coughlin,"Operational Amplifiers and Linear Integrated Circuits", 3rd Edition, Prentice Hall International, Inc. (Units–I, II & VI).
2. John F. Wakerly,"Digital Design Principles& Practices", 3rd Edition, Prentice Hall International, Inc. (Units –III & IV).
3. Henry W.Ott, JohnWiley & Sons,"Noise Reduction Techniques in Electronic Systems", 2nd Edition. (Units –IV & V)

Reference Books:

1. S Sedra and KC Smith, "Microelectronic Circuits", Oxford, 1998.
2. Mark.T Thompson,"Intuitive Analog Circuit Design", Published by Elsevier.

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Open Elective - II

DISASTER MANAGEMENT

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about disaster occurrence, strategies and remedial measures.

Learning Outcomes:

Students will be able to

- explain the aspects of disaster management and adopt remedial measures.
- access the impact of hazards on structures.
- explain the vulnerability conditions.
- adopt the rehabilitation procedures.

UNIT – I: Introduction

Concept of Disaster Management. Types of Disasters. Disaster mitigating agencies and their organizational structure at different levels.

UNIT – II: Overview of Disaster Situations in India

Vulnerability of profile of India and Vulnerability mapping including disaster – pone areas, communities, places. Disaster preparedness – ways and means; skills and strategies; rescue, relief reconstruction. Case Studies: Lessons and Experiences from Various Important Disasters in India

UNIT – III: Flood and Drought Disaster

Raising flood damage, assessing flood risk, flood hazard assessment, flood impact assessment, flood risk reduction options. Drought and development, relief management and prevention, drought mitigation and management- integrating technology and people.

UNIT – IV: Landslide and Earthquake Disaster

Land slide hazards zonation mapping and geo environmental problems associated with the occurrence of landslides. The use of electrical resistivity method in the study of landslide. Studies in rock mass classification and land slide management in a part of Garwal-Himalaya, India. Causes and effects of earth quakes. Secondary effects. Criteria for earthquake resistant design.

UNIT – V: Cyclone and Fire Disaster

Cyclone occurrence and hazards. Cyclone resistant house for coastal areas. Disaster resistant construction role of insurance sector. Types of fire. Fire safety and fire fighting method, fire detectors , fire extinguishers.

UNIT – VI: Rehabilitation

Rehabilitation programmes, Management of Relief Camp, information systems & decision making tools

Text Books:

1. Disaster Management, RB Singh (Ed), Rawat Publications, 2000.
2. Disaster Management Future Challenges and Opportunities, jagbir singh, I.K international publishing house

Reference Books:

1. Natural Hazards in the Urban habitat by Iyengar, CBRI, Tata McGraw Hill
2. Natural Disaster management, Jon Ingleton (Ed), Tulor Rose, 1999
3. Anthropology of Disaster management, Sachindra Narayan, Gyan Publishing house, 2000.

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Open Elective - II

SOLID WASTE MANAGEMENT
(Other than CE)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about Solid Waste management
- To describe the collection, treatment and disposal methods of Solid waste

Learning Outcomes:

Students will able to

- identify the types and sources of solid waste, and its characteristics.
- employ the treatment and disposal methods of solid waste.
- apply the concepts of solid waste management.

UNIT – I: Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes-Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics- Problems due to improper disposal of solid waste.

UNIT – II: Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes-Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT – III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid waste-Processing and segregation of the solid waste- various methods of material segregation.

UNIT – IV: Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition-methods of composting-advantages of composting- Incineration: definition-methods of incineration advantages and disadvantages of incineration.

UNIT – V: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification-Design and Operation of landfills, Land Farming, Deep well injection.

UNIT – VI: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Refence Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

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Open Elective - II

ENERGY AUDIT, CONSERVATION AND MANAGEMENT

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of Energy Auditing and Management.
- To familiarize the various Techniques of Electrical Energy Conservation.

Learning Outcomes:

Students will be able to

- understand the Process of Energy Audit of Industries.
- apply the concepts of Energy management for Efficient Energy Utilization and Conservation.
- identify a suitable method for Energy Conservation of various electric devices.
- analyze the benefits of energy conservation from the Economic aspects.

UNIT – I: Basic Principles of Energy Audit

Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT – II: Energy Management

Principles of energy management, organizing energy management program, initiating, planning,controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language, Questionnaire – check list for top management.

UNIT – III: Energy Efficient Motors

Energy efficient motors , factors affecting efficiency, loss distribution , constructional details, characteristics - variable speed , variable duty cycle systems, RMS hp-voltage variation-voltage unbalance- over motoring- motor energy audit.

UNIT – IV: Power Factor Improvement

Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor, power factor motor controllers

UNIT – V: Lighting and Energy Instruments

Good lighting system design andpractice, lighting control ,lighting energy audit – Energy. Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC's.

UNIT – VI: Economic Aspects and Analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return , present worth method , replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment .

Text Books:

1. Energy management by W.R. Murphy AND G. Mckay Butter worth, Heinemann publications.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998

Reference Books:

1. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition,1995.
2. Energy management hand book by W.C.Turner, John wiley and sons.
3. Energy management and good lighting practice: fuel efficiency- booklet12-EEO

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Open Elective - II

MATERIAL SCIENCE
(Other than ME)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Familiarise with the crystallography of materials and their properties i.e. Mechanical, Electrical and Optical and their field of applications.

Learning Outcomes:

Students will be able to

- understand of contemporary issues relevant to Crystal Structures.
- identify the defects in crystals and understand the mechanisms of plastic deformation.
- draw Equilibrium/phase diagrams.
- understand Mechanical, Electrical, Optical properties of Materials.

UNIT – I: Crystal Structure

Introduction, Space lattice, Unit cell, Lattice parameters, Bravis lattices, Structure and packing fractions of simple cubic, Body centred cubic, Face centred cubic crystals. Directions and planes in crystals, miller indices, Diffraction of X-rays by crystal planes, Bragg's law.

UNIT – II: Plastic Deformation

Plastic deformation of single crystals. Deformation by slip, CRSS for slip, Deformation of single crystal. Deformation by twinning, Stacking faults, hot working, and cold working. Recovery, recrystallization and grain growth. Grain size, Halt-Petch equation. Dislocations, types, Burgers' Vector, Dislocation movement by climb and cross slip.

UNIT – III: Equilibrium Diagrams and Phase Transformation

Solid solutions, Hume-Rothery's rules, Intermediate compounds, Phase diagrams, Gibb's phase rule, Equilibrium diagram of a binary system. Applications of phase transformations, Iron –carbon equilibrium diagram.

UNIT – IV: Mechanical properties

Tensile stress-strain diagrams, proof stress, yield stress diagrams, modules of elasticity. Hardness Testing: -Rockwell, Brinell and Vickers. Impact , toughness, Charpy V-Notch, fracture, ductile, brittle, Griffith criteria for brittle failure, creep, creep mechanisms, fatigue-mechanism-factors to improve fatigue resistance.

UNIT – V: Electrical Properties of Materials

Electronic conductivity, free electron theory, Super conductivity, Magnetic properties, Dia, para, ferro, ferri magnetism. Soft and hard magnetic materials.

UNIT – VI: Optical Properties

Optical properties of materials. Reflection, Refraction, Absorption and transmission of electromagnetic radiation in solids Polymerization, classification of polymers. Uses of polymers.

Text Books:

1. Materials Science and Engineering by V.Raghavan, Prentice Hall of India, Fifth edition.
2. Mechanical Metallurgy – GE Dieter., Mechanical metallurgy, 1988, edition, McGraw-Hill.
3. Material science and Engineering an introduction William D. callister, David G. Rethwisch.

References Books:

1. Essentials of Material Science by A.G.Guy, McGraw-Hill(1976).
2. Material Science for Engineers – Schakleford.

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Open Elective - II

AUTOMOTIVE ELECTRONICS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the electronic systems inside automotive vehicle.
- To know the advanced safety systems

Learning Outcomes

Students will be able to

- broad understanding of automotive technology
- knowledge in operating principles and performance of various subsystems of automotive systems.
- understand the operation of microcomputer systems.
- acquire knowledge in automotive sensors and control systems.
- develop communications & navigation/routing in automotive telematics

UNIT – I: Automotive Fundamentals

Use of electronics in the automobile, evolution of automotive electronics, the automobile physical configuration, evolution of electronics in the automobile, survey of major automotive systems, engine control or electronic control unit, ignition system

UNIT – II: Electronics Fundamentals

Semiconductor devices- diodes, rectifier circuit, transistors, field effect transistors; transistor amplifiers, use of feedback in op amps, summing mode amplifier, analog computers, digital circuits- binary number system, combinational- Basic logic gates, multiplexer (IC 74151), 3 to8 decoder (IC74138) , sequential- flip flops, decade counters(IC 7490).

UNIT – III: Automotive Micro-Computer System

Microcomputer fundamentals-digital versus analog computers, basic computer block diagram, microcomputer operations, CPU registers, accumulator registers, condition code register-branching; microprocessor architecture, memory-ROM, RAM; I/O parallel interface, digital to analog converter and analog to digital converters with block diagram, microcomputer application in automotive systems.

UNIT – IV: Basics of Electronics Engine Control

Motivation for electronic engine control, exhaust emissions, fuel economy, concept of an electronic engine control system, engine functions and control, electronic fuel control configuration, electronic ignition with sensors.

UNIT – V: Sensors and Actuators

Introduction; Basic sensor arrangement; Types of Sensors such as oxygen sensors, Crank angle position sensors, fuel Metering/vehicle speed sensors and detonation sensors, altitude sensors, flow Sensors, throttle position sensors, solenoids, stepper motors, relays. Actuators – Fuel Metering Actuator, Fuel Injector, Ignition Actuator

UNIT – VI: Future Automotive Electronic Systems

Telematics, Safety: Collision Avoidance Radar warning System with block diagram, speech synthesis, sensor multiplexing, control signal multiplexing with block diagram, fiber optics inside the car, automotive internal navigation system, GPS navigation system, voice recognition cell phone dialling, advanced cruise control system.

Text Books:

1. William B. Ribbens, "Understanding Automotive Electronics", 6th Edition, SAMS/Elsevier Publishing (UNIT I to VI).
2. Robert Bosch Gambh, "Automotive Electrics Automotive Electronics Systems and Components", 5th edition, John Wiley& Sons Ltd., 2007.

Reference Books:

1. Ronald K Jurgen, "Automotive Electronics Handbook", 2nd Edition, McGraw-Hill,1999.
2. G. Meyer, J. Valldorf and W. Gessner, "Advanced Microsystems for Automotive Applications", Springer, 2009.
3. Robert Bosch, "Automotive Hand Book" SAE, 5th Edition, 2000.

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Open Elective - II

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS
(Other than EEE, ECE, CSE & IT)

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To familiarize the students with architecture of 8086 microprocessor and 8051 microcontroller.
- To introduce the assembly language programming concepts of 8086 processor.
- To expose the students to various interfacing devices with 8086 using 8255.
- To introduce the concepts of interrupt mechanism and serial communication standards.

Course Outcomes:

Students will be able to

- understand the architecture and instruction set of 8086 Microprocessor and 8051 micro controller.
- design and develop various interfacing circuits with 8086 using 8255.
- understand the concepts of interrupt mechanism and serial communication.
- develop 8051 based different kinds of applications.

UNIT – I: 8086 Microprocessor

Introduction 8086 Processor, Architecture-Functional diagram, Register Organization, Memory Segmentation, Physical memory organization, signal descriptions of 8086- common function signals, Minimum and Maximum mode signals, Timing diagrams.

UNIT – II: Instruction Set and Assembly Language Programming of 8086

Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT – III: Basic Peripherals and Their Interfacing

8255 PPI various modes of operation and interfacing to 8086. Interfacing keyboard, display, stepper motor interfacing, D/A and A/D converter, Keyboard/Display Controller-8279,

Memory interfacing to 8086, Interfacing DMA controller 8257 to 8086

UNIT – IV: Interrupt Structure and Serial Communication

Interrupt structure of 8086, Vector interrupt table, Interrupt service routine, Interfacing Interrupt Controller 8259, Serial communication standards, Serial data transfer schemes,8251 USART architecture and interfacing, RS- 232, IEEE-4-88, Prototyping and trouble shooting.

UNIT – V: Introduction to 8051 Microcontroller

Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, addressing modes and instruction set of 8051, Interrupts, timer/ Counter and serial communication.

UNIT – VI: Interfacing and Applications of 8051

Interfacing 8051 to LED's, Push button, Relays and latch Connections, Keyboard Interfacing, Interfacing Seven segment display, ADC and DAC Interfacing

Text Books:

1. D. V. Hall' "Microprocessors and Interfacing", TMGH.2'1 edition 2006.(I to IV Units).
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontrollers and Embedded Systems", Pearson, 2nd Ed.(IV to VI Units)

Reference Books:

1. Barry B.Brey, "The Intel Microprocessors", PHI, 7th Edition 2006.
2. Liu and GA Gibson, "Micro Computer System 8086/8088 Family Architecture. Programming and Design", PHI, 2nd Ed.,
3. Kenneth. J. Ayala, "The 8051 Microcontroller", 3rd Edition, Cengage Learning, 2010.

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Open Elective - II

CLOUD COMPUTING
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:
- To understand Virtualization, Virtual Machine and different models of VM.
- To familiarize Cloud computing architecture and its security aspects.

Learning Outcomes

Students will be able to
- know about basics of cloud computing.
- cloud computing and its services available today.
- distinguish Virtualization and Virtual Machine and its need, Types of Virtualization.
- understand how to provide security for the cloud .
- understand disaster recovery and disaster management.
- design a Cloud for an Enterprise.

UNIT – I: Cloud computing

Introduction, what it is and what it isn't, from collaborations to cloud- a short history of cloud computing, the network is the computer- How cloud computing works, companies in the cloud- Cloud computing today.

UNIT – II: Ready for Computing in the cloud

The pros and cons of Cloud Computing, Developing Cloud Services- Why Develop Web-Based Applications?, The Pros and Cons of Cloud Service Development, Types of Cloud Service Development, Discovering Cloud Services Development services and Tools.

UNIT – III: Virtulization

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

UNIT – IV: Security

Data Security, Data Control Encrypt Everything, Regulatory and Standards compliances, Network Security, Firewall rules, Network Intrusion detection, Host Security, System Hardening, Antivirus Protection, Host Intrusion detection, Data segmentation, Credential Management.

UNIT – V: Disaster

What is Disaster, Disaster Recovery Planning, The Recovery Point objective, The Recovery Time Objective, Disasters in the Cloud, Backups and data retention, Geographic redundancy, Organizational redundancy, Disaster Management, Monitoring, Load Balancer Recovery, Application server recovery, Database Recovery.

