ELECTRICAL AND ELECTRONICS ENGINEERING

I SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
AHE1101	English	4	0	0	4
ABM1101	Mathematics – I	4	1	0	4
ACT1102	Computer Programming through C	4	1	0	4
AEE1101	Basic Network Analysis	4	1	0	4
AME1103	Engineering Mechanics	4	1	0	4
AME1102	*Engineering Drawing*	0	0	3	2
AHE1102	*English Language Lab*	0	0	3	2
ACT1103	*Computer Programming Lab*	0	0	3	2
	Total	**20**	**4**	**9**	**26**

II SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
ABM1102	Mathematics-II	4	1	0	4
ABP1101	Physics	4	1	0	4
ABC1101	Chemistry	4	1	0	4
AEC1101	Electronic Devices	4	1	0	4
ABE1101	Environmental Studies	4	0	0	4
AEE1102	*Networks Lab*	0	0	3	2
ABP1102	*Physics and Chemistry Lab*	0	0	3	2
AMT1101	*Engineering Workshop*	0	0	3	2
	Total	**20**	**4**	**9**	**26**

III SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
ABM1104	Mathematics – III	4	1	0	4
AEC1103	Electronic Circuits	4	1	0	4
ACE1152	Prime Movers and Pumps	4	0	0	4
AEC1106	Switching Theory and Logic Design	4	1	0	4
AEE1103	Electromagnetics	4	1	0	4
AEE1104	Performance and Design of DC Machines	4	1	0	4
ACE1153	*Prime Movers and Pumps Lab*	0	0	3	2
AEE1105	*DC Machines Lab.*	0	0	3	2
	Total	**24**	**5**	**6**	**28**

IV SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
ABM1107	Mathematics-IV	4	1	0	4
AEE1106	Network Analysis and Synthesis	4	1	0	4
AEC1105	Pulse and Digital Circuits	4	1	0	4
AEE1107	Power Generation Engineering	4	0	0	4
AEE1108	Performance and Design of AC Machines-I	4	1	0	4
AEE1109	Control Systems	4	1	0	4
AEE1110	*Control Systems Lab.*	0	0	3	2
AEC1144	*Electronic Devices and Circuits Lab*	0	0	3	2
	Total	**24**	**5**	**6**	**28**

V SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
ACT1104	Computer Organization	4	0	0	4
AEC1147	Linear and Digital IC Applications	4	1	0	4
AEE1111	Power Transmission Engineering	4	1	0	4
AEE1112	Power Electronics	4	1	0	4
AEE1113	Performance and Design of AC Machines – II	4	1	0	4
AEE1114	Electrical Measurements and Instrumentation	4	1	0	4
AHE1103	Advanced English Communication Skills Lab	0	0	3	2
AEC1112	IC and PDC Lab	0	0	3	2
	Total	**24**	**5**	**6**	**28**

VI SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
AEE1115	Digital Signal Processing	4	1	0	4
AEE1116	Microprocessor and Microcontrollers	4	1	0	4
AEE1117	Power Electronic Drives	4	1	0	4
ABM1109	Optimization Techniques	4	1	0	4
AEE1118	Switchgear and Protection	4	0	0	4
AHM1101	Managerial Economics and Financial Analysis	4	0	0	4
AEE1119	AC Machines Lab.	0	0	3	2
AEE1120	Power Electronics and Drives Lab	0	0	3	2
	Total	**24**	**4**	**6**	**28**

VII SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
AHM1102	Management Science	4	0	0	4
AEE1121	Power System Analysis	4	1	0	4
AEE1122	Power System Operation and Control	4	1	0	4
AEE1132	HVDC Transmission	4	1	0	4
	Elective – I	4	1	0	4
AEE1124	Renewable Energy Sources				
AEE1125	Reliability Evaluation of Engineering Systems				
AEE1126	Neural Networks and Fuzzy Logic				
AEE1140	Electrical Safety Management				
AEE1142	Design Concepts for Engineers				
	Elective – II	4	1	0	4
AEE1127	Programmable Logic Controllers				
ACT1121	Embedded Systems				
AEE1128	Distribution Automation				
AIT1114	Data Structures for Engineering Applications				

AEE1129	Electrical Measurements and Simulation Lab	0	0	3	2
AEE1130	Microcontrollers Lab	0	0	3	2
AEE11MP	Industry Oriented Mini Project*	-	-	-	2
	Total	**24**	**5**	**6**	**30**

VIII SEMESTER :

COURSE CODE	THEORY/LAB	L	T	P	C
AEE1131	Utilization of Electrical Energy	4	1	0	4
	Elective – III	4	1	0	4
AEE1123	Power Distribution Engineering				
AEE1134	High Voltage Engineering				
AEE1143	Flexible AC Transmission Systems				
AEE1133	Smart Grid				
	Elective – IV	4	1	0	4
AEC1117	VLSI Design				
ACT1109	Data Base Management Systems				
AEE1135	Digital Control Systems				
AEE1141	Engineering Ethics				
AEE11SM	Seminar	0	0	3	2
AEE11CV	Comprehensive Viva	-	-	-	4
AEE11PW	Project Work	0	0	9	12
	Total	**12**	**3**	**12**	**30**

SYLLABI FOR I SEMESTER

ENGLISH

Course Code : AHE1101

L	T	P	C
4	0	0	4

Reading and Writing skills

OBJECTIVES :

The primary objective of the course is to help students of engineering to achieve a sound foundation in communicational skills, basic grammar and vocabulary. It also enables them to become successful communicators in academic, professional and social areas of life.

The course aims to enable the students to use English effectively for the purpose of

- Understanding class room lectures in different subjects
- Reading technical and general materials
- Effective written communication in professional contexts

OUTCOMES :

- The learners develop adequate skills in skimming, scanning, intensive and extensive reading
- The learners also develop enough vocabulary to be clearly expressive in any group - Professional or Managerial or Social
- The learners can correspond and communicate in descriptive, analytical modes with ease.

COURSE WORK :

To achieve the above objectives, instruction will be imparted through relevant ESP materials, articles from newspapers, technical journals, magazines, industry materials etc. in classes and laboratory. Students will be given individual and holistic practice in LSRW skills.

Contents :

Reading :

- Reading with a purpose; Reading for understanding; skimming, scanning etc;
- Reading and interpreting charts and diagrams
- Vocabulary, synonyms, antonyms, prefixes, suffixes, confusables, one-word substitutes etc.

Writing :

- common errors, articles, prepositions, tenses, concord, phrasal verbs, modals, conditionals etc. (Remedial Grammar)
- Practice of writing- definition, description
- Paragraph writing with coherence, cohesiveness and clarity
- Essay, report and précis writing

Reference skills **:** Use of dictionary, thesaurus, library and internet materials.

UNIT - I

1. Around the House *(Language in Use)*
2. Education on Education *(English for Engineers)*

UNIT - II

1. On Holiday *(Language in Use)*
2. Vocabulary- synonyms, antonyms, prefixes, suffixes, confusables, one-word substitutes etc.

UNIT - III

1. Imagining *(Language in Use)*
2. Tenses & Concord, Articles & Prepositions

UNIT - IV

1. New Information Technology and Poverty Eradication (English for Engineers)
2. The media (Language in Use)

UNIT - V

1. What we must Learn from the West *(English for Engineers)*
2. Paragraph writing, Note-making and Minute writing

UNIT - VI

1. Essay writing
2. Value added Life *(English for Engineers)*

UNIT - VII

1. Breaking the Law *(Language in Use)*
2. Key item *(English for Engineers)*

UNIT - VIII

1. Letter and Précis writing
2. Dialogue writing

TEXT BOOKS :

1. "Language in Use(Intermediate)", Cambridge University Press India Pvt. Ltd.- Reprint-2008.
2. "English for Engineers", Regional Institute of English, Bangalore, Foundation Books Pvt. Ltd, 2006.

REFERENCES :

1. Eric H. Glendinning & Beverly Holmstorm,"Study reading- A course in Reading Skills for Academic Purposes"-CUP , 2004.
2. Liz Hamp Lyons, Ben Heasley, "Study writing", CUP, 2004.
3. Norman Lewis, "Word Power Made Easy", Lotus Press, 2006.
4. Michael Swan, "Practical English Usage", Oxford University Press, 3rd Edition, 2005.
5. Murphy "Murphy's English Grammar", CUP, 3rd Edition, 2004.

SUGGESTED READING : Stories of humour, adventure, mystery and autobiographies of eminent scientists.

MATHEMATICS – I

(Common to all Branches)

Course Code : ABM1101

L	T	P	C
4	1	0	4

AIM :

To impart the necessary fundamental principles that are essential to study the core courses of Engineering.

OBJECTIVE :

To motivate and inculcate the logical thinking and methodical approach to solve mathematical problems

UNIT - I

Sequences – Series – Convergence and divergence – Comparison test – Ratio test –Integral test –Alternating series, Leibniz's test

(9.1 to 9.9, 9.12).

Rolle 's theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem –Taylor's theorem and Maclaurin's series (all theorems without proof)

(4.3, 4.4).

UNIT - II

Differential equations of first order (linear, Bernoulli), Linear differential equations with constant coefficients, Method of Variation of parameters .

(11.9, 11.10, 13.1, 13.3-13.8(i), 13.9)

UNIT - III

Applications of Linear differential equations: orthogonal trajectories, Newton's law of cooling, Simple harmonic motion, Oscillatory electrical circuits (LC and LCR circuits).

(12.3, 12.6, 14.2, 14.5)

UNIT - IV

Laplace transform of elementary functions, properties, Transforms of derivatives and integrals – Unit step function – second shifting theorem, Periodic function.

(21.1-21.5, 21.7-21.11)

UNIT - V

Inverse transform –- Inverse transform of Derivatives and Integrals - Convolution theorem – Application of Laplace transforms to ordinary differential equations, Unit step function, Unit impulse function.

(21.12-21.15, 21.17, 21.18)

UNIT - VI

Partial differentiation: Total derivative, change of variables, Jacobians, Taylor's theorem for functions of two variables, maxima and minima of functions of two variables.

(5.5 – 5.9, 5.11)

UNIT - VII

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear first order (standard type) equations.

(17.1 to 17.3, 17.5, 17.6)

UNIT - VIII

Method of separation of variables – Classification of second order linear Partial Differential Equations, solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions.

(18.1 to 18.7)

TEXT BOOK :

Dr.B.S.Grewal, "Higher Engineering Mathematics", 40th Edition, Khanna Publishers.

REFERENCES :

1. Kreyszig E, "Advanced Engineering Mathematics", 8th Ed. John Wiley, Singapore, 2001.
2. Greenberg M D, "Advanced Engineering Mathematics", 2nd Ed, Pearson Education, Singapore, Indian Print, 2003.

COMPUTER PROGRAMMING THROUGH C

Course Code : ACT1102

L	T	P	C
4	1	0	4

AIM :

To give the basic idea about programming.

OBJECTIVE :

To make the students capable of programming in high level computer languages as well as applications.

UNIT - I

Algorithm, Flow chart, Program development steps, Basic structures of C Language, C tokens, Data types and sizes, Declaration of variables, Assigning values, Arithmetic, Relational and Logical operators, Increment and decrement operators, Conditional operator, Bitwise operators, Type conversions, Expressions, evaluation, Input output statements, blocks.

UNIT - II

If and switch statements, while, do while and for statements. C programs covering all the above aspects.

UNIT - III

One dimensional and two dimensional arrays, Initialization, String variables declaration, reading, writing, basics of functions, parameter passing, String handling functions.

UNIT - IV

User defined functions, recursive functions, variables and storage classes, scope rules, block structure, header files, C preprocessor, Example C Programs.

UNIT - V

Pointers and arrays: Pointers and addresses, Pointers and arrays, Pointers and function arguments, address arithmetic, character pointers and functions

UNIT - VI

Pointers to pointers, multi-dimensional arrays, initialization of pointer arrays, command line arguments, pointers to functions, function pointers.

UNIT - VII

Structure definition, initializing, assigning values, passing of structures as arguments, arrays of structures, pointers to structures, self reference to structures, unions, type-defs, bit fields, C program examples.

UNIT - VIII

Console and file-I/O: Standard I/O, Formatted I/O, Opening and closing of files, I/O operations on files, command line arguments.

TEXT BOOKS :

1. Herbert Schild, "Complete Reference Using C", 4th Edition, Tata McGraw Hill, 2009.
2. Yashawanth Kanethkar, "Let us C", 9th Edition, BPB Publishers, 2009.

REFERENCES :

1. B.A.Fouruzan and R.F.Gilberg, "Computer Science, A structured Programming Approach using C", 3rd Edition, Thomson Publishers, 2008.
2. B.W.Kerninghan and Dennis M. Ritche, "C Programming Language", 2nd Edition, Pearson Education, 2009.
3. Stephen G.Kochan, "Programming in C" 3rd Edition, Pearson Education, 2005.
4. N. B. Venkateswarlu, E. V. Prasad, "C & Data structures", 1st Edition, S. Chand Publications, 2002.

BASIC NETWORK ANALYSIS

Course Code : AEE1101

L	T	P	C
4	1	0	4

AIM :

The aim of the course is to teach Principles of Electrical Network Analysis.

OBJECTIVES :

Network Analysis is a basic foundation course for the disciplines EEE and ECE .Hence this is introduced in I-Year –I Sem so that the students feel comfortable with various other Electrical and Electronics Courses they come across.

UNIT - I

Network elements , Active & passive elements, Volt- Ampere – Power relation in R,L,C with basic laws , Constant Flux linkage & Constant Charge theorems , Mutual Inductance and Dot Convention, Source Transformation.

UNIT - II

D-C Resistive Circuit Analysis, Branch variables, solving by direct application KCL & KCL, Mesh (loop)Analysis, Nodal Analysis, Super Mesh and Super Node, Star – Delta Transformation.

UNIT - III

Transient in R-L, R-C & RLC circuit with DC Excitation, using differential equations.
Concept of steady state.

UNIT - IV

Sinusoidal steady state: Effective value of an alternative current /voltage excitation to inductance and capacitance. Inductive and Capacitive reactances, Average Power, Phasor representation.

UNIT - V

RL , RC and RLC – Series , parallel and series parallel circuits, average power and power factor , Impedance , complex impedance , complex power , real and reactor powers, Response of RLC Networks to harmonic excitation, Locus diagrams.

UNIT - VI

Resonance in RLC Circuits: Series resonance, parallel resonance, bandwidth & quality factor. Implications with voltage and current excitation.

UNIT - VII

Three phase circuit analysis: 3 –phase sources & loads (balanced & unbalanced) 3-phase, 4 -wire and 3 phase 3-wire systems. Analysis of balanced and unbalanced circuits, 3-phase power.

UNIT - VIII

Network Theorems (with proofs) : Linearity and superposition, superposition theorem , reciprocity theorem , Thevenin and Norton theorem, compensation theorem, Millmann Theorem.

TEXT BOOK :

N.C.Jagan and C. Lakshmi Narayana, "Network Analysis", 2nd Edition B.S.Publications (From relevant chapters.), 2008.

REFERENCES :

1. M.E Van Valkenburg , "Network Analysis", Prentice Hall of India, PVT Ltd, New Delhi, 3rd Edition, 1994.
2. Hayt and Kemmerly, "Circuit Analysis", 6th Edition, TMH, 2003.

ENGINEERING MECHANICS

Course Code : AME1103

L	T	P	C
4	1	0	4

AIM & OBJECTIVES :

1. To develop logical thinking approach to engineering problems.
2. Calculation and estimation of fourses developed in various engineering structures.

UNIT - I

SYSTEMS OF FORCES : Introduction – parallelogram law – Forces and components - Resultant of coplanar concurrent forces - component forces in space - vector notation – moment of force – principle of moments – couples. Resultant of planar force systems and spatial concurrent force system.

UNIT - II

EQUILIBRIUM OF FORCE SYSTEMS : Equilibrium – free body diagrams – Equations of equilibrium – equilibrium of planar systems – graphical methods and analytical methods for equilibrium of planar systems – equilibrium of spatial concurrent force systems.

UNIT - III

FRICTION: Introduction – Theory of friction – Angle of friction – Laws of friction - static friction – Kinetic friction-friction in bodies moving up or down on an inclined plane-screw friction and screw jack.

UNIT - IV

CENTROIDS AND CENTERS OF GRAVITY : Centre of gravity – centroids of area and lines – determination of centroids by integration – centroids of composite figures – theorems of Pappus.

UNIT - V

AREA MOMENT OF INERTIA : Moment of inertia – polar moment of Inertia – Radius of gyration - Transfer theorem for moment of Inertia – Moment of inertia of composite areas – product of inertia – Transfer formula for product of Inertia.

MASS MOMENT OF INERTIA : Moment of inertia of masses – Radius of gyration – Transfer formula for mass moment of inertia – Mass moment of Inertia by Integration.

UNIT - VI

KINEMATICS : Rectilinear motion-curvilinear motion - Rectangular components of curvilinear motion - Normal and Tangential components of acceleration, Radial and transverse components - Kinematics of rigid bodies - angular motion – fixed axis rotation – Definition and analysis of plane motion.

UNIT - VII

KINETICS: Kinetics of rigid bodies – equation of planes motion – fixed axis rotation – rolling bodies (simple examples) - general plane motion (Simple examples).

UNIT - VIII

WORK ENERGY METHODS : Work energy equations for translation – applications to particle motion – connected systems – fixed axis rotation (Simple cases)

TEXT BOOKS :

1. I.B. Prasad, "Applied Mechanics", Khanna Publishers, 19th Edition, 2009.
2. Ferdinand L. Singer, "Engineering Mechanics", Harper Collins Publishers India, 3rd Edition, 2008.

REFERENCES :

1. Irving. H. Shames, "Engineering Mechanics", PHI Publishers, 4th Edition, 2008.
2. Timoshenko & Young , "Engineering Mechanics", MGH Publishers, 4th Edition, 2010.
3. A.K. Tayal, "Engineering Mechanics", Umesh Publishers, 13th Edition, 2008.
4. K.L. Kumar, "Engineering Mechanics", TMH Publishers, 3rd Edition, 2009.

ENGINEERING DRAWING

Course Code : AME1102

L	T	P	C
0	0	3	2

AIM & OBJECTIVES :

1. To make the student familiar to the drawing practices and convention
2. To familiarize the student about various engineering curves used in industry
3. To enable the student draft simple engineering components.

LIST OF EXERCISES

1 Introduction to Engineering drawing & basics of Geometrical construction

2 Construction of parabola, ellipse, hyperbola

3 Construction of Involutes and Cycloidal curves

4 Projections of points and lines inclined to one plane

5 Projections of lines inclined to both the planes

6 Projections of planes in simple positions, planes inclined to one plane

7 Projections of planes inclined to both the planes

8 Demonstration & Practice: Computer aided drafting of lines, planes and dimensioning

9 Projections of solids in simple positions

10 Projections of solids inclined to both the planes

11 Isometric projections

12 Demonstration & Practice: Computer aided drafting of solids and dimensioning.

TEXT BOOKS :

1. N.D. Bhatt, V.M. Panchal, "Engineering Drawing", Charotar Publication House, 49th Edition, 2008.

2. R.B. Choudary "Engineering graphics with Auto CAD", Anuradha Publishes

3. Trymbaka Murthy, "Computer Aided Engineering Drawing", I.K. International, 3rd Edn. I.K. International, 2007

ENGLISH LANGUAGE LAB

Course Code: AHE1102

L	T	P	C
0	0	3	2

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

Objectives :

- To make students recognise the sounds of English through Audio-Visual aids and Computer Software.
- To help them overcome their inhibitions and self- consciousness while speaking in English and to build their confidence. *The focus shall be on fluency rather than accuracy.*
- To enable them to speak English correctly with focus on stress and intonation.

Syllabus :

The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
4. Oral Presentations- Prepared and Extempore/Speaking personally
5. 'Just A Minute' Sessions (JAM).
6. Describing things / Narration
7. Information Transfer
8. Debate
9. Telephoning Skills.
10. Giving Directions.

Suggested Software :

- Cambridge Advanced Learners' English Dictionary with CD.
- The Rosetta Stone English Library
- Clarity Pronunciation Power
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd with CD.
- Learning to Speak English - 4 CDs
- Microsoft Encarta with CD
- Murphy's English Grammar, Cambridge with CD

References :

1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
2. Daniel Jones, "English Pronouncing Dictionary", Current Edition with CD.
3. R. K. Bansal and J. B. Harrison, "Spoken English", Orient Longman 2006.
4. J. Sethi, Kamlesh Sadanand & D.V. Jindal, "A Practical course in English Pronunciation, (with two Audio cassettes)", Prentice-Hall of India Pvt. Ltd., New Delhi.
5. T.Balasubramanian (Macmillan), "A text book of English Phonetics for Indian Students", 18th Reprint, 2005.
6. English Skills for Technical Students, WBSCTE with British Council, OL

COMPUTER PROGRAMMING LAB

Course Code : ACT1103

L	T	P	C
0	0	3	2

AIM :

To give basic knowledge with practical orientation of programming language.

OBJECTIVE :

To train the students to write programmes in C language for different applications.

LIST OF PROGRAMMES :

1. To write C programs for the following
   a) Sum of individual digits of a positive integer.
   b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1.Subsequent terms are found by adding the preceding two terms in the sequence. Write a c program to generate to generate the first n terms of the Fibonacci sequence.

2
   a) To write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user
   b) To write a C program to calculate the following sum:
   Sum=$1+x^2/2!+x^4/4!$ ———————— upto given 'n' terms.
   c) To write a c program to find the roots of a quadratic equation.

3. To write C programs that uses both recursive and non-recursive functions
   i) To find the factorial of a given number.
   ii) To find the GCD(greatest common divisor) of two given integers.
   iii) To solve Towers of Hanoi problem.

4. The total distance traveled by vehicle in 't' seconds is given by distance=ut+1/2at^2 where 'u' and 'a' are the initial velocity (m/sec) and acceleration (m/sec^2). Write a C program to find the distance traveled at regular intervals of time given values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

5. Using switch-case statement, write a C program that takes two operands and one operator from the user, performs the operation and then prints the answer. (consider operators +, -, *, and %).

6. Write a C program to find the largest and smallest number in a list of integers.

7. Write a C program that uses functions to perform the following
   a. Addition of Two Matrices
   b. Multiplication of Two Matrices

8. Write a C program that uses functions to perform the following operations
   a. To insert a sub-string in to given main string from a given position
   b. To delete n characters from a given position in given string.

9. Write a C program to determine if the given string is a palindrome or not.

10.
   a) Write a C program that displays the position or index in the string S where the string T begins, or -1 if S does not contain T.
   b) Write a C program to count the lines, words and characters in a given text.

11. To write a C program
   a) to generate Pascal's triangle
   b) to construct a pyramid of numbers

12. To write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression $1+x+x^2+x^3+\ldots x^n$
For example : if n is 3 and x is 5, then the program computes 1+5+25+125. print x,n, the sum.

    Perform error checking. For example the formula does not make sense for negative

    Exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the nest pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too..

