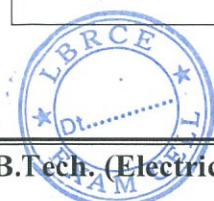


COURSE STRUCTURE**I SEMESTER**

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE01	Professional Communication - I	3	-	-	3	3	40	60	100
2	17FE04	Differential Equations and Linear Algebra	3	2	-	5	4	40	60	100
3	17FE12	Applied Physics	3	2	-	5	4	40	60	100
4	17CI01	Computer Programming	2	2	-	4	3	40	60	100
5	17ME50	Basic Engineering Mechanics	2	2	-	4	3	40	60	100
6	17FE60	English Communication Skills Lab	-	-	2	2	1	40	60	100
7	17FE62	Applied Physics Lab	-	-	2	2	1	40	60	100
8	17CI60	Computer Programming Lab	-	-	2	2	1	40	60	100
9	17ME60	Engineering Workshop	1	-	2	3	2	40	60	100
Total			14	8	8	30	22	360	540	900

II SEMESTER

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE02	Professional Communication - II	3	-	-	3	3	40	60	100
2	17FE06	Transformation Techniques and Vector Calculus	3	2	-	5	4	40	60	100
3	17FE14	Applied Chemistry	4	-	-	4	4	40	60	100
4	17ME51	Thermal and Hydro Prime Movers	2	2	-	4	3	40	60	100
5	17EE01	Electronic Circuits and Devices	2	2	-	4	3	40	60	100
6	17FE64	Applied Chemistry Lab	-	-	2	2	1	40	60	100
7	17ME76	Thermal and Hydro Prime Movers Lab	-	-	2	2	1	40	60	100
8	17ME75	Computer Aided Engineering Drawing Lab	1	-	2	3	2	40	60	100
9	17EE60	Electronic Circuits and Devices Lab	-	-	2	2	1	40	60	100
Total			15	6	8	29	22	360	540	900



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III SEMESTER

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE07	Numerical Methods and Fourier Analysis	3	2	-	5	4	40	60	100
2	17CI05	Data Structures	2	2	-	4	3	40	60	100
3	17EE02	Electric and Magnetic Fields	2	2	-	4	3	40	60	100
4	17EE03	Network Theory - I	2	2	-	4	3	40	60	100
5	17EE04	Digital Logic Circuit Design	2	2	-	4	3	40	60	100
6	17EE05	Power Generation and Utilization	3	-	-	3	3	40	60	100
7	17CI63	Data Structures Lab	-	-	2	2	1	40	60	100
8	17EE61	Digital Logic Circuit Design Lab	-	-	2	2	1	40	60	100
9	17EE62	Electrical Workshop	-	-	2	2	1	40	60	100
10	17PD03	Professional Ethics and Human Values	3	-	-	3	0	40	60	100
11	17PD01	Problem Assisted Learning	-	-	1	1	0	100	-	100
Total			17	10	7	34	22	500	600	1100

IV SEMESTER

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE03	Environmental Science	3	-	-	3	3	40	60	100
2	17FE10	Complex Variables and Statistical Methods	3	2	-	5	4	40	60	100
3	17EE06	Control Systems	2	2	-	4	3	40	60	100
4	17EE07	Network Theory - II	2	2	-	4	3	40	60	100
5	17EE08	Electronic Circuit Analysis	2	2	-	4	3	40	60	100
6	17EE09	Electrical Machines – I	2	2	-	4	3	40	60	100
7	17EE63	Numerical Methods Lab	-	-	2	2	1	40	60	100
8	17EE64	Electrical Networks Lab	-	-	2	2	1	40	60	100
9	17EE65	Control Systems Lab	-	-	2	2	1	40	60	100
10	17PD02	Problem Based Learning	-	-	1	1	0	100	-	100
Total			14	10	7	31	22	460	540	1000



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V SEMESTER

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17HS01	Engineering Economics and Accountancy	3	-	-	3	3	40	60	100
2	17EE10	Linear and Digital Integrated Circuits	2	2	-	4	3	40	60	100
3	17EE11	Electrical Machines – II	2	2	-	4	3	40	60	100
4	17EE12	Electrical Power Transmission	2	2	-	4	3	40	60	100
5	17EC22	Microprocessors and Microcontrollers	3	-	-	3	3	40	60	100
PROGRAMME ELECTIVE - I										
6	17EE13	Classical and Heuristic Optimization Techniques	3	-	-	3	3	40	60	100
	17EE14	Renewable Energy Technologies								
	17EE15	Electrical Engineering Materials								
	17EE16	Advanced Logic Design								
7	17FE61	Presentation Skills Lab	-	-	2	2	1	40	60	100
8	17EE66	Electrical Machines - I Lab	-	-	2	2	1	40	60	100
9	17EE67	Electronic Circuits and ICs Lab	-	-	2	2	1	40	60	100
10	17PD07	Seminar	-	-	2	2	1	100	-	100
11	17EE90	Electrical Safety (*Add on course – I)	3	-	-	3	3	40	60	100
12	17PD05	Employability Enhancement Skills - I	1	-	-	1	0	100	-	100
13	17PD06	Industrial Training/ In-house Training	-	-	-	-	-	-	-	-
Total			19	6	8	33	22/25*	600	600	1200