UNIT – VI: Defining Clouds for the Enterprise

Storage-as-a-Service, Database-as-a- Service, Information-as-a-Service, Process-as-a-Service, Application-as-a- Service, Platform-as-a-Service, Integration-as-a-Service, Security-as-a-Service, Management/Governance-as-a-Service, Testing-as-a-Service Infrastructure-as- a-Service.

Text Books:

1. Michael Miller, Cloud Computing – Web Based Applications That change the way you work and Collaborate Online –Person Education.
2. George Reese Cloud Application Architectures, Ist Edition O'Reilly Media.

Reference Books:

1. David S. Linthicum, Cloud Computing and SOA Convergence in your Enterprise : A Step-by-Step Guide- Addison-Wesley Professional.
2. Kai Hwang, Geoffery C.Fox, Jack J, Dongarra, Distributed & Cloud Computing From Parallel Processing to the Internet of Things.

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Open Elective - II

WEB TECHNOLOGIES
(Other than CSE & IT)
III Year – II Semester

Lecture	: 2 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:
- To develop real time web applications.
- To get acquainted with skills for creating websites and web apps through learning various technologies like HTML, CSS, JavaScript, XML, Servlets, JSP and JDBC.

Learning Outcomes:
Students will be able to
- develop UI for web applications using markup languages.
- build dynamic web pages using Java Script .
- build web pages using XML.
- design and implement one or more Java servlets; test and debug the servlets; deploy the servlets.
- design and implement one or more Java Server Pages; test and debug the JSPs; deploy the JSPs.
- update and retrieve the data from the databases using JDBC-ODBC.

UNIT – I: HTML & CSS
HTML- Basic HTML Tags, Working with Lists, Tables, Forms, Frames, Images and Image maps.
Cascading Style sheets- CSS rules, Selectors, Types of CSS, CSS Properties for Styling Backgrounds, Text, Fonts, Links, Lists, Tables and Positioning.

UNIT – II: Java Script
Introduction to Java Script, Variables, Data types, Functions, Operators, Control flow statements, Objects in Java Script, Event Handling. DHTML with Java Script

UNIT – III: XML
Basic building blocks, Validating XML Documents using DTD and XML Schemas, XML DOM, XML Parsers- DOM and SAX, XSLT, using CSS with XML.

UNIT – IV: Web Servers and Servlets
Tomcat web server, Introduction to Servlets, Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization parameters, The javax.servlet HTTP package, Using Cookies-Session Tracking.

UNIT – V: JSP

The Problem with Servlet. The Anatomy of a JSP Page, Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods, Passing Control and Data between Pages, Sharing Session and Application Data.

UNIT – VI: Database Access

JDBC Drivers, Database Programming using JDBC, Studying Javax.sql.* package, accessing a database from a JSP Page and a Servlet page, introduction to struts.

Text Books:

1. Web Technologies, "Black book", Kogent Learning Solutions, Dreamtech press.
2. Chris Bates, "Web Programming: building internet applications", WILEY Dreamtech, 2nd edition.

Reference Books:

1. Uttam K Roy, "Web Technologies", Oxford.
2. John Duckett, "Beginning Web Programming".
3. Wang Thomson, "An Introduction to web design and Programming".
4. Robert W Sebesta, "Programming the World Wide Web", Pearson publications, Fourth edition.

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Open Elective - II

VIRTUAL REALITY

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Understand key elements of virtual Reality with the components in VR systems.
- To gain knowledge of various input and output devices required for interacting in virtual world along with rendering and modeling.

Learning Outcomes:

Students will be able to

- identify basic elements of virtual Reality with the components in VR systems
- describe various input and output devices required for interacting in virtual world along with rendering and modeling.
- differentiate various types of modeling,
- apply the concepts of Virtual Reality for an application.

UNIT – I: Introduction

The three I's of virtual reality, commercial VR technology and the five classic components of a VR system

UNIT – II: Input Devices

Trackers, Navigation, and Gesture Interfaces- Three-dimensional position trackers, Navigation and manipulation, interfaces and gesture interfaces.

UNIT – III: Output Devices

Graphics displays, sound displays & haptic feedback.

UNIT – IV: Modeling

Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model Management.

UNIT – V: Human Factors

Methodology and terminology, user performance studies, VR health and safety issues.

UNIT – VI: Applications

Medical applications, military applications, robotics applications.

Text Books:

1. Virtual Reality Systems, John Vince, Pearson Education.
2. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.,

Reference Books:

1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier (Morgan Kaufmann).

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Open Elective - II

SCRIPTING LANGUAGES

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of various scripting languages.
- To familiar with development of web application using scripting languages.

Learning Outcomes:

Students will be able to

- employ JavaScript as a general purpose web-based client-side scripting language.
- utilize both XML and PHP to develop interactive web applications.
- describe and apply files concepts in traditional web applications.
- utilize PERL to solve a wide range of text processing problems.

UNIT – I: Advanced Java Script

Java Script Events, Objects, DHTML, DOM and Forms, Introduction to AJAX

UNIT – II: XML

XML Introduction and Overview, XML Syntax, XML Namespaces, Document Type Definitions (DTDs), XML Schemas, Parsing XML,X Path and XML Transformation

UNIT – III: Python

Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples –Dictionaries – Conditionals and Loops

UNIT – IV: Files

Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP –Execution Environment.

UNIT – V: Introduction to PERL

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines

UNIT – VI: Working with PERL

Packages and Modules- Working with Files –Data Manipulation.

Text Books:

1. Web Technologies , Uttam Roy, OXFORD University press.
2. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications,2003.

Reference Books:

1. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001.
2. Martin C. Brown, “Perl: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

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Open Elective - II

BIG DATA
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the fundamental concepts of cloud for laying a strong foundation of Apache Hadoop (Big data framework).
- To gain knowledge of HDFS file system, MapReduce frameworks and relevant tools.

Learning Outcomes:

StudentS will be able to

- describe the fundamentals of Bigdata and cloud architectures.
- utilize HDFS file structure and MapReduce frameworks to solve complex problems.
- know how to analyze data using UNIX tools and Hadoop.
- understand how to develop environment for analyzing Bigdata.
- understand how to use mapper and reducer functions

UNIT – I: Introduction to Big Data

What is Big Data, Why Big Data is Important, Meet Hadoop- data, Data Storage and Analysis, Comparison with other systems, Grid Computing, a brief history of Hadoop, Apache Hadoop and the Hadoop Eco System.

UNIT – II: MapReduce

Analyzing data with unix tools, Analyzing data with hadoop, Java MapReduce classes (new API), Data flow, combiner functions, Running a distributed MapReduce Job.

UNIT – III: Hadoop Distributed File System

HDFS concepts, Command line interface to HDFS, Hadoop File systems, Interfaces, Java Interface to Hadoop, Anatomy of a file read, and write, Replica placement and Coherency Model

UNIT – IV: Developing a MapReduce Application

Setting up the development environment, Managing configuration, Writing a unit test with MRUnit, Running a job in local job runner, Running on a cluster, Launching a job.

UNIT – V: MapReduce Working-I

Classic MapReduce, Job submission, Job Initialization, Task Assignment, Task execution, Progress and status updates

UNIT – VI: MapReduce Working-II

Job Completion, Shuffle and sort on Map and reducer side, Configuration tuning, MapReduce Types, Input formats, Output formats .

Text Books:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
1. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

Reference Book:

1. Frank J.Ohlhorst, "Big Data Analytics: Turning Big Data Into Big Money",2nd Edition, TMH,2012.

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Open Elective - II

MULTI-VARIATE ANALYSIS AND SPECIAL FUNCTIONS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the multivariate analysis concepts.
- To know special functions.

Learning Outcomes:

Students will be able to

- to analyze the multivariate data using dependence techniques.
- to apply interdependence techniques.

UNIT – I: Introduction

Nature of multivariate analysis – classifying multivariate techniques - Analysis of dependence.

UNIT – II: Analysis

Analysis of inter dependence - influence of measurement scales.

UNIT – III: Analysis of Dependence

Multiple regression analysis – Discriminant analysis – Multivariate Analysis of variance (MANOVA)

UNIT – IV: Analysis of inter Dependence

Factor Analysis – Cluster analysis – Multidimensional scaling.

UNIT – V: Legendre Functions

Legendre Polynomials. Properties, Rodrigue's formula, Recurrence Relations and orthoganality.

UNIT – VI: Bessel Functions

Solution of Bessel's equation, Properties, Recurrence Relations, orthoganality.

Text Books:

1. Richard Arnold Johnson, Dean W. Wichern, Applied Multivariate Statistical Analysis, Pearson Prentice Hall, 2007.
2. William G.Zikmund, Business Research Methods 7th Edition, Cengage Learning.
3. Tabachnick B., Fidell, L using multivariate statistics, 5th Edition, Pearson Education, Inc 2007.
4. J.N.Sharma, R.K.Gupta, Special Functions, Krishna Prakashan Media (p) Ltd., Meerut.

Reference Books:

1. Yang, K, Trewn, J. Multivariate Statistical Methods in Quality Management Mc Graw-Hill.
2. Larry C. Andrew, Special Functions of Mathematics for Engineers, SPIE Press, 1992.

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IC APPLICATIONS LAB

III Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To design and verify the functionality of linear and digital circuits using ICs.

Learning Outcomes:

Students will be able to

- design and develop various linear and digital circuits using MSI ICs.
- analyze different parameters using MSI ICs.
- write and prepare a lab report that details design procedures and experimental results.
- work in a team using available resources to design circuits to meet a given specification.

List of Experiments:

PART – A: Design and implement the analog circuits using Linear ICs

1. Adder/ Subtractor/ Comparator/Integrator/Differentiator-IC 741
2. Square/ Triangular waveform Generators - IC 741
3. Astable/ Monostable Multivibrators-IC 555.
4. Phase Locked Loop Analysis-IC 565
5. Weighted Resistor/ R-2R ladder Digital to Analog Converters-IC 741

PART – B: Design and Test the circuits using Digital ICs

1. Adders and Subtractors- IC 74x999/283
2. Encoders and Decoders- IC 74x148/139/138
3. Multiplexers and Demultiplexers- IC 74x151/153/157/155
4. Counters - IC 74x163
5. Shift Registers – IC 74x95/194/195
6 Design and implementation of hardware circuit for a given application using linear/digital ICs - Open ended experiment

Reference Books:

1. Ramakanth A. Gayakwad, “OP-Amps & Linear ICs”, PHI, 1987.
2. John F. Wakerly, “Digital Design Principles & Practices”, PHI/ Pearson Education Asia, 3rd Edition, 2005 .
3. D. Roy Chowdhury, “Linear Integrated Circuits”, New Age International (p) Ltd, 2nd Edition,2003.
4. Sergio Franco, “Design with Operational Amplifiers & Analog Integrated Circuits”, McGraw Hill, 1988.
5. C.G. Clayton, “Operational Amplifiers”, Butterworth & Company Publ. Ltd. Elsevier, 1971.
6. Mano, “Digital Logic and Computer Design”, Pearson Education, 1979.
7. The TTL Data Book for Design engineers, Texas Instruments incorporated, 2nd Edition.

URLs:

1. http://www.ti.com/lit/ds/symlink/lm741.pdf
2. http://www.ti.com/lit/ds/symlink/lm555.pdf
3. http://www.ti.com/lit/ds/snosbu1b/snosbu1b.pdf

ECAD LAB

III Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with CAD tools.
- To familiarize with design, simulation and synthesis of combinational and sequential circuits using CAD tools.

Learning Outcomes:

Students will be able to

- understand and use CAD tools for simulation and synthesis of digital systems.
- design and synthesize different combinational and sequential circuits.
- design and implement complex digital systems using CAD tools.
- write and prepare a lab report that details design procedures and experimental results.
- work in a team using available resources to design circuits to meet a given specification.

List of Experiments:

Design, Simulate and Synthesize the following circuits using Front End Tools:

1. BCD to Seven Segment Decoder
2. Dual Priority Encoder
3. Code Converters
4. Multiplexer and Demultiplexers
5. Adders
6. ALU*
7. MOD Counters
8. Universal Shift Register
9. Pseudo Random Binary Sequence Generator
10. RAM (16x4)
11. Control circuit for a given application-Open ended experiment

***Note: FPGA implementation has to be done.**

Reference Books:

1. Charles H.Roth, Jr, Lizy Kurian John, “Digital Systems Design using VHDL”, 2013.
2. Douglas L Perry, “VHDL programming by example”, 4th Edition, TMH Publishers, 2003.
3. Jayaram Bhasker, “A VHDL Primer”, 3rd Edition.

URLs:

1. The TTL Data Book for Design Engineers, Texas Instruments incorporated, 2nd Edition.

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ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the characteristics and operation of measuring instruments.
- To introduce the concepts of passive and active Transducers.

Learning Outcomes:

Students will be able to

- classify the instruments based on static and dynamic characteristics.
- understand the principle of operation of electronic measuring instruments.
- understand the concepts of passive and active transducers.

UNIT – I:

Performance characteristics of instruments, Static characteristics- Accuracy, Resolution, Precision, Expected value, Error, Sensitivity, Errors in Measurement; Dynamic Characteristics- speed of response, Fidelity, Lag and Dynamic error; DC Volt meters-Multirange, AC voltmeters- multi range, DC ammeter, Aryton shunt, Ohmmeters -series and shunt type.

UNIT – II:

Digital Voltmeters: Ramp technique, Dual slope integrating type DVM (Voltage to Time Conversion) Integrating Type DVM (Voltage to Frequency Conversion), Successive Approximations, digital multimeters.

UNIT – III:

Signal Generators- fixed and variable, Standard and AF sine and square wave; Function Generators-Square, Pulse, sweep; Random noise, Arbitrary waveform generator.

UNIT – IV:

Bridges-Wheat stone bridge, Kelvin bridge; Measurement of inductance- Maxwell's , Anderson bridge; Measurement of capacitance-Schearing, Wien bridge; Q-meter, Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers.

UNIT – V:

Oscilloscopes, CRT features, vertical amplifier, horizontal deflection system, simple CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital storage oscilloscope, standard specifications of CRO, probes for CRO.

UNIT – VI:

Transducers- passive and active; Strain gauges, LVDT, Piezoelectric transducers, Thermocouples, Thermistors, Data acquisition systems.

Text Books:

1. A.D. Helfrick and W.D.Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 5th Edition, 2002.

Reference Books:

1. David A. Bell, "Electronic Instrumentation and Measurements", PHI, 2nd Edition, 2003.
2. H.S.Kalsi, "Electronic Instrumentation", Second Edition, Tata McGraw Hill, 2004.

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MICROCONTROLLERS AND EMBEDDED SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the architecture of 8051 microcontroller and ARM Processor.
- To familiarize with the Embedded hardware and software design.

Learning Outcomes:

Students will be able to

- understand the architecture and instruction set of 8051 micro controller ARM Processor.
- design different interfacing circuits using 8051 microcontroller
- learn embedded system concepts.