13. To write a C program
    a) to find the 2's compliments of a binary number.
    b) to convert a Roman numeral to its decimal equivalent

14. To write a C program that uses functions to perform the following operations
    a. Reading a complex number
    b. Writing a complex number
    c. Addition of 2 complex numbers
    d. Multiplication of 2 complex numbers
    (Note: represent complex number using a structure)

15. To write a C program
    a) to copy the contents from one file to another.
    b) to reverse the first n characters in a file.

    (Note: the file name and n are specified on the command line)

    c) to fine the no. of characters, no. of words, no. of lines in a given file.

16. To implement the algorithms for the below given iterative methods using C to find one root of the equation f(x)=x sinx + cosx=0

    a) Bisection b) False Position c) Newton-Raphson
    d) Successive approximation

17. To write C programs to implement the Lagrange interpolation
18. To implement the Newton- Gregory forward interpolation using C language.
19. To implement in C the linear regression algorithm.
20. To implement in C the polynomial regression algorithm.

TEXT BOOKS :

1. P. Dey & M. Ghosh, "Programming in C", Oxford Univ. Press
2. E. Balaguruswamy, "C and Data Structures", TMH publications
3. P. Padmanabham, "C Programming and Data Structures", 3rd Edition, BS publications.
4. M.K. Jain, S.R.K. Iyengar & R.K. Jain, "Numerical Methods for Scientific and Engineering Computation", New Age International Publishers.
5. Aitkinson & Han, "Elementary Numerical Analysis", Wiely India, 3rd Edition 2006.

SYLLABI FOR II SEMESTER

MATHEMATICS – II

(Common to all Branches)

Course Code : ABM1102

L	T	P	C
4	1	0	4

AIM :

To impart the necessary fundamental principles that are essential to study the core courses of Engineering

OBJECTIVE :

To motivate and inculcate the logical thinking and methodical approach to solve mathematical problems

UNIT - I

Matrices: Rank – Normal form - Echelon form – Consistency – Solution of system of simultaneous linear homogeneous and non-homogeneous equations.(Gauss Jordan)

(2.8, 2.11)

UNIT - II

Eigen values, Eigen vectors – properties – Cayley-Hamilton Theorem (only statement) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalisation of matrix. (2.14-2.17)

UNIT - III

Quadratic forms - Linear Transformation - Orthogonal Transformation. Reduction of quadratic form to canonical form, Nature of the quadratic form.

(2.12, 2.18 , 2.19).

UNIT - IV

Double and triple integrals, Change of order, change of variables

(7.1 – 7.3 , 7.5, 7.7).

UNIT - V

Vector Differentiation**:** Differentiation of vectors, Scalar and Vector point functions. Gradient of a scalar field and directional derivatives- Divergence and curl of a Vector field and it's physical interpretation.

(8.1, 8.4 – 8.8)

UNIT - VI

Vector Integration - Line integral – -Circulation-work done - surface and volume integrals Vector integral theorems: Green's theorem- Stoke's and Gauss's Divergence Theorem (Without proof). Verification of Green's - Stoke's and Gauss's Theorems. (8.10 – 8.17)

UNIT - VII

Fourier series: Euler's formulae, Conditions for Fourier expansion, Change of interval, even and odd functions, half range series.

(10.1 – 10.7)

UNIT - VIII

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – Finite Fourier transforms.

(22.1 – 22.4)

TEXT BOOK :

1. Dr.B.S.Grewal "Higher Engineering Mathematics", 40th Edition, Khanna Publishers

REFERENCES :

1. Kreyszig E, "Advanced Engineering Mathematics", 8th Edn. John Wiley, Singapore (2001)
2. Greenberg M D, "Advanced Engineering Mathematics", 2nd Edn, Pearson Education, Singapore, Indian Print (2003).

PHYSICS

Course Code : ABP1101

L	T	P	C
4	1	0	4

AIM :

To give prerequisites in understanding the advanced Physics leading to applications in engineering field.

OBJECTIVE :

To impart the students the concept and principles in Engineering to enable them to comprehend and take up the experimental work independently.

UNIT - I

VIBRATIONS & ACOUSTICS OF BUILDINGS :

i) Overview of vibrations with emphasis on damped and forced oscillations- resonance, coupled oscillators - two coupled pendulums and normal mode solutions.

(Engineering Physics - Gaur & Gupta Chap - 33, and Unified Physics, Vol-1, S L Gupta & Sanjeev Gupta, Chap-11 (coupled oscillators)

ii) Reverberation and Reverberation time – Sabine's formula for reverberation time – measurement of absorption coefficient of material- Basic requirements of acoustically good hall -Factors affecting the architectural acoustics and their remedies.

(Engineering Physics - Gaur & Gupta Chap - 14)

UNIT – II

PHYSICAL OPTICS :

INTERFERENCE: Superposition of waves, Young's double slit experiment, Interference in thin films by reflection, Newton's rings experiment with necessary theory.

DIFFRACTION: Fresnel and Fraunhoffer diffraction, Diffraction at single slit and diffraction grating, determination of wavelengths of various spectral

lines, resolving power of grating.

Polarization: Types of Polarizations, Brewster's law, Double refraction, Nicol Prism, Polaroid's.

(Engineering Physics - Gaur & Gupta Chap - 26, 27, 28 & 29)

UNIT – III

CRYSTAL PHYSICS & SUPERCONDUCTIVITY :

i) Crystal Physics : Space lattice, basis and crystal structure, Unit cell, primitive cell, Seven crystal systems, Bravais lattices- SC, BCC, FCC crystal structures- crystal planes and Directions- Miller indices, Derivation of inter planar spacing.

(Applied Physics for Engineers - P K Palanisamy Chap - 2)

ii) Superconductivity: superconducting phenomenon, Meissner effect, Type I & Type II Super conductors, BCS theory, DC and AC Josephson effects, SQUIDS, High Temperature Super conductors- Applications.

(Applied Physics for Engineers - P K Palanisamy Chap - 9)

UNIT – IV

QUANTUM MECHANICS : Dual nature of matter, DeBroglie wave length, Time independent Schrödinger wave equation, Physical significance of wave function, particle in a potential well, rigid and non rigid walls, Tunneling effect

(Applied Physics for Engineers - P K Palanisamy Chap - 3)

UNIT – V

FREE ELECTRON THEORY : Introduction, Quantum free electron theory, Fermi-Dirac distribution and its dependence on temperature, Fermi energy, Electron scattering and resistance, motion of an electron in periodic potential, Kronig-Penney model (qualitative treatment), effective mass; classification of solids.

(Applied Physics for Engineers - P K Palanisamy Chap - 4 & 5)

UNIT – VI

DIELECTRICS : Basic definitions, relation between **P,D** and **E** vectors, Polarization mechanisms, expression for electronic polarizability, Internal

fields in solids, Claussius-Mosotti equation, frequency and temperature dependence of electronic polarization, Dielectric strength, Dielectric loss, Loss tangent and Dielectric breakdown, Applications.
(Applied Physics for Engineers - P K Palanisamy Chap - 6)

UNIT – VII

LASERS AND FIBER OPTICS :

i) Introduction, Characteristics of lasers, Induced absorption, spontaneous and stimulated emission of radiation, Population Inversion, Einstein's coefficients, Low and high power Lasers, Ruby laser, He-Ne laser, CO_2 and semiconductor laser, Applications of lasers.

(Applied Physics for Engineers - P K Palanisamy Chap - 10)

ii) Basic principle of propagation of light in optical fibers, Numerical aperture, acceptance angle, Derivation of Numerical aperture, Classification of optical fibers on the basis of refractive index profile, Fiber optic communication system, Applications.

(Applied Physics for Engineers - P K Palanisamy Chap - 2)

UNIT – VIII

FUNCTIONAL MATERIALS :

i) Bio materials, SMART materials, metallic glasses, metal matrix composites, Electrets – piezo and ferro electric matrerials.

(Engineering Physics by V Rajendran, Chap - 21, 24, 25, materials Science - M Armugam - Metal Matrix composites and Electrets, SMART Materials chap -11)

ii) Nanophase materials: Introduction to nano materials, types of nano materials, Fabrication Techniques: ball milling, nano lithography, CVD, carbon nano tubes (CNT's), Applications.

(Engineering Physics M R Sirnivasn, Chap - 15)

TEXT BOOKS :

1. R.K. Gaur and S.L.Gupta, "Engineering Physics", 8th Edition, Dhanpaat Rai, 2003.

2. P.K. Palanisamy, "Applied Physics", 2nd Edition, Scitech Publishers, 2010.
3. M.R. Srinivasan, "Engineering Physics", 1st Edition, New Age Publishers, 2009.
4. V. Rajendran, "Engineering Physics", TMH, 2009.

REFERENCES :

1. C.Kittel, "Introduction to Solid State Physics", 7th Edition, John Wiley, 2007.
2. M Ross, Lowrence, Shepard, J Wulff, "Structure and Properties of Materials", (Volume-4, Electronic properties), Wiley East Publishers, 2004.
3. Avadhanulu & Kshirasagar, "Engineering Physics", 9th Edition, S. Chand Publishers, 2008.
4. S.O. Pillai, "Solid State Physics", New Age Publishers, 2004.
5. Sulabh. K. Kulkarni, "Nano Technology - Principles and Practices", 2006.
6. V.Raghavan, "Material Science", 5th Edition, PHI, 2007.
7. R.L.Singhal, "Solid State Physics", 6th Edition, Kedarnadh, Ramnadh Publishers, 2003.
8. A. Beiser., "Perspectives in Modern Physics", 5th Edition, McGraw Hill Publishers, 2006.
9. A.J. Dekker, "Electrical Engineering materials", 1st Edition, Mac Millan, 2007.
10. M. Armugam, "Material Science",3rd Edition, Anuradha Publishers, 2009.
11. S.L. Gupta, & Sanjeev Gupta, "Unified Physics", Vol - 1, 16th Edition, Jaiprakash Nath & Co., 2007.

CHEMISTRY

Course Code : ABC1101

L	T	P	C
4	1	0	4

AIM :

The aim of the course is to provide basic chemistry background required for under graduate students of engineering.

OBJECTIVE :

The Objective of the course is to provide an over view of chemical properties of materials which the engineers are likely to use during their professional careers.

UNIT - I

ELECTROMOTIVE FORCE : Electrode potential, Nernest equation, EMF of electro chemical cell, calculation of cell potential, concentration cell, determination of P^H of solution.

BATTERIES - primary cell-Dry or Lachanche cell, alkaline battery; secondary cells (storage batteries or accumulators) – Lead-acid Accumulator, Nickel-cadmium battery.and lithium ion battery.

Fuel cells - hydrogen, oxygen fuel cell, phosphoric acid fuel cell, solid oxide fuel cells.

UNIT - II

CORROSION AND ITS CONTROL : Introduction-Dry or chemical corrosion, Wet or Electrochemical corrosion-Hydrogen evolution type, oxygen absorption type, Galvanic corrosion and concentration cell corrosion, pitting ,waterline, and stress corrosion; passivity; Galvanic series; factors influencing corrosion. Corrosion control-proper designing, cathodic protection, modifying the environment and using inhibitors. Protective coatings- anodic and cathodic coatings; Hot dipping-Galvanizing and Tinning, Metal cladding; Electroplating; Electro less plating; cementation or diffusion coatings.

UNIT - III

CHEMICAL KINETICS : Arrhenius theory-effect of temperature on reaction rates –concept of activated complex; collision theory of reaction rates; Lindeman's theory of unimolecular reactions, steady state approximation; Transition state theory.

UNIT - IV

BONDING IN COORDINATION COMPOUNDS : Valence bond theory- limitations, crystal field theory, ligand field theory- octahedral and tetrahedral complexes. Spectral properties of d^1 ions & magnetic properties of low spin and high spin complexes.Molecular orbital theory as applied to octahedral complexes not involving pi-bonding.

UNIT - V

PRINCIPLES AND MECHANISMS OF ORGANIC REACTIONS

Bond fission – homolysis and heterolysis-examples. Types of reagents-electrophilic and nucleophilic reagents -examples. Concept of aromaticity, Huckel's (4n+2) rule. Introduction to mechanistic aspect of electrophilic aromatic substitution- nitration, sulphonation. Friedel-Crafts alkylation and acylation.

UNIT - VI

POLYMER SCIENCE AND TECHNOLOGY : Nomenclature; Types of polymerization, Mechanism of addition and condensation polymerization, Effect of polymer structure on properties. Plastics- Thermo and thermosetting plastics, constituents of a plastic. Preparation, properties and uses of polythene, PVC, Teflon, nylons-6,6, bakelite and silicones.

RUBBER - Natural rubber-structure-vulcanization, compounding of rubber; synthetic rubbers-Buna-Sand Buna-N.

UNIT - VII

SEMI CONDUCTING MATERIALS : Band theory of solids, Types-Intrinsic, extrinsic,(n-type, p-type,) non-elemental semi conducting materials- stoichiometric semi conducting compounds, defect semiconductors, controlled valency semiconductors. Preparation of semiconductors- Zone refining, Czochralski crystal pulling technique, Doping technique.

UNIT - VIII

CHEMISTRY OF ENGINEERING MATERIALS

Cement - classification; Portland cement- raw materials, manufacture of Portland cement, chemical constititution of Portland cement, setting and hardening of Portland cement.

REFRACTORIES - Classification and properties of refractories

FUELS - classification; calorific value and its determination using Bomb and Junker's gas calorimeter, theoretical calculation of calorific value-Proximate and ultimate analysis of coal; Refining of petroleum-, catalytic cracking; catalytic reforming, knocking, octane rating, improvement in anti knock characteristics, unleaded petrol; diesel engine fuels, cetane value

LUBRICANTS - Friction- mechanism of lubrication-Fluid film lubrication; thin or boundary lubrication and extreme pressure lubrication, classification-Lubricating oils, greases and solid lubricants.

TEXT BOOKS :

1. Jain& Jain, "A text book of Engineering Chemistry", Dhanapat Roy publishing company, 15th Edition, 2006.
2. Shiva Shankar, "Engineering Chemistry", Tata Mc Graw Hill, 2008.

REFERENCES :

1. Sashi chawala, "Engineering Chemistry", Dhanpath Rai Publications, 3rd Edition, 2010.
2. C. Parameswara Murthy, C.V. Agarwal and Andhra Naidu, "A Text Book of Engineering Chemistry", B.S. Publications, 1st Edition, 2006.
3. J.D.Lee, "Concise inorganic Chemistry", Black Well Science Publications, 5th Edition, 2005.
4. Arun Bahl & B.S.Bahl, "Advanced Organic Chemistry", S.Chand Publications, 2010.
5. Gurudeep Raj, "Physical Chemistry", Goel Publications, 3rd Edition, 2007.
6. S.S. Dara, "Text book of Engineering Chemistry", S. Chand Publications, 11th Edition, 2006.

ELECTRONIC DEVICES

Course Code : AEC1101

L	T	P	C
4	1	0	4

AIM & OBJECTIVES :

All electronic equipment in the world consist of various components Like Diodes , Transistors, SCR etc. The different combinations of these active components result in the development of new equipment for various applications.

In this course the fundamental characteristics of various devices (components) are studied. The applications of all these devices are discussed.

UNIT - I

ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS : Bonding forces in solids, energy bands, Metal, Semiconductor, Insulators, Direct & Indirect Semiconductor, Variation of energy bands with alloy composition, Electrons and holes, Effective mass, Intrinsic and Extrinsic material, Fermi level, carrier concentrations at equilibrium, temperature dependence of carrier concentrations, compensation and space charge neutrality, conductivity, mobility, hall effect.

UNIT - II

EXCESS CARRIERS IN SEMICONDUCTORS : Direct recombination, indirect recombination, Steady state carrier generation, diffusion processes, diffusion and drift of carriers, continuity equation, steady state carrier injection, diffusion length.

UNIT - III

PN JUNCTION : The contact potential , equilibrium Fermi levels, space charges at a junction, qualitative and quantitative description of current flow at a junction, carrier injection, majority and minority carrier current. Zener & Avalanche Breakdown, time variation of stored charge, reverse

recovery transient, capacitance of PN Junction region, ohmic contacts.

UNIT - IV

SEMICONDUCTOR DIODE CHARACTERISTICS : V-I characteristics of diode, temperature dependence, Zener diode characteristics, Zener diode as series and shunt regulator, Varactor Diode, LED, Photodiode, Solar cells.

UNIT - V

RECTIFIERS, FILTERS & REGULATORS : Half-wave rectifier, ripple factor, full-wave rectifier, Bridge rectifier, harmonic components in a rectifier circuit, inductor filter, capacitor filter, L- Section filters, multiple L- section filter, PI filter, comparison of various filter circuits in terms of ripple factor and regulation, Introduction to Power Supply and regulators.

UNIT - VI

BJT CHARACTERISTICS : Junction transistor, transistor current components, transistor as an amplifier & switch, input and output characteristics of transistor in C-B, C-E, C-C configurations, α, β and γ relation, typical voltage values.

UNIT - VII

FET & UJT CHARACTERISTICS : JFET characteristics (qualitative & quantitative discussion), MOSFET characteristics.
(Enhancement and Depletion Type), Negative resistance, UJT characteristics and applications.

UNIT - VIII

SPECIAL DEVICES : Degenerate semiconductors, tunnel diode, Semiconductor Lasers, PNPN device, SCR, DIAC, TRIAC, LCD, Schottky diode.

TEXT BOOKS :

1. Millman Jacob Halkias C Christos, "Electronic Devices and Circuits", 2nd Edition, Tata Mcgrawhill Publications, 2007.

2. B.G. Streetman, "Solid State Electronic Devices", 5th Edition, Prentice Hall of India Publications, 2002.

REFERENCES :

1. B.Visweswara Rao, K.Bhaskarram Murthy, K.Raja Rajeswari, P.Chalam Raju Pantulu, "Electronic Devices And Circuits", Pearson Publications, 2nd Edition, 2009.
2. Raju GSN, "Electronic Devices And Circuits", IK International Publishing House, 1st Edition, 2006.
3. Boylestad.Robert, "Electronic Devices And Circuits Theory", PHI Publications, 10th Edition, 2008.
4. Lal Kishore, "Electronic Devices & Circuits Vol I", BSP publications, 2nd Edition, 2005.
5. Sanjeev Gupta, "Electronic Devices And Circuits", Dhanpat Rai Publications, Reprint, 2003.
6. K.Satyaprasad, "Electronic Devices And Circuits", VGS Publications, 2006.

ENVIRONMENTAL STUDIES

Course Code : ABE1101

L	T	P	C
4	0	0	4

AIM :

To create awareness on environmental hazards.

OBJECTIVE :

The student shall acquire knowledge regarding utilization of natural resources, and the imbalance in ecosystems, environmental pollution caused by various practices and safe guards to be taken.

UNIT - I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES : Definition, Scope and Importance – Need for Public Awareness.

UNIT - II

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems -Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

ECOSYSTEMS : Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems
(ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - IV

BIODIVERSITY AND ITS CONSERVATION : Introduction - Definition: genetic, species and ecosystem diversity.- Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social,ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, manwildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Exsitu conservation of biodiversity.

UNIT - V

ENVIRONMENTAL POLLUTION : Definition, Cause, effects and control measures of :

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

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

UNIT - VI

SOCIAL ISSUES AND THE ENVIRONMENT : From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies - Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. -Consumerism and waste products. –Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution)

Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT - VII

HUMAN POPULATION AND THE ENVIRONMENT : Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. -Case Studies.

UNIT - VIII

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

TEXT BOOKS :

1 Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", University Press, Reprint 2005.

2 R. Rajagopalan, "Environmental Studies", Oxford University Press, 2nd Edn. 2011..

REFERENCE :

1. M. Anji Reddy, B "Textbook of Environmental Sciences and Technology"

NETWORKS LAB

Course Code : AEE1102

L	T	P	C
0	0	3	2

AIM :

To introduce the student to the fundamental principles of Network Analysis.

Objectives :

The student should be able to learn the basics of

a) Network theorems
b) Resonance Phenomena
c) Self and Mutual Inductance of a coupled coil
d) Time Response of Electric circuits
e) Fundamentals of A.C.Circuits

* The following experiments are required to be conducted as compulsory experiments:

1) Verification of Thevenin's and Nortons Theorem.
2) Verification of Maximum Power Transfer Theorem.
3) Verification of Superposition Theorem.
4) Locus Diagrams of RL and RC Series Circuits.
5) Series Resonance.
6) Verification of Reciprocity Theorem.
7) Determination of Self, Mutual Inductances and Coefficient of coupling.
8) Determination of Form Factor for a Non-Sinusoidal Waveform.

* In addition to the above eight experiments, at least any two experiments from the following list are required to be conducted.

9) Verification of Kirchoff Laws.

10) Harmonic analysis of non-sinusoidal waveform signal.

11) Time Response of RL And RC Network for periodic Non-sinusoidal Input

12) Measurement of Active Power for Balanced Loads.

TEXT BOOK :

Network Analysis by N.C.Jagan and C-Lakshmi Narayana, B.S.Publications

REFERENCES :

1. Network Analysis , by M.E Van Valkenburg , Prentice Hall of India, PVT Ltd, New Delhi.

2. Circuit Analysis , by Hayt and Kemmerly.

PHYSICS AND CHEMISTRY LAB

Course Code : ABP1102

L	T	P	C
0	0	3	2

AIM :

To give prerequisites to understand the advanced Physics & Chemistry leading to applications in engineering field.

OBJECTIVES :

Training the students to understand the principles and concepts helpful in performing experiments in laboratory classes individually. To mould them to solve any technical problem in general.

LIST OF PHYSICS EXPERIMENTS

Any **SIX** of the following experiments are to be performed during the semester

01. Determination of rigidity modulus of the material of a given wire– Torsional pendulum
02. Verification of laws of vibration of stretched string - Sonometer
03. Determination of radius of curvature of a given convex lens - Newton's rings
04. Determination of wavelength of spectral lines of a mercury spectrum - Diffraction grating
05. Study of frequency response of LCR series and parallel resonant circuits
06. Study of variation of magnetic field along a circular current carrying conductor – Stewart & Gee apparatus
07. Determination of Hall coefficient and carrier concentration - Hall effect

08. Study of I-V characteristics of a solar cell
09. Optical Fibers – Determination of numerical aperture and losses in fibers
10. Measurement of dielectric constant of material by Waveguide method

LIST OF CHEMISTRY EXPERIMENTS

Any **SIX** of the following experiments are to be performed during the semester.

1. Preparation of standard potassium dichromate and determination of ferrous iron.
2. Determination of hardness of water by EDTA method.
3. Determination of dissolved oxygen in water.
4. Determination of chlorides in water.
5. Determination of iron-II by potentiometric method.
6. Determination of viscosity of lubricant by viscometer.
7. Determination of flash and fire points of oils.
8. Determination of percentage residue of carbon in oils.
9. Determination of calorific value of solid fuels.
10. Colorometric determination of iron in cement.

REFERENCES :

1. J.Mendham Et.al., "Vogel's text book of Quantitative Chemical Analysis", 6th Edn. Pearson Education.
2. Dr. K. B. Chandrasekhar, "Chemistry practical lab manual".
3. K.Sudha Rani, "Laboratory Manual on Engineering Chemistry"

ENGINEERING WORKSHOP

Course Code : AMT1101

L	T	P	C
0	0	3	2

Aim : To provide hands on experience on basic Engineering and IT related skills.