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VI SEMESTER

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17EE17	Analog and Digital Signal Processing	2	2	-	4	3	40	60	100
2	17EE18	Power System Analysis	2	2	-	4	3	40	60	100
3	17EE19	Power Electronics	2	2	-	4	3	40	60	100
4	17EE20	Measurements and Instrumentation	3		-	3	3	40	60	100
PROGRAMME ELECTIVE - II										
	17EC51	Digital Controllers								
5	17EC29	Embedded System Design	3	-	-	3	3	40	60	100
	17EC52	Data Communications and Networking								
	17EC16	VLSI Design								
6	OPEN ELECTIVE - I		3	-	-	3	3	40	60	100
7	17EE68	Electrical Machines - II Lab	-	-	2	2	1	40	60	100
8	17EC70	Microprocessors and Microcontrollers Lab	-	-	2	2	1	40	60	100
9	17PD04	Mini Project	-	-	4	4	2	100	-	100
10	17EE91	Electrical Reliability Engineering (*Add on course - II)	3	-	-	3	3	40	60	100
11	17PD08	Employability Enhancement Skills - II	1	-	-	1	0	100	-	100
		Total	19	6	8	33	22/25*	560	540	1100



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VII SEMESTER

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17EE21	Power System Protection	3	-	-	3	3	40	60	100
2	17EE22	Power Systems Operation and Control	2	2	-	4	3	40	60	100
3	17EE23	Solid State Drives	2	2	-	4	3	40	60	100
		PROGRAMME ELECTIVE - III								
	17EE24	Intelligent Control Systems								
4	17EE25	Digital Control Systems	3	-	-	3	3	40	60	100
	17EE26	Advanced Control Systems								
	17EE27	Industrial Process Control								
		PROGRAMME ELECTIVE - IV								
	17EE28	Energy Conservation and Audit								
5	17EE29	PLC and Automation	3	-	-	3	3	40	60	100
	17EE30	Energy Storage Systems								
	17EE31	Distribution System Planning and Automation								
6	OPEN ELECTIVE - II		3	-	-	3	3	40	60	100
7	17EE69	Power Electronics Lab	-	-	2	2	1	40	60	100
8	17EE70	Power Systems Lab	-	-	2	2	1	40	60	100
9	17PD09	Internship	-	-	1	1	2	100	-	100
10	17EE92	High Voltage Engineering (*Add on course – III)	3	-	-	3	3	40	60	100
11	17PD10	Extra-curricular/Co-curricular Activities	-	-	1	1	-	-	-	-
Total			19	4	6	29	22/25*	460	540	1000



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M. Uvalle

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VIII SEMESTER

S. No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	PROGRAMME ELECTIVE - V									
	17EE32	Special Electrical Machines								
	17EE33	Modeling and Analysis of Electrical Machines	3	-	-	3	3	40	60	100
	17EE34	Advanced Power Converters								
	17EE35	Switched Mode Power Converters								
2	PROGRAMME ELECTIVE - VI									
	17EE36	Power Quality								
	17EE37	HVDC and FACTS	3	-	-	3	3	40	60	100
	17EE38	Smart and Micro Grid								
	17EE39	Restructured Power Systems								
3	OPEN ELECTIVE - III		3	-	-	3	3	40	60	100
4	17PD11	Project Work	-	-	24	24	12	40	60	100
5	17PD12	Comprehensive Viva-Voce	-	-	2	2	1	100	-	100
		Total	9	-	26	35	22	260	240	500



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P. Shankar

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OPEN ELECTIVE – I (VI Semester)

S. No.	Course Code	Title of the Course	Offered by	Chosen by
1	17MB80	Industrial Engineering and Management	MBA	AE, CE, CSE, ECE, EEE, EIE & IT
2	17MB81	Project Management	MBA	AE, CE, CSE, ECE, EEE, EIE, IT & ME
3	17MB82	Logistics and Supply Management	MBA	AE, CE, CSE, ECE, EEE, EIE, IT & ME
4	17MB83	Banking and Insurance Management	MBA	AE, CE, CSE, ECE, EEE, EIE, IT & ME

OPEN ELECTIVE – II (VII Semester)

S. No.	Course Code	Title of the Course	Offered by	Chosen by
1	17AE80	Principles of Flight	AE	CE, CSE, ECE, EEE, EIE, IT & ME
2	17CE80	Basic Civil Engineering	CE	AE, CSE, ECE, EEE, EIE, IT & ME
3	17CS80	Java Programming	CSE	AE, CE, ECE, EEE, EIE & ME
4	17CS81	Introduction to Operating Systems	CSE	AE, CE, ECE, EEE, EIE & ME
5	17EC80	Satellite Technology	ECE	AE, CE, CSE, EEE, EIE, IT & ME
6	17EC81	Analog and Digital Communications	ECE	AE, CE, CSE, EEE, IT & ME
7	17EE80	Basic Control Systems	EEE	AE, CE, CSE, IT & ME
8	17EE81	Utilization of Electrical Energy	EEE	AE, CE, CSE, ECE, EIE, IT & ME
9	17EI80	Instrumentation Technology	EIE	AE, CE, CSE, ECE, EEE, IT & ME
10	17IT80	Introduction to Database	IT	AE, CE, ECE, EEE, EIE & ME
11	17ME80	Optimization Techniques	ME	AE, CE, CSE, ECE, EIE & IT
12	17ME81	Elements of Automobile Engineering	ME	AE, CE, CSE, ECE, EEE, EIE, & IT



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OPEN ELECTIVE – III (VIII Semester)