UNIT – I: Introduction to 8051 Microcontroller

Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, addressing modes and instruction set of 8051, Interrupts, timer/ Counter and serial communication

UNIT – II: Interfacing and Applications of 8051

Keyboard,LED, 7- segment display, LCD, stepper motor, ADC, DAC, Relays, opto isolators and sensor interfacing with 8051 microcontroller.

UNIT – III: The ARM Architecture

The ARM programmer's model, ARM development tools, 3-stage pipeline ARM organization, ARM implementation, The ARM memory interface,The Advanced Microcontroller Bus Architecture (AMBA).

UNIT – IV: ARM / THUMB Instruction Set

Data processing instructions,Multiply instructions,Count leading zeros (CLZ - architecture v5T only),Single word and unsigned byte data transfer instructions,Half-word and signed byte data transfer instructions,Multiple register transfer instructions,Swap memory and register instructions (SWP),Status register to general register transfer instructions, Thumb data processing instructions,Thumb single register data transfer instructions,Thumb multiple register data transfer instructions.

UNIT – V: Introduction to Embedded System

Embedded system vs. general computing systems, classification of embedded systems, major application area of embedded systems, purpose of embedded

system, core of the embedded system, memory, sensor and actuators, communication interface, embedded firmware, PCB and passive components.

UNIT – VI: Embedded Firmware Design and Development

Embedded firmware design approaches- superloop based approach, embedded operating system based approach; Embedded firmware development languages- assembly language, high level language, mixing assembly and high level language; Programming in embedded C- C v/s embedded C, compiler vs cross compiler, using C in embedded C.

Text Books:

1. M.A. Mazidi, J.G. Mazidi, R.D. Mckinlay, "The 8051 Microcontroller and Embedded Systems", Pearson 2nd Edition (I, II units).
2. Steve Furber, "ARM System-on-Chip",Pearson Publications, 2nd Edition. (III,IV Units).
3. Shibu. K.V," Introduction to Embedded Systems", TMH, 1st Edition (V, VI Units)

Reference Books:

1. Rajkamal, "Microcontroller Architecture programming Interfacing and System Design", Pearson, 5th Impression.
2. Ajay V Deshmukh ,"Microcontrollers" , TMH 1st Edition.

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Elective - II

CELLULAR AND MOBILE COMMUNICATIONS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce various issues of cellular radio system design.
- To expose students to different types of interferences occurred in cellular systems.
- To familiarize the students to various multiple access techniques and wireless systems.

Learning Outcomes:

Students will be able to

- describe the operation of various wireless systems.
- select appropriate value of C/I to design the Antenna system.
- distinguish various types of interferences.
- explain the use of various components in cellular system.

UNIT – I: Cellular Mobile Radio Systemns

Introduction to cellular mobile system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, analog cellular systems.

UNIT – II: Elements of Cellular Radio System Design

Concept of frequency channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular system.

UNIT – III: Interference

Introduction to co-channel interference, real time co-channel interference, design of antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference.

UNIT – IV: Frequency Management and Channel Assignment

Numbering and grouping, setup, access and paging channels, channel assignments to cell sites and mobile units, channel sharing and borrowing, non fixed channel assignment.

Handoff: Handoff invitation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, dropped call rates and their evaluation.

UNIT – V: Multiple Access Techniques for Wireless Communications

Introduction, frequency division multiple access, time division multiple access, spread spectrum multiple access, space division multiple access, packet radio.

UNIT – VI: Wireless Systems and Standards

AMPS and ETACS, United States digital cellular standards (IS-54 and IS-136), Global system for mobile communications, CDMA digital cellular standard (IS-95).

Text Books:

1. W.C.Y. Lee, "Mobile Cellular Telecommunications", Tata McGraw Hill, 2nd Edition; 2006.(Units: I to IV).
2. Theodore. S. Rapport, "Wireless Communications", Pearson Education, 2nd Edition;2002. (Units: V to VI).

Reference Books:

1. Jon W. Mark and Weihua Zhqung, "Wireless Communication and Networking", PHI, 2005.
2. R. Blake, "Wireless Communication Technology", R. Blake, Thompson Asia Pvt. Ltd., 2004.

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Elective - II

SENSORS AND INSTRUMENTATION

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives :

- To impart knowledge of measurement and sensing techniques for thyristorised DC and AC circuits, OPAMPS, PLL, 555 timers and Digital Systems, ADCs and DACs in sensing schemes.
- Gain the knowledge about sensing scheme techniques for closed loop control, Virtual Instrumentation, DSP, Measurement of EMI and EMC.

Learning Outcomes:

Students will be able to

- apply measurement and sensing techniques in Power Electronic systems.
- use the digital storage oscilloscopes.
- analyze & Design analog and digital devices in the PE Instrumentation.

UNIT – I: Importance of Sensors In Power Electronic Systems

Importance of measurement and sensing measurement techniques for Thyristorised DC and AC circuits measurement of voltage, current, power factor, speed etc.

UNIT – II: Analog Sensing Circuits

Analog systems, characteristics of operational amplifier, fundamental circuit using OPAMPS, PLL, 555 timers and application, application of these analog circuits in measurement and sensing of voltage, current, frequency, speed, power and power factor, isolation buffer amplifier.

UNIT – III: Digital Systems

Digital System, Digital circuits, Boolean algebra, combinational and sequential logic circuit, analysis design using memories, multiplexers, PLAS and PAL, Sensing and measurement of voltage, current, frequency, speed Power and Power factor using digital circuits, study of digital storage oscilloscope.

UNIT – IV: Firing Schemes for Power Electronic Circuits

Firing scheme for DC chopper single phase and three phase power Electronics converters, Inverter employing PWM techniques.

UNIT – V: ADC and DAC Circuits

ADC DAC types and principle of operation, use of ADCs and DACs in sensing schemes in power Electronics systems, closed loop current and speed control scheme implementation using these circuits.

UNIT – VI: Introduction to Virtual Instrumentation and DSP Processors

Measurement of EMI(Electro Magnetic Interference) and EMC(Electromagnetic Compatibility).

Text Books:

1. Dubey, G. K. Et al. "Thyristorised Power Controllers", New age International New Delhi,1996.

Reference Books:

1. Sidney socloff, "Applications of Analog Integrated Circuit", Prentice Hall India Ltd, New Delhi, 1990
2. Sen, P. C., 'Thyristor DC Drives' John Wiley and sons, Newyork, 1981.
3. Roth, 'Fundamental of Logic Design', McGraw Hill Publishing Co, Newyork.

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Elective - II

ADVANCED COMPUTER ARCHITECTURE

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of multi-processors and multi-computers.
- To familiarize with the concepts to increase the performance of the system.

Learning Outcomes:

Students will be able to

- analyze the effect of multi processors and multi computers on the performance of the system.
- apply appropriate techniques to achieve parallelism at instruction level.
- analyze different techniques to increase the cache performance.
- differentiate between CISC and RISC Architectures.
- understand shared memory based architectures.
- explain about flow control strategies and multicast routing algorithms.

UNIT – I: Parallel Computer

The state of Computing- Evolution of Computer Architecture, System Attributes to performance ,Multiprocessors and Multi Computers-Shared and Distributed Memory Multiprocessors.

UNIT – II: Memory Hierarchy Design

Introduction, optimization of Cache Performance-Small and Simple First level Caches to Reduce hit time, Way Prediction to reduce hit time, pipelined caches to increase Cache Bandwidth, Nonblocking Caches to increase Cache Bandwidth, Virtual Memory and Virtual Machines-Protection Via Virtual Memory, Protection via Virtual machines.

UNIT – III:

Design space of processors, Instruction set Architectures, Characteristics of typical CISC and RISC Architecture, Hierarchical Memory Technology, Inclusion,Coherence and Locality.

UNIT – IV:

Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP - ILP software approach- compiler techniques- static branch protection - VLIW approach - H.W support for more ILP at compile time- H.W verses S.W Solutions

UNIT – V:

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading. VSIMD and MIMD computer organizations - implementation models. control processors and processing nodes

UNIT – VI: Cache Coherence and message passing Mechanism

Cache coherence problem, snoopy Bus protocols, Directory based protocols, message passing Mechanisms: Message Routing schemes, dead lock virtual channels, flow control strategies, multicast routing algorithms.

Text Books:

1. KAI HWANG & Naresh Jotwani "Advanced Computer Architecture- Parallelism, Scalability , Programmability" 2nd Edition MC GrawHill Publishing.
2. HENNESSY PATTERSON "Computer Architecture – a Quantitative Approach" 5th Edition , ELSEVIER

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Elective - II

DSP ARCHITECTURE AND APPLICATIONS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize students about basic architectural features of programmable DSP devices.
- To familiarize the students about I/O peripheral, Direct Memory Access

Learning Outcomes:

Students will be able to

- apply the concepts of sampling, DFT and Filter concepts.
- describe the Architectural features of DSP Computational building blocks.
- describe the Programmable Digital Signal Processors TMS320C54XX architecture.
- specify the applications of Programmable DSP Devices.

UNIT – I: Introduction to Digital Signal Processing

Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences, Linear Time Invariant Systems, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Digital filters, Decimation and interpolation.

UNIT – II: Computational Accuracy in DSP Implementations

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter

UNIT – III: Architecture for Programmable DSP Devices

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, address generation unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT – IV: Digital Signal Processor - TMS320C54XX

Data Addressing modes, memory space, Program control, instructions and programming, on-chip peripherals, interrupts and pipeline operations.

UNIT – V: Perpheral Interfacing with TMS320C54XX

Interfacing Memory and I/O Peripherals to Programmable DSP Devices Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

UNIT – VI: Applications of Programmable DSP Devices

Introduction, DSP – based biotelemetry receiver: Pulse position modulation, Decoding scheme for the PPM receiver, Biotelemetry receiver implementation, ECG signal processing for Heart rate determination. Speech-Processing System-Digital model for production of speech signal

Text Books:

1. Avtar Singh and S. Srinivasan, "Digital Signal Processing" –Thomson Publications, 2004.
2. B. Venkata Ramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications" –TMH, 2004.

Reference Books:

1. Steven W. Smith, Ph.D., "*The Scientist and Engineer's Guide to Digital Signal Processing"* California Technical Publishing, ISBN 0- 9660176-3-3, 1997.
2. Jonatham Stein, John Wiley, "Digital Signal Processing", 2005.
3. K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, "A Practical Approach to Digital Signal Processing" - New Age International, 2006/2009.
4. Woon-Seng Gan, Sen M.Kuo, "Embedded Signal Processing with the Micro Signal Architecture": Wiley-IEEE Press, 2007.

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Elective - III

FPGA DESIGN

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the advanced design and analysis of digital circuits with HDL. The primary goal is to provide in depth understanding of logic and system design.
- The course enables students to apply their knowledge for the design of advanced digital hardware systems with help of FPGA tools.

Learning Outcomes:

Students will be able to

- design and manually optimize complex combinational and sequential digital circuits on FPGA.
- model Programmable Logic Devices on FPGA Cyclone-II Architecture.
- design and model digital circuits with Verilog HDL at behavioral, structural, and RTL Levels.
- develop test benches to simulate combinational and sequential circuits.

UNIT – I: System Implementation Strategies

FPGA Paradigm, Design and Implementation using FPGA, Implementation styles, design styles, design methodologies.

UNIT – II: Review of Logic Design and Electrical Aspects

Combinational circuit design, Sequential circuit design, State Machines, Petri Nets for State machines, Electrical Aspects.

UNIT – III: Introduction to FPGA Architecture

Background to FPGA Concept, Channel type FPGA's -XILINX 3000 series, Actel ACT 2 family, Structured PAL - Altera EP1810, Computational Logic Arrays, VLSI Primitives, Historical Background.

UNIT – IV: Design Process Flows and Software tools

Software Tool box, FPGA Design Dichotomy, Design Process Flow, ASIC Route, Libraries and Design Idioms, Placement, Routing and Wirability.

UNIT – V: FPGA and its Architectures

Types of Programmable Logic Devices- PLA & PAL- FPGA Generic Architecture. ALTERA Cyclone II Architecture – Timing Analysis and Power analysis using Quartus-II- SOPC Builder.

UNIT – VI: FPGA Applications

Soft-core Processor- System Design Examples using ALTERA FPGAs – Traffic light Controller, Real Time Clock - Interfacing using FPGA: VGA, Keyboard, LCD.

Text Books:

1. Jhon V.Old " Feild Programmable Gated Arrays" John Wiley 1995.(Units: 1,2,3,4).
2. Stephen Brown & Zvonko Vranesic, "Digital Logic Design with Verilog HDL" TATA Mc Graw Hill Ltd. 2nd Edition 2007. (Units: 5, 6).

Reference Books:

1. Wayne Wolf , "FPGA Based System Design", Prentices Hall Modern Semiconductor Design Series.
2. T. R. Padmanabhan and B. Bala Tripura Sundari "Design Through Verilog HDL" A John Wiley & Sons, Inc., Publication, IEEE press.
3. ALTERA Quartus II Handbook Ver10.0.

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Elective - III

DIGITAL TV ENGINEERING

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the television standards and TV signal transmission.
- To introduce the concepts of digital TV engineering.

Learning Outcomes:

Students will be able to

- understand color Television standards and their specifications.
- understand the operation of color Television system.
- find the applications of Digital TV.

UNIT – I: Introduction to TV Standards

Standard scanning sequence, line frequency and frame frequency, Video band width, composite video signal, blanking, synchronizing and equalizing pulses. CCIR-B Standard specifications.

UNIT – II: Colour Television

Block diagram of colour TV receiver, PAL – D decoder, Separation of U and V signals, Color burst separation and Burst phase discriminator, Indent and color killer circuits, U & V demodulators, Colour signal mixing.

UNIT – III: Sync Separation and AFC

AGC, Keyed AGC and noise cancellation, Synchronous separation, K noise in sync pulses and separation of frame and line sync pulses, Deflection Oscillators.

UNIT – IV: Digital Television Transmission Standards

ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard, channel allocations, antenna height and power, MPEG-2.

UNIT – V: Performance Objectives for Digital Television

System noise, external noise sources, transmission errors, error vector magnitude, eye pattern, interference, co-channel interference, adjacent channel interference, analog to digital TV, transmitter requirements.

UNIT – V: Television Applications

Remote control circuit, CCTV systems, video tape recording and playback circuit, HDTV, TV via satellite, Remote Control, DTH system.

Text Books:

1. R.R.Gulati, "Monochrome Television Practice, Principles, Technology and servicing." Third Edition 2006, New Age International Publishers.(Units:I to III,VI)
2. Gerald W. Collins, "Fundamentals of Digital Television Transmission", John Wiley, 2001.(Units: IV to VI)

Reference Books:

1. A.M Dhake, "Television and Video Engineering", 2nd ed., TMH, 2003.
2. R.P.Bali, "Color Television, Theory and Practice", Tata McGraw-Hill, 1994

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Elective - III

DIGITAL IMAGE PROCESSING

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce fundamental concepts of image processing and different operations on image elements.
- To expose students to the practical problems associated with restoration of an image.
- To familiarize the students with advanced image processing operations.