Objectives :

* To train the student in the basics of computer components, maintenance, software(s) installation and office tools.
* To demonstrate and train the students in basic professional trades.

Compulsory Exercises :

- Identification of the peripherals of a computer, components in a CPU and its functions - Block diagram of the CPU along with the configuration of each peripheral. Disassembly and assembly of a personal computer.
- Installation of MS windows on the personal computer.
- One lamp controlled by a one-way switch and (b) Two-way switching for stair-case lamp

Any Nine Exercises From The Following :

- **Carpentry**: Making a Cross-half lap joint using wooden pieces
- **Carpentry**: Making a Mortise and Tenon joint using wooden pieces
- **Fitting**: Preparation of a V-fit between mild steel flat pieces
- **Fitting**: Preparation of a Square-fit between mild steel flat pieces
- **Foundry**: Preparation of a sand mould using a single piece pattern
- **Foundry**: Preparation of a sand mould using a split piece pattern

- **Tin-Smithy**: Preparation of a sheet metal pipe-joint using tin-smithy tools
- **Tin-Smithy**: Preparation of a sheet metal funnel using tin-smithy tools
- **Welding**: Making a Lap joint through arc welding
- **Lathe Machine**: Demonstration of turning related activities on Lathe machine
- **Black smithy**: Demonstration of Black smithy trade
- **Plumbing**: Demonstration of Plumbing trade
- **Installation of Linux** on the computer wherein the windows was installed. The system should be configured as dual boot with both windows and Linux.
- **Hardware Troubleshooting :** Identification of the problem of a PC which does not boot (due to improper assembly or defective peripherals) and fixing it to get the computer back to working condition.
- **Software Troubleshooting :** Identification of the problem of a malfunctioning CPU (due to some system software problems) and fixing it to get the computer back to working condition.
- **Connectivity Boot Camp : C**onnectivity to the Local Area Network and accessibility to the Internet. TCP / IP setting.
- **Web Browsers, Surfing the Web : C**ustomization the web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
- **Using LaTeX and / word : C**reation of project certificate. Exposure to features like:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and / Word.
- **Creating project abstract :** Features to be covered are: Formatting Styles, Inserting table, Bullets and Numbering,

Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

- **Creating a Newsletter** : Features to be covered are : Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs
- **Creating a Feedback form** - Features to be covered are: Forms, Text Fields, Inserting objects, Mail Merge in Word.
- **Excel Orientation : Introduction of** Excel as a Spreadsheet tool, Using Excel –Accessing, overview of toolbars, saving excel files, Using help and resources
- **Creating a Scheduler -** Features to be covered are: Gridlines, Format Cells, Summation, auto fill, Formatting Text
- **Calculating GPA** - Features to be covered:- Cell Referencing, Formulae in excel – average, standard deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP
- **Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting
- **Power point presentation**
- Exposure to basic power point utilities and tools (PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Power point, Hyperlinks, inserting Images, Clip Art, Audio, Video, Objects, Tables, Charts) .to create basic power point presentation.

SYLLABI FOR III SEMESTER

MATHEMATICS – III

(Common to ECE, EEE)

Course Code: ABM1104

L	T	P	C
4	0	0	4

AIM:

To acquire basic knowledge in the theory of functions of complex variables and special functions.

OBJECTIVE:

The primary objective of this course is to introduce the special functions and to develop the theory that is prominent in applications of the subject. A special emphasis has been given to the application of residues and conformal mappings.

UNIT-I

BETA AND GAMMA FUNCTIONS: Beta-function and Gamma function, relation between Beta and Gamma functions, results and problems. (7.14 - 7.16)

UNIT-II

BESSEL'S AND LEGENDRE'S FUNCTIONS: Bessel's function, Recurrence formulae, Expansions for $J_0(x)$, $J_1(x)$, Generating function, Orthogonality of Bessel functions

Legendre's function, Rodrigue's formula, Recurrence formulae, Orthogonality of Legendre polynomials. (16.6 – 16.9, 16.11, 16.13 – 16.17)

UNIT – III

FUNCTIONS OF A COMPLEX VARIABLE: Complex function, Limit, Continuity and Derivative of a Complex function, Cauchy- Riemann equations in Cartesian and polar form, Analytic functions, Harmonic functions, Milne –Thomson method. (20.2 – 20.5)

UNIT- IV

ELEMENTARY FUNCTIONS OF A COMPLEX VARIABLE: Exponential and Circular functions of a Complex variable, Hyperbolic and Inverse Hyperbolic functions, Real and Imaginary parts of Circular and Hyperbolic functions, Logarithmic function of a complex variable. (19.8 - 19.13)

UNIT- V

COMPLEX INTEGRATION: Complex Integration, Cauchy's theorem, Cauchy's Integral Formula, Morera's theorem, Cauchy's inequality, Liouville's theorem, Poisson's integral formulae. (20.12 - 20.15)

UNIT-VI

COMPLEX POWER SERIES: Series of complex terms, Taylor's series, Laurent's series,Zeros of an analytic function (20.16 - 20.17)

UNIT-VII

RESIDUES: Residues, Residue theorem, Calculation of residues, Evaluation of real definite integrals. (20.18 - 20.20)

UNIT-VIII

CONFORMAL MAPPINGS: Geometrical representation of $w=f(z)$, Standard transformations, bilinear transformation, Conformal transformations: $w=z^2$, $w=z + 1/z$, $w=e^z$, $w=\sin z$, $w=\cos z$, $w=\sinh z$, $w=\cosh z$. (20.7, 20.8, 20.10)

TEXT BOOK:

Dr.B.S.Grewal, "Higher Engineering Mathematics", 40th Edition, Khanna Publishers

REFERENCE BOOKS:

1. James Ward Brown & Ruel V. Churchill, "Complex Variables and Applications", 7th Edition, McGraw-Hill, 2004.
2. Goyal JK , Gupta KP, "Functions Of A Complex Variable", Pragati Prakashan.

ELECTRONIC CIRCUITS

(Common to ECE, EEE)

Course Code: AEC1103

L	T	P	C
4	1	0	4

AIM & OBJECTIVES:

To introduce the basic design concepts of low frequency, high frequency amplifiers and oscillators circuits using various transistors for different applications.

UNIT-I

BIASING AND STABILIZATION: BJT biasing, DC equivalent model, criteria for fixing operating point, methods of Bias stabilization, Thermal runaway, Thermal stability, Compensation Techniques, Biasing of JFET and MOSFET.

UNIT-II

SMALL SIGNAL AMPLIFIERS : h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: A_V, A_I, R_i, R_o (CB, CE & CC), Small signal model of FET and MOSFET (CG, CD & CS configurations).

UNIT -III

MULTI STAGE AMPLIFIERS: Concept of Multi Stage Amplifiers, Methods of Inter Stage Coupling, Two Stage RC Coupled amplifier (CE configuration), n –Stage Cascaded Amplifiers, Equivalent Circuits, Miller's Theorem, Frequency Effects, High Input Resistance Transistor Circuits: Cascode Transistor Configuration, CE-CC Amplifiers, Frequency response of RC Coupled Amplifiers using BJT, Gain Bandwidth Product.

UNIT -IV

HIGH FREQUENCY TRANSISTOR CIRCUITS: Transistor at High Frequencies, Hybrid-ð Common Emitter Transconductance Model, Determination of Hybrid- ð Conductances, Variation of Hybrid Parameters

with $|I_C|$, $|V_{CE}|$ and Temperature, The Parameters $f_{\hat{o}}$, expression for $f_{\acute{a}}$, $f_{\hat{a}}$, Current Gain with Resistance Load, CE Short Circuit Current Gain.

UNIT- V

FEEDBACK AMPLIFIERS: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Analysis of negative feedback amplifiers.

UNIT-VI

OSCILLATORS: Condition for oscillations, RC and LC type Oscillators: Hartley, and Colpitts Oscillators, RC-phase shift and Wien-bridge oscillators using BJT and JFET, Frequency and amplitude stability of oscillators, Crystal oscillators.

UNIT -VII

POWER AMPLIFIERS: Class- A Power Amplifier, Maximum Value of Efficiency of Class- A Amplifier, Transformer Coupled Amplifier, Transformer Coupled Audio Amplifier, Push Pull Amplifier, Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier), Class C Power Amplifier, Phase Inverters, Class D Operation, Class S Operation, Heat Sinks.

UNIT -VIII

TUNED AMPLIFIERS: Single Tuned Capacitive Coupled Amplifier, Tapped Single Tuned Capacitance Coupled Amplifier, Single Tuned Transformer Coupled or Inductively Coupled Amplifier, CE Double Tuned Amplifier, Stagger Tuning, Stability Considerations, Tuned Class B and Class C Amplifiers, Wideband Amplifiers, Applications of Tuned Amplifiers.

TEXT BOOKS:

1. J.Millman and C.C.Halkias, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2007.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson/Prentice Hall, 10th Edition, 2008.

3. B.Visweswara Rao, K.Bhaskarram Murthy, K.Raja Rajeswari, P.Chalam Raju Pantulu, "Electronic Devices and Circuits", Pearson Publications, 2nd Edition, 2009.

4. Raju GSN, "Electronic Devices and Circuits", IK International, 1st Edition, 2006.

REFERENCES:

1. T.F. Bogart Jr., J.S.Beasley and G.Rico, "Electronic Devices and Circuits", Pearson Education, 6th edition, 2004.

2. S.G.Burns and P.R.Bond, "Principles of Electronic Circuits", Galgotia Publications, 2nd Edn.,1998.

3. Millman and Grabel, "Microelectronics", 2nd Edition, Tata McGraw Hill, 2001.

4. S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, "Electronic Devices and Circuits", 2nd Edition, TMH, 2007.

5. K. Lal Kishore, "Electronic Devices and Circuits", B.S. Publications, 2nd Edition, 2005.

PRIME MOVERS AND PUMPS

Course Code: ACE1152

L	T	P	C
4	0	0	4

AIM:

To introduce the concepts of Pumps and Hydraulic Prime Movers to make the students gainful.

OBJECTIVE:

To Gain basic knowledge on Fluid Statics, Fluid Dynamics, closed conduit flows and know the basic machinery with their efficiencies. Create much awareness on Hydro Electric Power Stations, Turbines, Pumps and their performances.

UNIT-I

FLUID STATICS: Dimensions and units: physical properties of fluids-specific gravity, viscosity, surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure –measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT-II

FLUID KINEMATICS AND DYNAMICS: Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT-III

CLOSED CONDUIT FLOW: Reynold's experiment- "Darcy Weisbach" equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.Measurement of flow: pitot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter (Ref.4)

UNIT-IV

BASIC TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT-V

HYDROELECTRIC POWER STATIONS: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT-VI

HYDRAULIC TURBINES: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working principles, work done, efficiencies, hydraulic design–draft tube theory, functions and efficiency.

UNIT-VII

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT-VIII

CENTRIFUGAL AND RECIPROCATING PUMPS: Classification, working of centrifugal pump, work done – manomertic head- losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, NPSH. Working of reciprocating pumps, Discharge, slip, percentage slip, indicator diagrams.

TEXT BOOKS :

1. P.N.MODI and S.M.SETH, "Hydraulics, fluid mechanics and Hydraulic machinery", Standard Book House, New Delhi
2. R. K. Rajput , "Fluid Mechanics and Hydraulic Machines", S.Cand & Company (Ltd.) New Delhi.
3. Banga & Sharma," Hydraulic Machines", Khanna Publishers.

REFERENCE BOOKS:

1. D.S. Kumar, Kataria S.K & Sons, "Fluid Mechanics and Fluid Power Engineering".
2. D. Rama Durgaiah, "Fluid Mechanics and Machinery", New Age International.
3. Dr. R .K. Bansal,"A text of Fluid mechanics and hydraulic machines", Laxmi Pubilications (P) Ltd., New Delhi.
4. James W. Dally, William E. Riley, "Instrumentation for Engineering Measurements", John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements)

SWITCHING THEORY AND LOGIC DESIGN

(Common to ECE, EEE)

Course Code : AEC1106

L	T	P	C
4	1	0	4

AIM & OBJECTIVES:

1. To design combinational & sequential digital circuits used in digital systems.
2. To introduce programmable logic devices.

UNIT-I

NUMBER SYSTEMS & CODES: Philosophy of number systems, complement representation of negative numbers,binary arithmetic,binary codes,error detecting & error correcting codes, hamming codes.

UNIT-II

BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS: Fundamental postulates of Boolean Algebra, Basic theorems and properties, switching functions,Canonical and Standard forms,Algebraic simplification digital logic gates, properties of XOR gates,universal gates,Multilevel NAND/NOR realizations.

UNIT-III

MINIMIZATION OF SWITCHING FUNCTIONS: Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicants chart, simplification rules.

UNIT-IV

COMBINATIONAL LOGIC DESIGN: Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions, Parity bit generator, Code-converters, Hazards and hazard free realizations.

UNIT -V

PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC: Basic PLD's-ROM, PROM, PLA, PAL Realization of Switching functions,

Capabilities and limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

UNIT -VI

SEQUENTIAL CIRCUITS - I: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic flip-flops-Triggering and excitation tables, registers, shift registers, Steps in synchronous sequential circuit design, synchronous counters, ripple counters.

UNIT -VII

SEQUENTIAL CIRCUITS - II: Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector, Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified sequential machines, Partition techniques, incompletely specified sequential machines using merger table.

UNIT -VIII

ALGORITHMIC STATE MACHINES: Salient features of the ASM chart, Simple examples, System design using data path and control subsystems, control implementations, examples of weighing machine and binary multiplier.

TEXT BOOKS:

1. Morris Mano, "Digital Design", PHI, 3rd Edition, 2006.
2. Zvi Kohavi, "Switching & Finite Automata theory", TMH, 2nd Edition, 2008.
3. R.P.Jain, "Modern Digital Electronics", TMH, 3rd Edition, 2006.

REFERENCES:

1. Fletcher, "An Engineering Approach to Digital Design", PHI, 1980.
2. Charles H. Roth, "Fundamentals of Logic Design", Thomson Publications, 5th Edition, 2004.
3. John M. Yarbrough, "Digital Logic Applications and Design", Thomson Learning Publications, 2001.

ELECTROMAGNETICS

Course Code: AEE1103

L	T	P	C
4	1	0	4

AIM:

To know the fundamental knowledge of Electricity, Magnetism and Electromagnetism.

OBJECTIVE:

The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

UNIT – I

ELECTROSTATICS: Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Gauss's law, Application of Gauss's Law – Maxwell's first law, div (D)=ρ_v.

UNIT – II

CONDUCTORS AND DIPOLE: Laplace's and Poisson's equations – Solution of Laplace's equation in one variable. Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators.

UNIT – III

DIELECTRIC & CAPACITANCE: Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics

– Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity

UNIT – IV

MAGNETO STATICS: Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.

UNIT – V

AMPERE'S CIRCUITAL LAW AND ITS APPLICATIONS: Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=J_c, Field due to a circular loop, rectangular and square loops.

UNIT – VI :

FORCE IN MAGNETIC FIELDS: Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field

UNIT – VII :

MAGNETIC POTENTIAL: Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations. Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

UNIT – VIII :

TIME VARYING FIELDS : Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple problems. Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

TEXT BOOKS :

1. William H. Hayt & John. A. Buck,"Engineering Electromagnetics", Mc. Graw-Hill Companies, 7th Editon.2006.
2. Sadiku, "Electro Magnetic Fields", 4th Edition Oxford Publications.

REFERENCE BOOKS :

1. D J Griffiths, "Introduction to Electro Dynamics", 2nd edition, Prentice-Hall of India Pvt.Ltd.
2. J. D Kraus, "Electromagnetics", 4th edition, Mc Graw-Hill Inc, 1992.
3. N.Narayana Rao, "Elements of Engineering Electromagnetics", Prentice-Hall of India Pvt Ltd.

PERFORMANCE AND DESIGN OF DC MACHINES

Course Code: AEE1104

L	T	P	C
4	1	0	4

Aim:

To familiarize the student with the principles of Electro-Mechanical Energy Conversion with particular reference to D.C. Machines that find wide application in industry. The course covers construction, performance and design aspects of D.C. Machines.

Objective:

In this course the different types of DC generators and motors which are widely used in industry are covered and their performance and design aspects will be studied.

UNIT – I

ELECTROMECHANICAL ENERGY CONVERSION: Basic principle of electromechanical energy conversion. Forces and torque in Permanent and electro magnetic field systems; energy balance and flow of energy – Energy and force in a singly excited magnetic field system; Determination of magnetic force. Co-energy- multi-excited magnetic field systems. Examples involving linear cases.

UNIT – II

D.C. MACHINES – CONSTRUCTION & OPERATION : D.C. Generators – Principle of operation – Action of commutator – constructional features – armature windings – Simple lap and wave windings – E.M.F Equation – Problems

UNIT – III

ARMATURE REACTION & COMMUTATION IN D.C. MACHINES: Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation: interpole winding

UNIT – IV

CHARACTERISTICS OF D.C GENERATORS: Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures. Load characteristics of shunt, series and compound generators – parallel operation of d.c shunt,series and compound generators – use of equalizer bar and cross connection of field windings – load sharing.

UNIT – V

D.C. MOTORS: D.C Motors – Torque equation – characteristics and application of shunt, series and compound motors. Starting of motors – 3 and 4 point starter with protective devices. Calculation of starter – steps for a shunt machine.

UNIT – VI

CONVENTIONAL METHODS OF SPEED CONTROL: Conventional methods of Speed control of DC. Motors: Armature voltage and field flux control methods. Ward-Leonard system. Braking of DC machines – Plugging, dynamic and regenerative braking.

UNIT – VII

TESTING OF D.C. MACHINES: Testing of DC. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency

Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of losses in a DC Motor.

UNIT – VIII

PRINCIPLES OF DESIGN: Specific electric loading, flux density in air gap. Output coefficient. Design of main dimensions(D,L). Design of field poles , armature and field winding, commutator and brushes. Illustrative examples.

TEXT BOOKS:

1. I.J. Nagrath & D.P. Kothari , "Electric Machines", Tata McGraw – Hill Publishers, 3rd edition, 2004.
2. P.S. Bimbra, " Electrical Machines", Khanna Publishers.
3. A.K.Sawhney, "Design of Electrical Machine", Dhanpat Rai and Sons.

REFERENCE BOOKS:

1. Clayton & Hancock, "Performance and Design of D.C.Machines", BPB Publishers.
2. A. E. Fritzgerald, C. Kingsley and S. Umans, "Electric Machinary", 5th Edition, McGraw-Hill Companies.
3. S.K. Battacharya, "Electrical Machines".

PRIME MOVERS AND PUMPS LAB

Course Code: ACE1153

L	T	P	C
0	0	3	2

AIM:

To introduce the concepts of Pumps and Hydraulic Prime Movers to make the students gainful.

OBJECTIVE:

To Gain basic knowledge on Fluid Statics, Fluid Dynamics, closed conduit flows and know the basic machinery with their efficiencies. Create much awareness on Hydro Electric Power Stations, Turbines, Pumps and their performances.

1. Impact of jets on Vanes
2. Performance Test on Pelton Wheel, Turbine.
3. Performance Test on Francis Turbine
4. Performance Test on Kaplan Turbine
5. Performance Test on Single Stage Centrifugal Pump
6. Performance Test on Multi Stage Centrifugal Pump
7. Performance Test on Reciprocating Pump
8. Calibration of Venturimeter
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli's theorem.

Note: Any 10 of the above 12 experiments are to be conducted.

DC MACHINES LAB

Course Code: AEE1105

L	T	P	C
0	0	3	2

AIM:

To introduce the basic concepts of DC Machines

OBJECTIVE:

The lab is intended for the students to get hands on experience in dealing with DC Machines.

The following experiments are required to be conducted compulsory experiments :

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC compound generator. Determination of characteristics.
4. Speed control of DC shunt motor
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Brake test on DC shunt motor. Determination of performance characteristics.
7. Swinburne's test. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.

In addition to the above eight experiments, atleast any two of the experiments from the following list are required to be conducted:

9. Brake test on DC series motor.
10. Retardation test on DC shunt motor.
11. Separation of losses in DC shunt motor.
12. Field test on DC series machines.

SYLLABI FOR IV SEMESTER

MATHEMATICS – IV
(Common to ECE, EEE)

Course Code: ABM1107

L	T	P	C
4	1	0	4

AIM:

To acquire basic knowledge of probability and numerical computation.

OBJECTIVE:

The primary objective of this course is to introduce the Mathematical concepts of probability that are sufficiently general they can apply to any suitably defined random phenomena and also shall be able to apply methods of numerical computation for real time problems.

UNIT-I

PROBABILITY: Probability Introduced through Sets and Relative Frequency, Joint and Conditional Probability, Independent Events, Combined Experiments, (1.3 – 1.6 of [1])

UNIT-II

RANDOM VARIABLE-EXPECTATION: The Random Variable Concept, Distribution Function, Density Function, The Gaussian Random Variable, Conditional Distribution and Density Function, Expectation, Transformations of a Random Variable. (2.1 –2.4, 2.6, 3.1, 3.2, 3.4 of [1])

UNIT-III

MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution and Its Properties, Joint Density and Its Properties, Conditional Distribution and Density, Statistical Independence, Distribution and Density of a sum of Random Variables, Central Limit Theorem (without proof). 4.1 – 4.7 of [1])

UNIT-1V

OPERATIONS ON MULTIPLE RANDOM VARIABLES : Expected Value of a Function of Random Variables, Jointly Gaussian Random Variables, Transformations of Multiple Random Variables.

(5.1, 5.3, 5.4 of [1])

UNIT- V

RANDOM PROCESS – TEMPORAL CHARACTERISTICS: The Random Process Concept, Stationarity and Independence, Correlation Functions, Measurement of Correlation Functions, Gaussian Random Processes, Poisson Random Process (6.1 – 6.6 of [1])

UNIT- VI

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: Introduction to Numerical Methods, Solution of algebraic and transcendental equations-Bisection method, method of false position, Newton's method, Iteration method, Finite differences, Differences of a polynomial, Difference operators

(28.1, 28.2, 29.1, 29.2 & 29.4 of [2])

UNIT-VII

INTERPOLATION: Newton's interpolation formulae, Central difference interpolation formulae, Interpolation with unequal intervals – Lagrange's formula, Newton's divided difference formula, Inverse interpolation.

(29.5, 29.6, 29.8& 29.9 of [2])

UNIT-VIII

NUMERICAL DIFFERENTIATION AND INTEGRATION: Numerical differentiation, Numerical Integration – Newton-cote's formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule. (29.10, 29.12 of [2])

TEXT BOOKS:

1. Peyton Z. Peebles, Jr., Ph.D. "Probability, Random Variables and Random Signal Principles", 4th Edition, Tata McGraw-Hill Publishing Company Limited

2. Dr.B.S.Grewal "Higher Engineering Mathematics", 40th Edition, Khanna Publishers

REFERENCE BOOKS:

1. Athanasios Papoulis and S.Unnikrishna Pillai, Probability, Random variables and Stochastic Processes, PHI, 4th Edition 2002
2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, Numerical Methods for Scientific and Engineering Computation, New age International Publishers
3. S. S. Sastry, "Introductory Methods of Numerical Analysis", Prentice Hall India Pvt. Limited.