S. No.	Course Code	Title of the Course	Offered by	Chosen by
1	17AE81	Space Technology	AE	CE, CSE, ECE, EEE, EIE, IT & ME
2	17CE81	Disaster Management	CE	AE, CSE, ECE, EEE, EIE, IT & ME
3	17CS82	Internet Technologies	CSE	AE, CE, ECE, EEE, EIE & ME
4	17CS83	Shell Programming	CSE	AE, CE, ECE, EEE, EIE & ME
5	17EC82	Elements of Communication Systems	ECE	AE, CE, CSE, IT & ME
6	17EC83	Systems and Signal Processing	ECE	AE, CE, CSE, IT & ME
7	17EE82	Energy Auditing	EEE	AE, CE, CSE, ECE, EIE, IT & ME
8	17EE83	Renewable Energy Sources	EEE	AE, CE, CSE, ECE, EIE & IT
9	17EI81	Nano Technology	EIE	AE, CE, CSE, ECE, EEE, IT & ME
10	17IT81	Computer Networks	IT	AE, CE, EEE & ME
11	17ME82	Robotics and Automation	ME	AE, CE, CSE, ECE, EEE & IT
12	17ME83	Mechanical Handling Systems and Equipments	ME	AE, CE, CSE, ECE, EEE, EIE & IT



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D.K
P. Sekha

B.Tech. (I Sem.)

17FE01 - PROFESSIONAL COMMUNICATION – I

L	T	P	Cr.
3	-	-	3

Pre-requisites : Basics in English Grammar & Vocabulary

Course Educational Objective:

To improve the proficiency of students in English with an emphasis on Vocabulary & Grammar for better communication in formal and informal situations; Develop listening skills required for thorough understanding and analysis to face interviews with confidence.

Course Outcomes: At the end of the course, the student will be able to

CO1: Use English vocabulary & grammar effectively while speaking and writing.

CO2: Comprehend the given text and Communicate confidently in formal and informal contexts.

CO3: Draft E-mails & Memos

CO4: Understand the written and spoken information thoroughly.

CO5: Face interviews with confidence.

UNIT – I

Presidential Address – Dr. A.P.J. Abdul Kalam

Vocabulary: Word formation: Prefixes, suffixes & Compound Collocations

Grammar: Punctuation; Parts of Speech

Reading: Double Angels, David Scott

Writing: Sentence structure; Paragraph writing & Dialogue writing

UNIT – II

SatyaNadella’s E-Mail to his Employees

Vocabulary: Homonyms, Homophones, Homographs (Words often confused)

Grammar: Types of verbs; Types of sentences

Reading: The Road Not Taken – Robert Frost

Writing: Letter Writing: Official Letters

UNIT – III

Technology with a Human Face – E.F.Schumacher

Vocabulary: Synonyms & Antonyms, commonly misspelt words

Grammar: Tenses: Types & Uses

Reading: Extract from ‘Preface’ to Lyrical Ballads – William Wordsworth

Writing: E-mails; Memo drafting

UNIT – IV

Listening Skills: The boy who broke the bank – Ruskin Bond; Importance of active listening; understanding the people; understanding places & events; expanding the proverbs on listening & listening at work place.

UNIT – V

Interview Skills: The lighthouse keeper of Aspinwall – Henryk Sienkiewicz; Interview skills from the story; expanding proverbs on Interview skills; Tips for attending an Interview

Covering letters for job applications & Writing a CV/Résumé



Handwritten signature and stamp of the Head of Department, Dept. of Science and Humanities, AKIREDDY BALIREDDY COLLEGE OF ENGINEERING, MYLAVARAM.

TEXT BOOKS

1. Board of Editors, "Fluency in English – A Course book for Engineering Students", Orient Black Swan, Hyderabad, 2016
2. Dhanavel S.P, "English and Soft Skills", Orient Black Swan, Hyderabad, 2010.

REFERENCES

1. Murphy, "English Grammar with CD", Cambridge University Press, New Delhi, 2004.
2. Rizvi Ashraf M., "Effective Technical Communication", Tata McGraw Hill, New Delhi, 2008
3. BaradwajKumkum, "Professional Communication", I.K.International Publishing House Pvt.Lt., New Delhi, 2008.
4. Raman, Meenakshi and Sharma, Sangeeta, . "Technical Communication -Principles and Practice".Third Edition. New Delhi: Oxford University Press. 2015.



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B.Tech.(I Sem.)

17FE04- DIFFERENTIAL EQUATIONS AND
LINEAR ALGEBRA

L	T	P	Cr.
3	2	-	4

Pre-requisites : Basics of Differential Calculus and Matrix Algebra

Course Educational Objective :

The objective of this course is to introduce the first order and higher order differential equations, functions of several variables. The students will also learn Matrix Algebra.

Course Outcomes : At the end of the course, the student will be able to :

- CO1: Apply first order and first degree differential equations to find Orthogonal trajectories and to calculate current flow in a simple LCR circuit.
- CO2: Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients.
- CO3: Developing continuous functions as an infinite series and compute the Jacobian to determine the functional dependence.
- CO4: Distinguish among the pros and cons between the Row operation methods and Iterative methods in solving system of linear equations.
- CO5: Compute the Eigen values and Eigen vectors and powers, Inverse of a square matrix through Cayley – Hamilton theorem.

UNIT –I

Differential Equations of First Order and First Degree

Differential equations of first order and first degree – Exact and Non Exact Differential Equations, Applications to Orthogonal trajectories, Newton’s Law of Cooling and Law of Growth and Decay.