Learning Outcomes:

Students will be able to

- understand the fundamental concepts of a digital image processing system.
- apply and analyze basic digital image processing operations.
- apply and analyze various filtering techniques for image restoration.
- develop algorithms for advanced image analysis.

UNIT – I: Introduction

Origin of digital image processing, uses of digital image processing, fundamental steps in digital image processing, components of an image processing system, digital image fundamentals, elements of visual perception, light and electromagnetic spectrum, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

UNIT – II: Image Transforms

Need for image transforms, spatial frequencies in image processing, introduction to Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform and its algorithm, properties of Fourier Transform-sampling theorem, Parsevals Theorem, Discrete Cosine Transform, Discrete Sine Transform, WalshTransform, Hadamard Transform, Haar Transform, Slant Transform, SVD and KL Transforms or Hotelling Transform.

UNIT – III: Image Enhancement

Image enhancement using point processing, histogram processing, spatial filtering-smoothing spatial filters and sharpening spatial filters.Image enhancement in frequency domain, Image smoothing, Image sharpening.

UNIT – IV: Image Restoration

A model of the image degradation/restoration process, noise models, restoration in the presence of noise only- spatial filtering, periodic noise reduction by frequency domain filtering, linear, position-invariant degradations, estimation of degradation function, inverse filtering, minimum Mean Square Error (Wiener) filtering, constrained least squares filtering, geometric mean filter, image reconstruction from projections.

UNIT – V: Image Segmentation

Fundamentals,point, line and edge detection, thresholding, Region–based segmentation, Segmentation using morphological watersheds, the use of motion in segmentation.

UNIT – VI: Image Compression

Image compression redundancies and their removal methods, fidelity criteria, image compression models, source encoder and decoder, error free compression, lossy compression.

Text Books:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing" Pearson Education, 2011.
2. S.Sridhar, "Digital Image Processing" Oxford Publishers, 2011.

Reference Books:

1. Anil K. Jain, "Fundamentals of Digital Image Processing," Prentice Hall of India, 2012.
2. S. Jayaraman, S. Esakkirajan, T. Veerakumar, "Digital Image Processing" Mc-Graw Hill Publishers, 2009.

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Elective - III

EMBEDDED REAL TIME OPERATING SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Learn the UNIX, Commands, and basic concepts of Inter-process communication.
- To be exposed to the basic concepts of real time Operating system, skills necessary to design and develop embedded applications by means of real-time operating systems.

Learning Outcomes:

Students will be able to

- describe the concepts of embedded systems.
- explain the basic concepts of real time Operating system design.
- use the system design techniques to develop software for embedded systems, differentiate between the general purpose operating system and the real time operating system.
- model real-time applications using embedded-system concepts

UNIT – I: Introduction

Introduction to UNIX, Overview of Commands, File I/O, (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec), Signals, Interprocess communication,(pipes, fifos, message queues, semaphores, shared memory)

UNIT – II: Real Time Systems

Typical real time applications, Hard Vs Soft real-time systems, a reference model of Real Time Systems: Processors and Resources, Temporal Parameters of real Time Work load, Periodic task model precedence constraints and data dependency, functional parameters, Resource Parameters of jobs and parameters of resources.

Unit III: Scheduling and Inter-process Communication

Commonly used Approaches to Real Time Scheduling Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs State Systems, Effective release time and Deadlines, Offline Vs Online Scheduling. Inter-process Communication and Synchronization of Processes, Tasks and Threads- Multiple Process in an

Application, Problem of Sharing data by multiple tasks & routines, Inter-process communication

UNIT – IV: Real Time Operating Systems & Programming Tools

Operating Systems Services, I/O Subsystems, RT & Embedded Systems OS, Interrupt Routine in RTOS Environment. Micro C/OS-II- Need of a well Tested & Debugged RTOs, Use of mCOS-II

UNIT– V: VX Works

Memory managements task state transition diagram, pre-emptive priority, Scheduling context switches- semaphore- Binary mutex, counting watch dogs, I/O system

UNIT – VI: Case Study

Data compressor -Alarm Clock- Audio player- Software modem-Digital still camera - Telephone answering machine-Engine control unit –Video accelerator. Case study of sending application Layer byte Streams on a TCP/IP network

Text Books:

1. Rajkamal, "Embedded Systems- Architecture, Programming and Design", 2nd edition., 2008, TMH.
2. Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2008.

Reference Books:

1. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
2. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
3. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, Mc Graw Hill 1997.
4. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.

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Open Elective - III

BUILDING SERVICES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of basic services and its applications.
- To equip students with the required information and technologies of building services.
- Application of this knowledge in architectural design project.
- Evolving understanding in students to choose appropriate systems and integrate the same in their design projects.

Learning Outcomes:

Students will be able to

- understand the measures to be taken while planning for sanitation and installation of various sanitary units.
- identify the minimizing and disposal techniques of waste and garbage.
- evaluate the illumination strategies by consuming less energy resources.
- acquaint with distribution of electricity to all units of the project.
- provide fire protection units at service points.

UNIT – I: Water Supply

Tapping of water, Storage and distribution of water in premises, Pipes, piping network, specials, materials, joinery, installation of network both open and concealed, all appurtenances required for installations e.g. taps, faucets, mixing units, valves, flushing cisterns, flushing valves and other fittings.

UNIT – II: Drainage and Sanitation

Study of sanitary fittings with reference to use, materials and functions, traps and their uses, classification of traps as per use and shape, pipes and piping systems, specials, vent and anti-siphonage systems, jointing and installations, storm water and roof drainage systems and their installations, underground drainage systems with application of ventilation, self cleansing velocity, laying of drains to required gradients and testing of drains, disposal of sewage within the premises using septic tanks, effluent treatment plants, their function and layouts.

UNIT – III: Room Acoustics

Key terms & Concepts, Introduction, Acoustic principles, Sound power and pressure levels, Sound pressure level, absorption of sound, Reverberation time,

Transmission of sound. Sound pressure level in a plant room, out door sound pressure level, Sound pressure level in intermediate space, noise rating, Data requirement, output data.

UNIT – IV: Lighting and Ventilation

Indoor lighting- natural and artificial, systems of lighting such as direct, indirect, diffused, applications of lighting systems with reference to levels of illumination for various uses and lumen method calculations, light fittings/ luminaries-All types of energy efficient lamps, optic fiber, led etc. Ventilation - Introduction, Ventilation requirements, Natural and Mechanical systems, Removal of heat gains Psychrometric cycles, Ventilation rate measurement, Material for ventilation duct work.

UNIT– V: Electrification

Introduction to generation and distribution of electric power in urban areas, substations for small schemes in industrial units, electrical system installations in a building from the supply mains to individual outlet points, including meter board, distribution board and layout of points with load calculations, electrical wiring systems for small and large installations including different material specification electrical control and safety devices- switches, fuse, circuit breakers, earthing, lightning conductors etc.

UNIT – VI: Fire Protection, Plant and Service Areas

Key terms and concepts, introduction, Fire classification, Portable existing gushers, Fixed – Fire fighting installation, fire detectors and alarus, smoke ventilation. Key terms and conditions, Introduction, Mains and services, Plant room space requirements, service ducts, pipe, duct and cable supports, plant connections, Co-ordinated service drawings boiler room ventilation.

Text Books:

1. S.C.Rangwala, Water supply and sanitary engineering, Charotar publishing house.
2. A. Kamala & DL Kanth Rao, Environmental Engineering, Tata McGraw – Hill publishing company Limited

Reference Books

1. Technical teachers Training Institute (Madras), Environmental Engineering, Tata McGraw Hill publishing Company Limited.
2. M.David Egan, Concepts in Building Fire Safety.28
3. V.K.Jain, Fire Safety in Building.
4. E.G.Butcher, Smoke control in Fire-safety Design.
5. National Building Code 2005.

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Open Elective - III

MODERN OPTIMIZATION TECHNIQUES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the concepts of evolutionary optimization
- To develop an understanding of Genetic Algorithm
- To expose students to Particle Swarm Optimization
- To introduce the principles of Differential Evolution
- To gain knowledge on Ant Colony Optimization

Learning Outcomes:

Students will be able to

- analyze the pros and cons of different optimization techniques.
- describe the concepts of various techniques.
- develop suitable algorithms for the implementation of above techniques.
- apply these techniques to solve various engineering optimization problems .
- compare the performance of various techniques.
- select a suitable technique to optimize a given problem.

UNIT – I: Definition-Classification of optimization problems

Unconstrained and Constrained optimization-Optimality conditions, Evolution in nature-Fundamentals of Evolutionary algorithms- Evolutionary Strategy and Evolutionary Programming.

UNIT – II: Genetic Algorithm

Basic concepts- search space- working principle -encoding-fitness function - Genetic Operators-Selection: Roulette-wheel, Boltzmann, Tournament, Rank and Steadystate-Elitism- Crossover: single-pint, two-point, multi-point, uniform, matrix and cross over rate.

UNIT – III: Mutation

Mutation, mutation rate. Variations of GA: Adaptive GA and Real coded GA - Issues in GA implementation-Particle Swarm Optimization: Introduction-Fundamental principles of Particle Swarm Optimization-Velocity Updating-Advanced operators-Parameter selection.

UNIT – IV:

Binary, discrete and combinatorial PSO-Implementation issues-Convergence issues, Multi-objective PSO (Dynamic neighbourhood PSO-Vector evaluated PSO)-Variations of PSO: weighted, repulsive, stretched, comprehensive learning, combined effect PSO and clonal PSO.

UNIT – V: Differential Evolution

Introduction-Fundamental principles of Differential Evolution- different strategies of differential evolution-function optimization formulation-mutation and crossover operators-estimation and selection-Discrete Differential Evolution.

UNIT – VI: Ant Colony Optimization

Introduction-Fundamental principles of Ant colony optimization-Ant foraging behaviour-initialization-transition strategy-pheromone update rule- applications.

Text Books:

1. Kalyanmoy Deb, "Multi objective optimization using Evolutionary Algorithms", John Wiley and Sons, 2008.
2. E. Goldberg, Genetic Algorithms in search, Optimization and machine learning, 1989
3. Particle Swarm Optimization, An overview by Riccardo Poli, James Kennedy, Tim Blackwell, Springer
4. Differential Evolution, A Practical Approach to Global Optimization, Authors: Price, Kenneth, Storn, Rainer M., Lampinen, Jouni A. , Springer
5. Ant Colony Optimization by Marco Dorigo, Thomas Stutzle, MIT Press.

Reference Books:

1. Soliman Abdel Hady, Abdel Aal Hassan Mantawy, "Modern optimization techniques with applications in Electric Power Systems", Springer,2012.
2. M. Mitchell, 'Introduction to Genetic Algorithms", Indian reprint, MIT press Cambridge, 2nd edition, 2002.
3. R.C. Eberhart, Y.Sai and J. Kennedy, Swarm Intelligence , The Morgan Kaufmann Series in Artificial Intelligence, 2001.
4. K.M. Passino, Biomimicry for optimization, control and automation, Springer-Verlag, London, UK, 2005.
5. G. C. Onwubolu, & B. V. Babu, New Optimization Techniques in Engineering, Springer- Verlag Publication, Germany, 2003.

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Open Elective - III

ELECTRICAL POWER UTILIZATION
(Other than EEE)
IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the mechanics of train movement.
- To gain knowledge on selection of appropriate heating method.
- To introduce the laws of illumination.
- To develop an understanding of refrigeration and air-conditioning.
- To expose students to the process of elctrolysis.

Learning Outcomes:

Students will be able to

- analyze the appropriate type of traction system.
- select a suitable method of heating for a given application.
- design an illumination system.
- calculate the required tonnage capacity for a given air-conditioning system.
- select a suitable charging method.
- evaluate domestic wiring connection and debug any faults occured.

UNIT – I: Electrical Traction

Features of an Ideal Traction System, Systems of Electrical Traction, Traction Supply System, Mechanism of Train Movement, Speed- Time Curve, Traction Motors, Tractive Effort and Horse Power, Speed Control Schemes, Electric Braking, Recent Trends in Traction.

UNIT – II: Electric Heating

Classification, Heating Element, Losses in Oven and Efficiency, Resistance Furnace, Radiant Heating, Induction Heating, High Frequency Eddy Current Heating, Dielectric Heating, Arc Furnace, Heating of Furnace, Electric Welding, Methods and Equipments.

UNIT – III: Illumination

Radiant Energy, Terms and Definitions, Laws of Illumination, Polar Curves, Photometry, MSCP, Integrating Sphere, Luminous Efficacy, Electrical Lamps, Design of Interior and Exterior Lighting Systems, Illumination Levels for Various Purposes, Light Fittings, Factory Lighting, Flood Lighting, Street Lighting, Energy Conservation in Lighting.

UNIT – IV: Air Conditioning and Refrigeration

Control of Temperature, Protection of Motors, Simple Heat-Load and Motor Calculations, Various Types of Air Conditioning, Functioning of Complete Air Conditioning System, Type of Compressor Motor, Cool Storage, Estimation of Tonnage Capacity and Motor Power.

UNIT – V: Electro-Chemical Processes

Electrolysis – Electroplating – Electro deposition – Extraction of metals current, Efficiency - Batteries – types – Charging Methods.

UNIT – VI: Basics of Domestic Electrical Wiring

Types of Cables, Flexible Wires Sizes and Current Capacity, Use of Fuse, MCB and MCCB (Working and Construction), Idea about Megger, Earthling – Domestic and Industrial.

Text Books:

1. Garg and Girdhar, "Utilisation of Electric Energy" 1982, Khanna Publisher.
2. Pratab H., "Art and Science of Utilization of Electrical Energy", Second Edition, Dhanpat Rai and Sons, New Delhi.

Reference Books:

1. Wadhwa C.L., "Generation, Distribution and Utilization of Electrical Energy",1993, Wiley Eastern Limited,
2. S.C.Tripathy, "Electric Energy Utilization and Conservation",1993, Tata McGraw Hill.
3. R.K. Rajaput, . "Utilization of Electric Power", Laxmi Publications, 1st Edition, 2007.
4. N.V.Suryanarayana, "Utilization of Electric Power", New Age International, 2005
5. C.L.Wadhwa, "Generation, Distribution and Utilization of Electrical Energy, New Age International, 4th Edition, 2011.
6. M. Prasad, Refrigiration and Air-conditioning, Wiley Eastern Ltd., 1995 .
7. Taylor E. Openshaw, "Utilization of Electrical Energy", 1968, Orient Longman.
8. Gupta J. B., "Utilization of Electric Power and Electric Traction", 2002,S. K. Kataria and Sons.