NETWORK ANALYSIS AND SYNTHESIS

Course Code: AEE1106

L	T	P	C
4	1	0	4

AIM:

This second course in Network Analysis can be treated both as complement and supplement to the basic course. This course opens for entry to wide range of advanced courses such as Systems Theory, Control Systems, Analog & Digital Networks etc.,

OBJECTIVE:

This course trains the student to think deep into the subject for analyzing the time – advance and frequency domain analysis of systems in general and prepare, the student for advanced learning and research.

UNIT – I :

NETWORK TOPOLOGY : Linear Graphs in Electrical Networks, Basic Definitions, Incidence, Loop and cut-set matrices,Fundamental Loop and Fundamental Cut-Set Matrices,GraphTheoretic version of KCL and KVL,Loop Impedance and Node Admittance Matrices.

UNIT – II :

A REVIEW OF LAPLACE TRANSFORMS: Laplace Transform of unit step,unit ramp,exponential and periodic signals,Laplace Transform of Impulse and Doublet Functions,Inverse Transform Shifting Theorems, Initial Value & Final Value Theorems, Convolution Theorem.

UNIT – III :

LAPLACE TRANSFORM APPLICATION TO NETWORK ANALYSIS: Solution of RLC Networks using Laplace Transforms,concept of complex frequency, Transform Impedance (or Operational Impedance) unit step and unit impulse responses, Impulse response and convolution,Embedding initial conditions as circuit elements,Evaluation of Initial State of a Network ,the special cases of

all inductor loops and all capacitor cut sets.

UNIT – IV :

NETWORK FUNCTIONS POLES AND ZEROS AND TWO-PORT NETWORKS: Driving Point Functions Poles and Zeros, O.C & S.C critical frequencies, Properties of Driving Point Functions,Two Port Networks,immittance,Transmission and Hybrid Parameters, Interconnection of 2 – Ports.

UNIT – V :

FOURIER TRANSFORMS: Fourier Series of Typical Wave Forms, Complex Fourier Series, Fourier Spectra Fourier Integral and Fourier Transforms of typical signals, Analysis of simple networks in steady state to Non-sinusoidal periodic signals,Power Spectrum of Periodic Signals.

UNIT – VI :

NETWORK SYNTHESIS (DRIVING POINT SYNTHESIS ONLY): Positive Real (PR) functions,Hurwitz Polynomials,Testing of PR functions, Elementary Synthesis Operations.

UNIT – VII :

LC NETWORK SYNTHESIS: Driving Point Functions of LC Networks Interlacing Properties of Poles & Zeros and Foster's Reactance Theorem, Synthesis by Foster's and Cauer Forms.

UNIT – VIII :

RC AND RL NETWORK SYNTHESIS: The driving Point Functions of RC & RL Networks derived from LC functions, Foster and Cauer forms of RC & RL driving Point Functions.

TEXT BOOKS:

1. M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India Pvt. Ltd., New Delhi,2000.
2. Frankyln F.Kuo, "Network Analysis and Synthesis", Wiley International, 2006.
3. N.C.Jagan and C. Lakshmi Narayana, "Network Analysis", B.S. Publications, 2008.

REFERENCE BOOKS:

1. M.E. Van Valkenburg, "Introduction to Modern Network Synthesis", Wiley Eastern Limited, New Delhi,1993.
2. Charles K. Alexander, Mathew N.O Sadika, "Fundamentals of Electric Circuts", TMH Education Pvt. Ltd., New Delhi, 3rd Editions, 2008.
3. Umesh Sinha, "Network Analysis and Synthesis", Satya Publications, 2007.

PULSE AND DIGITAL CIRCUITS

(Common to ECE, EEE)

Course Code: AEC1105	L	T	P	C
	4	1	0	4

AIM & OBJECTIVES:

1. To design Linear & Non Linear waveshaping Circuits.
2. To design Logic circuits using semiconductor devices.
3. Generation of various waveforms.

UNIT -I

LINEAR WAVESHAPING: Low pass &High pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs, RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT -II

NON-LINEAR WAVE SHAPING: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT -III

SWITCHING CHARACTERISTICS OF DEVICES: Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

UNIT -IV

MULTIVIBRATORS: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

UNIT -V

TIME BASE GENERATORS: General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

UNIT-VI

SYNCHRONIZATION AND FREQUENCY DIVISION: Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

UNIT-VII

SAMPLING GATES: Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

UNIT -VIII

REALIZATION OF LOGIC GATES USING DIODES & TRANSISTORS: AND, OR gates using Diodes, Resistor, Transistor Logic, Diode Transistor Logic.

TEXT BOOKS:

1. J. Millman and H. Taub, Pulse, "Digital and Switching Waveforms", McGraw-Hill, 2008.
2. A. Anand Kumar, "Pulse and Digital Circuits", PHI, 2nd Edition, 2005.

REFERENCES:

1. David A. Bell, "Solid State Pulse Circuits", PHI, 4th Edn., 2002
2. L. Strauss, "Wave Generation and Shaping", 2nd Edition, TMH, 1970.
3. R.Venkataraman, "Pulse, Digital Circuits and Computer Fundamentals", 3rd Edition, Dhanpat Rai Publications, Delhi 1994.

POWER GENERATION ENGINEERING

Course Code: AEE1107

L	T	P	C
4	0	0	4

AIM:

To introduce Power Plant Engineering to the students of Electrical and Electronics Engineering.

OBJECTIVE:

Electrical Power plays significant role in day to day life of entire mankind. This course concerns the generation of power along with the economic aspects.

UNIT-I :

THERMAL POWER STATIONS: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gases.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers, ESP, Turbo-Generator Features.

UNIT-II :

HYDROELECTRIC POWER STATIONS: Plant Layout, Classification, Components, Calculation of Available Power, Hydrology, Hydroelectric Power Plant, Hydroelectric Generator Features.

UNIT-III :

NUCLEAR POWER STATIONS: Nuclear Power Stations: Nuclear Fission and Chain reaction.- Nuclear fuels.- Principle of operation of Nuclear reactor.-Reactor Components: Moderators, Control rods, Reflectors and Coolants.- - Types of Nuclear reactors and brief description of PWR, BWR and FBR, Radiation hazards: Shielding and Safety precautions.

UNIT-IV :

GAS AND DIESEL POWER STATIONS

GAS POWER STATIONS: Principle of Operation and Components (Block Diagram Approach Only), Combined Cycle Power Plant.

Diesel Power Stations: Main Components, Schematic arrangement, Diesel Engine types and characteristics, Plant Operation, Plant layout.

Unit-V

NON-CONVENTIONAL SOURCES OF ENERGY: Renewable Energy sources-Advantages-Obstacles to the implementation of Renewable Energy sources-Prospects-Introduction to Solar Energy, Wind Energy, Bio-Mass Energy, Geo Thermal Energy, Ocean Energy, Tidal and Wave Energies-Schematic Diagrams and Principle of Operation only.

Unit-VI

SUBSTATIONS: Classification of substations:Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system, main and transfer bus bar system, one-and-a-half breaker scheme with relevant diagrams.

Gas insulated substations (GIS) – Advantages , different types , single line diagram , bus bar arrangement, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

Unit-VII

ECONOMICS OF POWER GENERATION: Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

Unit-VIII :

TARIFF METHODS: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods- Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods, Numerical Problems

TEXT BOOKS:

1. M.L. Soni, P.V. Gupta, U.S. Bhatnagar and A. Chakraborti, "A Text Book on Power System Engineering", Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. G.D. Rai, "Non-Conventional Energy Sources", Khanna Publishers, 2007

REFERENCE BOOKS:

1. M.V. Deshpande, "Elements of Power Station Design and Practice", Wheeler Publishing,1979
2. Fredrick T. Morse, "Power Plant Engineering", East-West Press
3. Arora and S.Domkundwar, "Power Plant Engineering", Dhanpat Rai & Sons,1978.

PERFORMANCE AND DESIGN OF AC MACHINES-I

Course Code: AEE1108

L	T	P	C
4	1	0	4

AIM:

At the end of this course a student will be able to evaluate the equivalent circuit, efficiency and regulation of Transformer, Induction Machine and basic design principles.

OBJECTIVE:

This subject facilitates to study of the performance of Transformers and Induction motors which are the major part of industrial drives and agricultural pump sets.

UNIT – I

SINGLE PHASE TRANSFORMERS – CONSTRUCTION & OPERATION: Single phase transformers-types - constructional details-minimization of hystersis and eddy current losses-EMF equation - operation on no load and on load - phasor diagrams

UNIT- II

SINGLE PHASE TRANSFORMERS - PERFORMANCE: Equivalent circuit - losses and efficiency- regulation. All day efficiency - effect of variations of frequency & supply voltage on iron losses.

UNIT- III

TESTING OF SINGLE PHASE TRANSFORMER AND AUTO TRANSFORMER: OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit -comparison with two winding transformers.

UNIT-IV

POLYPHASE TRANSFORMERS: Polyphase transformers - Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

UNIT-V

POLYPHASE INDUCTION MOTORS: Polyphase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation.

UNIT-VI

PERFORMANCE OF INDUCTION MACHINES: Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging. Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations

UNIT-VII

METHODS OF SPEED CONTROL: Speed control-change of frequency; change of poles and methods of consequent poles; cascade connection. Injection of emf into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT-VIII

BASIC PRINCIPLES OF DESIGN: Heating and cooling time curves-short time rating, thermal rate Transformer: output equation, volt/turn of a 1-phase transformer, basic design of square, stepped core, windings, and overall dimensions with examples.

3-ø induction Motor: output equation, basic design of stator core, windings, squirrel cage rotor with examples.

TEXT BOOKS:

1. M. G. Say, "Performance and Design of AC Machines", BPB Publishers
2.. I. J. Nagrath & D. P. Kothari, "Electric Machines", Tata McGraw Hill, 7th Edition. 2005.
3.. A. K. Sawhney, "Electrical Machine Design", Dhanapat Rai &Co Publications

REFERENCE BOOKS:

1. A.E. Fitzgerald, C. Kingsley and S. Umans, "Electric Machinery", Mc Graw Hill Companies, 5th Edition.
2. P.S. Bhimbra, "Electrical Machines", Khanna Publishers
3. Langsdorf, "Theory of Alternating Current Machinery", Tata McGraw-Hill Companies, 2nd Edition.

CONTROL SYSTEMS

Course Code: AEE1109

L	T	P	C
4	1	0	4

AIM:

To study the Time frequency Response Analysis and various methods to find out stability of Control Systems.

OBJECTIVE:

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT – I

MATHEMATICAL MODELLING: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, transfer functions - Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph – Reduction using Mason's gain formula.

UNIT II

TRANSFER FUNCTION REPRESENTATION: Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, DC and AC position control systems

UNIT-III

TIME RESPONSE ANALYSIS AND STABILITY: Standard test signals - Time response of first order systems – Characteristic Equation

of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability

UNIT – IV

ROOT LOCUS ANALYSIS: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT – V

FREQUENCY RESPONSE ANALYSIS-I: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT – VI

Frequency Response Analysis-II

Polar Plots- Nyquist Plots- Stability Analysis

UNIT – VII

CLASSICAL CONTROL DESIGN TECHNIQUES: Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, – Effects of proportional derivative, proportional integral systems. PID Controllers.

UNIT – VIII

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. I.J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P) Limited, Publishers, 2nd Edition.
2. Norman. S. Nise, "Control Systems Engineering", 3rd Edition, John wiley & Sons.

REFERENCE BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. N. K. Sinha, "Control Systems", New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. B. C. Kuo, "Automatic Control Systems", John wiley and son's.,8th edition, 2003
4. Narciso F. Macia George J. Thaler, "Modelling & Control Of Dynamic Systems", Thomson Publishers.

CONTROL SYSTEMS LAB

Course Code: AEE1110

L	T	P	C
0	0	3	2

AIM:

To evaluate time response of first & second order systems, servomotors, and effect of P, PD, PI, PID controllers on second order system Design of Compensation Network coding in MATLAB for Control Systems Problems.

OBJECTIVE:

The lab is intended for the students to get hands on experience in dealing with different controllers, PLC and MATLAB.

The following are the experiments required to be conducted as compulsory experiments:

1. Time response of Second order system.
2. Characteristics of Synchros.
3. Temperature controller using PID.
4. Effect of feedback on DC servo motor.
5. Transfer function of DC motor.
6. Effect of P, PD, PI, PID Controller on a second order systems.
7. State space model for classical transfer function using MATLAB – Verification.
8. Simulation of Transfer functions using operational amplifier.

In addition to the above eight experiments, atleast any two of the experiments from the list are required to be conducted:

1. Lag and lead compensation – Magnitude and phase plot
2. Transfer function of DC generator
3. Programmable logic controller – Study and Verification of truth tables of logic gates, simple boolean expressions and application of speed control of motor
4. Characteristics of magnetic amplifiers.
5. Characteristics of AC servo motor.
6. Design problems for required specifications using Root locus and Bode Plot with MATLAB.

ELECTRONIC DEVICES & CIRCUITS LAB

Course Code: AEC1144

L	T	P	C
0	0	3	2

AIM & OBJECTIVE:

To design & implement various electronic circuits such as amplifiers oscillators.

EXPERIMENTS:

1. PN Junction diode characteristics.
2. Zener Diode characteristics & Voltage Regulator.
3. Rectifiers without filters (Half wave & Full wave).
4. Rectifiers with filters (Half wave & Full wave).
5. Transistor CB characteristics.
6. Transistor CE characteristics.
7. JFET characteristics.
8. MOSFET Characteristics
9. UJT characteristics.
10. CE Amplifier
11. CC Amplifier.
12. CS FET Amplifier.
13. RC Phase shift oscillator.
14. Colpitt's oscillator.

Note: Any TEN of the above experiments are to be conducted.

SYLLABI FOR V SEMESTER

COMPUTER ORGANIZATION

(Common to ECE, CSE, IT)

Course Code: ACT1104

L	T	P	C
4	1	0	4

AIM:

To give detailed information about the structure of computers and internal organization of different units regarding memory I/O devices registers.

OBJECTIVE:

Student will get an idea about the internal organization of the computer system and its internal operations.

UNIT-I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Multicore processors, Data Representation. Fixed Point Representation & Arithmetic, Error Detection codes.

UNIT-II

REGISTER TRANSFER LANGUAGE AND MICRO OPERATIONS: Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic Micro-operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle.

Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

UNIT-III

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control

UNIT-IV

COMPUTER ARITHMETIC: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – Point Representation, Floating – point Arithmetic operations, Decimal Arithmetic unit Decimal Arithmetic operations.

UNIT-V

THE MEMORY SYSTEM: Basic concepts, semiconductor RAM memories, Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID, Hierarchical memory features.

UNIT-VI

INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

UNIT-VII

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

UNIT-VIII

MULTI PROCESSORS: Characteristics or Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization Cache Coherance. Shared Memory Multiprocessors.

TEXT BOOKS:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, "Computer Organization", 5th Edition, McGraw Hill, 2009.
2. M.Moris Mano, "Computer Systems Architecture", 3rd Edition, Pearson Education, 2006.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture", 6th Edition, Pearson Education 2006.
2. Andrew S. Tanenbaum, "Structured Computer Organization", 5th Edition, PHI, Pearson Education, 2006.
3. Sivaraama Dandamudi, "Fundamentals of Computer Organization and Design, Springer Int. Edition, Springer, 2009.
4. John L. Hennessy and David A. Patterson, "Computer Architecture a Quantitative Approach", 4th Edition Elsevier, 2009.
5. Joseph D. Dumas II, "Computer Architecture, Fundamentals and Principles of Computer Design", 1st Edition, BS Publication, 2010.
6. John P. Hayes, "Computer Architecture and Organization", 3rd Edition, Tata McGraw hill, 2009.

LINEAR AND DIGITAL IC APPLICATIONS

Course code: AEC1147

L	T	P	C
4	1	0	4

AIM:

To introduce the importance of Integrated circuits over those made by the interconnecting discrete components.

OBJECTIVES:

- Applications of Linear IC's
- Applications of Digital IC's

UNIT-I

INTEGRATED CIRCUITS: Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

UNIT-II

OP-AMP APPLICATIONS: Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT-III

ACTIVE FILTERS & OSCILLATORS: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters, Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT-IV

TIMERS & PHASE LOCKED LOOPS: Introduction to 555 timer, functional diagram, monostable and astable operations and applications,

Schmitt Trigger, PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT-V

IC VOLTAGE REGULATORS: Voltage Regulator Types, Fixed and Variable voltage regulators, IC723 voltage regulator, Three Terminal Voltage Regulators – IC 7805, Switching Regulator IC 1723.

UNIT-VI

D-A AND A-D CONVERTERS: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC specifications.

UNIT-VII

INTRODUCTION TO LOGIC FAMILIES: Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis& characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT-VIII

COMBINATIONAL LOGIC DESIGN: Design using TTL-74XX & CMOS 40XX series: code converters, decoders, Demultiplexers, Encoder, priority Encoder, multiplexers & their applications.

SEQUENTIAL LOGIC DESIGN: DESIGN USING TTL-74XX & CMOS 40XX SERIES: Flip-flops & their conversions, Design of synchronous counters, Decade counter, shift registers & applications.

TEXT BOOKS:

1. Ramakanth A. Gayakwad, “Op-Amps & Linear ICs”, PHI, 4th Edn, 2008.
2. D. Roy Chowdhury , “Linear Integrated Circuits”, New Age International (p) Ltd, 2nd Ed., 2003.
3. Floyd and Jain, “Digital Fundamentals”, Pearson Education, 8th Edition, 2005.

4. John F. Wakerley, "Digital Design Principal", Pearson education, 3rd Edition, 2005.

REFERENCES:

1. R.F. Coughlin and Fredrick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, 6th Edn 2009.
2. S.Salivahan and Kanchana Bhaaskaran, V. S., "Linear Integrated Circuits" TMH, 1st ed., 2007.
3. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", McGraw Hill, 3rd Ed., 2002.

POWER TRANSMISSION ENGINEERING

Course Code: AEE1111

L	T	P	C
4	1	0	4

AIM:

To acquire basic knowledge in Power Transmission Engineering

OBJECTIVE:

This course deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

UNIT-I

TRANSMISSION LINE PARAMETERS : Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT-II

PERFORMANCE OF SHORT AND MEDIUM LENGTH TRANSMISSION LINES: Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

UNIT-III

PERFORMANCE OF LONG TRANSMISSION LINES : Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants,

Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT-IV

POWER SYSTEM TRANSIENTS: Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT-V

VARIOUS FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINE: Skin and Proximity effects - Description and effect on Resistance of Solid Conductors - Ferranti effect - Charging Current & Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss.

UNIT-VI

OVERHEAD LINE INSULATORS: Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

UNIT-VII

SAG AND TENSION CALCULATIONS: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT-VIII

UNDERGROUND CABLES : Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

TEXT BOOKS:

1. John J Grainger William D Stevenson, Power System Analysis, TMH, 1st Edition, 2003.
2. Hadi Saadat, Power System Analysis, TMH Edition, 2nd Edition, 1999.

REFERENCES:

1. I.J. Nagarath and D.P Kothari, "Power System Engineering", Tata Mc Graw-Hill, 2nd Edition, 2007.
2. C.L. Wadhwa, "Electrical Power Systems", New Age International (P) Limited, Publishers, 5th Edition, 2009.
3. B.R. Gupta, "Power System Analysis and Design", S. Chand, Reprint, 2010.
4. S.A. Nasar, "Theory and Problems of Electric Power Systems", Schaum's Outline series, Mc Graw-Hill Company, 2nd Edition 2010.

POWER ELECTRONICS

Course Code: AEE1112

L	T	P	C
4	1	0	4

AIM:

To familiarize the student with different power semiconductor devices, converter circuits that find wide application in industry.

OBJECTIVE:

With the advent of semiconductor devices, revolution is taking place in the power transmission, distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and their analysis.

UNIT-I

POWER SEMICONDUCTOR DEVICES: Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics– Basic principle of operation of SCR – Static characteristics – Two transistor analogy of SCR - Turn on and turn off methods- Dynamic characteristics of SCR – Turn on and Turn off times -Salient points .

UNIT-II

TRIGGERING AND COMMUTATION CIRCUITS: Series and parallel connections of SCR's – Thyristor Protection-di/dt protection-dv/dt protection-over voltage protection-over current protection-gate protection-(Principle of operation only)– Specifications and Ratings of SCR - Gate triggering circuits, Line Commutation and Forced Commutation circuits- Numerical problems.

UNIT-III

SINGLE PHASE FULLY CONTROLLED CONVERTERS: Fully controlled converters, Mid point and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current

for continuous load current only– Effect of freewheeling diode- Line commutated inverters -Active and Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems.

UNIT-IV

SINGLE PHASE HALF CONTROLLED CONVERTERS: Half controlled bridge converter with R, RL and RLE load- Derivation of average load voltage and current for continuous load current operation only-Active and Reactive power inputs to the converters–Numerical problems

UNIT-V

THREE PHASE LINE COMMUTATED CONVERTERS : Three phase converters – Three pulse and six pulse converters – Mid point and bridge connections- derivation of average load voltage With R and RL loads-Three phase half controlled bridge converter-derivation of average load voltage – Effect of Source inductance–Dual converters (both single phase and three phase) - Numerical Problems.

UNIT-VI

AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS: AC voltage controllers – Single phase two SCR's in anti parallel – With R and RL loads, Derivation of RMS load voltage, current and power factor -wave forms –numerical problems - Cyclo converters – Single phase mid point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms

UNIT-VII

CHOPPERS : Choppers – Time ratio control and Current limit control strategies – Step down choppers- Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage Expression ,Morgan's chopper, Jones chopper (Principle of operation only) Waveforms — AC Chopper – Problems.

UNIT-VIII

INVERTERS: Inverters – Single phase inverter – Basic series inverter

– Basic parallel Capacitor inverter, Bridge inverter – Waveforms - Voltage control techniques for inverters -Pulse width modulation techniques.

TEXT BOOKS:

1. M. D. Singh & K. B. Kanchandhani, "Power Electronics", Tata Mc Graw – Hill Publishing company, 2nd Edition, 1998.
2. P. S. Bimbra, "Power Electronics", Khanna Publishers, 4th Edition, 2000.

REFERENCES:

1. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", Prentice Hall of India 2nd Edition, 1998.
2. P.C.Sen, "Power Electronics", Tata Mc Graw-Hill, 1st Edition, 2001.
3. Vedam Subramanyam, "Power Electronics", New Age International (P) Limited, Publishers, 2003.
4. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education, 2nd Edition, 2003.

PERFORMANCE AND DESIGN OF AC MACHINES – II

Course Code: AEE1113

L	T	P	C
4	1	0	4

AIM:

To familiarize the student with the principles of AC Machines that find wide application in industry. The course covers construction, performance and design aspects of A.C. Machines.

OBJECTIVE:

In this course the different types of AC generators and motors which are widely used in industry are covered and their performance and design aspects will be studied.

UNIT-I

CONSTRUCTION AND PRINCIPLE OF OPERATION: Constructional Features of round rotor and salient pole machines – Armature windings - advantages of stationery armature – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation.

UNIT-II

SYNCHRONOUS GENERATOR CHARACTERISTICS: Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT-III

REGULATION OF SYNCHRONOUS GENERATOR: Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method– salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT-IV

PARALLEL OPERATION OF SYNCHRONOUS GENERATOR: Synchronizing alternators with infinite bus bars – synchronizing power Synchronious torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input.