UNIT –II

Higher Order Differential Equations

Linear differential equations of second and higher order with constant coefficients, method of variation of parameters.

UNIT – III

Functions of Several variables

Generalized Mean Value Theorem (without proof), Maclaurin’s series, Functions of several variables, Jacobians (polar, cylindrical, spherical coordinates), Functional dependence.

Partial Differential Equations.

Formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions. Solution of first order and first degree linear partial differential equation – Lagrange’s method.

UNIT –IV

System of Linear Equations.

Matrices - Rank- Echelon form, Normal form, PAQ form– Solution of Linear Systems – Homogeneous system of equations and Non Homogeneous system of equations

UNIT – V

Eigen Values and Eigen Vectors

Eigen values – Eigen Vectors – Properties – Cayley Hamilton Theorem – Inverse and Powers of a matrix by using Cayley Hamilton Theorem.



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MYLAVARAM - 524 001, Andhra Pradesh

TEXT BOOKS

1. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH Publications, New Delhi, 2010.

REFERENCE

1. M. D. Greenberg, "*Advanced Engineering Mathematics*", 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Krezig, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley & Sons, New Delhi, 2011.
3. W. E. Boyce and R. C. DiPrima, "*Elementary Differential equations*", 7th Edition, John Wiley and sons, New Delhi, 2001.



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B.Tech. (I Sem.)

17FE12 – APPLIED PHYSICS

L	T	P	Cr.
3	2	-	4

Pre-requisites : Basics in Light, Conductivity in different solid materials etc.,

Course Educational Objective : To make students learn the basic concepts of Optics such as Interference, Diffraction, Polarization and Lasers; the principle of quantum mechanics, free electron theory of metals, Concept of semi conductors, diodes and different types of polarizations in dielectrics and their applications.

Course Outcomes : At the end of the course, the student will be able to :

- Co1: Define the nature of Interference and Diffraction.
- Co2: Describe the polarization and LASER, types of lasers and their applications.
- Co3: Estimate the electrical conductivity in metals.
- Co4: Design the circuits of semiconductor diodes, LED, Photodiode, Solar cell.
- Co5: Classify the different types of polarisations in dielectric materials.

UNIT – I : INTERFERENCE AND DIFFRACTION

INTERFERENCE: Introduction, coherence, Conditions for Interference, Interference in thin film by reflection, Newton's rings (reflection), Working principle of Interferometer.

DIFFRACTION: Introduction, Diffraction, Fraunhofer diffraction at single slit- Diffraction due to circular aperture –Diffraction due to N- slits- Diffraction Grating- Resolving power of Grating, Telescope.

UNIT – II : POLARIZATION AND LASERS

POLARIZATION: Introduction – Polarization of light, Brewster's law –Double refraction ,Quarter wave plate – Half wave plate - Polarimeter.

LASERS: Introduction- Characteristics of Lasers – Principle of laser (Absorption, Spontaneous and stimulated emission of Radiation), Einstein Coefficients - Nd-YAG laser, Helium Neon Laser.

UNIT – III : PRINCIPLES OF QUANTUM MECHANICS & FREE ELECTRON THEORY PRINCIPLES OF QUANTUM MECHANICS

De Broglie waves, Experimental verification- Schrodinger wave equation-time independent wave equation, physical significance of the wave function – particle in a box.

FREE ELECTRON THEORY

Classical free electron theory- Postulates , Expression for electrical conductivity and drift velocity, Advantages and Draw backs, Fermi-Dirac statistics(qualitative treatment only), Classification of Solids on the basis of Band theory.

UNIT – IV: SEMI CONDUCTOR PHYSICS

Conductivity of Intrinsic and Extrinsic semiconductors, Drift and Diffusion Einstein relation, Hall Effect, Differences between direct and indirect Band Gap semiconductors, LED, photo detector, Solar Cell, Applications of Solar Cells.

UNIT – V: DIELECTRIC MATERIALS

Dielectric polarization (Electronic, ionic, orientation polarization), Local field, Clausius Mosotti equation, Dielectric loss, Ferro electricity, Piezoelectricity, Dielectric breakdown, Applications of dielectric materials.



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TEXT BOOKS

1. V. Rajendran, "*Engineering Physics*", TMH, New Delhi, 6th Edition, 2013.
2. D. K. Bhattacharya, Poonam Tandon, "*Applied Physics*", Oxford press, New Delhi, 1st Edition, 2016.

REFERENCES

1. M.N. Avadhanulu, TVS Arun Murthy, "*Applied Physics*", S. Chand & Co., 2nd Edition, 2007.
2. P.K. Palani Samy, "*Applied Physics*", Sci. Publ. Chennai, 4th Edition, 2016.
3. P. Sreenivasa Rao, K Muralidhar, "*Applied Physics*", Him. Publi. Mumbai, 1st Edition, 2016.
4. Hitendra K Mallik , AK Singh "*Engineering Physics*", TMH, New Delhi, 1st Edition, 2009.




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B.Tech. (I Sem.)

17CI01 - COMPUTER PROGRAMMING

L	T	P	Cr.
2	2	-	3

Pre-requisites : NIL

Course Educational Objective: In this course student will learn about

The basic elements C programming structures like data types, expressions, control statements, various I/O functions and how to solve simple mathematical problems using control structures. The derived data types like arrays, strings, various operations on them. Modular programming using functions and Memory management using pointers. User defined structures and various operations on it. The basics of files and its I/O operations.