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Open Elective - III

ROBOTICS
(Other than ME)
IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with anatomy, kinematics, sensors and dynamics of a programmable machine, robot.

Learning Outcomes:

Students will be able to

- distinguish between fixed automation and programmable automation.
- identify various components of robot.
- select appropriate type of actuator for a joint.
- illustrate robot applications in manufacturing.
- analyze kinematics of a robot.
- derive equations of motion of a manipulator for a particular application.
- write a programme to control a robot for execution of a work cycle.

UNIT – I: Introduction

Automation and Robotics, Components of Robot – Mechanical manipulator-control system and end effectors-Types of end effectors — Requirements and challenges of end effectors classification of robots by coordinate system and control system. Control resolution, accuracy, repeatability and work volume of robot.

UNIT – II: Robot actuators and Feed back components

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
Feedback components: position sensors – potentiometers, resolvers, encoders – Velocitysensors.

UNIT – III: Robot Application in Manufacturing

Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.
Future applications of robots.

UNIT – IV: Motion Analysis

Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – V:

Differential transformation and manipulators, Jacobians – problems.Dynamics: Lagrange – Euler and
Newton – Euler formations – Problems.

UNIT – VI:

Trajectory planning and avoidance of obstacles, path planning, Slew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

Text Books:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

Reference Books:

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall.
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

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Open Elective - III

ASSISTIVE TECHNOLOGIES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Understand the laws that govern the use of assistive technology in higher education.
- Evaluate appropriate pieces of technology according to a student's specific disability and academic needs.

Learning Outcomes:

Students will be able to

- identify the legislative policies connected with assistive
- discuss Universal design principles in the context of general education environments and curriculum materials.
- explore the process for finding the right technology and the right applications, and determine how to pay for it.
- explore and discuss how to establish a technology team with an assistive technology representative, perform a school wide assessment of all student needs and develop a school and/or classroom tech plan.

UNIT – I: Introduction to Assistive Technology (AT) Devices and Services

Assistive Technology Defined. Historical Overview of Assistive Technology. Multidisciplinary Nature of at Service Provision.

UNIT – II: Adaptations Framework for Considering Assistive Technology

Introduction to the Adaptations Framework, Setting-Specific Demands, Person-Specific Characteristics, Adaptations, Evaluation of Effectiveness of Adaptations.

UNIT – III: Assistive Technology Assessments

Overview of Assessment Issues, Overview of General Assessments , Assistive Technology Assessments, Assessment Components.

UNIT – IV: Enhance Speech Communication

Nature of Spoken Language, Introduction to Augmentative and Alternative Communication Systems, Selection Techniques for Aided Communication Systems, Overview of Nonelectronic Systems and Electronic Devices.

UNIT – V: Mobility & Access to Information

Introduction to Mobility Adaptations, Basic Design Considerations, Seating and Positioning Issues. Introduction to Information Access, Computer Access, Telecommunication, Listening and Print Access.

UNIT – VI: Enhance Independent Living

Introduction to Independent Living, Devices for Daily Life, Switches and Scanning. Environmental Control Units, Access to Management Devices.

Text Books:

1. Diane P edrotty Bryant, Brian R. Bryant, Allyn and Bacon "Assistive Technology for People with Disabilities", 2nd edition ***Psycho-Educational Services***
2. Amy G.Dell, Deborah A.Newton, Jerry G.Petroff, "Assistive Technology in the class room Enhancing the school experiences of students with disabilities", Pearson Publications

Reference Books:

1. Marion A.Hersh, Michael A.Johnson , " Assistive Technology for the Hearing-impaired, Deaf and Deafblind", Springer Publications
2. Meeko Mitsuko K.Oishi, lan M.Mitchell, H.F. Machiel vanderloss, "Design and use of Assistive Technology, Springer Publications.
3. Eckehard Fozzy Moritz, "Assistive Technologies for the Interaction of the Elderly", Springer Publications.

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Open Elective - III

INTRODUCTION TO EMBEDDED SYSTEMS

(Other than ECE, CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge on basic quantitative principles of embedded system design and performance measurements.
- To study about different embedded firmware and RTOS concepts

Learning Outcomes:

Students will be able to

- know the design concepts of different embedded systems.
- know the embedded system components and firmware.
- learn about the techniques of the task communication and RTOS concepts
- design principles of RTOS Based Embedded System Design

UNIT – I: Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT – II: Typical Embedded System

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory selection for Embedded Systems, Processor selection for embedded system.

UNIT – III: Embedded System Components and Firmware

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware design approaches and Development languages.

UNIT – IV: Embedded communication interface

Communication Interface: Onboard and External Communication Interfaces, Serial/ Parallel Communication – Serial communication protocols -RS232 standard – RS485 –Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C).

UNIT – V: RTOS Based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT – VI: Task Communication

Task Synchronization, Task communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Text Books:

1. Shibu K.V, "Introduction to Embedded Systems ",Mc Graw Hill. (I to VI Units)
2. Raj Kamal,"Embedded Systems", TMH. (IV Unit)

Reference Books:

1. Frank Vahid, Tony Givargis,"Embedded System Design", John Wiley.
2. Lyla, "Embedded Systems", Pearson, 2013
3. David E. Simon, "An Embedded Software Primer", Pearson Education.

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Open Elective - III

SOCIAL NETWORKS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To provide basic concepts of Social networks and make them learn the psychological foundations of Social networks.
- To Know about Network Influence and diffusion

Learning Outcomes:

Students will be able to

- describe Social network concepts.
- categorize segmentation and Characteristics.
- analyze psychological foundation of Social networks.
- evaluation of various organizations of networks.
- define Network Influence and diffusion.
- design social network systems in different areas.

UNIT – I:

Basic social network concepts-Distributions- Multiplexity-Roles and positions-Embedded of the informal within instituted or named networks.

UNIT – II:

Network segmentation-Named and Unnamed Network segments-segmenting groups on the basis of cohesion-structural similarity and structural equivalence.

UNIT – III:

Psychological foundations of social networks-safety-effectiveness-Status-Limits on individual networks

UNIT – IV:

Organizations and networks Information-Driven organizations-Bridging the gaps: Network size, diversion and social cohesion

UNIT – V:

Networks, Influence and diffusion – influence and decision making-epidemiology and network diffusion.

UNIT – VI:

Network as social capital –Individual level social capital-social capital as an attribute of social systems.

Text Books:

1. Understanding Social Networks: Theories, Concepts, and Findings By Charles Kadushin.

Reference Books:

1. Social Networks and the Semantic Web By Peter Mika.
1. **Social Network Analysis: Methods and Applications** By Stanley Wasserman, Katherine Faust

Open Elective - III

MOBILE APPLICATION DEVELOPMENT

(Other than CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To prepare students with skills and knowledge of Mobile application development using J2ME Technology.
- Understand the Android OS architecture and able to develop the applications for mobile devices

Learning Outcomes:

Students will be able to

- configure a J2ME environment for development.
- plan and design of J2ME applications.
- access and work with database under the J2ME.
- reproduce the installation of the Android Eclipse SKD.
- implement the user interface for android applications.
- use best design practices for mobile development, designing applications for performance and responsiveness and also implement communication between the mobile devices.

UNIT – I: J2ME Overview

Inside J2ME, How J2ME Is Organized, J2ME and Wireless Devices, What J2ME Isn't, Other Java Platforms for Small Computing Devices.

J2ME Architecture and Development Environment : J2ME Architecture ,Small Computing Device Requirements, Run-Time Environment, MIDlet Programming .Java Language for J2ME ,J2ME Software Development Kits ,Hello World J2ME Style Multiple MIDlets in a MIDlet Suite ,J2ME Wireless Toolkit.

UNIT – II:

Commands, Items, and Event Processing: J2ME User Interfaces ,Display Class ,The Palm OS Emulator ,Command Class ,Item Class ,Exception Handling .High-Level Display: Screens :Screen Class , Alert Class, Form Class ,Item Class ,List Class, Text Box Class, Ticker Class.

Canvas: The Canvas, User Interactions Graphics, Clipping Regions, Animation

UNIT – III:

Record Management System : Record Storage ,Writing and Reading Records, Writing and Reading Mixed Data Types ,Record Enumeration ,Sorting Records, Searching Records ,Record Listener .

J2ME Database Concepts: Data, Databases, Database Schema, Overview of the JDBC Process, Database Connection.

UNIT – IV:

Installation and configuration of android, starting an android application project: components, debugging with eclipse. Application design: the screen layout and Main.xml file, components ids, controls, creating and configuring android Emulator, communication with emulator.

UNIT – V:

controls and user interface: radio buttons, radio group ,the spinner, data picker, buttons, array adapter .

view class: combining graphics with a touch listener ,canvas, bitmap, paint ,motion event.

UNIT – VI:

working with images :display images ,using images stored on android devices ,image view, working with text files ,working with data tables, using sqlite ,using xml for data exchange, cursor, content values, XML PUL Parser, XML Resource parser.

Client -server applications: socket, server socket, HTTP URL connection, URL.

Text Books:

1. J2ME: The Complete Reference by James Keogh ,McGraw-Hill/Osborne.
2. Android Application development for java programmers by James C Sheusi, Cengage Learning

Reference Books

1. Core J2ME Technology by John W. Muchow, Prentice Hall PTR; 1st edition.
2. Enterprise J2ME : developing mobile java applications –Michael juntao yuan,pearson Education ,2004.
3. Beginning java ME platform, Ray Richpater, Après, 2009.
4. Android apps for absolute Beginners by Wallace Jackson, Apress.
5. Begining android 4 application development, Wei-meng Lee, wiley Programming android, Ziguord Mednieks, Laired Dornin, G.Blake Meike & Masumi Nakameera, Orelly

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Open Elective - III

REAL - TIME SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the concepts of Real – Time systems.

Learning Outcomes:

StudentS will be able to

- understand the use of multi tasking techniques in real time systems.
- evaluate the performance of soft and hard real time systems.
- analyze multi task scheduling algorithms for periodic, aperiodic and sporadic tasks.
- design real time operating systems.

UNIT – I:

Real-Time systems, typical real-time applications, hard versus soft real-time systems, a reference model of real-time systems.

UNIT – II:

Commonly used approaches to hard real-time scheduling, clock-driven scheduling,

UNIT – III:

Priority-driven scheduling of periodic tasks, scheduling aperiodic and sporadic jobs in priority- driven systems.

UNIT – IV:

Resources and resource access control, multiprocessor scheduling and resource access control.

UNIT – V:

Scheduling flexible computations and tasks with temporal distance constraints.

UNIT – VI:

Real-Time Communications, Operating Systems.

Text Books:

1. Jane Liu, Real-Time Systems, Prentice Hall, 2000.
2. Philip.A.Laplante, Real Time System Design and Analysis, 3rd Edition, PHI, 2001.

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Open Elective - III

NETWORK MANAGEMENT SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand key elements of Network Management.
- To understand the various Network management tools.

Learning Outcomes:

Students will be able to

- analyze the key elements of Network Management.
- distinguish different types of SNMPs.
- apply the remote monitoring mechanism for an application.

UNIT – I: Data communications

Analogy of Telephone Network Management, Communications protocols and Standards, Challenges of Information Technology Managers

UNIT – II: Network Management

Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

UNIT – III: SNMPV1 Network Management

Organization and Information and Information Models.

Managed network: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model.

UNIT – IV: SNMPv1 Network Management

Communication and Functional Models, The SNMP Communication Model, Functional model

UNIT – V: SNMP Management

SNMPv2: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, the SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1

UNIT – VI: SNMP Management

RMON: What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems.

Text Book:

1. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

Reference Books:

1. Network management, Morris, Pearson Education.
2. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.

. Distributed Network Management, Paul, John Wiley.

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Open Elective - III

FUNDAMENTALS OF E-COMMERCE

(Other than CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of E-Commerce.
- To gain the knowledge on various Mercantile Process models.
- To identify the fundamental concepts in E-Payment systems like smart card, credit card..etc
- To expose to electronic data interchange (EDI) problems.

Learning Outcomes:

Students will be able to

- outline the fundamentals in E-Commerce.
- describe various Mercantile Process models.
- discuss about various E-Payment systems.
- identify electronic data interchange (EDI) problems.
- describe various Advertising techniques on internet

UNIT – I: Electronic Commerce-Frame work

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT – II: Consumer Oriented Electronic commerce

Consumer Oriented Electronic commerce - Mercantile Process models.

UNIT – III: Electronic payment systems

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

UNIT – IV: Inter Organizational Commerce

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

UNIT – V: Intra Organizational Commerce

Work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT – VI: Advertising and Marketing

Information based marketing, Advertising on Internet, on-line marketing process, market research

Text Book:

1. Kalakota, Whinston *Frontiers of electronic commerce*, Pearson.

Reference Books:

1. Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang *E-Commerce fundamentals and applications*, John Wiley.
2. S.Jaiswal – Galgotia *E-Commerce.*
3. Kenneth C.Taudon, Carol Guyerico Traver *E-Commerce – Business, Technology, Society.*

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Open Elective - III

STATISTICAL METHODS USING R SOFTWARE

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand statistical concepts.
- To know R software.

Learning Outcomes:

Students will be able to

- examine the relationship between the variables and forecast.
- apply suitable range of statistical tests.
- use R for statistical programming, Computation, Graphics, and modeling.
- expand their knowledge of R on their own.

UNIT – I: Correlation-Regression

Simple correlation for ungrouped data , rank correlation and simple regression.

UNIT – II: Testing of Hypothesis

Introduction - population-sample-large sample and small sample. Testing of hypothesis - hypothesis - null hypothesis - alternative hypothesis - level of significance - degrees of freedom - one tailed and two tailed tests - procedure of testing of hypothesis.

UNIT – III: One Sample Significance Tests

One sample tests: Large sample - Test for single mean, single proportion, Small sample tests: t-test for single mean.

UNIT – IV: Two Sample Significance Tests

Two sample tests : Large sample - test for two means, two proportions, Small sample: t-test for two means, F-test.

UNIT – V: Introduction to R software

An introductory R session- R as a calculator- Getting help and loading packages- Data entry and exporting data.

Correlation and Regression using R: Calculating correlation coefficient-calculating rank correlation-finding regression lines- interpretations

UNIT – VI: One Sample and Two Sample Tests using R

Large sample: Calculating Z value for single and two means - interpretation - Calculating Z value for single proportion and two proportions-interpretations

Small sample: Calculating t for single mean and two means- interpretations Calculating F value -interpretations

Text Books:

1. S.C.Gupta and V.K.kapoor-Fundamentals of Mathematical Statistics-S.chand & co.
2. Probability and Statistics, Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganatham and Dr. M.V. S. S. N. Prasad, S. Chand & Company Ltd.
3. Peter Dalgaard. Introductory Statistics with R (Paperback) 1st Edition Springer-Verlag New York, Inc. ISBN 0-387-95475-9
4. W. N. Venables and B. D. Ripley. 2002. Modern Applied Statistics with S. 4th Edition. Springer. ISBN 0-387-95457-0

Reference Books:

1. An Introduction to R. Online manual at the R website at http://cran.r-project.org/manuals.html
2. Andreas Krause, Melvin Olson. 2005. The Basics of S-PLUS. 4th edition. Springer-Verlag, New York. ISBN 0-387-26109-5.