UNIT-V

SYNCHRONOUS MOTORS: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed.

UNIT-VI

POWER CIRCLES: Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT-VII:

SINGLE PHASE MOTORS & SPECIAL MOTORS: Single phase induction motor – Constructional features-Double revolving field theory – Elementary idea of cross-field theory – split phase motors – shaded pole motor.

Principle & performance of A.C. Series motor-Universal motor, Principle of permanent magnet and reluctance motors

UNIT-VIII

PRINCIPLE AND DESIGN OF SYNCHRONOUS MACHINE:

Specific electric loading, flux density in air gap. Output coefficient. Design of main dimensions. Design of field poles and winding. Illustrative examples.

TEXT BOOKS:

1. M.G. Say, "Performance and Design of A.C. Machines", ELBS and Pitman & Sons, 3rd Edition, 2008.
2. A.K. Sawhney, "Electrical Machine Design", Dhanpat Rai & Sons, 5th Edition, 2004.
3. P.S. Bimbra, "Electrical Machines", Khanna Publishers, 7th Edition, 2010.

REFERENCES:

1. I. J. Nagrath & D.P.Kothari, "Electric Machines", Tata Mc Graw-Hill Publishers, 4th Edition, 2010.
2. A.E. Fitzgerald, C. Kingsley and S. Umans, "Electric Machinery", Mc Graw-Hill Companies, 5th Edition, 1990.
3. Mukerjee and Chakravarthy, "Electrical Machines", Khanna Publishers, 2nd Edition 1993.
4. Langsdorf, "Theory of Alternating Current Machinery", Tata Mc Graw-Hill, 2nd Edition, 2006.

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Code: AEE1114

L	T	P	C
4	1	0	4

AIM:

To familiarize the students in the field of measuring instruments, its errors associated and its controlling procedures.

OBJECTIVE:

Electrical measurements and Instrumentation course introduces the basic principles of all the measuring instruments and also it's monitoring analysis of any Physical system and its control.

UNIT-I

SIGNAL CHARACTERISTICS: Measuring Systems, Performance Characteristics, Static characteristics, Dynamic Characteristics. Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.

UNIT-II

MEASURING INSTRUMENTS: Classification – Deflecting, Control and Damping Torques – Ammeters and Voltmeters – PMMC & MI Type Instruments – Expression for the Deflecting Torque and Control torque – Errors and Compensations, Extension of Range using Shunts and Series Resistance. Electrostatic Voltmeters, Electrometer and Attracted disc Types.

UNIT–III

MEASUREMENT OF POWER & ENERGY: Single Phase and Three Phase Dynamometer wattmeter (LPF and UPF), Expression for Deflecting and Control Torques – Measurement of Active and Reactive Powers in Balanced and Unbalanced systems.

Single Phase Induction Type Energy Meter – Driving and Braking torques – Three Phase Energy Meter – Maximum Demand Meter.

UNIT–IV

MEASUREMENT OF RESISTANCE, INDUCTANCE AND CAPACITANCE: Principle and operation of D.C. Crompton's potentiometer – Standardization – Measurement of unknown Resistance, Current, Voltage – Sensitivity of Wheatstone's bridge, Kelvin's Double Bridge for measuring Low Resistance, Measurement of High Resistance – Loss of Charge method and Megger.

Measurement of Inductance, Quality Factor - Maxwell's, Hay's & Anderson's Bridges, Measurement of Capacitance and loss angle – De Sauty's, Wien's & Schering Bridges.

UNIT-V

INSTRUMENT TRANSFORMERS: Current Transformer and Potential Transformer – Ratio and Phase angle errors – Design considerations.

Type of P.F. Meters – Dynamometer and Moving Iron Type – Single and Three Phase meters, Frequency meters – Resonance Type and Weston type – Synchroscopes.

UNIT-VI

MAGNETIC MEASUREMENTS: Ballistic galvanometer, Calibration of Hibbert's Magnetic Standard Flux meter, Lloyd Fischer Square for measuring Iron loss. Testing of ring and bar specimens, determination for BH curve and Hysteresis loss using CRO, Determination of leakage factor.

UNIT-VII

TRANSDUCERS: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of Resistor, Inductor, LVDT and Capacitor Transducers; LVDT Applications, Thermistors, Thermocouples, Piezoelectric Transducers, Photovoltaic, Photo conductive cells, measurements of non electrical quantities- Strain gauge and its principle of operation, gauge factor, torque and angular velocity.

UNIT-VIII

MEASUREMENT OF LIGHT AND TEMPERATURE:

Illumination-Definitions, Laws of Illumination, standards of Illumination intensity-substandards of illumination intensity, measurement of luminous intensity. General methods of measuring temperature-electrical Resistance pyrometers-laws of resistance variation with temperature-indicators and recorders-Thermo electric pyrometers-thermo electric emf's, radiation pyrometers.

TEXT BOOKS:

1. E.W. Golding and F. C. Widdis, "Electrical Measurements and Measuring Instruments", 5th Edition, Wheeler Publishers.
2. D.V.S. Murthy, "Transducers and Instrumentation", PHI Learning, 2nd Edition, 1995.

REFERENCES:

1. A. K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpatrai & Co., 18th Edition, 2008.
2. A.S Morris, "Principles of Measurement and Instrumentation" Pearson /Prentice Hall of India, 2nd Edition.
3. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw-Hill, 3rd Edition, 2010.
4. A.D.Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Pearson/Prentice Hall of India, 14th Reprint, 2003.

ADVANCED COMMUNICATION SKILLS LAB

CODE: AHE1103

L	T	P	C
0	0	3	2

INTRODUCTION :

The introduction of English Language Lab is considered essential at III/ IV B.Tech year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context. This is an integrated theory and lab course to enable students use 'good' English and perform the following:

- Gathering ideas and information: organizing ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research/technical reports
- Making oral presentations.
- Writing formal letters and essays.
- Transferring information from non-verbal to verbal texts and vice versa.
- Taking part in social and professional communication.

OBJECTIVES:

The Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' accuracy and fluency in English through a well-developed vocabulary, and enable them listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

- To enable them communicate their ideas relevantly and coherently in writing.

TEXT BOOK: LANGUAGE IN USE (Upper-Intermediate) ***by Adrian Doff and Christopher Jones, Cambridge University Publications.***

UNIT-I

- Reading and Listening comprehension – reading for facts, guessing meanings from context, scanning, skimming, inference, critical reading
- (Lesson 2: Communicating)

UNIT-II

- Vocabulary building, Creativity & Innovation, Using Advertisements and Music, Case studies
- Decision-Making, Time Management, Positive Thinking
- (Lesson 4: Sports and Games, Lesson 8: In The Market-Place)

UNIT-III

- Cross-Cultural Communication- Problems of Language, Lack of Language equivalency/difficulties in using English.
- Non-Verbal Communication across different Cultures.
- (Lesson 13: Right and Wrong)

UNIT-IV

- Literary reviews- reviewing the choicest genres like science fiction, autobiographies, travelogues, modern poetry etc.

UNIT-V

- Group Discussion – dynamics of group discussion , Lateral thinking, Brainstorming and Negotiation skills

(Lesson 10: Life, the universe and everything & Lesson 16: World Affairs)

UNIT-VI

- Resume writing – structure and presentation, planning, defining the career objective

- Interview Skills – concept and process, pre-interview planning, opening strategies, answering-strategies, interview through tele and video-conferencing

UNIT-VII

- Writing essays for competitive examinations
- Media writing-writing headlines, analyzing newspaper articles
- Analytical writing

UNIT-VIII

- Technical Report writing – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.- Progress and Project Reports.

RECOMMENDED BOOKS:

COMMUNICATIONS SKILLS

1. M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw-Hill Publishing Company Ltd., 2005.
2. Bhanu Ranjan, "An Approach to Communication Skills", DhanpatRai &Co, 2010.
3. Raymond V. Lesikar, Marie E. Flatley, "Basic Business Communication: Skills for Empowering The Internet Generation", 11th Edition, Tata McGraw-Hill. 2006.
4. Stephen Bailey, "Academic Writing- A Practical guide for students", Routledge Falmer, London & New York, 2004.
5. Dr A. Ramakrishna Rao, Dr G.Natanam & Prof S.A. Sankaranarayanan, "English Language Communication : A Reader cum Lab Manual", Anuradha Publications, Chennai, 2006.
6. Dr. Shalini Verma, "Body Language- Your Success Mantra", S. Chand, 2006.
7. Barron's, "DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice", New Age International (P) Ltd., Publishers, New Delh, Books on TOEFL/GRE/GMAT/CAT, 2011.
8. "IELTS series with CDs", CUP, 2010.

9. Daniel G. Riordan & Steven E. Pauley, "Technical Report Writing Today", Biztantra Publishers, 2005.
10. Andrea J. Rutherford, "Basic Communication Skills for Technology", 2nd Edition, Pearson Education, 2007.
11. Sunita Mishra & C. Muralikrishna, "Communication Skills for Engineers", Pearson Education, 2007.
12. Jolene Gear & Robert Gear, "Cambridge Preparation for the TOEFL" Test, 2010.
13. Meenakshi Raman & Sangeeta Sharma, "Technical Communication", OUP, 2010.
14. Nick Ceremilla & Elizabeth Lee, "Cambridge English for the Media", CUP, 2010

GENERAL READING

1. A Reader's Digest Selection, "Classic Short Stories" (India Today group), 2004.
2. Saros Cowasjee, "More Stories from the Raj and After", HarperCollins Publishers India, 1986.
3. Girish Karnad, "Hayavadana", OUP 1976.
4. A.P.J. Abdul Kalam "Wings of Fire", Universities Press, 1999.
5. Bernard Shaw, "Apple Cart/Arms and the Man", Orient Longman, 2010.
6. Khalil Gibran, "The Prophet" - Rajapal & Sons, 2008.

IC/PDC LAB

Course Code: AEC1112

L	T	P	C
0	0	3	2

AIM AND OBJECTIVES:

To study the various applications of analog (linear and Non linear) and Digital IC's.

Any **TEN** of the following experiments are to be performed during the semester.

LIST OF EXPERIMENTS

1. Linear wave shaping
2. Non Linear wave shaping-clippers
3. Non Linear wave shaping-clampers
4. Study of Logic gates& Some Applications
5. Astable Multivibrator using transistors
6. Monostable Multivibrator using transistors
7. Bistable Multivibrator or Schmitt Trigger using transistors
8. IC 741 OP AMP Applications- Adder, Integrator and Differentiator.
9. Active Filters- LPF, HPF (first order)
10. Function Generator using 741 OP AMP
11. IC 555 Timer- Monostable Operation Circuits, Astable Operation Circuits.
12. Schmitt Trigger Circuits-Using IC 741 or IC 555
13. Voltage Regulator using IC 723
14. 4 bit using 741 OP AMP.

SYLLABI FOR VI SEMESTER

DIGITAL SIGNAL PROCESSING

Course Code: AEE1115

L	T	P	C
4	1	0	4

AIM:

To review signals and systems, study Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Applications of Z-transforms, discuss the design of Infinite Impulse Response (IIR) & Finite Impulse Response (FIR) filters and study typical applications of digital signal processing.

OBJECTIVES:

- To have an overview of signals and systems.
- To study
- DFS, DFT & FFT.
- The applications of Z-transforms.
- The design of IIR filters.
- The design of FIR filters.
- The Multi rate DSP & the applications of DSP.

UNIT-I

INTRODUCTION: Introduction to Digital Signal Processing, Review of discrete-time signals and systems, analysis of discrete-time linear time invariant systems, Frequency domain representation of discrete time signals and systems.

UNIT-II

DISCRETE FOURIER SERIES: DFS representation of periodic sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT, Relation between Z-transform and DFS.

UNIT-III

FAST FOURIER TRANSFORMS: Fast Fourier transforms (FFT) -

Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT-IV

REALIZATION OF DIGITAL FILTERS: Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function.

UNIT-V

IIR DIGITAL FILTERS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations.

UNIT-VI

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response, Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT-VII

MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

UNIT-VIII

APPLICATIONS OF DSP: Voice Synthesizers, Vocoders, Image processing (Qualitative treatment only).

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", Pearson Education, PHI, 3rd Edition, 2007.
2. Andreas Antoniou , "Digital Signal Processing", Tata McGraw Hill, 1st Edition, 2006

REFERENCE BOOKS:

1. A.V. Oppenheim and R.W. Schaffer , "Discrete Time Signal Processing", PHI, 4th Edition, 2007.
2. M.H. Hayes, "Digital Signal Processing: Schaum's Outlines", Tata Mc-Graw Hill, 2nd Edition, 2009.
3. C. Britton Rorabaugh, "DSP Primer", Tata McGraw Hill, 1st Edition, 2005.
4. Robert J. Schilling, Sandra L. Harris, "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007
5. Ramesh Babu, Digital Signal Processing, SCITECH Publications, 4th Edition,2009.

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: AEE1116

L	T	P	C
4	1	0	4

AIM:

To give an exposure on different microprocessors and their programming.

OBJECTIVE:

The student shall be able to learn features of different microprocessors, assembly language programming and interfacing. This syllabus focuses on processors with Harvard architecture with an efficient instruction set. Students should be able to work for Industrial applications by understanding these concepts.

UNIT-I

INTRODUCTION TO EMBEDDED PROCESSORS: Evolution of Microprocessors & Microcontrollers, Van Neuman and Harvard Architectures and their features. Types of Processors by different Vendors, Types of memory built in with processor numbers and features available in them – Low Pin count, versatility and Peripherals.

Introduction to Classic 8051 family Architecture, Address and data bus with multiplexed I/O pins, Memory Organization, Registers , Instruction set , Addressing Modes - Simple Programs.

Applications using Timers, Counters and I/O programming for external logic sensing and control. Interrupts and its programming, Serial Communication – Simple Programs.

UNIT-II

PERIPHERAL SYSTEMS IN 8051 FAMILY: Applications of Microcontrollers – Interfacing **8051** to LEDs, Push buttons and Relays , Interfacing Keyboards ,Seven Segment LED Display , LCD Display, ADC and DAC Interfacing. DC Motor Interfacing, Stepper Motor Interfacing, Servo Motor Interfacing.

Peripheral Systems and Features of C8051F020 Mixed Signal MCU Family. Timers/Counters, Capture Control & PWM, Comparators, ADC /DAC Channels, I/O Programming

UNIT-III

PIC FAMILY OF PROCESSORS: Introduction to Harvard architecture. Advantages of separate address and data busses, Built in Flash with two wire programming reducing CPU size. Provision of peripherals and flash ROM, EEPROM, and a large special function register work space for application oriented embedded systems.

Introduction to PIC family Architecture and instruction set. Introduction to the RISC instruction set and its usage with example programs using integrated development environment MPLAB simulation.

UNIT-IV

PERIPHERAL SYSTEMS IN PIC 16F877A PROCESSOR: Digital Input and Output Programming, Timers and Counters, Capture Control and PWM, Analog to Digital Converters and their Programming, Simple data acquisition systems and programming.

UNIT-V

APPLICATION DESIGN USING PIC MICROCONTROLLER FAMILY: Introduction to Real Time Control – Need for RTOS with Examples. Logical I/O, Motor control- BLDC Motors, AC Induction Motor control, Power and Energy Measurement and Control.

UNIT-VI

SERIAL COMMUNICATION BUSSES: USART with addressable feature, SPI Bus, I^2C Two wire bus, Introduction to USB bus.

UNIT-VII

AVR MICROCONTROLLERS: AVR Microcontrollers - Introduction to Atmega processor family architecture using typical Atmega 8535 processor. Features in the peripherals provided, Introduction to its large instruction set, Using IDE Atmel Studio for programming and simulation.

Peripheral systems in Atmega 8535- Digital Input and Output Programming, Timers and Counters, wave form generation, Capture Control and PWM, Analog to Digital Converters and their Programming, Simple data acquisition programming.

UNIT-VIII

ADVANCED MICROCONTROLLERS: ARM (Advanced Research Microprocessor) – Arm Core Architecture, Bus Architecture, Addressing modes, Peripherals supported, Advantages of 32 bit CPU.

Renesas Microcontrollers- Brief Overview of the Renesas Family of Microcontrollers and their special features.

TEXT BOOKS:

1. Bendapudy Kanta Rao, "Embedded Systems", Prentice Hall India, 1st Edition, 2011.
2. Subrata Goshal, "8051 Microcontroller-Internals, Instructions, Programming and Interfacing", Pearson Education, 1st Edition, 2011.

REFERENCE BOOKS:

1. Kenneth J Ayala, "The 8051 Micro Controller", 3rd Edition, Thomson Publishers, 2010.
2. Raj Kamal, "Microcontrollers, "Architecture, Programming, Interfacing and System Design", 2nd Edition, Pearson Education, 2011.
3. Ali Mazidi Mohammed Gillispie, Mazide Janice, "The 8051 Microcontroller and Embedded Systems", 2nd Edition, Pearson Education, 2011.
4. Ajay V Deshmukh, "Microcontrollers -Theory & Applications", TMH, 2010

WEB RESOURCES: For additional information only:

1. www.keil.com
2. www.microchip.com
3. www.atmel.com
4. www.silabs.com

POWER ELECTRONIC DRIVES

Course Code: AEE1117

L	T	P	C
4	1	0	4

AIM:

To familiarize the student with AC and DC drives that find wide application in industry.

OBJECTIVE:

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are presented.

UNIT-I

AN INTRODUCTION TO INDUSTRIAL DRIVES: Electrical Drives, Advantages of Electrical drives, Parts of Electrical Drives, Choice of electrical Drives, Status of ac and dc drives, Fundamental torque equation, multiquadrant operation, Components of load torques, Nature and classification of load torques.

UNIT-II

CONTROL OF DC MOTORS BY SINGLE PHASE CONVERTERS: Braking of DC motor-Dynamic braking, plugging and regenerative braking-Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation only – output voltage and current waveforms – Speed and Torque expressions , Speed – Torque Characteristics- Problems on Converter fed d.c motors.

UNIT-III

CONTROL OF DC MOTORS BY THREE PHASE

CONVERTERS : Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions , Speed – Torque characteristics – Problems, Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor (Block Diagram Only).

UNIT-IV

CONTROL OF DC MOTORS BY CHOPPERS : Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuos current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors – Closed Loop operation (Block Diagram Only).

UNIT-V

INDUCTION MOTOR DRIVES AND SPEED CONTROL THROUGH STATOR VOLTAGE: Three phase Induction motor-analysis and performance, Braking-Regenerative braking, Plugging, Dynamic braking, Speed Control of Induction Motor through Stator voltage-Control by AC voltage controllers and soft start- speed torque characteristics- problems.

UNIT-VI

CONTROL OF INDUCTION MOTOR THROUGH STATOR FREQUENCY: Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only).

UNIT-VII

CONTROL OF INDUCTION MOTOR FROM ROTOR SIDE: Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages- applications – problems.

UNIT-VIII

CONTROL OF SYNCHRONOUS MOTORS: Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI, CSI and cyclo converters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI.

TEXT BOOKS :

1. G K Dubey, "Fundamentals of Electric Drives", Narosa Publications, 2nd Edition, 2008.
2. MD Singh and K B Khanchandani, "Power Electronics", Tata – McGraw-Hill Publishing company, 2nd Edition,1998.

REFERENCES:

1. Vedam Subramanyam, "Electric Drives", Tata Mc Graw Hill Publications, 4th Edition, 1999.
2. B K Bose, "Modern Power Electronics & AC Drives", PHI Learning, 1st Edition, 2010.
3. N.K De and P.K. Sen, "Electric Drives", PH International Publications, 2nd Edition, 2001.
4. Vedam Subramanyam, "Thyristor Controlled Electric Drives", McGraw Hill Publications, 11th Reprint.

OPTIMIZATION TECHNIQUES

Course Code : AEE1139

L	T	P	C
4	1	0	4

AIM:

To acquire basic knowledge in Optimization Techniques.

OBJECTIVE:

The student shall be able to use various techniques of optimization for solving several engineering problems.

UNIT-I

INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

UNIT-II

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints: Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints: Kuhn – Tucker conditions.

UNIT-III

LINEAR PROGRAMMING: Standard form of a linear programming problem – geometry of linear programming problems – motivation to the simplex method – simplex algorithm, dual LP.

UNIT-IV

TRANSPORTATION PROBLEM: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT-V

UNCONSTRAINED NONLINEAR PROGRAMMING: One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

UNIT-VI

UNCONSTRAINED OPTIMIZATION TECHNIQUES: Univariate method, Powell's method, steepest descent method, Davidon-Fletcher-Powell method.

UNIT-VII

CONSTRAINED NONLINEAR PROGRAMMING: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming problem.

UNIT-VIII

INTEGER PROGRAMMING: Gomory's cutting plane method, Branch and bound method.

TEXT BOOK:

1. S.S.Rao,"Engineering optimization, "Theory and practice", New Age International (P) Limited, 3rd edition, 2004.

REFERENCE BOOKS:

1. K.V. Mital and C. Mohan " Optimization Methods in Operations Research and systems Analysis", New Age International (P) Limited, Publishers, 3rd Edition, 1996.
2. Kanthi Swarup, P.K.Gupta and Man Mohan" Operations Research", Sultan Chand & Sons New Delhi, 14th Edition, 2008.

SWITCHGEAR AND PROTECTION

Course Code: AEE 1118

L	T	P	C
4	0	0	4

AIM:

To familiarize the students in Electromagnetic, Static and Microprocessor based protection of Power System.

OBJECTIVE:

This course introduces all types of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. Also introduces the introductory of static and Microprocessor relays. It emphasis on Neutral grounding, mechanical relays and online protection.

UNIT-I

CIRCUIT BREAKERS-I: Principle of operation – RRRV – Current chopping. Circuit Breaker ratings and specifications. Testing of Circuit Breakers.

UNIT-II

CIRCUIT BREAKERS-II: Constructional features and selection of LT breakers (MCB/MCCB/ELCB) and HT breakers (ABCB-OCB-SF_6 CB-VCB).

UNIT-III

PROTECTIVE RELAYS-I: Electromagnetic Relays: Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types. Application of relays: Over current, Under voltage, Directional, Differential and Percentage Differential.

UNIT-IV

PROTECTIVE RELAYS-II: Universal Torque Equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays,

Characteristics of Distance Relays and Comparison. Static Relays, Static Relays verses Electromagnetic Relays. Microprocessor Based Relays: impedance, directional, reactance, Mho & offset Mho and mathematical expression for distance relay.

UNIT-V

GENERATOR PROTECTION: Protection of Generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth Fault and Inter-Turn fault Protection. Numerical Problems on % Winding Unprotected.

UNIT-VI

TRANSFORMER PROTECTION: Percentage Differential Protection, Numerical Problems on Design of CT's Ratio, BUCHHOLTZ Relay Protection.

UNIT-VII

FEEDER AND BUS-BAR PROTECTION: Protection of Lines: Over Current, Carrier Current and Three-zone Distance Relay Protection using Impedance Relays. Translay Relay.

Protection of Bus bars – Differential protection.