Course Outcomes: At the end of the course, the student shall be able to:

CO1: Identify basic elements of C programming structures like data types, expressions, control statements, various simple functions and in view of using them in problem solving.

CO2: Apply various operations on derived data types like arrays and strings in problem solving.

CO3: Design and Implement Modular Programming and memory management using pointers.

CO4: Implement user defined data structures used in specific applications.

CO5: Compare different file I/O operations on text and binary files.

UNIT – I

Introduction to Problem solving through C-Programming: Problem Specification.

Algorithm / pseudo code, flowchart, examples.

C-Programming: Structure of C program, identifiers, basic data types and sizes, Constants, variables, Input-output statements, A sample c program, operators: arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence of operators and order of evaluation. **Conditional statements:** if, if else, else if ladder and switch statements, continue, goto and labels. Loops: while, do-while and for statements, break, programming examples.

UNIT – II

Arrays- one dimensional arrays-concept, declaration, definition, accessing elements, storing elements, two dimensional and multi-dimensional arrays. **Character Strings:** declaration, initialization, reading, writing strings, arithmetic operations on characters, string handling functions programming examples

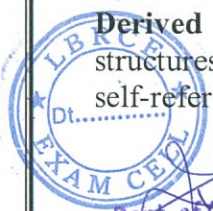
UNIT – III

Functions: basics, category of functions, parameter passing techniques, recursive functions-comparison with Iteration, Functions with arrays, storage classes- extern, auto, and register, static, scope rules, Standard library functions., dynamic memory management functions, command line arguments, c program examples.

Pointers- concepts, declaring & initialization of pointer variables, pointer expressions, address arithmetic, pointers and arrays, pointers and character strings, pointers to pointers, Pre-processor Directives and macros.

UNIT –IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, C program examples.



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UNIT – V

Files – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling, and C program examples.

TEXT BOOK

Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 7th Edition, 2013

REFERENCE

1. N.B.Venkateswarlu and E.V.Prasad, C and Data Structures, S.Chand Publishing, 1st Edition, 2010,
2. ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015
3. Stephen G.Kochan, Programming in C, Pearson Education, 3rd Edition, 2005
4. PradeepDey, Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition, 2011
5. E Balagurusamy, Computer Programming, McGraw Hill Education, 1st Edition




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B.Tech. (I Sem.)

17ME50 - BASIC ENGINEERING MECHANICS

L	T	P	Cr.
2	2	-	3

Prerequisite Subject: NONE**Course Educational Objectives (CEO):**

The main objective of this course is to develop the capacity to predict the behaviour of rigid bodies under the action of external forces in real world scenario.

Course Outcomes: After completion of the course, students will be able to

CO1 : Analyze the coplanar force systems using free body diagrams.

CO2 : Analyze the rigid bodies associated with friction forces using conditions of equilibrium.

CO3 : Determine the centroid and moment of inertia of plane sections.

CO4 : Determine the center of gravity and mass moment of inertia of solids.

CO5 : Examine the behaviour of moving bodies in rectilinear and trajectory motion using kinematic equations.

UNIT – I

Introduction to Engineering Mechanics: Basic concepts of Mechanics

Resultant of System of Forces: Resultant of Coplanar Concurrent Force System, Moment of a Force, Couple, Varignon's Theorem, Resultant of Coplanar Non-Concurrent Force System.

Equilibrium of Systems of Forces: Equilibrium of a Body Subjected to Concurrent Forces and Non-Concurrent Forces, Free Body Diagrams, Lami's Theorem, Equilibrium of Connected Bodies.

UNIT - II**Friction**

Introduction, Types of Friction, Laws of Friction, Angle of Friction, Angle of Repose, Problems on blocks resting on horizontal and inclined planes, Ladder Friction.

UNIT - III

Centroid: Concept of Centroid, Centroid of plane sections.

Area Moment of Inertia: Theorems of Moment of Inertia, Determination of area moment of Inertia of Circle, Rectangle, Hollow Circle, Semi Circle, Triangle.

UNIT – IV

Centre of Gravity: Concept of Centre of gravity, Centre of gravity of simple bodies.

Mass Moment of Inertia: Theorems of Moment of Inertia, Radius of gyration, Determination of Mass Moment of Inertia of Uniform Rod, Rectangular Plate, Circular Plate, Solid Cone, Solid Sphere, Solid Cylinder.

UNIT – V**Kinematics:**

Rectilinear Motion, Motion Curves, Motion with Uniform Velocity, Motion with Uniform Acceleration.

Projectiles: Definitions, Motion of a Body Projected Horizontally, Inclined projection on Level Ground, Inclined Projection with Point of Projection and Point of Strike at Different Levels.



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TEXT BOOKS

1. S.S. Bhavikatti, Engineering Mechanics, 4th Edition, New Age International (P) Ltd, 2012.
2. N.H. Dubey, Engineering Mechanics, McGraw Hill, 2013.

REFERENCES

1. Ferdinand . L. Singer, Engineering Mechanics, 3rd edition, Harper – Collins, 1994.
2. B. Bhattacharya, Engineering Mechanics, 1st edition , Oxford University Press, 2008.
3. A.K. Tayal, Engineering Mechanics, 14th edition , 2nd reprint, Umesh Publications, 2012.
4. R.K. Bansal, Engineering Mechanics, 3rd edition, Laxmi Publications, 1996.
5. Manoj K Harbola, Engineering Mechanics, 2nd edition, Cengage Learning, 2012.