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DIGITAL SIGNAL PROCESSING LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course objectives:

- To analyze and manipulate digital signals for the representation of systems using MATALB.
- To introduce the architecture of TMS320C6711 DSP and the programming of DSP.

Learning Outcomes:

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

1. Analyze and implement digital signal processing systems in time domain.
2. Compute circular convolution and the discrete Fourier transform (DFT) of discrete-time signals.
3. Determine the frequency response of frequency-selective digital filters using Butterworth, chebyshev approximationsand windows.
4. Implement DSP operations on TMS320C6711 DSP processor.

List of Experiments:

1. Represent signal, it's basic transformations, sum of sinusoidal signals and multiplication of sinusoidal signals.
2. Obtain output of LTI system (without using default functions).
3. Perform linear convolution using the circular convolution (without using default functions)
4. Obtain spectrum of the discrete time sequence (without using default functions)
5. Obtain DFT using FFT(without using default functions)
6. Verify DFT properties (without using default functions)
7. Design IIR filter using Butterworth/Chebyshev Approximations.
8. Design FIR filter using windowing techniques.
9. Obtain power density spectrum of a sequence.
10. Linear convolution implementation on DSP chips.
11. Open-ended experiment-application of filters.

Text Books:

1. John G. Proakis,Dimitris G.Manolakis, "Digital Signal Processing, Principles, Algorithms, and Applications": Pearson Education / PHI, 2013.
2. A.V.Oppenheim and R.W. Schaffer , "Discrete Time Signal Processing ", PHI

URL'S

1. *www.ti.com/cn/lit/pdf/spru509*c.pdf
2. *www.ti.com/lit/ug/spru301c/spru301c.pdf*

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MICROWAVE AND OPTICAL COMMUNICATIONS LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To expose to characterization of microwave components and measurements at microwave frequencies.
- To familiarize with the fiber optic communication system.

Learning Outcomes:

Students will be able to

- obtain the characteristics of microwave components.
- measure signal parameters at microwave frequencies.
- find numerical aperture of an optical fiber.
- obtain the characteristics of LED, LASER, analog and digital optical links.

List of Experiments:

1. Reflex Klystron characteristics.
2. Gunn-diode characteristics.
3. VSWR measurement.
4. Frequency, wave length and Attenuation measurements.
5. Directional coupler characteristics.
6. Scattering parameters of Circulator/ Magic Tee.
7. Characterization of LED and Laser Diode.
8. Intensity Modulation of Laser output through an optical link.
9. Measurement of Numerical aperture.
10. Characterization of Analog/Digital optical link

Reference Books:

1. Samuel Y. Liao , "Microwave Devices and Circuits" , PHI, 3rd Edition,1994.
2. R.E. Collin, "Foundations for Microwave Engineering", IEEE Press, John Wiley, 2nd Edition, 2002.
3. Peter A. Rizzi, "Microwave Engineering Passive Circuits" –PHI, 1999.
4. M.L. Sisodia and G.S.Raghuvanshi, "Microwave Circuits and Passive Devices" Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
5. R. Chatterjee, "Elements of Microwave Engineering", Affiliated East-West Press Pvt. Ltd., New Delhi, 1988.
6. Gerd Keiser, "Optical fiber communications" –3rdEd.MGH.
7. Djafar K. Mynbaev and Lowell L. Scheiner, "Fiber Optic Communication Technology" (Pearson Education Asia)
8. User manuals for Microwave Lab equipment.
9. Data sheets for optical sources.

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VLSI AND EMBEDDED SYSTEMS LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To design and simulation of combinational and sequentialCircuits using Mentor Graphics back end tools.
- To familiarize concepts of 8051 programming

Learning Outcomes:

Students will be able to

- design and verify the functionality of different combinational and sequential circuits.
- develop and implement various digital circuits using Mentor Graphics back end Back end tools.
- interface different I/O devices with microcontroller.
- perform serial communication with microcontroller.

Part – A: Using Mentor Graphics Backend Tools

1. CMOS Inverter
2. CMOS NOR/NAND gates
3. CMOS XOR and XNOR gates
4. CMOS full adder
5. Basic NAND/NOR Latch
6. D-Flip flop
7. Design and implementation of static/dynamic logic circuit for a given application- Open ended experiment

Part: – B: Using Microcontroller

1. Serial and Parallel Blinking of LEDs using 8051.
2. Serial communication implementation using 8051.
3. Delay generation using timers of 8051.
4. Traffic control implementation using ARM.
5. Keypad interfacing with ARM
6. Design a circuit to read a given sensor data and display on LCD- open ended experiment.

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Elective - IV

TESTING AND VERIFICATION OF VLSI CIRCUITS

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Prerequisites:

- Familiarity with Digital logic Design.

Course Objectives:

- To familiarize with testing of VLSI circuits.
- To introduce the concepts of verification.

Learning Outcomes:

Students will be able to

- understand fault models and testing techniques.
- apply ATPG algorithms to find test patterns for a given Circuit under Test and to design circuit which is testable.
- analyze and verify the system at various levels.

UNIT – I: Fault Modeling

Role of Testing, Digital and Analog VLSI Testing, Defects, Errors, and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault and its definitions.

UNIT – II: Logic And Fault Simulation

Simulation for Design Verification, Simulation for Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-Value Simulation, Algorithms for Fault Simulation.

UNIT – III: Combinational and Sequential Circuit Test Generation

Algorithms and Representations, Combinational ATPG Algorithms, ATPG for Single-Clock Synchronous Circuits, Time-Frame Expansion Method.

UNIT – IV: Introduction to Verification

Technology Challenges, Verification Technology Options, Verification Methodology, Testbench Creation, Verification Approaches, Verification and Device Test, Verification Plans.

UNIT – V: System-Level Verification

System Design, System Verification and its types, Bluetooth SoC.

UNIT – VI: Block-Level Verification

IP Blocks, Block Level Verification, Block Details of the Bluetooth SoC, Lint Checking, Formal Model Checking, Functional Verification/Simulation, Directed Random Testing, Code Coverage Analysis.

Text Books:

1. M. Bushnell and V. D. Agarwal, "Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits", Kluwer Academic Publishers, 2000. (Units: I to III)
2. Prakash Rashinkar, Peter Paterson, Leena Singh, "System-On-a-Chip Verification Methodology and Techniques" Kluwer Academic Publishers, 2002. (Units: IV to VI)

Reference Books:

1. Parag K.Lala, "Fault Tolerant and Fault Testable Hardware Design" BS Publications, 2002.
2. Laung-Terng Wang, Cheng-Wen Wu, Xiaoqing Wen , VLSI Test Principles and Architectures: Design for Testability, Elsevier's Science & Technology publishing.
3. M. Abramovici, M. A. Breuer and A. D. Friedman, "Digital Systems Testing and Testable Design", IEEE Press.

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Elective - IV

SPEECH PROCESSING

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with speech production, speech analysis and speech processing.
- To introduce the concepts of coding of speech, speech enhancement, speech and speaker recognition systems

Learning Outcomes:

Students will be able to

- understand how speech is produced.
- perform speech analysis and homomorphic processing of speech signals.
- code the speech signals using linear predictive analysis.
- enhance the speech signals and recognize speech as well as speaker.

UNIT – I: Speech Production

Anatomy and Physiology of Speech organs- Lungs, Larynx and vocal tract, Articulatory Phonetics, Acoustic Phonetics, Acoustic theory of speech production, Lossless Tube Models, Digital Models for Speech Signals.

UNIT – II: Speech Analysis

Short–Time Speech Analysis: Windowing, Spectra of Windows, Time domain parameters- Signal analysis in time domain, Short time average energy, magnitude, zero-crossing rate and auto correlation function, Frequency domain (Spectral) Parameters : Short–Time Fourier Transform Analysis, Spectral Displays, Formant Estimation and Tracking, Energy separation.

UNIT – III: Homomorphic Speech Processing

Homomorphic systems for Convolution, Complex cepstrum of speech, Pitch detection, formant estimation, Homomorphic Vocoder.

UNIT – IV: Linear predictive coding (LPC) of Speech

Basic principles of Linear predictive Analysis, Computation of Gain, Solution of LPC Equation- Cholesky Decomposition solution for covariance method and Durbin's Recursive Solution for the Autocorrelation Equations, Prediction error Signal , Frequency domain interpretation of mean squared prediction error, Applications of LPC parameters –pitch detection and Formant analysis using LPC parameters.

UNIT – V: **Speech enhancement**

Nature of interfering sounds, Spectral subtraction, Filtering and adaptive noise cancellation, Multi-Microphone Adaptive Noise Cancellation.

UNIT – VI: Networks for speech recognition

Hidden Markov Model (HMM), training and testing using HMMs, adapting to variability in speech.

Speech Recognition Systems: Isolated Digit Recognition system and continuous Digit Recognition system, LPC Distance measures .

Speaker Recognition Systems:Verification vs Recognition, Speaker verification system and speaker identification system

Text Books:

1. Douglas O Shaughnessy, "Speech Communications", Second Edition, Oxford University Press, 2000 (Units I, II, V,VI).
2. L.R. Rabiner and S.W. Schafer, "Digital Processing of Speech Signals", Person Education (Units I,III, IV, VI).

Reference Books:

1. Thomas F. Quatieri , "Discrete –Time Speech signal Processing Principles and Practice", Person Education.
2. Owens, "Signal Processing of Speech".
3. Dr. Shaila D. Apte, "Speech and Audio Procesing" , WILEY Precise Textbook.
4. Claudio Becchetti and Klucio Prina Ricotti, "Speech Recognition Theory and C++ Implementation",WILEY.

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Elective - IV

SATELLITE COMMUNICATIONS

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn the concepts of communication satellites, earth stations and communication links.
- To familiarize with various multiple access techniques and Satellite Navigation.

Learning Outcomes:

Students will be able to

- understand the concepts of communication satellites and earth stations.
- design communication link for satellite communications.
- compare various multiple access techniques.
- understand Non-Geostationary orbit satellite systems and Satellite navigation.

UNIT – I: Fundamentals and Orbital Mechanics

Origin of Satellite Communications, Historical Background, Basic concepts and Frequency allocations, Applications and Future Trends, Orbital Mechanics, Look Angle Determination, Orbital Perturbations, Orbit Determination, Orbital Effects.

UNIT– II: Launchers and Satellite Sub-Systems

Launchers AND Launch Vehicles, Attitude and Orbit Control System, TTCM, Power System, Communication Sub System, Satellite Antennas, Equipment Reliability and Space Qualification.

UNIT– III: LEO, GEO Satellite Systems and Link Design

Considerations-Orbit, Power and Frequency, Delay and Throughput, System, Operational NGSO Constellation Design; Basic transmission Theory, System Noise Temperature and G/T Ratio, Design of Uplink and Downlinks, Design of satellite Links for specified C/N, System Design Examples.

UNIT – IV: Multiple Access

FDMA, Inter modulation, Calculation of C/N, TDMA, Frame Structure, Satellite Switched TDMA On-Board Processing, DAMA, CDMA, Spread Spectrum Transmission and Reception.

UNIT – V: Earth Station Technology

Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Primary Power, Test Methods.

UNIT – VI: Satellite Navigation and GPS

Radio and Satellite navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A code Accuracy, Differential GPS

Text Books:

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, "Satellite Communications", WSE, Wiley Publications,2nd Edition, 2003.(Units-I,II,III,IV,VI).
2. Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, "Satellite Communications Engineering", 2nd Edition, Pearson Publications, 2003.(unit-V)

Reference Books:

1. M. Richharia, "Satellite Communications : Design Principles", BS Publications, 2nd Edition,2003.
2. D.C Agarwal, "Satellite Communication"- Khanna Publications, 5th Ed.
3. K.N. Raja Rao, "Fundamentals of Satellite Communications" –PHI, 2004
4. Dennis Roddy, "Satellite Communications", McGraw Hill, 2nd Edition, 1996.

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Elective - IV

WIRELESS SENSOR NETWORKS

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the design issues in ad hoc and sensor networks, different types of MAC protocols and be familiar with different types of ad hoc routing protocols.
- To be expose to the TCP issues in ad hoc networks and Learn the architecture, protocols of wireless sensor networks.

Learning Outcomes:

Students will be able to

- explain the concepts, network architectures and applications of ad hoc and wireless sensor Networks
- analyze the protocol design issues of ad hoc and sensor networks.
- design routing protocols for ad hoc and wireless sensor networks with respect to some protocol Design issues.
- 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 Mechanisms – Characteristics of the Wireless Channel -Applications of Ad Hoc and Sensor networks, Design Challenges in Ad hoc and Sensor Networks.

UNIT – II:

Physical layer and transceiver design considerations, Personal area networks, Hidden node problem, Exposed node problem, Topologies of PAN'S, Topologies of MANETS, Topologies of WANETS

UNIT – III: MAC Protocols for AD HOC Wireless Networks

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms-Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT – IV: Routing Protocols and Transport Layer in ADHOC wireless Networks

Issues in designing a routing and Transport Layer protocol for Adhoc networks-proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT – V: Wireless Sensor Networks (WSNS) and MAC Protocols

Sensor Network Architecture, data relaying and aggregation strategies, MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4

UNIT – VI: Sensor Network Platforms and Tools

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

Application of WSN: Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications

Text Books:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.
2. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005

Reference Books:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
4. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

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Elective - V

LOW POWER VLSI DESIGN

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Prerequisites:

- Familiarity with Bipolar and CMOS digital circuits.

Course Objectives:

- To learn about various low power circuit techniques and design elements.
- To familiarize with BiCMOS fabrication process.

Learning Outcomes:

Students will be able to

- understand sources of power dissipation and low power design limitations.
- understand Special Techniques of Low Power.
- design low power CMOS combinational and sequential circuits.
- apply low power design techniques for memories.

UNIT – I: Introduction

Need for low power VLSI chips, Sources of power dissipation on Digital Integrated circuits. Basic principles of Low Power Design, Emerging Low power approaches. Power dissipation in CMOS devices.

Device & Technology Impact on Low Power: Dynamic dissipation in CMOS, Effects of Vdd and V_t on speed, constraints on V_t Reduction, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

Unit – II: Low Power Special Techniques

Power Reduction in Clock Networks, CMOS Floating Node, Low Power Bus, Delay Balancing, Low Power Techniques for SRAM.

UNIT – III: Low Power Design

Circuit level: Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library

Logic level: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic.