UNIT-VIII

GROUNDING TECHNIQUES & OVER VOLTAGE PROTECTIONS: Grounded and Ungrounded Neutral Systems. Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding, Arcing Grounds and Grounding Practices.

Protection against Over Voltages- Volt-Time Characteristics- Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination-BIL, Impulse Ratio, Standard Impulse Test Wave.

TEXT BOOKS :

1. Sunil S Rao, "Switchgear Protection and Power Systems", Khanna Publishers, New Delhi, 11th Edition, 1999.
2. Badri Ram, Viswakarma.D.N., "Power System Protection and Switchgear", TMH Publications, 2001.

REFERENCES:

1. T. S. Madhav Rao, "Power System Protection Static relays with Microprocessor Applications", TMH Publication,2nd Edition, 2006.
2. C R Mason, "Art & Science of Protective Relaying", Wiley Eastern Ltd.

   URL: http://www.gedigitalenergy.com/multilin/notes/artsci/index.htm.
3. C.L. Wadhwa, "Electrical Power Systems", New Age International (P) Limited, Publishers, 5th Edition, 2009.
4. B.L. Soni, Gupta, Bhatnagar, Chakrabarthy, "A Text book on Power System Engineering", Dhanpat Rai & Co, 2008.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: AHM 1101

L	T	P	C
4	0	0	4

OBJECTIVE:

To explain the basic principles of managerial economics, accounting practices and financial management techniques for effective business decision making and to promote entrepreneurial abilities among budding engineers.

OUTCOME:

To understand the economic environment and to give an idea on various accounting and financial management techniques for effective utilization of economic resources.

UNIT-I

INTRODUCTION TO MANAGERIAL ECONOMICS: Definition, Nature and Scope of Managerial Economics, Demand Analysis, Demand Determinants, Law of Demand and its exceptions

UNIT-II

ELASTICITY OF DEMAND AND DEMAND FORECASTING: Definition, Types, Measurement and Significance of Elasticity of Demand Demand Forecasting, Factors governing demand forecasting, Methods of demand forecasting (Survey method, Statistical method, Expert opinion method, Test marketing, Controlled experiment, Judgmental approach).

UNIT-III

THEORY OF PRODUCTION AND COST ANALYSIS: Production Function – Isoquants and Isocosts, Laws of returns, Internal and External Economies of Scale Cost Analysis: Types of Costs, Break Even Analysis (BEA) – Determination of Break Even Point (Simple numerical problems) – managerial significance and limitations of BEA.

UNIT-IV

INTRODUCTION TO MARKETS: Market Structures: Types of competition, features of perfect competition, monopoly and monopolistic competition, price output determination in case of perfect competition and monopoly.

UNIT-V

FORMS OF BUSINESS ORGANIZATIONS: Features of Business, Advantages, Limitations of Sole Proprietorship, Partnership and Joint Stock Company, Types of companies – Features of Public and Private limited companies.

UNIT-VI

INTRODUCTION TO FINANCIAL ACCOUNTING: Accounting: Principles, concepts, conventions, double entry book keeping, Journal, Ledger Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments, international financial reporting standards (simple numerical problems).

UNIT-VII

FINANCIAL ANALYSIS THROUGH RATIOS: Introduction, Advantages and limitations, Computation, Analysis and Interpretation of Liquidity ratios, Activity ratios, Solvency ratios and Profitability ratios (simple numerical problems).

UNIT-VIII

BUDGETING AND CAPITAL BUDGETING: Introduction to Budgeting: Production budget, Flexible budget and Cash budget Definition, nature and scope of capital budgeting, features of capital budgeting proposals, methods of capital budgeting: Traditional and discounted methods (simple numerical problems).

TEXT BOOKS:

1. A R Aryasri, "Managerial Economics and Financial Analysis", 3rd Edition, Tata Mc Graw Hill, 2009.
2. Siddiqui & Siddiqui, "Managerial Economics and Financial Analysis", 1st Edition, New Age Publishers, 2005.

REFERENCES:

RL Varshney and KL Maheswari, "Managerial Economics", 19th Edition, Sultan Chand & Sons, 2007.

D Ragnunath Reddy & M V Narasimha Chary, "Managerial Economics and Financial Analysis", 1st Edition, SciTech Publishers, 2008.

Dwivedi , "Managerial Economics", 7th Edition, Vikas Publishers, 2009.

P K Sharma and Shashi K Gupta, "Management Accounting", 1st Edition, Kalyani Publishers, 2002.

S P Jain and K L Narang, "Financial Accounting", 1st Edition, Kalyani Publishers, 2002.

S N Maheswari & S K Maheswari, "Financial Accounting", 4th Edition, Vikas Publishers, 2006.

P L Mehta , "Managerial Economics", 15th Edition, Sultan Chand, 2010.

AC MACHINES LAB

Course Code: AEE1119

L	T	P	C
0	0	3	2

AIM:

To introduce the basic concepts of A.C Machines

OBJECTIVE:

The lab is intended for the students to get hands on experience in dealing with AC Machines.

The following experiments are required to be conducted as compulsory experiments:

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
6. V and Inverted V curves of a three—phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of X_d and X_q of a salient pole synchronous machine

In addition to the above eight experiments, at least any two of the following experiments are required to be conducted from the following list:

9. Parallel operation of Single phase Transformers
10. Separation of core losses of a single phase transformer
11. Brake test on three phase Induction Motor
12. Regulation of three-phase alternator by Z.P.F method

13. Efficiency of a three-phase alternator
14. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
15. Measurement of sequence impedance of a three-phase alternator.

POWER ELECTRONICS AND DRIVES LAB

Course code: AEE1120

L	T	P	C
0	0	3	2

AIM:

To introduce the basic concepts of Power Electronics and Drives.

OBJECTIVE:

The lab is intended for the students to get hands on experience in dealing with power semiconductor devices and converter circuits.

The following experiments are required to be conducted as compulsory experiments

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. PSPICE simulation of single-phase full converter using RLE load.
10. PSPICE simulation of Single phase AC voltage controller using RL load.

    In addition to the above ten experiments at least any two of the experiments from the following list are required to be conducted:

11. PSPICE simulation of single phase Inverter with PWM control

12. PSPICE simulation of Resonant pulse commutation circuit and Buck chopper
13. Single Phase Half controlled converter with R and RLE load.
14. Three Phase fully controlled bridge converter with R-load.
15. Single Phase series inverter with R and RL loads.
16. Speed Control of D.C. motor using dual converter.
17. IGBT based PWM Inverter
18. V/ F control of induction motor using voltage source Inverter.

SYLLABI FOR VII SEMESTER

MANAGEMENT SCIENCE

Course Code: AHM 1102

L	T	P	C
4	0	0	4

AIM :

To familiarize with the process of management and to provide basic insights to select contemporary management practices.

OBJECTIVE :

To understand the management processes and evolve management levels for effective decision making

UNIT-I

INTRODUCTION TO MANAGEMENT : Concepts of Management and Organization – Nature, Importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne experiments, Maslow's Theory of human needs, Douglas Mc Gregor's Theory X and Theory Y, Hertzberg's Two factor Theory of motivation, Systems approach to Management, Leadership styles

UNIT-II

DESIGNING ORGANIZATIONAL STRUCTURES : Basic concepts related to Organization, Departmentation and Decentralization, Types of Mechanistic and Organic Structure of Organization (Line Organization, Line and staff Organization, Functional Organization, Committee Organization, Matrix Organization, Virtual Organization, Cellular Organization, Team Structure, Boundary less Organization, Inverted Pyramid Structure, Lean and Flat Organization Structure) and their merits, demerits and suitability

UNIT-III

OPERATIONS MANAGEMENT : Principles and Types of Plant Layout, Methods of Production (Job, Batch and Mass Production), Work Study, Basic procedure involved in Method Study and Work

Measurement, Statistical Quality Control: R chart, P chart, C chart (Simple numerical problems)

UNIT-IV

MATERIALS MANAGEMENT :

Objectives, Need for Inventory control, EOQ, ABC & VED Analysis, Purchase Procedure, Stores Management and Stores Records (simple numerical problems)Just in Time System (JIT)

UNIT-V

MARKETING MANAGEMENT : Functions of Marketing, Marketing mix, marketing strategies based on product life cycle, Channels of distribution, Consumer behavior and Customer relationship management

UNIT-VI

HUMAN RESOURCES MANAGEMENT : Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager : Manpower planning, Recruitment, Selection, Training and Development, Placement, Performance Appraisal, Job Evaluation and Merit Rating Grievance handling and Welfare Administration

Introduction to Social Security Laws: Payment of Gratuity Act (1972), Employees Provident Fund & Miscellaneous Provisions Act (1958), Employees State Insurance Act (1948)

UNIT-VII

PROJECT MANAGEMENT (PERT / CPM) : Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, probability of completing the project within given time, project cost analysis, project crashing (simple numerical problems)

UNIT-VIII

STRATEGIC MANAGEMENT : Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Steps in strategy formulation and implementation, value Chain Analysis, SWOT Analysis

Corporate social responsibility, business ethics and corporate governance

TEXT BOOKS :

1. A R Aryasri, "Management Science", Tata McGraw Hill, 2nd Edition, 2007
2. O P Khanna, "Industrial Engineering and Management", Dhanpat Rai Publishers, 2nd Edition, 2007

REFERENCE BOOKS :

1. Azhar Kazmi: Business Policy and Strategic Management, Tata McGraw Hill, 3rd Edition, 2008.
2. S D Sharma : Operations Research, Kedarnath Ramnath& Co
3. Philip Kotler & Keller : Marketing Management, Pearson Education, 13th Edition, 2008.
4. C B Mamoria & C B Mamoria : Personnel Management, Himalaya Publishers, 12th Edition, 1996.
5. B S Goel: Production and Operations Management, Pragati Prakasan, 2nd Edition, 1979.
6. Strategic Management: R Srinivasan, Eastern Economy Edition, PHI, 3rd Edition, 2008.
7. L M Prasad: Principles and Practice of Management, Sultan Chand & Sons, 7th Edition, 2008.

POWER SYSTEM ANALYSIS

Course Code: AEE1121

L	T	P	C
4	1	0	4

AIM & OBJECTIVE:

Students get trained in Modelling concepts, network calculations and Load flow methods. Students will be able to analyze symmetrical faults and unsymmetrical faults using symmetrical components. Students will also have understanding on Stability of single machine and multi machine stability.

UNIT-I

MODELLING CONCEPTS & PER UNIT SYSTEM : Per Unit Quantities, The circuit model of a synchronous machine, The effect of synchronous machine excitation, The ideal transformer, The equivalent circuit of a practical transformer, The auto transformer, Per unit impedances in single phase transformer circuits, 3-phase transformers, p.u. systems and its advantages: impedances of three winding transformers, One line diagram, Impedance and reactance diagrams.

UNIT-II

NETWORK CALCULATIONS: Equivalence of sources, Node equations, Matrix partitioning, Node elimination by matrix algebra, The bus admittance and impedance matrices, Modification of an existing bus impedance matrix, Direct determination of a bus impedance matrix.

UNIT-III

LOAD FLOW STUDIES- 1 : Data for Load flow studies, The Gauss-Siedel method, The Newton Raphson method (Polar & Rectangular), Digital computer studies of load flow, Information obtained in a load flow study, Numerical results.

UNIT-IV

LOAD FLOW STUDIES- 2 : Decoupled and Fast decoupled Load flows, Control of Power into a network, The specification of bus voltages, Capacitor banks, Control by transformers.

UNIT-V

THREE PHASE SYMMETRICAL FAULTS : Transients in RL series circuits, Short circuit currents and reactance of synchronous machines, internal voltages of loaded machines under transient conditions, Bus impedance matrix in fault calculations, bus impedance matrix equivalent network, Selection of circuit breakers.

UNIT-VI

SYMMETRICAL COMPONENTS: Synthesis of unsymmetrical phasors from their symmetrical components, Operators, The symmetrical components of unsymmetrical phasors, Phase shift of symmetrical components in star- delta transformer banks, Power in terms of symmetrical components, Unsymmetrical series impedances, Sequence impedances and sequence networks, Sequence networks of unloaded generators, Sequence impedances of circuit elements, Positive and negative and zero sequence networks.

UNIT-VII

UNSYMMETRICAL FAULTS : Single line to ground fault on an unloaded generator, Line to line fault on an unloaded generator, Double line to ground fault on an unloaded generator, Unsymmetrical faults on power systems, Single line to ground fault on a power system, Line to line fault on a power system, Double line to ground fault on a power system, Interpretation of the interconnected sequence networks, Analysis of unsymmetrical faults using bus impedance matrix, Faults through impedance, Computer calculation of fault currents.

UNIT-VIII

POWER SYSTEM STABILITY : The stability problem, Rotor dynamics and swing equation, Further considerations of swing equation, power-angle equation, Synchronizing power coefficients, Equal area criterion of stability, Further applications of the equal area criterion, Multi machine stability studies, Classical representation, Step by step solution of the swing curve, Algorithms for Digital computer programs for transient stability studies, Factors affecting transient stability.

TEXT BOOKS:

1. M. A. Pai, "Computer Techniques in Power System Analysis", Tata McGraw-Hill, 2nd Edition 2005.
2. William D. Stevenson Jr, "Elements of Power System Analysis", Mc. Graw-Hill International, 4th Edition, 1982.

REFERENCES:

1. I.J.Nagrath&D.P.Kothari, "Modern Power System Analysis", Tata McGraw-Hill Publishing Company, 3rd Edition, 2003.
2. A.R.Bergen, "Power System Analysis", Prentice Hall Inc, 2nd Edition, 2000.
3. Hadi Saadat, "Power System Analysis", TMH, 2nd Edition, 1999.

POWER SYSTEM OPERATION AND CONTROL

COURSE CODE: AEE1122

L	T	P	C
4	1	0	4

AIM:

To introduce the fundamental concepts of power system operation and its control.

OBJECTIVE:

At the end of the course, the student understands:

- The economics of power system operation of simple power systems and economic scheduling of hydro-thermal mix of generation.
- Optimization of power flow including reactive power, its computation and implementation.
- Various aspects of load frequency control, interconnected operation.
- Voltage and Reactive Power Control.

UNIT-I:

ECONOMIC OPERATION OF POWER SYSTEMS:- Characteristics of Steam Plants – Input-Output curves, Incremental Heat Rate characteristics, Incremental Fuel Cost Characteristics, Heat Rate characteristics and Incremental Production cost characteristics; Generating costs at thermal plants; constraints in operation; Plant scheduling methods; Equal Incremental cost method with transmission losses neglected; Transmission Loss Formula – B-coefficients; Economic scheduling of thermal plants considering transmission losses; Penalty Factor; Evaluation of λ for computation.

UNIT-II

HYDROTHERMAL SCHEDULING: Characteristics of Hydro Plants – Incremental water rate characteristics, incremental production cost characteristics; Hydro Electric Plant Models; Pumped Storage Plant; Hydro-thermal scheduling – Energy scheduling method; Short-term Hydro

thermal scheduling – Method of Lagrange multipliers neglecting losses and considering losses.

UNIT-III

OPTIMAL LOAD FLOW : Reactive Power control for loss minimization; Gradient method for optimal load flow; Non-linear programming; Lagrange functions for optimal load flow and computational procedure; conditions for optimal load flow; Implementation of optimal load flow.

UNIT-IV

LOAD FREQUENCY CONTROL : Speed Governing Mechanism – Speed Governor, Steady-state speed regulation, adjustment of governor characteristics; Transfer function of a power system and speed governor; Governing of Hydro Units; Penstock Turbine model; Model for a steam vessel; Steam turbine model – Reheat type steam turbine model; Single Area control; The basics of Load Frequency control, analysis of single area system, dynamic response of load frequency control loop (uncontrolled case); control strategy, PID Controllers.

UNIT-V

OPTIMAL LOAD FREQUENCY CONTROL : The optimal Control Problem, Linear Regulator problem, Matrix Riccati equation; Optimal Load Frequency Control – single area system, optimal control for tandem compound single reheat Turbine-Generator system, Optimal control of Hydro Speed Governing system; Load frequency control with restrictions on the rate of power generation; Load frequency control and economic dispatch

UNIT-VI

CONTROL OF INTERCONNECTED SYSTEMS : Interconnected operation, Flat frequency control of interconnected stations, Flat Tie-line and Flat Frequency control and complete tie-line bias control; Two-Area system – Tie-Line power model, block diagram for two-area system; Analysis of Two Area system – steady-state response and dynamic response.

UNIT-VII

VOLTAGE AND REACTIVE POWER CONTROL - 1: Impedance and Reactive Power; System voltage and reactive power; reactive power

generation by synchronous machines; effect of Excitation control; Voltage regulation and Power transfer; exciter and voltage regulator; Excitation systems – Block schematic of excitation control, Static Excitation system, Brushless Excitation system; Automatic Voltage Regulators for alternators; Analysis of Generator voltage control – Steady state performance evaluation, dynamic response of voltage regulation control; Stability compensation for voltage control and stabilizing transformer; IEEE – Type 1 excitation and Power System Stabilizer.

UNIT-VIII

VOLTAGE AND REACTIVE POWER CONTROL-2: Reactive power generation by Turbo-generator, Synchronous Compensators, Reactors, Capacitors, Tap-Changing Transformers; Tap-staggering method; Voltage Regulation and Short Circuit Capacity; Loading capability of a Line; Compensation in Power Systems – Load Compensation, Static Compensators and their steady state performance;

TEXT BOOK :

1. P.S.R.Murthy, "Operation and Control of Power Systems", BS Publications, 2nd Edition, 2011.

REFERENCES :

1. C.L.Wadhwa, "Electrical Power Systems", New-Age International Publishers, 6th Edition, 2009.
2. D.P.Kothari and I.J.Nagrath, "Modern Power System Analysis", Tata Mc-Graw Hill Publishing Company, 3rd Edition, 2008.
3. O.I. Elgerd, "Electric Energy Systems Theory", Tata McGraw Hill Publishing Company, 2nd Edition, 2007.
4. A.J.Wood and B.F.Wollenberg, "Power Generation, Operation and Control", John-Wiley & Sons, 2nd Edition, 2006.
5. T.J.E.Miller, "Reactive Power Control in Electric Systems", John Wiley & Co, 1982.
6. Prabha Kundur, "Power System Stability and Control", McGraw Hill Education, 2005.

H.V.D.C. TRANSMISSION

Course Code: AEE1132

L	T	P	C
4	1	0	4

AIM & OBJECTIVE:

This course trains the student on types of HVDC Transmission Systems and HVDC converter analysis. The student will be able to formulate equivalent circuit of HVDC transmission system and learn the control characteristics. The student will have an understanding on various faults and protection of HVDC Transmission Systems.

UNIT-I

BASIC CONCEPTS: Comparison of AC and DC Transmission-Economics of power transmission-Technical performance-Reliability, Application of DC transmission, Description of DC transmission system-Types of DC links-Converter station, planning for HVDC transmission, Modern trends in HVDC technology.

UNIT-II

ANALYSIS OF HVDC CONVERTERS: Analysis of Graetz circuit – with grid control but no overlap-with grid control and overlap less than 60^0 -relationship between AC and DC quantities-equivalent circuit of rectifier, Inversion-equation of average direct current and voltage in terms of â and ã –equivalent circuit of inverter, 12 Pulse converters-relations between AC and DC quantities-modified equivalent circuit.

UNIT-III

HVDC SYSTEM CONTROL: Basic means of control-desired features of control-actual control characteristics-constant minimum ignition angle control-constant current control-constant extinction angle control-tap changer control-power control and current limits, System control hierarchy, firing angle control-IPC-EPC.

UNIT-IV

REACTIVE POWER CONTROL : Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategies-sources of reactive power-AC Filters – shunt capacitors synchronous condensers.

UNIT-V

CONVERTER FAULT & PROTECTION: Converter faults – protection against over current, Overvoltages in a converter station-protection against over voltage in converter station – surge arresters – smoothing reactors – DC breakers.

UNIT-VI

HARMONICS : Generation of Harmonics –Characteristics harmonics, calculation of characteristics AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics – Calculation of voltage & Current harmonics – Effect of Pulse number on harmonics.

UNIT-VII

FILTERS: Types of AC filters, Design of Single tuned filters –Design of High pass filters.

UNIT-VIII

MULTI TERMINAL DC SYSTEMS: Introduction, Potential applications of MTDC systems, Types of MTDC systems-series MTDC system-parallel MTDC system-comparison of series and parallel MTDC systems

TEXT BOOKS:

1. E.W.Kimbark, "Direct Current Transmission", Wiley Inter Science-New York ,1971
2. K.R. Padiyar, "HVDC Power Transmission System", New Age International Publishers, 2nd Edition, 2010.

REFERENCES:

1. J.Arrillaga, "H.V.D.C Transmission", Peter Peregrinus Ltd., London UK 1983.
2. E.Uhlmann, "Power Transmission by Direct Current", Springer Verlag, Berlin Helberg-1985.

RENEWABLE ENERGY SOURCES

(ELECTIVE – I)

Course Code: AEE1124

L	T	P	C
4	1	0	4

AIM:

To introduce the importance of renewable energy sources – its generation and advantages.

OBJECTIVE:

At the end of the course, the student understands:

- Issues related to conventional energy sources like depletion of fuel its environmental aspects and thus the need of renewable energy sources.
- Solar radiation – its measurement and estimation of energy to be generated, fundamentals of Photovoltaic Cells.
- Basics of Wind energy generation, bio-fuels and fuel cells.

UNIT-I

ENERGY RESOURCES:

GENERATION AND ENVIRON-MENTAL IMPACT : Electrical Energy from conventional sources – Thermal plants, Integrated Gassification Combined Cycle Power Generation, Gas Turbine Plant; Nuclear Power- Nuclear Fission and Fusion; Energy reserves of India – Coal, Oil, Natural Gas, Hydro-electric power potential;

Environmental aspects of Electric Energy Generation – Atmospheric pollution, Hydrocarbons, particulates; Thermal Pollution; Hydroelectric Projects; Nuclear Power Generation and Environment – Natural Radiation, Radioactive Pollution; Operational safety in Nuclear Power Safety; Disposal of Nuclear waste; Impact of Renewable Energy Generation of Environment.

UNIT-II

SOLAR RADIATION AND ITS MEASUREMENT: Solar constant, Spectral distribution of Extraterrestrial Radiation; Terrestrial Solar Radiation; Solar Radiation Geometry; Computation of Cosθ for any location having any orientation; Sunrise, Sunset and Day length; Empirical equation for estimating the availability of solar radiation; Solar Radiation Measurements and data for India.

UNIT-III

SOLAR THERMAL ENERGY COLLECTORS: Introduction, Flat Plate Collectors, Effect of design parameters on performance – Heat Transport System, Selective surfaces, Number of Covers, Spacing; Laws of Thermal Radiation; Transmissivity of the cover system – Transmittance considering absorption only, Transmittivity-Absorptivity product; Performance analysis of a liquid flat-plate collector; Total loss coefficient and Heat Losses; Solar Concertrating collectors – Types, Thermodynamic limits to concentration, Performance analysis of Cylindrical Parabolic Collector; Compound Parabolic Concentrator – Tracking CPC and Solar swing, Performance analysis of CPC; Solar Thermal Energy Storage.