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(SANKARARAO.V)

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B.Tech. (I Sem.)

17FE60 - ENGLISH COMMUNICATION SKILLS LAB

L	T	P	Cr.
-	-	2	1

Pre-requisites: Students should have fundamental knowledge in making sentences and be with readiness to speak

Course Educational Objective:

To improve the proficiency of students in English with an emphasis on better communication in formal and informal situations; Develop speaking skills required for expressing their knowledge and abilities and to face interviews with confidence.

Course Outcomes: At the end of the course, the student will be able to

- CO1 : Articulate English with good pronunciation.
 CO2 : Manage skilfully through group discussions.
 CO3 : Communicate with the people effectively.
 CO4 : Collect and interpret data aptly.

Syllabus: English Communication Skills Lab (ELCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self- study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise – I

CALL Lab:

Understand: Sentence structure, written language.

ICS Lab:

Practice: Introduction to English Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Phonetic Transcription.

Exercise – II

CALL Lab:

Understand: Usage of various words in different parts of speech.

ICS Lab:

Practice: Ice-Breaking Activity and JAM Session – Introducing Oneself.

Exercise – III

CALL Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication

ICS Lab:

Practice: Situational Dialogues – Role-Play – Expressions in various situations – Making Requests and seeking permissions.

Exercise – IV

CALL Lab:

Understand: Data collection strategies – Interpretation of collected data.

ICS Lab:

Practice: Data interpretation – Information transfer from flow charts, pie charts, bar graphs, pictograms etc.



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Exercise – V

CALL Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

ICS Lab:

Practice: Introduction to Group Discussions

Lab Manual:

Board of Editors, “ELCS Lab Manual – A Workbook of CALL and ICS Lab Activities”, Orient Black Swan Pvt. Ltd., Hyderabad, 2016.

SUGGESTED SOFTWARE:

1. Digital Mentor: Globarena, Hyderabad, 2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA, 2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, the Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company, USA, 2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008.



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L	T	P	Cr.
-	-	2	1

B.Tech. (I Sem.)

17FE62 – APPLIED PHYSICS LAB

Pre-requisites : Awareness about the usage of Vernier callipers, Screw Gauge etc.,

Course Educational Objective :

To make students learn the theoretical concepts, Analytical techniques and graphical analysis through completing a host of experiments with the procedures and observational skills using simple and complex apparatus.

Course Outcomes : At the end of the course, the student will be able to :

CO1: Find the wave length of Laser light source and width of single slit by forming diffraction pattern.

CO2: Estimate the Radius of curvature of Plano convex lens by forming Newton's rings.

CO3: Analyze the characteristics of different Diodes.

CO4: Determine the energy band gap of a semiconductor Diode.

List of Experiments

(ANY 8 EXPERIMENTS)

GENERAL EXPERIMENTS:

1. Study the characteristics of LED.
2. Determine the energy band gap of a semi conductor Diode.
3. Determine the frequency of AC supply by using Sonometer.
4. Study the characteristics of Zener Diode.
5. Study the magnetic field along the axis of a current carrying circular coil using Stewart's & Gee's apparatus and to verify Biot - Savart's law.
6. Study the characteristics of Solar cell
7. Determine the dielectric constant of a dielectric material.
8. Study the characteristics of Photo diode

OPTICS LAB EXPERIMENTS:

9. Determine the wavelength and divergence of a laser radiation.
10. Determine the width of a single slit by forming diffraction pattern.
11. Determine the Radius of Curvature of a Plano - Convex lens by forming Newton's Rings.
12. Find the specific rotation of sugar solution by using a polarimeter.
13. Determine the Refractive index of a material of the given prism.
14. Determine the Wavelengths of various spectral lines by using diffraction grating.
15. Determination of a thickness of thin wire by using wedge shaped film.

TEXT BOOKS

Lab Manual Prepared by the LBRCE.



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B.Tech. (I Sem.)

17CI60 - COMPUTER PROGRAMMING LAB

L	T	P	Cr.
-	-	2	1

Pre-requisites : NIL

Course Educational Objective: In this course student will learn about Software development tools like algorithm, Pseudo codes and programming structure. Basic elements C programming structures like data types, expressions, Control statements, various I/O functions and how to solve simple mathematical Problems using control structures. Design and implementation of various software components which solve real world problems.

Course Outcomes: At the end of the course the student will be able to

CO1: Apply and practice logical formulations to solve some simple problems leading to specific applications.

CO2: Demonstrate C programming development environment, compiling, debugging, linking and executing a program using the development environment.

CO3: Design effectively the required programming components that efficiently solve computing problems in real world.

Mandatory: All Programs must have Algorithms and Flow Charts

LAB CYCLE SYLLABUS

I) Exercise Programs on Basics of C-Program

Write a program in 'C' language to cover the following problems.

- Example program which shows the usage of various preliminary Data types available in C Language.
- Example program which shows the usage of various Operators available in C Language.
- Example programs to illustrate the *order of evaluation*.