UNIT – IV: Low Voltage Low Power Adders, Multipliers

Introduction, Standard Adder Cells, CMOS Adder's Architectures, Low Voltage Low Power Design Techniques, Current Mode Adders. Overview of Multiplication, Types of Multiplier Architectures- Braun, Baugh-Wooley, Booth, and Wallace Tree Multipliers.

UNIT – V: Low power Architecture & Systems

Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

UNIT – VI: Low Voltage Low Power Memories

Basics of SRAM, Memory Cell, Low Power SRAM Technologies, Types of DRAM, Basics of DRAM, Self Refresh Circuit, Half-Voltage Generator, Voltage Down Converter, Future Trends and Developments of DRAM. Types of ROM, Basic Physics of Floating Gate Nonvolatile Devices, Floating Gate Memories, Basics of ROM, Low Power ROM Technology.

Text Books:

1. Gary K. Yeap, 'Practical Low Power Digital VLSI Design', KAP, 2002. (Units:1,2,3,5).
2. Kiat Seng Yeo, Kaushik Roy, "Low Voltage, Low Power VLSI Subsystems", TATA McGraw-Hil. (Units: 4,6).

Reference Books:

1. J.Rabaey (1996), "Digital Integrated circuits: a Design Perspective", PHI.
2. N.H.E Weste, K.Eshraghian, Adison Wesley, "Principles of CMOS Design", 2nd Edition.
3. Kaushik Roy, Sharat Prasad, 'Low-Power CMOS VLSI Circuit Design' Wiley, 2000.

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Elective - V

RADAR ENGINEERING

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the basic principle of RADAR and operation of different types of Radars.
- To introduce to different RADAR performance factors.

Learning Outcomes:

Students will be able to

- understand the basic principle of Radar and working of MTI and Pulse Doppler Radars.
- calculate radar parameters.
- understand the design principles of RADAR systems.
- detect signals in the presence of noise.

UNIT – I: Introduction to Radar

Nature of Radar, Maximum Unambiguous Range, Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Radar Equation, Minimum Detectable Signal, Receiver Noise, Integration of Radar Pulses, PRF and Range Ambiguities, System Losses.

UNIT – II: CW AND FM-CW Radar

Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver; Non-zero IF Receiver, Receiver Bandwidth Requirements, FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

UNIT – III: MTI AND Pulse Doppler Radar

Principle, Block diagram of MTI Radar, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs; Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, Non-coherent MTI, MTI versus Pulse Doppler Radar.

UNIT – IV: Tracking Radar

Tracking with Radar, Sequential Lobbing, Conical Scan, Mono-pulse Tracking Radar – Amplitude Comparison (one- and two- coordinates), Phase Comparison; Target Reflection Characteristics and Angular Accuracy, Tracking in Range, Acquisition and Scanning Patterns.

UNIT – V: Detection of Radar Signals in Noise

Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise

UNIT – VI: Radar Receivers

Noise Figure and Noise Temperature, Different types of Radar displays, Duplexers – Branch type and Balanced type, Circulators as Duplexers; Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

Text Books:

1. Merrill I Skolnik, “RADAR SYSTEMS”, 2nd Edition.

Reference Books:

1. Stimson’s, “Introduction to Airborne Radar” 3rd Edition.
2. Merrill I Skolnik, “Introduction to RADAR SYSTEMS”, 3rd Edition.

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Elective - V

SOFTWARE ENGINEERING

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To illustrate basic taxonomy and terminology of the software engineering
- To plan and monitor the control aspects of project.

Learning Outcomes:

Students will be able to

- explore the basic concepts of software engineering.
- choose appropriate life cycle model for a project.
- implement the phases of the traditional software development process.
- design various test cases for a software product.
- analyze different architectural views.

UNIT – I: Introduction to Software Engineering:

The evolving role of software, Changing Nature of Software, Software myths. **The software problem:** Cost, schedule and quality, Scale and change.

UNIT – II: Software Process

Process and project, component software process, Software development process models: Waterfall model, prototyping, iterative development, relational unified process, Extreme programming and agile process.

UNIT – III: Planning a software project

Effort, Cost and Duration estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan.

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases.

UNIT – IV: Software Architecture

Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures.

UNIT – V: Design

Design concepts, function-oriented design, object oriented design, detailed design, verification and validation, metrics for design.

UNIT – VI: Coding and Unit testing

Programming principles and guidelines, testing concepts, testing process, black-box testing, white-box testing, and metrics for testing.

Text Books:

1. Pankaj Jalote, "A Concise introduction to software engineering" (undergraduate topics in computer science), Springer International Edition.
2. Roger S. Pressman, "Software Engineering", TMH , 3rd edition & 7th edition.

Reference Books:

1. Pankaj Jalote, Wiley, "Software Engineering", A Precise Approach.
2. W S Jawadekar, "Software Engineering Principles and Practice", TMH
3. Sommerville, "Software Engineering", Pearson, 8th edition.
4. R Fairley, "Software Engineering Concepts", TMH.

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Elective - V

BIO-MEDICAL INSTRUMENTATION

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the man instrumentation system, electrode theory and various systems in a human body.
- To introduce the measuring techniques on human biological systems, biotelemetry and the prevention techniques.

Learning Outcomes:

Students will be able to

- recognize the significance of Electronics Engineering applied to Biological systems like ECG, EEG.
- understand the Physiological systems like Cardio-Vascular System, Respiratory System.
- understand the procedures of Diagnosis and Calibration and applications of Therapeutic and Prosthetic Devices.
- understand the Bio-Telemetry Techniques, Shocking Hazards, and Accident Prevention Methods.

UNIT – I: Introduction to Bio-Medical instrumentation

Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses. Introduction to Electrode Theory, Biopotential Electrodes.

UNIT – II: Cardiova Scular System and Measurements

The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

UNIT – III: Respiratory System, Patient Card and Monitoring

The Physiology of the Respiratory System, Tests and Instrumentation for the Mechanics of Breathing, Respiratory Therapy Equipment. Patient care and monitoring: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Other Instrumentation for Monitoring Patients, Pacemakers, Defibrillators.

UNIT – IV: Therapeutic and Prosthetic Devices

Audiometers and Hearing Aids, Laparoscope, Ophthalmology Instruments, Anatomy of Vision, Electrophysiological Tests, Ophthalmoscope, Tonometer for Eye Pressure Measurement, Diathermy.

UNIT – V: Diagnostic Techniques and Bio-Telemetry

Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray, CAT Scan, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for Emergency Patient Monitoring

UNIT – VI: Shock Hazards and Prevention

Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

Text Books:

1. Onkar N. Pandey, Rakesh Kumar,"Bio-Medical Electronics and Instrumentation", Katson Books.
2. Cromewell , Wiebell, Pfeiffer, "Bio-Medical Instrumentation".

Reference Books:

1. Joseph J.Carr, John M.Brown, "Introduction to Bio-Medical Equipment Technology", 4th Edition, Pearson Publications.
2. Khandapur, "Hand Book of Bio-Medical Instrumentation", McGrawHill.

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Self Study Course

GLOBAL POSITIONING SYSTEMS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the concept and usage of GPS for various applications.

Learning Outcomes:

Students will be able to

- explain the GPS components.
- choose a specific GPS receiver and GPS survey method.
- interpret the navigational message and signals received by the GPS satellite
- identify location of features and map the geospatial features.

UNIT – I: Overview and Observables of GPS

Basic concept. Space segment- constellation, satellites, operational capabilities, denial of accuracy and access. Control segment- master control station, monitor stations, ground control stations. User segment- user categories, receiver types, information services.

Observables:

Data acquisition- code pseudoranges, phase psecudoranges, Doppler data, biases and noise. Data combinations- linear phase combinations, code, psecudorange smoothing. Atmospheric effects- phase and group velocity ,ionospheric refraction, toposoheric refraction, atmospheric monitoring.

UNIT – II: Surveying with GPS

Introduction- terminology definitions, observation techniques, field equipment. Planning a GPS survey- General remarks, Pre survey planning, field reconnaisence, monumentation, organizational design. Surveying Procedure- preobservation, observation, postobservation, ties to control monuments. In Situ data Processing- data transfer, data processing, trouble shooting and quality control, datum transformations, computation of plane coordinates. Survey report.

UNIT – III: Methods of Processing GPS Data

Data processing- data handling, cycle slip detection and repair. Ambiguity resolutions- general aspects, basic approaches, search techniques, ambiguity validation. Adjustment, filtering and smoothening- least squares adjustments, kalmal filtering, smoothening. Network adjustment- single base line solution,

multipoint solution, single base line versus multi point solution, least squares adjustment of base lines. Dilutin of precision. Accuracy measures- introduction, chi-square distribution, specifications.

UNIT – IV: Applications and Future of GPS

General Uses of GPS- global uses, regional uses, local uses. Attitude determination- theoretical and practical considerations. Air borne GPS for photo control. Interoperability of GPS- GPS and inertial navigation systems, GPS and GLONASS, GPS and other sensors.

Future of GPS:

New application aspects. GPS modernization- future GPS satellites, augmented signal structure. GPS augmentation- ground based and satellite based augmentation. GNSS - GNSS development, GNSS/Loran-C integration.

Text Books:

1. B. Hofmann- Wellnhoff, H.Lichtenegger and J. Collins: GPS theory and practice, fifth edition, Springer Wien, Newyork.
2. Bradford W. Parkinson, James Spilker, Global Positioning System: Theory and Applications, Vol. I, 1996.

Reference Books:

1. Gunter Seeber, Satellite Geodesy Foundations, Methods and Applications, Walter de Gruyter Pub., 2003.
2. Hofmann W.B, Lichtenegger, H, Collins, J Global Positioning System – Theory and Practice, Springer-VerlagWein, 2001.

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Self Study Course

INTERIOR DESIGN

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand concepts, principles, procedures and components of communication; interpret reasons of communication failure and source respective remedies.
- To classify communication and select appropriate media; draft business letters and reports pertinent to interior designing profession.
- To work in groups and teams; demonstrate leadership quality; make use of group skills to achieve goals.

Learning Outcomes:

Students will able to

- implement the key features that can enhance architectural view.
- understand the need of designing construction projects.
- identify the paints and materials for specific interior design.

UNIT – I: Interior Design and Decoration, Decoration and Tools

Importance of design - Optimization, Economics, Time, Maintainability, Multiplicity, Role of Interior Designer-Interest of user with respect to economy, comfort, safety, security, etc, Limitations on design due to existing constraints

Aesthetical tools

a. Principles of Design - Balance, Emphasis, Rhythm, Harmony, Scale and Proportion

b. Elements of design - Point, Line, Shape, Form, colour and colour theory, Texture and Pattern

c. Aesthetical design consideration - Physical such as touch, smell, hearing, Social such as interactive, status symbols, Psychological such as derivable pleasure from use, emotional comfort, Ideological such as environmental, patriotic, socialistic conditions .

Functional tools

a. Ergonomics- Its study - Postures, Anthropometrics, Biomechanics.

b. Zoning, Grids, Modulation of space within and without, enveloping space within the room and furniture.

UNIT – II: Design Notions

Concepts - Manifestation of realization through contemplative germination, Period & Styles - Historical & Cultural approach with stress on ability to identify Occidental

Periods and Oriental styles and with special focus on Contemporary Indian period and styles.

a. Occidental - Classical, Medieval, 19th Century AD, Contemporary
b. Oriental - Japanese, Chinese, Thai, and Indian Themes - The common thread that binds the entire design in a story line on Beach and Mela.

UNIT – III: Planning Process

Understanding process of design (Need-Design brief-Information collection-Developing Alternatives-Analysis-Solution) Planning Process of Interior Design

a. Design Brief - simple and clear description about what is to be designed.
b. Relevant Data collection such as location & condition of site, Client profile & requirements, Materials, etc.
c. Data Analysis - analyzing and forming alternative schemes based on personal interpretations of design brief and relevant data using design tools and design concepts.
d. Selection- finalizing the best scheme through personal justifications.
e. Presentation- representing the final scheme in graphical manner.

UNIT – IV: Materials, Paints, Varinishes and Coatings for Interior Design

Cement, Lime, Sand and Gypsum: Types & Properties of Cement, Lime, Fine and Course Aggregates Types & Applications of Concretes, Mortars and Plasters Properties & Applications of Gypsum & its products.

Paints, varnishes and coatings:

Constituents (Pigment, Thinner, etc.), Classification (Water, Oil, acrylic based), Types (lime wash, distempers, acrylic emulsion, metallic, textured, etc.), Textural quality (Matt, Gloss, Satin, Lustre, etc) and Properties Process of painting (preparation of surface, primer coat, etc.) & application of paint with brush, roller, spray, etc. including applications of paints on different surfaces. Constituents, Types & uses of Varnishes, Polishes & Coatings.

Text Books:

1. Joseph De Chaira Jullius Panero Martin Zelnik Time Saver Standard for Interior Design & Space Planning Mcgraw Hill New York.
2. John Pile Interior Design Harry N. Adry Publishers.

Reference Books:

1. Jullius Panero Martin Zelnik Human Dimensions and Interior Spaces Whitney Library New York.
2. Phillis Sleen Allen Beginning of Interior Environment New York.
3. Shirish Bapat Basic Design of Anthropometry Bela books Publishers.
4. Shirish Bapat Living Area (Interior Space) Bela books Publishers.

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Self Study Course

ELECTRICAL SAFETY MANAGEMENT

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To provide a comprehensive exposure to electrical hazards, safety procedures.
- To familiarize the students with various grounding techniques.

Learning Outcomes:

Students will be able to

- describe electrical hazards and safety equipment.
- analyze and apply various grounding and bonding techniques.
- select appropriate safety method for low, medium and high voltage equipment.
- participate in a safety team.

UNIT – I:

Primary and secondary hazards- arc, blast, shocks-causes and effects-safety equipment- flash and thermal protection, head and eye protection-rubber insulating equipment, hot sticks, insulated tools, barriers and signs, safety tags, locking devices- electrician's safety kit.

UNIT – II:

The six step safety methods- pre job briefings- hot -work decision tree-safe switching of power system, safety equipment, procedure for low, medium and high voltage systems- the one minute safety audit.

UNIT – III:

General requirements for grounding and bonding- definitions- grounding of electrical equipment- bonding of electrically conducting materials and other equipment-connection of grounding and bonding equipment- system grounding- purpose of system grounding- grounding of low voltage and high voltage systems.

UNIT – IV:

Company safety team- safety policy- safety meetings- safety audit- accident prevention- first aid- rescue techniques-accident investigation- national electrical safety code- standard for electrical safety in work place- occupational safety and health administration standards.

Text Book:

1. *Dennis Neitzel*, Al Winfield,'Electrical Safety Handbook', McGraw-Hill Education, 4th Edition,2012.

Reference Books:

1. John Cadick, 'Electrical Safety Handbook', McGraw-Hill School Education Group, 1994.
2. Maxwell Adams.J, "Electrical safety- a guide to the causes and prevention of electric hazards",The Institution of Electric Engineers, 1994.
3. Ray A. Jones, Jane G. Jones, 'Electrical safety in the workplace', Jones & Bartlett Learning, 2000.