UNIT-IV

SOLAR PHOTOVOLTAIC SYSTEM: Introduction, Semi-conductor materials and doping – p-type and n-type semiconductors, Photon energy, Fermi level, p-n junction; Photovoltaic Effect; Efficiency of Solar Cells, Limits to Cell efficiency; Semiconductor materials for Solar Cells, Application of PV systems, PV Hybrid System; Grid Interactive Solar Power System.

UNIT-V

WIND ENERGY: Introduction, Classification Wind Turbines, Types of Rotors, Terms used in Wind Energy, Aerodynamic Operation of Wind Turbines, Wind Energy Extraction, Extraction of Wind Turbine Power, Wind Characteristics, Mean Wind speed and Energy estimation, Power Density Duration Curve, Wind Power Generation Curve, Modes of Wind Power Generation, Advantages and disadvantages of Wind Energy system, Selection of Optimum Wind Energy Generator, Grid interfacing of a Wind Farm, Methods of Grid connection, Grid system and properties.

UNIT-VI

SMALL HYDROPOWER: Introduction, Power Equation, Classification of Small Hydropower Stations, Classification of Water Turbines, Specific Speed, Major components of small Hydropower Projects; Low-Head Small Hydro Power Projects.

UNIT-VII

BIOMASS ENERGY: Introduction, Biomass Resources – Biofuels, Biogas, Producer Gas; Biogas Plants, Energy Recovery from Urban Waste, Power Generation from Landfill Gas, Power Generation from Liquid Waste, Biomass cogeneration.

FUEL CELLS – Introduction, Principle of operation of an Acidic fuel cell, Fuel Cell types, Advantages of Fuel Cell power plants, Fuel Cell battery-powered Bus System.

UNIT-VIII

GEOTHERMAL ENERGY: Introduction to Geothermal energy, structure of the Earth's interior, Plate Tectonic Theory; Geothermal Resources – Hydrothermal resource, Vapour-dominated Resource, Geopressured Resource, Magma; Geothermal Power Generation.

TIDAL ENERGY : Introduction to Tidal Energy, Tidal characteristics, Tidal Energy Estimation, Energy and Power in a Double Cycle System, Development of a Tidal Power Scheme, Important components of Tidal Power Plant, Advantages and disadvantages of Tidal Power.

TEXT BOOK:

1. D.P.Kothari, K.C.Singal and Rakesh Ranjan, "Renewable Energy Sources and Emerging Technologies", PHI Learning Private Limited, Second Edition, 2009.

REFERENCE BOOKS:

1. G.D.Rai,"Non-Conventional Energy Sources", Khanna Publications Limited, 1997.
2. Tiwari and Ghosal, "Renewable Energy Sources", Narosa Publications, 2005.

RELIABILITY EVALUATION OF ENGINEERING SYSTEMS

(ELECTIVE - I)

Course Code: AEE1125

L	T	P	C
4	1	0	4

AIM :

This is a basic course on Reliability in application to Engineering Systems in general. This course, as an elective can be taken by other branches also in general, by Mechanical, Chemical and Electronics and Communication branches in particulars.

OBJECTIVE :

The subject introduces concepts of reliability after reviewing concepts of Probability and Random Variables. The course is helpful in System Analysis and Design.

UNIT-I

INTRODUCTION AND PRELIMINARIES : Introduction to the subject , Review of basic Probability Theory: Probability concepts, Venn Diagrams, Combining Probabilities, Random Variables, distribution and Density Functions, Expectation, Variance, Standard Deviation, Binomial Distribution and properties.

UNIT-II

NETWORK MODELING AND EVALUATION OF SIMPLE SYSTEMS: Network Modeling Concepts, Series, Parallel and Series Parallel Systems, Redundant Systems.

UNIT-III

NETWORK MODELING AND EVALUATION OF COMPLEX SYSTEMS: Modeling and Evaluation, conditional Probability approach, Cutset Method, Tie-set Method, Connection Matix Techniques, Event trees, Fault trees, Failure Models.

UNIT-IV

PROBABILITY DISTRIBUTION AND RELIABILITY

EVALUATION: Distribution concepts, General reliability functions and evaluation, Poisson, Normal and Exponential Distribution, Reliability functions, A-posteriori failure probability, Mean Value and standard deviation, Different other distributions , Data Analysis.

UNIT-V

SYSTEM RELIABILITY EVALUATION USING PROBABILITY DISTRIBUTIONS : Series and Parallel Systems, Partially Redundant and Systems, Mean Time to Failure, Standby Systems, Wear out and Component Reliability, Maintenance and Component Reliability.

UNIT-VI

DISCRETE MARKOV CHAINS : Modeling concepts, Stochastic transitional probability Matrix, Time dependant probability evaluation, Limiting State Probability Evaluation, Absorbing States, Applications.

UNIT-VII

CONTINUOUS MARKOV CHAINS : General Modeling Concepts, State Space diagrams, Stochastic Transitional Probability Matrix.

UNIT-VIII

CONTINUOUS MARKOV CHAINS (CONTINUED): Evaluating Limiting State Probabilities and Time dependant Sate Probabilities, Reliability Evaluation in Repairable Systems, Mean time to failure, Applications.

TEXT BOOKS :

1. Roy Billington, Ronald N. Allan, "Reliability Evaluation of Engineering Systems" (Concepts and Techniques), Springer, 2nd edition, 2010.

REFERENCE BOOK :

1. Charles Ebelling, "An Introduction to Reliability & Maintainability Engineering" Tata MC. Graw Hill Science, 1st edition, 2000.

NEURAL NETWORKS AND FUZZY LOGIC

(ELECTIVE – I)

COURSE CODE: AEE1126

L	T	P	C
4	1	0	4

AIM:

To introduce fundamentals of neural networks and fuzzy logic.

OBJECTIVE:

At the end of the course, the student understands:

- Functioning and comparison of biological and artificial neuron, characteristics of artificial neural networks, its training.
- Neural Networks - Perceptron, Backpropagation, Self-Organizing maps, Associative Memory
- Application of the above networks for small applications.
- Fuzzy sets, difference between crisp and fuzzy sets, fuzzification and defuzzification.

UNIT-I

INTRODUCTION : History of Neural Networks; Structure and function of a Single Neuron – Biological neurons, Artificial neuron models; Neural Net Architectures – Fully connected networks, Layered networks, Acyclic networks, Feed-forward networks, Modular neural networks; Neural learning – Correlation learning, Competitive learning, Feedback-based weight adaptation; Applications of Artificial Neural Networks.

UNIT-II

SUPERVISED LEARNING: Single Layer Networks – Perceptrons, Linear seperability, Perceptron Training Algorithm – Termination criterion, choice of learning rate, Non-numeric inputs; Guarantee of success; Modifications – Pocket algorithm, Adalines, Multiclass algorithm.

UNIT-III

SUPERVISED LEARNING: Multilayer Networks – Multilevel Discrimination, Preliminaries – Architecture and 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; Accelerating the Learning process – Quickprop algorithm, conjugate gradient; Applications.

PREDICTION NETWORKS – Recurrent networks, Feedforward networks for forecasting; Radial Basis Functions

UNIT-IV

UNSUPERVISED LEARNING : Winner-Take-All Networks - Hamming Networks, Max-net, simple competitive learning; Learning Vector Quantizers; Counter propagation Networks.

ASSOCIATIVE MODELS – Non-iterative procedure for Association; Hopfield Networks – Discrete Hopfield networks, Storage capacity of Hopfield Networks, continuous Hopfield Networks; Hetero-associators.

UNIT-V

INTRODUCTION TO FUZZY SYSTEMS : An historical perspective, the utility of Fuzzy systems, limitations of Fuzzy systems.

FUZZY SETS AND MEMBERSHIPS: Chance versus Fuzziness; Properties and Operations on classical and Fuzzy sets – Classical sets, operations on classical sets, properties of classical sets, Mapping of classical sets to Functions, Fuzzy sets, Fuzzy set operations, properties of Fuzzy sets; Classical Relations – Cartesian Product, Crisp Relations, Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition; Fuzzy Relations – Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and composition. Value Assignment – Cosine Amplitude, Max-Min Method, other forms of the composition operation

UNIT-VI

PROPERTIES OF MEMBERSHIP FUNCTIONS, FUZZIFICATION AND DEFUZZIFICATION – Features of Membership Function, various forms; Fuzzification; Defuzzification to Crisp sets, Defuzzification to scalars.

CLASSICAL LOGIC AND FUZZY LOGIC – Classical Logic, Tautologies, Contradictions, Equivalence, Exclusive or and Exclusive

Nor, Logical Proofs, Deductive inference; Fuzzy Logic – Fuzzy Logic, Approximate Reasoning, other forms of the implication operation.

UNIT-VII

FUZZY SYSTEMS: Natural Language, Linguistic Hedges; Fuzzy (Rule-Based) Systems – Multiple conjunctive antecedents, multiple disjunctive antecedents, Aggregation of Fuzzy Rules.

DEVELOPMENT OF MEMBERSHIP FUNCTIONS: Membership value Assignments – Intuition, Inference, Rank Ordering, Neural Networks, Genetic Algorithms and Inductive Reasoning.

UNIT-VIII

FUZZY CONTROL SYSTEMS: Control System Design Problem, Control(Design) Surface, Assumptions in Fuzzy Control system design, simple Fuzzy Logic Controllers; Fuzzy Engineering Process Control – Classical Feedback Control, Classical PID Control, Fuzzy Control.

TEXT BOOKS :

1. Kishan Mehrotra, Chilukuri K.Mohan and Sanjya Ranka, "Elements of Artificial Neural Networks", Penram International Publishing(India),1996.
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", 2nd Edition, John Wiley & Sons.

REFERENCE BOOKS :

1. S.N.Sivanandam, S.Sumathi and S.N.Deepa, "Introduction to Neural Networks Using MATLAB", Tata McGraw Hill Publication Private Limited, 1st Edition, 2005.
2. Jacek M.Zurada, "Introduction to Artificial Neural Systems", Jaico Publishers, 1st Edition, 1994.
3. John Yen and Reza Langari, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education, 1st Edition, 1999.
4. George J.Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", Prentice-Hall, 1st Edition, 2009.

ELECTRICAL SAFETY MANAGEMENT

(ELECTIVE – I)

Course Code: AEE 1140

L	T	P	C
4	1	0	4

AIM :

To familiarize with the Electrical Safety in hazardous areas and to provide basic precautions in engineering practices.

OBJECTIVE:

To understand various electrical rules and acts, safety precautions in electrical systems

UNIT-I

INTRODUCTION TO ELECTRICAL SAFETY : Terms and definitions, objectives of safety and security measures, Hazards associated with electric current, and voltage, who is exposed, principles of electrical safety, Approaches to prevent Accidents, scope of subject electrical safety, Fire prevention and Fire Fighting.

UNIT-II

ELECTRICAL SHOCKS THEIR PREVENTION AND FIRST AID: Primary and secondary electrical shocks, possibilities of getting electrical shock and its severity, medical analysis of electric shocks and its effects, shocks due to flash/ Spark overs, prevention of shocks, safety precautions against contact shocks, flash shocks, burns, residential buildings and shops.

First Aid: first principles of actions after electric shocks, Artificial respiration, External Cardiac massage, Control of bleeding, burns and scalds and Heat exhaustion

UNIT-III

ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL AND AGRICULTURAL INSTALLATIONS : Wiring and fitting – Domestic appliances – water tap giving shock – shock from wet wall

– fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

UNIT-IV

SAFETY DURING INSTALLATION, TESTING AND COMMISSIONING, OPERATION AND MAINTENANCE: Preliminary preparations – safe sequence – risk of plant and equipment – safety documentation – field quality and safety - personal protective equipment – safety clearance notice – safety precautions – safeguards for operator's safety.

UNIT-V

ELECTRICAL SAFETY IN HAZARDOUS AREAS : Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations – Classification of equipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

UNIT-VI

EQUIPMENT EARTHING AND SYSTEM NEUTRAL EARTHING: Introduction, Distinction between system grounding and Equipment Grounding, Equipment Earthing, Functional Requirement of earthing system, description of a earthing system, , neutral grounding(System Grounding), Types of Grounding, Methods of Earthing Generators Neutrals.

UNIT-VII

SAFETY MANAGEMENT OF ELECTRICAL SYSTEMS : Principles of Safety Management, Management Safety Policy, Safety organization, safety auditing, Motivation to managers, supervisors, employees.

UNIT-VIII

REVIEW OF IE RULES AND ACTS AND THEIR SIGNIFICANCE : Objective and scope – ground clearances and section clearances – standards on electrical safety - safe limits of current, voltage – earthing

of system neutral – Rules regarding first aid and fire fighting facility.

The Electricity ACT, 2003, (Part1, 2, 3,4 & 5)

TEXT BOOKS:

1. S. Rao, Prof. H.L. Saluja, "Electrical Safety, Fire Safety Engineering and Safety Management", Khanna Publishers, New Delhi, 1988.
2. Pradeep Chaturvedi, "Energy Management Policy, Planning and Utilization", Concept Publishing company, New Delhi, 1997.
3. www.apeasternpower.com/downloads/elecact2003.pdf

DESIGN CONCEPTS FOR ENGINEERS

(Elective – I)

Course Code: AEE 1142

L	T	P	C
4	1	0	4

AIM & OBJECTIVE:

To teach the principles of design, and how they apply to engineering design projects and future job activities. It teaches the design process, rather than the technical details of any one engineering field. Basic design principles of and design tools, are introduced.

UNIT-I

WHAT IS ENGINEERING? : Definition. Various fields of engineering. Engineering professional bodies.

UNIT-II

WHAT IS DESIGN? : Difference between analysis , design, and replication. Good design versus bad design. The design cycle. Overall objectives.

UNIT-III

MODELING AND ANALYSIS : Gathering information. Build document and test. Revise. Informal brain storming. Examples.

UNIT-IV

PROJECT MANAGEMENT AND TEAM WORK SKILLS : Working in a team . Building a team. Job description. Team meetings. Working with other teams.

UNIT-V

TIME LINE : Pert. Documentation. Logbook. Technical reports. Electronic documentation. Case studies.

UNIT-VI

ENGINEERING TOOLS : Estimation. Significant figures. Plots.Prototyping. Reverse engineering. Computer analysis.

UNIT-VII

THE HUMAN MACHINE INTERFACE : How people interact with machines. Ergonomics. Societies view of engineering. Learning from mistakes. Role of failure. Case studies.

UNIT-VIII

LEARNING TO SPEAK, WRITE, AND MAKE PRESENTATIONS : Importance of good communication. Preparing for meetings. Preparing a formal presentation. Technical papers. Proposals. Instructional manuals.

TEXT BOOK:

1. Mark .N Horenstien, "Design Concepts for Engineers", Prentice Hall, 4th Edition, 2009.

REFERENCE BOOK:

1. Balbir S. Dillon, "Advanced Design Concepts for Engineers", Technology Publishing Company, 1st Edition, 1998.

PROGRAMMABLE LOGIC CONTROLLERS

(ELECTIVE – II)

COURSE CODE: AEE1127

L	T	P	C
4	1	0	4

AIM & OBJECTIVE :

This course trains the students on Basics of PLC including Programming and ladder logic and also students get exposure to different Registers of PLC and functions of PLC. Students will understand the applications of PLC and PID principles.

UNIT-I

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming Equipment,

programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

UNIT-II

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

UNIT-III

Digital logic gates, programming in the Boolean algebra system, conversion examples Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system.

UNIT-IV

PLC Registers: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

UNIT-V

PLC Functions: Timer functions & Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions

UNIT-VI

Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep functions and their applications

UNIT-VII

Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis & three axis Robots with PLC, Matrix functions.

UNIT-VIII

Analog PLC operation: Analog modules & systems, Analog signal processing, Multi bit Data Processing, Analog output Application Examples, PID principles, position indicator with PID control, PID Modules, PID tuning, PID functions.

TEXT BOOKS:

1. John W. Webb & Ronald A.Reiss, "Programmable Logic Controllers- Principles and Applications", 5th Edition, PHI, 2009.

REFERENCE BOOK:

1. Jr. Hackworth & F. DHackworth Jr., "Programmable Logic Controllers- Programming Method and Applications", Pearson, 2003.
2. Gary Dunning, "Introduction to Programmable Logic Controllers", Delmar Thomas Learning, 3rd Edition, 2005.

EMBEDDED SYSTEMS

(Elective – II)

Course Code: ACT1121

L	T	P	C
4	1	0	4

AIM :

High speed systems are now part of our life. These systems are low cost intelligent systems used in all technical disciplines to add intelligence to applications. The 32 bit architecture of two popular processors is introduced.

OBJECTIVE :

This program provides ISA architecture, memory structured to System, kernel, and user modes, for generating efficient coding in Assembly and high level. It imperative that Computer students understand these developments.

UNIT-I

The ARM instruction set Architecture. The bus structure and the peripherals. Memory organization and processor initialization [startup code]. Load store instruction set. Assembly programming using assemblers. Linkers, Loaders and Debuggers.

UNIT-II

ARM / THUMB architecture. Program structure to Supervisor, Kernel, and User modes.

Peripherals and their control: GPIO, Timers, Counters, PWM, ADC and serial communication channels. Assembly example applications.

UNIT-III

Application coding Examples: Measurement and control of Time, frequency velocity acceleration, Power control, and gesture and Touch monitoring.

UNIT-IV

Modern communication protocols starting with addressable USART,

SPI bus, 12C bus and USB their characteristics protocols and usage in high speed communication.

UNIT-V

Introduction to MIPS processor architecture in PIC 32 bit family CPU architecture and a detailed introduction to peripherals present. GPIO, timers, capture control and PWM features. Instruction set usage with application examples.

(http://ww1.microchip.com/downloads/en/DeviceDoc/61146B.pdf)

UNIT-VI

Simulation and debugging of programs using MPLAB integrated development Environment. Interrupts, modes and vectored interrupt priority processing using the many shadow registers. Challenges in development of intelligent programs.

UNIT-VII

Introduction to RTOS and its need in real time applications: in industry particularly in robots, automobiles and gesture identification.

UNIT-VIII

Introduction to In circuit Emulation techniques using JTAG. Watching CPU activity, and techniques of in circuit flash programming.

TEXT BOOKS:

1. B.Kantha Rao, " Embedded Systems", 1st Edition, PHI Learning Private Limited, 2011. (Units 1, 3, 7)
2. Trevor Martin, "Introduction to the LPC2000", 1st Edition, Hitex (UK) Ltd, 2005. (Units 1, 2, 4)
3. Lucio Di Jasio, "Programming 32-bit Microcontrollers in C Exploring the PIC 32", 1st Edition, Newnes, 2008. (Units 6, 8)

REFERENCE BOOKS:

1. A.N.Sloss, D.Symes and C. Wright, "RM system's Developer Guide, Designing and Optimizing system software", 1st Edition, Morgann Kaufmann Publishers, 2004.
2. Steve Furber, "ARM system on Chip Architecture", 2nd Edition, Adison Wesley Publishers, 2000.

3. David Seal, "ARM Architecture reference Manual", 2nd Edition, Adison Wesley Publishers, 2001.

WEB REFERENCE BOOKS:

1. http://ww1.microchip.com/downloads/en/DeviceDoc/61146B.pdf (Unit 5)

DISTRIBUTION AUTOMATION

(ELECTIVE – II)

Course Code: AEE1128

L	T	P	C
4	1	0	4

AIM AND OBJECTIVE:

To introduce the concepts of Distribution Automation, which is the necessity of the present Indian Power Distribution System in delivering reliable and quality and reliable power to customers.

UNIT-I

DISTRIBUTION AUTOMATION AND THE UTILITY SYSTEM: Introduction to Distribution Automation (DA), control system interfaces, control and data requirements, centralized vs decentralized control, DA System (DAS), DA Hardware, DAS software.

UNIT-II

DISTRIBUTION AUTOMATION FUNCTIONS: DA capabilities, Automation system computer facilities, Management processes, Information management, System reliability management, System efficiency management, Voltage management, Load management.

UNIT-III

COMMUNICATION SYSTEMS FOR DA : DA communication requirements, Communication reliability, Cost effectiveness, Data rate requirements, Two way capability, Ability to communicate during outages and faults, Ease of operation and maintenance, Conforming to the architecture of data flow.

UNIT-IV

COMMUNICATION SYSTEMS USED IN DA : Distribution line carrier (Power line carrier), Ripple control, Zero crossing technique, telephone, cable TV, Radio, AM broadcast, FM SCA, VHF Radio, UHF Radio, Microwave, Satellite. Fiber optics, Hybrid Communication systems, Communication systems used in field tests.

UNIT-V

TECHNICAL BENEFITS : DA benefit categories, Capital deferred

savings, Operation and Maintenance savings, Interruption related savings, Customer related savings, Operational savings, Improved operation, Function benefits, Potential benefits for functions, Function shared benefits, Guidelines for formulation of estimating equations

UNIT-VI

Parameters required, economic impact areas, Resources for determining benefits, integration of benefits into economic evaluation, impact on distribution system.

UNIT-VII

ECONOMIC EVALUATION METHODS : Development and evaluation of alternate plans, Select study area, Select study period, Project load growth, Develop Alternatives, Calculate operating and maintenance costs, Evaluate alternatives.

UNIT-VIII

Economic comparison of alternate plans, Classification of expenses and capital expenditures, Comparison of revenue requirements of alternative plans, Book Life and Continuing plant analysis, Year by year revenue requirement analysis, Short term analysis, End of study adjustment, Break even analysis, Sensitivity analysis Computational aids.

TEXT BOOK:

1. D Bessett, E Clinard, J Grainger, S Purucker and D Ward, IEEE Tutorial Course "Distribution Automation",IEEE Tutorial publication 88 EHO 280-8-PWR, 1988..

REFERENCE BOOK:

1. R.P.Gupta, "Electric Power Distribution Automation", Narosa Publications, 2nd Edition., 2006.
2. James A.Momoh, "Electric Power Distribution, Automation, Protection and Control", CRC Press, 3rd Edition, 2007.
3. James Northcote-Green, Robert Wilson, "Control and Automation of Electrical Power Distribution Systems (Power Engineering)", CRC Press,Taylor and Francis, 2007.
4. Dr M.K. Khedkar, Dr G.M.Dhole, "A Text of Electric Power Distribution Automation", Laxmi Publications, First Edition., 2010.

DATA STRUCTURES FOR ENGINEERING APPLICATIONS

(Elective -II)

Course Code: AIT1114

L	T	P	C
4	1	0	4

AIM :

To empower students to build efficient software applications with suitable data structures.

OBJECTIVE :

To make students understand the software design techniques for solving engineering applications of their discipline

UNIT-I

RECURSION AND LINEAR SEARCH : Preliminaries of algorithm, Algorithm analysis and complexity, Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi.

Chapters 1, 2 from Text Book 1

UNIT-II

SEARCHING TECHNIQUES : Introduction, Linear Search, Transpose Sequential, Search, Interpolation Search, Binary Search, Fibonacci Search.

Chapter 15 from Text Book 2.

UNIT-III

SORTING TECHNIQUES : Basic concepts, insertion sort, selection sort, bubble sort, quick sort, merge sort.

Chapter 12 from Text Book 1

UNIT-IV

STACKS : Basic Stack Operations, Representation of a Stack using

Arrays, Stack Applications: Reversing list, Factorial Calculation, In-fix-to postfix Transformation, Evaluating Arithmetic Expressions.