II) Exercise Programs on Control Structures:

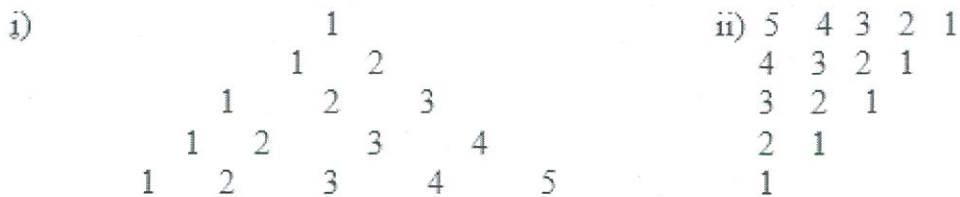
- To check whether the given year is leap year (or) not
- Roots of Quadratic Equation.
- Finding smallest & biggest number from the given set of 4 numbers using 'if' statement.
- Calculate the student grade in the examination – assume suitable Constraints.
- Prepare electricity bill for the consumed units – assume suitable Constraints.
- Converting given two digit number into words using switch statement
- To illustrate the usage of 'goto' statement.

III) Exercise Programs on Loops:

- To Display first N natural numbers
- To find whether the given number is Armstrong (or) not
- To find reverse of the given number and to check whether it is palindrome (or) not.
- To find whether given number is strong number (or) not.
- To check whether given number is Prime (or) not
- To display prime numbers with in the given range (Nesting of Loops).
- To display the following structure (Nesting of Loops)



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IV) Exercise Programs on Arrays & Strings:

Write example programs in C Language to perform following operations:

- a) Finding the sum and average of given numbers using Arrays.
- b) To display elements of array in reverse order
- c) To search whether the given element is in the array (or) not using linear search & binary search.
- d) Write a C program to perform the following operations
 - i) Addition, subtraction and multiplication of Matrices
 - ii) Transpose of given matrix
 (The above operations are to be exercised using functions also bypassing arguments)
- e) Write a C program to find whether the given string is palindrome (or) not.
- f) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
- g) Write an example program to illustrate the use of any 5 string handling functions.

V) Exercise Programs on Functions & Pointers:

- a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.
- b) Write an example program to describe the usage of *call by reference*.
- c) Write a program to find sum of the elements of the array using functions.

VI) Exercise Programs on Functions:

Write example programs in C Language:

- a) To find factorial of a given number using functions.
- b) Swap two numbers using functions.
- c) To find GCD of two numbers using recursion
- d) Write a recursive function to solve Towers of Hanoi problem.
- e) Write an example program to illustrate use of external & static storage classes.
- f) Write an example program to illustrate the usage of command line arguments.
- g) Program to illustrate the usage of dynamic memory management functions.

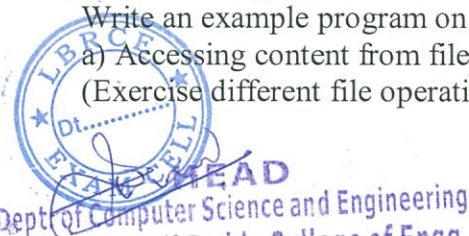
VII) Exercise Programs on Derived data types:

- a) Write an example program using structures to process the student record. Assume suitable fields for student structures (Different kinds of initialization of structure variables are to be exercised)
- b) Write a program to read records of 10 employees and find their average salary (Exercise array of structures & Nested structures concepts through this program).
- c) Write a program to handle a structure variable using pointers and implement self referential structure (i.e. A structure variable having a pointer to itself)

VIII) Exercise Programs on Files:

Write an example program on file to perform following operations:

- a) Accessing content from files and writing content in to it.
(Exercise different file operation modes)



L	T	P	Cr.
1	-	2	2

B.Tech. (I Sem.)

17ME60 - ENGINEERING WORKSHOP

PRE-REQUISITES: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability

COURSE EDUCATIONAL OBJECTIVE:

The objective of this course is to get familiarized with various trades used in Engineering Workshop and learn the safety pre-cautions to be followed in the workshops, while working with the different tools.

COURSE OUTCOMES: After completion of the course students are the able to:

CO1 : Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint.

CO2 : Fabricate and model various basic prototypes in the trade of fitting such as Straight fit, V- fit.

CO3 : Produce various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder.

CO4 : Perform various basic House Wiring techniques.

(Conduct at least 4 Trades with 2 exercises from each Trade and demonstrate about 2 Trades)

Trade –1: CARPENTRY SHOP

1.1. Introduction to various types of wood such as Teak, Mango, Sheesham, etc. (Demonstration and their identification).

1.2. Demonstration, function and use of commonly used hand tools.

1.3. Introduction to various types of wooden joints, their relative advantages and uses.

1.4. Care maintenance of tools and safety precautions in carpentry shop.

Job I- Marking, sawing, planning and chiselling & their practice

Job II -Preparation of half lap joint

Job III -Preparation of Mortise and Tenon Joint

Trade –2: FITTING SHOP

2.1. Introduction to fitting shop tools, common materials used in fitting shop.

2.2. Description and demonstration of simple operation of hack-sawing, various types of blades and their specifications, uses and method of fitting the blade.

2.3. Care and maintenance of tools & safety precautions in fitting shop.

Job I-Making a L-Fit from a rectangular piece of MS

Job II-Making a T-Fit from a rectangular piece of MS

Job III-Making a V-Fit from a rectangular piece of MS

Job IV-Making a Half round Fit from a rectangular piece of MS

Trade -3: TIN- SMITHY SHOP

3.1. Introduction to tin -smithy shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material and specifications.

3.2. Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanized corrugated sheet, aluminium sheets etc.

3.3. Care and maintenance of tools & safety precautions in Tin-Smithy shop.

Job I - Preparation of a rectangular tray.