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Self Study Course

GREEN ENGINEERING

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart knowledge, how engineering fundamentals can be applied to achieve sustainability and minimize environmental impacts in all engineering disciplines across life cycles.

Learning Outcomes:

Students will be able to

- To Create sustainable products, facilities, processes and infrastructure.
- To Design ecofriendly products.

UNIT – I: Introduction

Humanity and Technology, the Concept of Sustainability, Industrial Ecology and Sustainable Engineering Concepts.The Relevance of Biological Ecology to Industrial Ecology, Metabolic Analysis, Technology and Risk, the Social Dimensions of Industrial Ecology.

UNIT – II: Implementation

Sustainable Engineering, Technological Product Development, Design for Environment and Sustainability: Customer Products, Design for Environment and Sustainability: Buildings and Infrastructure.

UNIT – III: Life Cycle Assessment

An Introduction to Life Cycle Assessment, The LCA Impact and Interpretation Stages, Streamlining the LCA Process.

UNIT – IV: Analysis of Technological Systems

Systems Analysis, Industrial Ecosystems, Material Flow Analysis, Energy and Industrial Ecology, Water and Industrial Ecology, Urban Industrial Ecology, Modelling in Industrial Ecology.

Text Books:

1. T E Graedel, Braden R Allenby "Industrial ecology and sustainable engineering" Prentice Hall, ©2010.
2. David T. Allen, David R Shonnard "Sustainable Engineering Concepts, Design and Case Studies" Prentice Hall, 2011.

References Books:

1. Anastas, Paul T, Zimmerman, Julie B, "Innovations in Green Chemistry and Green Engineering", Springer, First Edition, 2013.
2. Daniel A. Vallero, Chris Brasier, "Sustainable Design: The Science of Sustainability and Green Engineering", Wiley, First Edition, 2008.

Self Study Course

MANAGING INNOVATION & ENTREPRENEURSHIP

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- Understand process of innovation and its exploitation.

Learning Outcomes:

Students will be able to

- explore opportunities to implement innovative ideas.
- assess the level of risk involved in realizing the innovative ideas as entrepreneur.

UNIT – I:

Innovation and entrepreneurship. A model for innovation and entrepreneurship, the challenge of innovation strategy.

UNIT – II:

The challenge of social entrepreneurship, the potential of" bottom of the pyramid", challenges in managing social entrepreneurship.

UNIT – III:

Developing new products, services and ventures. The global business plan.

UNIT – IV:

International Opportunities for Innovation and Entrepreneurship. The Future Impact on Innovation on Consumers, Business and Government

Text books:

1. John Bessant, Joe Tidd, "Innovation and Entrepreneurship", John Wiley and sons Ltd, second edition, 2011.
2. Robert D Hisrich Claudine Kearney "Managing Innovation and Entrepreneurship" SAGE publications, 2014.

Reference Books:

1. Joe Tidd , John Bessant, "Managing Innovation: Integrating technological, market and organizational change" Wiley, Fifth edition, 2013.
2. Joe Tidd , John Bessant, "Strategic Innovation Management", Wiley, First edition, 2014.
3. Richard Owen , John Bessant , Maggy Heintz , "Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society", Wiley, First edition,2013.

Self Study Course

INTERNET OF THINGS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with IOT levels and Protocols.
- To provide an insight on specific IoT domain.

Learning Outcomes:

Students will be able to

- integrate Internet services and physical objects.
- analyze prototypes of Internet-connected products using appropriate tools.
- apply adequate patterns for user-interaction with connected-objects

UNIT – I: Introduction to Internet of Things

Introduction, History , Objects and things, The identifier, Enabling technology , The internet.

UNIT – II: RFID

Introduction and principles , Components- Active, Passive, Semi-active, and Semi-passive; Future of RFID, RFID application scenarios-case study

UNIT – III: Wireless Sensor Network

Overview , History, The node, Connecting Nodes, Networking Nodes. Securing communication- standards.

UNIT – IV: Internet of Things Protocols

An Introduction to M2M area network physical layers , Applications, Introduction to Legacy M2M protocols for sensor networks, Examples (Mod Bus, Zig Bee). Introduction to next generation Internet of Things Protocols-IP based protocols.

Text Books

1. **Hakima Chaouchi, "The Internet of Things: Connecting Objects", John Wiley and sons, ISTE, Briton. (I to III Units).**
2. **Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", johnwiley and sons. (IV unit).**

Reference Books:

1. Sergei Evdokimov, Benjamin Fabian, Oliver Gunther, Lenka Ivantysynova, Holger Ziekow, "RFID and the Internet of Things: Technology, Applications, and Security challenges", Now Publishers Inc, 2011.
2. Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning,"The Internet of Things: From RFID to the Next-Generation Pervasive Networked systems", Auerbach Publications,CRC Press.

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Self Study Course

CONSUMER ELECTRONICS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand working principles of various electronic gadgets and consumer products.
- To study the various technical specifications and facilities of the consumer products.

Learning Outcomes:

Students will be able to

- how to work with latest electronic gadgets.
- understand audio and video processing.
- keen learn with home appliances.
- should able to differentiate old and latest developments in electronic world

UNIT – I: Audio Systems

PA system – Microphone, Amplifier, Loudspeakers, Radio receivers – AM/FM, Audio recording and reproduction – Cassettes, CD and MP3.

UNIT – II: Video Systems

Video system VCR/VCD/DVD players, MP4 players, Set Top box, CATV and Dish TV, LCD, Plasma & LED TV, Projectors – DLP, Home Theatres, Remote Controls.

UNIT – III: Landline and Mobile Telephony

Basic landline equipment – CLI, Cordless Intercom/ EPABX system, Mobile phones – GPRS & Bluetooth GPS Navigation system.

UNIT – IV: Electronic Gadgets

Scanners – Barcode / Flat bed, Printers, Xerox, Multifunction units (Print, Scan, fax, and copy) Digital clock, Digital camera, Handicam, Home security system, CCTV.

Text Books:

1. S. P. Bali ,"Consumer Electronics", Pearson Education ,2008.
2. R. G. Gupta "Audio and Video systems: Principles, Maintenance and Troubleshooting", Tata McGraw Hill (2004).

Reference Books:

1. Ronald K.Jurgen, "Digital Consumer Electronics Handbook", McGraw Hill Professional Publishing, 1997.
2. R.R Gulati, "Colour Television-principles and practice", Wiley Eastern Limited, New Delhi.
3. B.R. Gupta, Vandana singhal,"Consumer Electronics", S.K. Kataria and sons, 2006.

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Self Study Course

e-WASTE MANAGEMENT

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize the concepts of e-Waste management.
- To gain knowledge in recycling technologies for e-Waste.

Learning Outcomes:

Students will be able to

- analyze the recycling techniques of e-Waste management.
- analyze various toxic releases and health complications due to e-Waste.
- apply various reuse techniques for e-Waste.
- acquire knowledge for handling and management of e-Waste.
- apply waste disposal strategy for e-Waste.

UNIT – I: Introduction to e-Waste Management in India

Global e-waste growth, Dark shadows of digitization on Indian horizon, e-waste generation, migration, Present practice and systems, disposal methods, Present processing practices, Initiatives to manage e-waste, Strengths and weaknesses of the current system.

UNIT – II: WEEE (waste electrical and electronic equipment) - toxicity and health

Hazardous substances in waste electrical and electronic equipment-toxicity and release, Occupational and environmental health perspectives of e-waste recycling.

UNIT – III: Options and Scenarios for e-Waste Management

Actions to be considered to achieve goals of e-waste management, Collection/ take back system, Closing the Plastic loop: Turning the supply chain into a supply cycle by mining plastics from end-of-life electronics and other durable goods.

UNIT – IV: Recycling technologies for e-waste

Recycling of e-scrap in a global environment-opportunities and challenges, Technologies for recovery of resources from e-waste.

Reuse: A Bridge from Unsustainable e-waste to sustainable e-resources.

Text Books:

1. Rakesh Johri, E-waste: Implications, regulations, and management in India and current global best practices .
2. Klaus Hieronymi, Ramzy Kahhat, Eric Williams, E-Waste Management: from Waste to Resource

Reference Books:

1. Satish Sinha, Priti Mahesh,Waste Electrical and Electronic Equipment The EU and India.
2. By Ronald E. Hester, Roy M. Harrison , Electronic Waste Management .

Self Study Course

MANAGEMENT INFORMATION SYSTEMS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the scope of information systems and strategies.
- To know the types of information systems and their functionalities in an enterprise.
- To know the applications of information systems in various business areas
- To analyze and develop the system.

Learning Outcomes

Students will be able to

- define the basic concepts, strategies and challenges of MIS.
- describe the nature of the information system in the business process.
- analyze the applications of information system in various functional business areas.
- compare various information system design and analysis.

UNIT – I: Introduction to Information Systems

International Information Systems Meaning, Scope of Information Systems**,** Concepts of system and organization, strategic uses, Evolution of MIS, Challenges and New opportunities. Growth of international information systems; Managing global information Systems.

UNIT – II: Information System in the Enterprise

Major types of Systems in the organization; Systems from a functional perspective; Enterprise e application–Enterprise systems, Business Process Reengineering and Information Technology.

UNIT – III: Application of Information Systems to Functional Business Areas

Significance of Information systems; Application of Operational Information System to Business;

UNIT – IV: Systems Analysis and Design

Systems analysis; Structured systems analysis and design; Alternative application development and evaluation, IT Act 2000

Text Books:

1. Kenneth C Laudon & Jane P Laudon, Management Information Systems, 8th Edition, PHI–2003.
2. Robert Schultheis & Mary Sumner, Management Information Systems–The Managers View 20th reprint, TMH –2010.

Reference Books:

1. V.M.Prasad, Management Information Systems, 9th Edition, PearsonEducation–2005.
2. Robert G Murdick, Joel E Ross & James R Claggett , Information Systems for Modern Management, 3rd Edition, PHI - 2007.

Self Study Course

INFORMATION & COMMUNICATION TECHNOLOGY

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To explore the use of internet to access remote information, communicate and collaborate with others.
- To familiarize with social, economic, security and ethical issues associated with the use of ICT.

Learning Outcomes:

Students will be able to

- understand the basic concepts of networking.
- explore internet for learning.
- understand social, economic and security issues associated with the use of ICT.
- apply the concepts of ICT for their professional growth.

UNIT – I: Computer Networks & Internet

Concept, Types & Functions of Computer Networks, Internet and its Applications, Web Browsers & Search Engines, Legal & Ethical Issues.

UNIT – II: E-Learning & Web Based Learning

E-Learning, Web Based Learning, Virtual Classroom- concept, elements, advantages and limitations, EDUSAT

UNIT – III: Effects of using ICT

Software Copyright, Hacking, Viruses & its Management, Employment Patterns, IT in the home, Information from the Internet, Health and Safety**.**

UNIT – IV: ICT for Professional Development

ICT for Personal & Professional Development: Tools & Opportunities.
Open Education Resources: Concept & Significance.

Text Books:

1. Roger Crawford, Heinemann IGCSE ICT, Pearson Education Limited

Reference Books:

1. Agarwal J.P. (2013): Modern Educational Technology. Black Prints, Delhi.
2. Barton,R.(2004).Teaching Secondary Science with ICT. McGraw Hill International
3. Bhaskar Rao (2013): Samachara Prasara Sankethika vidya Shastramu, Masterminds, Guntur.
4. Cambridge, D.(2010).E-Portfolios for Lifelong Learning and Assessment. John Wiley and Sons

Self Study Course

ORGANIZATIONAL BEHAVIOUR

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To provide a basic knowledge of main ideas and key theories relating to organizational behavior.
- To understand basic concepts, theories and techniques in the field of human behaviour at the individual, group and organizational levels in the changing global scenario.
- To increase managerial effectiveness through understanding of self and others.
- To develop an interest in, an appreciation of, and a positive attitude toward the many aspects of the subject matter of management.

Learning Outcomes:

Students will be able to

- eemonstrate clear understanding of a number of established theorists, theories and studies relating to Organizational Behavior.
- explain and evaluate the key assumptions on which behaviour in organizations is currently managed and assess the effect of these ideas on employee attitudes and actions.
- apply problem solving and critical thinking abilities to analyze the kinds of choices available for developing alternative Organizational Behaviour approaches in the workplace.
- form an appreciation of the complexities and uncertainties of Organizational Behaviour by examining your own role in the light of experience of real-time problem settings.

UNIT – I: Introduction

Nature, scope & Importance – linkages with other social sciences – Individual Roles and Organizational Goals - Perspectives of Human Behavior, Approach to Organizational behavior - models of organizational behavior (Autocratic, Custodial, Supportive, Collegial & SOBC).

UNIT – II: Perceptual Management

Nature, importance - Process – selection, organization and interpretation – Influencing factors **-**Motivation – Concepts - Needs and Motives and theories (Maslow & Herzberg) Leadership and Motivating people - Leadership Theories. Attitudes and Values: formation - types – changes and behavior modification techniques.

UNIT – III: Personality Development

Nature - Stages, Factors, Determinants of Personality, Theories of personality - Johari Window - Transactional Analysis, Learning Processes - theories, Creativity and Creative Thinking. Leadership – nature – skills. Decision Making Process**:** Behavioral Dimensions, Groups and their formation - Group Dynamics, Informal Organizations, Group versus Individual Interaction.

UNIT – IV: Inter- Personal Communication

Listening, Feedback, Collaborative Processes in Work Groups, Team Building, Team Decision Making, Conflict Resolution in Groups and Problem Solving Techniques.

Taxonomy, Elements of Structure, Determinants of Structure, Functional Aspects of Structure, Role Impingement, Stress in Organization. Principles Underlying the Design of Organizations, Organizational Culture, Power and Authority. Organizational Development**:** Goals, processes, change – resistance to change – Nature of OD - interventions, OD techniques and OD applications.

Text Books:

1. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma:"Organizational Behavior", Tata McGraw Hill Education, New Delhi, 2008.
2. K.Aswathappa: "Organizational Behavior-Text, Cases and Games", Himalaya Publishing House, New Delhi,

Reference Books:

1. Jerald Greenberg and Robert A Baron: "***Behavior in Organizations***", PHI Learning Private Limited, New Delhi, 2009.
2. Pareek Udai: "***Understanding Organizational Behavior***", Oxford University Press, New Delhi, 2007.
3. Jai B.P.Sinha: "***Culture and Organizational Behavior***", Sage Publication India Private Limted, New Delhi, 2008.
4. Sharma VS, Veluri: "***Organizational Behavior***", JAICO Publishing House, New Delhi, 2009.
5. Slocum,n Helireigel: "***Fundamentals of Organizational Behavior***", Cengage Learning India, New Delhi, 2009.

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