Chapter 3 from Text Book 1.

UNIT-V

QUEUES : Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack.

Chapter 4 from Text Book 1.

UNIT-VI

APPLICATIONS OF QUEUES : Applications of Queues- Enqueue, Dequeue, Circular Queues, Priority Queues.

Chapter 4 from Text Book 1.

UNIT-VII

LINKED LISTS : Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, merging two single linked lists into one list, Reversing a single linked list, Circular linked list, Double linked list. Chapter 6 from Text Book 2.

UNIT-VIII

TREES : Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in-order and pre(post)order traversals.

Chapter 8 from Text Book 2.

TEXT BOOKS:

1. Richard F, Gilberg & Behrouz A. Forouzan, "Data Structures", 2nd Edition, Thomson, 2007.
2. GAV PAI, "Data Structures and Algorithms", 1st Edition, Tata McGraw-Hill, 2010.

REFERENCES:

1. Seymour Lipschutz, "Data Structure with C", 1st Edition, TMH, 2009.

2. Debasis ,Samanta "Classic Data Structures", 2nd Edition, PHI,2009

3. Horowitz,Sahni, Anderson "Fundamentals of Data Structure in C", 2nd Edition, Freed, University Press, 2009.

Note : A small application may be implemented in software from their respective disciplines at the end of the course.

ELECTRICAL MEASUREMENTS & SIMULATION LAB

Course code: AEE1129

L	T	P	C
0	0	3	2

AIM & OBJECTIVE:

This lab is intended to give exposure on different measuring instruments and power system using MATLAB/Mi Power.

The following experiments are required to be conducted as compulsory experiments:

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Measurement of 3-phase reactive power in balanced loads.
4. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
5. Develop a simulink model for a single area load frequency problem and simulate the same.
6. Formation of Y-Bus & Z-Bus
7. Develop a program to solve Swing Equation.
8. Conduct a power flow study on a given power system network using Mi-Power.

a) Gauss- Siedel method

b) Newton – Raphson method

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

9. Calibration LPF wattmeter – by Phantom testing
10. Measurement of Dielectric strength of oil using H.T. testing Kit
11. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.

12. Develop a simulink model for a two-area load frequency problem and simulate the same.
13. Design a PID controller for two-area power system and simulate the same.
14. Design a compensator for a given systems for required specifications.
15. Fault analysis for a given network using Mi-Power.
16. Optimal Generation scheduling of a given Power System.

MICROCONTROLLERS LAB

Subject Code: AEE 1130

L	T	P	C
0	0	3	2

AIM :

To Provide exposure to the Integrated Development Environment of various processors for writing , simulating and debugging programs in assembly language and to apply microprocessor based techniques to problems in Electrical Engineering in particular and also other disciplines of in general.

OBJECTIVE :

After successful completion of the this course a student will be familiar with using Integrated Development Environments of various processors and be able to design and write code for embedded applications.

Further the student will also be able to also test and analyze applications using the skills learnt during the course.

THE FOLLOWING EXPERIMENTS ARE REQUIRED TO BE CONDUCTED AS COMPULSORY EXPERIMENTS:

1. Evaluation of Arithmetic Expression Using 8051 Kit.
2. Binary , BCD , ASCII Conversions using MPLAB
3. Multi-precision Addition , Subtraction , Multiplication and Division using AVR Studio.
4. Program to generate square wave using 8051 microcontroller.
5. Stepper motor Control using 8051 microcontroller.
6. Keyboard & LCD interfacing using PIC processor.
7. Keyboard & LCD interfacing using Atmega processor.
8. Program to generate square wave of given duty cycle using PIC Processor.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted (using PIC/ Atmega Processors):

9. Program to generate sine wave of given frequency
10. Measurement of voltage
11. Measurement of Current
12. Servo motor – Position Control
13. Measurement of Power factor
14. Measurement of speed
15. Measurement of frequency
16. Measurement of Power
17. Measurement of Energy
18. Measurement of Torque
19. DC Motor – Speed and Direction Control
20. BLDC Motor – Speed control

SYLLABI FOR VIII SEMESTER

UTILIZATION OF ELECTRICAL ENERGY

Course Code: AEE1131

L	T	P	C
4	1	0	4

AIM AND OBJECTIVE:

The objective of this course is to train students on characteristics of various drives, Heating, Welding methodologies, Illumination methods and Traction system.

UNIT-I

ELECTRIC DRIVES I : Type of electric drives, choice of motor, starting and running characteristics, speed control.

UNIT-II

ELECTRIC DRIVES II: Temperature rise, Particular applications of electric drives, Types of industrial loads, continuous, Intermittent and variable loads, load equalization.

UNIT-III

ELECTRIC HEATING: Advantages and methods of electric heating, resistance heating, induction heating and dielectric heating.

UNIT-IV

ELECTRIC WELDING : Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT-V

ILLUMINATION FUNDAMENTALS: Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

UNIT-VI

VARIOUS ILLUMINATION METHODS: Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT-VII

ELECTRIC TRACTION – I : System of electric traction and track electrification. Review of existing electric traction systems in India, Special features of traction motor, methods of electric braking-plugging rheostatic braking and regenerative braking, Mechanics of train movement, Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT-VIII

ELECTRIC TRACTION- II : Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. J.B. Gupta, "Utilization of Electric Power and Electric Traction", Kataria & Sons Publishers, Delhi, 9th Edtion, 2004.
2. C.L. Wadhwa, "Generation, Distribution and Utilization of electrical Energy", New Age International (P) Limited Publishers, 3rd Edition, 2010.

REFERENCES:

1. N.V. Suryanarayana, "Utilization of Electrical Power including Electric drives and Electric traction", New Age International (P) Limited Publishers, 1st Edition,1994.
2. E. Open Shaw Taylor, "Utilization of Electric Energy", Orient Longman,1st Edition,1937.

POWER DISTRIBUTION ENGINEERING

(ELECTIVE – III)

Course Code: AEE1123

L	T	P	C
4	1	0	4

AIM AND OBJECTIVE:

To study the fundamental principles and various parts/components of power distribution systems and also impart knowledge of distribution system protection, voltage control and power factor improvement.

UNIT-I

GENERAL CONCEPTS: Introduction to distribution systems, Load modelling and characteristics, Coincidence factor, Contribution factor Loss factor. Relationship between the load factor and loss factor, Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

UNIT-II

DISTRIBUTION FEEDERS : Design Considerations of Distribution Feeders: Radial and Loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.

UNIT-III

SUBSTATIONS : Location of Substations: Rating of distribution substation, service area within primary feeders, Benefits derived through optimal location of substations.

UNIT-IV

SYSTEM ANALYSIS : Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT-V

PROTECTION : Objectives of distribution system protection, types of common faults and procedure for fault calculations, Protective Devices:

Principle of operation of Fuses, Circuit Reclosures, line sectionlizers, and circuit breakers.

UNIT-VI

COORDINATION : Coordination of Protective Devices: General coordination procedure.

UNIT-VII

COMPENSATION FOR POWER FACTOR IMPROVEMENT : Capacitive compensation for power factor control, Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation, Economic justification, Procedure to determine the best capacitor location.

UNIT-VIII

VOLTAGE CONTROL : Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOK :

1. Turan Gonen "Electric Power Distribution system, Engineering", CRC Press, 2nd Edition, 2007.

REFERENCE BOOKS:

1. A.S. Pabla "Electric Power Distribution", Tata Mc Graw-Hill Publishing company, 5th edition, 1997.
2. Anthony J Pansini, " Electrical Distribution Engineering", The Fairmont Press, Inc, 2007.
3. H. Lee Willis, "Power Distribution Planning Reference Book", Power Engineering Series, CRC Press, 2nd Edition, 2004.

HIGH VOLTAGE ENGINEERING

(ELECTIVE-III)

Course Code: AEE1134

L	T	P	C
4	1	0	4

AIM AND OBJECTIVE:

Students get trained in various types of Generation and Measurement of High Voltage AC, DC and Impulse waves along with testing methods of High Voltage Equipment**.** **S**tudents to become aware of the necessity of EHV AC Transmission and appreciate its power handling capacity and major problems like Corona, High Electrostatic Fields, Power Frequency voltage control.

UNIT-I

GENERATION OF HIGH VOLTAGES AND CURRENTS : Generation of High Direct Current Voltages, Generation of High Alternating Voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and Control of Impulse Generators.

UNIT-II

MEASUREMENT OF HIGH VOLTAGES AND CURRENTS : Measurement of High Direct Current voltages, Measurement of High Voltages Alternating and Impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for Impulse Voltage and Current Measurements.

UNIT-III

OVER VOLTAGE PHENOMENON AND INSULATION CO-ORDINATION : Natural causes for over Voltages – Lightning phenomenon, Over voltage due to switching surges, System faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT-IV

HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS : Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

UNIT-V

EHV AC TRANSMISSION LINE TRENDS AND PRELIMINARY ASPECTS : Standard transmission voltages – Power handling capacities and line losses – Mechanical aspects.

UNIT-VI

CORONA : Corona in EHV lines – Corona loss formulate – Attenuation of traveling waves due to corona – Audio noise due to corona, its generation, Characteristics and limits measurement of audio noise.

UNIT-VII

ELECTROSTATIC FIELD AND ITS CALCULATION AND EFFECTS: Electric Shock Currents and their threshold values**,** Calculation of electro static field of AC lines, Effect of High E.S. field on Humans, Animals, Plants, etc, Meters and Measurement of E.S. fields.

UNIT-VIII

POWER FREQUENCY VOLTAGE CONTROL : Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous conductor, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines

TEXT BOOK :

1. M. S. Naidu and V. Kamaraju," High Voltage Engineering", TMH Publications, 4th Edition, 2009 [UNITS 1-4].
2. Rakosh Das Begamudre, "Extra High Voltage AC Transmission Engineering", Wiley Eastem ltd., New Delhi – 1987 [UNITS 5- 8].

REFERENCES:

1. C. L. Wadhwa, "High Voltage Engineering", New Age Internationals (P) Limited, 3rd Edition, 2010.

2. Ravindra Arora & Wolfgang Mosch , "High Voltage Insulation Engineering", New Age International (P) Limited, 1st Edition,1995.
3. E. Kuffel, W. S. Zaengl, J. Kuffel, "High Voltage Engineering: Fundamentals", CBS Publishers, New Delhi, 2nd Edition, 2005.
4. Turan Gonen, "Electric Power Transmission System Engineering", John Wiley,1988.
5. EHV Transmission line reference book – Edision Electric Institute (GEC) 1986.

FLEXIBLE AC TRANSMISSION SYSTEMS

(ELECTIVE – III)

Course Code: AEE1143

L	T	P	C
4	1	0	4

AIM:

At the end of this course a student will be able to study the performances of various FACTS devices and also be able to distinguish which type of FACTS device can be used for a particular application and location

OBJECTIVE:

Energy plays a major role in our daily life where load is changing at every point of time so to incorporate those changes and to run the power system as flexible as possible with various contingencies. FACTS devices are one of the solutions. In this course the student will know various FACTS devices, their operations and Applications.

UNIT-I

INTRODUCTION TO FACTS : Basics of Power Transmission Networks, Control of Power Flow in AC Transmission Line Flexible AC Transmission System, Application of FACTS Controllers in Distribution Systems

UNIT-II

AC TRANSMISSION LINES AND REACTIVE POWER COMPENSATION : Introduction to FACTS controllers – Reactive power control: Reactive power, uncompensated transmission line, reactive power compensation – Principles of conventional reactive power compensators: Synchronous condensers, saturated reactor, phase angle regulator and other controllers.

UNIT-III

STATIC VAR COMPENSATORS : Analysis of SVC Configuration of SVC, SVC Controller, Voltage Regulator Design (Some Issues),

Harmonics and Filtering, Protection aspects Modelling of SVC, Applications of SVC

UNIT-IV

THYRISTOR CONTROLLED SHUNT COMPENSATOR : Objective of shunt compensation – Principle and operating characteristics of Thyristor Controlled Reactor (TCR) – Thyristor Switched Capacitor(TSC)

UNIT-V

THYRISTOR CONTROLLED SERIES COMPENSATOR (TCSC) : Series compensation – Principles of operation of TCSC – Capability characteristics of TCSC – Modeling of TCSC – TCSC control system – enhancement of system damping – mitigation of sub-synchronous resonance.

UNIT-VI

STATIC SYNCHRONOUS SERIES COMPENSATOR (SSSC): Operation of SSSC and the Control of Power Flow , Modeling and Control of SSSC , SSSC with an Energy Source, Analysis of SSR with a SSSC Applications of SSSC

UNIT-VII

VSC BASED SHUNT AND SERIES COMPENSATOR : Static Synchronous Compensator (STATCOM) Principle of operation, VI Characteristics, Harmonic performance – Steady state model – SSR mitigation. Static Synchronous Series Compensator (SSSC): Principle of operation and characteristics of SSSC – control range and VA rating – capability to provide real power compensation – Immunity to sub-synchronous resonance – control scheme for SSSC.

UNIT-VIII

UNIFIED POWER FLOW CONTROLLER: Basic operating principles – conventional transmission control capability of UPFC – Independent real and reactive power flow control – control scheme for UPFC – Basic control system for P and Q control – dynamic performance.

TEXT BOOKS:

1. Narain G. Hingorani and Laszlo Gyugyi, "Understanding FACTS Concepts and Technology of Flexible AC transmission Systems" Edition 2001, IEEE power Engineering society Sponsor, IEEE press, 2001.
2. **K.R. PADIYAR "**FACTS Controllers In Power Transmission and Distribution", New Age International (p) Limited June, 2007 **Edition**.

REFERENCE BOOKS:

1 . Vijay K. Sood, "HVDC and FACTS Controller: Application of Static Converters in power systems", IEEE Power Electronics and Power Systems series, Kluwer Academic publishers, Boston, First edition January 2004.
2. Timothy John Eastham Miller, "Reactive power control in Electric systems", John Wiley and sons, New York, 1982.
3. Yong Hua Song and Allan T Johns, "Flexible AC Transmission System (FACTS)", IEEE Power Engineering Series-IEEE Press, 1999.

SMART GRID

(ELECTIVE – III)

COURSE CODE: AEE1133

L	T	P	C
4	1	0	4

AIM AND OBJECTIVE:

Students get trained in information and communication technologies used Smart Grids; sensing, measurement, control and automation technologies implemented ins Smart Grids, Management Systems, Power Electronics and energy storage technologies used in Smart Grids.

UNIT-I

INTRODUCTION: Introduction, Early Smart Grid initiatives, Overview of the technologies required for the Smart Grid.

UNIT-II

COMMUNICATION TECHNOLOGIES: Introduction to data communication, Dedicated and shared communication channels, Switching techniques, Communication channels, Layered architecture and protocols, Communication technologies for the Smart Grid, Standards for information exchange

UNIT-III

INFORMATION SECURITY : Introduction to information security for the Smart Grid, Encryption and decryption, Authentication, Digital signatures, Cyber security standards.

UNIT-IV

SENSING, MEASUREMENT, CONTROL : Introduction to smart metering and demand-side integration, Smart metering, Smart meters: An overview of the hardware used, Communication infrastructure and protocols for smart metering, Demand-side integration.

UNIT-V

AUTOMATION TECHNOLOGIES : Introduction to distribution

automation equipment, Substation automation equipment, Faults in the distribution system, Voltage regulation.

UNIT-VI

DISTRIBUTION MANAGEMENT SYSTEMS : Data sources and associated external systems, Modelling and analysis tools, Applications

UNIT-VII

TRANSMISSION SYSTEM OPERATION: Data sources, Energy management systems, Wide area applications, Visualisation techniques.

UNIT-VIII

POWER ELECTRONICS AND ENERGY STORAGE : Power electronics in the Smart Grid, Renewable energy generation, Fault current limiting, FACTS, HVDC, Energy storage technologies.

TEXT BOOK :

1. Janaka E., Nick Jenkins, Kithsiri Liynage, Jianzhong Wu, Akihiko Yokoyama, "The Smart Grid – Technology and Applications", John Wiley, 2012.

REFERENCE BOOK

1. Clark W. Gellings, "The Smart Grid", CRC Press, 2009.
2. Lars T. Berger, Krzysztof, Iniewski, "Smart Grid Applications, Communications and Security", John Wiley, 2012.

VLSI DESIGN

(ELECTIVE – IV)

Course Code: AEC 1117

L	T	P	C
4	1	0	4

AIM:

To make the students familiarization with Concepts of VLSI Design.

OBJECTIVE:

To acquire knowledge of fabrication process involved in MOS Devices and to introduce the basic electrical properties of MOS devices and VLSI Circuit Design Processes.

UNIT-I

INTRODUCTION TO MOS TECHNOLOGIES: VLSI Design Flow, Introduction to IC Technology–MOS, PMOS, NMOS, CMOS & Bi-CMOS technologies.

UNIT-II

BASIC ELECTRICAL PROPERTIES: Basic Electrical Properties of MOS and Bi-CMOS Circuits: I_{ds} - V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit, Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-III

VLSI CIRCUIT DESIGN PROCESSES: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT-IV

GATE LEVEL DESIGN : Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Sheet Resistance R_S and its concept to MOS, Area Capacitance Units, Calculations, Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

UNIT-V

SUBSYSTEM DESIGN: Sub system Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters, High Density Memory Elements.

UNIT-VI

SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach.

UNIT-VII

CMOS DESIGN METHODS AND TESTING: Design methods, Design capture tools, Design Verification Tools, CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, System-level Test Techniques, Layout Design for Improved Testability.

UNIT-VIII

INTRODUCTION TO CMOS PROCESSING TECHNOLOGY: Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors.

TEXTBOOKS:

1. Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, "Essentials of VLSI circuits and systems", 3rd Edn. PHI, 2005.
2. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 3rd Edn. 1999.
3. S.M. SZE, "VLSI Technology", TMH, 2nd edn, 2003.

REFERENCES:

1. John .P. Uyemura, "Introduction to VLSI Circuits and Systems", 1st Edn., 2003. John Wiley 2. John M. Rabaey, "Digital Integrated Circuits", PHI, EEE, 2nd Edn 1997.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 1997.
3. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", The McGraw Hill, 2001.

DATABASE MANAGEMENT SYSTEMS

(ELECTIVE-IV)

Course Code: ACT1109

L	T	P	C
4	1	0	4

AIM:

To make the student confident in maintaining huge amount of data by creating tables, and accessing them.

OBJECTIVE:

Student can get the capability of maintenance of huge amount of data along with reducing of redundancy in data.

UNIT-I

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.

UNIT-II

History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT-III

Introduction to the Relational Model – Integrity Constraint over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views. Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT-IV

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT-V

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT-VI

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

UNIT-VII

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

UNIT-VIII

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

TEXT BOOKS:

1. Raghurama Krishnan, Johannes Gehrke, "Database Management Systems", 3rd Edition, TATA McGraw Hill, 2008.
2. Silberschatz, Korth, "Data base System Concepts", 5th Edition, Mc Graw Hill, 2010.

REFERENCES:

1. Peter Rob & Carlos Coronel, "Data base Systems design, Implementation, and Management", 7th Edition, Pearson Education, 2000.
2. Elmasri Navrate, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2007.
3. C.J.Date: "Introduction to Database Systems", 7th Edition, Pearson Education, 2002.

DIGITAL CONTROL SYSTEMS

(ELECTIVE-IV)

Course Code: AEE1135

L	T	P	C
4	1	0	4

AIM:

To provide basic tools for the design of a control system that is to be implemented using a computer or microprocessor.

OBJECTIVE:

After the completion of the course the student gains the necessary background knowledge to design a digital controller for a control system. Also the students gain an understanding of designing controllers by discretization of a continuous controller direct design and also design using State Space Methods.

UNIT-I

Sampling and reconstruction : Introduction Examples of discrete time Control Systems Digital to Analog and Analog to digital conversion, sample and hold operation (Zero order hold and First Order Hold)

UNIT-II

Introduction – Definition of Z – Transform – Z – Transform of standard functions – Theorems of z – Transform – Inverse Z – Transform.

UNIT-III

Z - Plane Analysis of Discrete Time Control Systems : Difference equations – classical solution Z – Transform method of solving difference equations.

UNIT-IV

State Space Analysis: State Space representation of Discrete Time Systems – Solving Discrete Time State Space Equations – State Transition Matrix and its properties – Methods of Computation of State Transition Matrix – Discretization of continuous times State Space Equations.

UNIT-V

Controllability and Observability : concepts of controllability and observability, Tests for controllability and observability – Duality between controllability and observability - testing for controllability and observability.

UNIT-VI

Stability Analysis: Mapping between S-Plane and Z – Plane – Primary Strips and Complimentary Strips – Constant Frequency Loci - Constant damping Ratio Loci – Stability analysis of closed loop systems in the z – plane , Jury's stability Analysis using bilinear transformation and Routh Stability criterion.

UNIT-VII

Design of Discrete Time Control Systems by Conversion Methods: Transient and Steady State response Analysis – Design based on Frequency Response Analysis – Bilinear Transformation and Design in the W – Plane – Lead, Lag, and Lag - Lead by compensation design.

UNIT-VIII

State Feedback Controllers : Design of State Feed Back Controller through Pole Placement – Necessary and sufficient conditions – Ackerman's formula.

TEXT BOOKS :

1. K. Ogata , "Discrete Time Control Systems", Prentice Hall, 2nd Edition, 2011.
2. M. Gopal , "Digital Control and State variable Methods", TMH Publication, 2nd Edition, 2003.

REFERENCES :

1. Kuo, "Digital Control Systems", Oxford University Press, 2nd Edition.
2. Franklin, Powell, " Digital Control of Dynamic Systems", Addison Wisley.

ENGINEERING ETHICS

(ELECTIVE – IV)

Course Code: AEE 1141

L	T	P	C
4	1	0	4

AIM & OBJECTIVE:

To bring awareness of the importance of ethics within the engineering profession as the work of engineers can affect public health and safety. Also to bring awareness of what is called moral autonomy which is the ability to think critically and independently about moral issues and apply this moral thinking to situations that arise in the course of professional engineering practice.

UNIT-I

Introduction. Why ethics? Personal, professional ethics. Origin of ethical thought. Case studies.

UNIT-II

Professionalism and codes of ethics. Codes of ethics. Professional ethics.

UNIT-III

Understanding ethical problems. History of ethical thought. Ethical theories.

UNIT-IV

Ethical problem solving techniques. Analysis of issues in ethical problems. Line diagrams. Flow charts. Conflict problems.

UNIT-V

Risk, safety and accidents. Safety and risks. Accidents.

UNIT-VI

The rights and responsibilities of engineers. Professional responsibilities.

UNIT-VII

Ethics in research and experimentation. Case studies.

UNIT-VIII

Doing the right thing. Case studies.

TEXT BOOK:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Education, 2nd Edition, 2004.

REFERENCE BOOKS:

1. Roland Schinzinger & Mik. W. Martin "Introduction to Engineering Ethics", Mc GrawHill, Newyork – 2000.
2. Charles E. Harris, JR Michael S.Pritchard and Michel J Rabins. "Engineering Ethics, Concepts & Cases", Wadsworth Publishing Company, Belmont, CA, 2000.