Job II- Preparation of a open scoop/ funnel.

Job III - Preparation of a Single Seam Joint and Double Seam Joint.

Job IV - Preparation of a Corner Seam Joint.

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Trade -4: PLUMBING SHOP

- 4.1. Introduction to plumbing –use of hand tools and accessories e.g. pipe vice, Die sets, adjustable spanners, pipe wrench, pipe cutter and pipes and pipe fittings -various raw materials used in plumbing such as PVC Pipes, CI Pipes, MS pipes, Brass Pipes, Copper Pipes, Aluminium Pipes.
- 4.2. Demonstration of hand tools used in plumbing – preparation of pipe layout and pipe threading.
- 4.3. Care and maintenance of tools & safety precautions in Plumbing.
Job I – preparation of pipe layout.
Job II – Pipe threading.

Trade -5: BLACK SMITHY

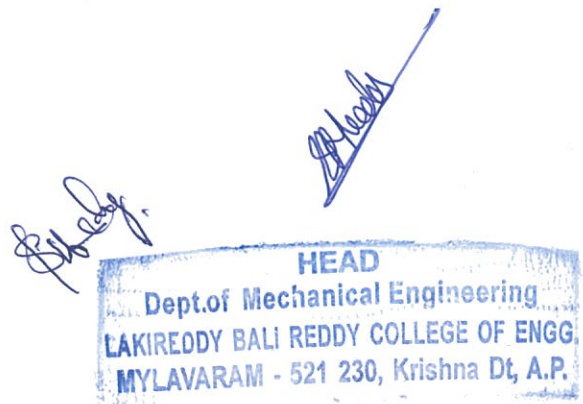
- 5.1. Introduction to Black smithy –use of tools and equipments e.g.
- 5.2. Demonstration of forging operations.
- 5.3. Care and maintenance of tools & safety precautions in Black smithy.
Job I – preparation of S –Hook.
Job II – preparation of Chisel

Trade -6: HOUSE WIRING

- 6.1. Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, PVC Conduits.
- 6.2. Study of electrical safety measures and demonstration about use of protective devices such as fuses, and relays including earthing.
Job I - Two lamps in series and parallel connection with one way switch
Job II – Florescent lamp and calling bell circuit.
Job III- One lamp connection with two 2- way switches(stair case connection).
Job IV – House wiring circuit.

REFERENCE

1. LBRCE Workshop Lab Manual
2. S.K.Hajra Choudary & A.K.Choudary, “Workshop Technology-I”, Media Promoters and Publishers Pvt.Ltd., Mumbai, 2012.
3. B.S.Raghuvamsi, “Workshop Technology-I”, Dhanpatrai and company, New Delhi, 2014.
4. P.Khannaiah, K.L.Narayana, “Workshop Mnaual”, Scitech Publications India Pvt.Ltd, 2015.



B.Tech. (II Sem.)

17FE02 - PROFESSIONAL COMMUNICATION - II

L	T	P	Cr.
3	-	-	3

Pre-requisites: Students should have basics in English vocabulary and Grammar & they should write error free sentences

Course Educational Objective : To Improve vocabulary, Grammar, Verbal – Non verbal Communication; to develop adaptability, assertive skills and Team spirit for skillful management in work place; and to Interpret technical data given in the form of charts, graphs & pictograms for writing technical reports.

Course Outcomes: At the end of the course, the student will be able to

- CO1 : Use appropriate vocabulary to interpret data thoroughly and to write reports effectively.
 CO2 : Face any situation with confidence and voice opinions/decisions assertively.
 CO3 : Use English Language effectively in spoken and written forms.
 CO4 : Work effectively in teams for better result.
 CO5 : Communicate effectively using verbal and non-verbal dimensions aptly.

UNIT – I

Good Manners – J.C. Hill

Vocabulary: Idioms; One-word substitutes

Grammar: Subject-Verb agreement (Concord)

Reading: If – Rudyard Kipling

Writing: Information transfer: Tables, Bar graphs, Line graphs, Pie charts, Flow charts, Tree Diagrams, Pictograms; Note-making & Abstract/Summary writing

UNIT – II

Assertive Skills: Verger – Somerset Maugham; Assertive skills from the story; Assertive skills at personal level & at workplace; Expanding proverbs & their Significance

Team work skills: White washing the fence – Mark Twain; Teamwork skills from the story; Teamwork at work place & its Importance

UNIT – III

Oh Father, Dear Father – Raj Kinger

Vocabulary: Foreign Languages and their Influence on English

Grammar: Conditional Sentences; Degrees of Comparison; Question Tags

Reading: Basic Education – M.K. Gandhi

Writing: Report Writing: Nature, Significance & Types of Reports

UNIT – IV

Adaptability: Sen~or Payroll – W E Barrett; Understanding the Organizational Communication; Adaptability skills from the story; Expanding proverbs on Adaptability skills; Importance at work place & Real life - Active & Passive Voice; Direct & Indirect Speech.



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UNIT – V

Non-Verbal Communication Skills: A real good smile – Bill Naughton; ‘Wh’ & ‘Yes’ or ‘No’ questions; Working on articulation and gestures; Non-Verbal Communication Skills from the story; Expanding the proverbs on Non-Verbal Communication; enhancing skills through real life experiences - Common Errors.

TEXT BOOKS

1. Board of Editors, “Fluency in English – A Course book for Engineering Students”, Orient Black Swan, Hyderabad, 2016
2. Dhanavel S.P, “English and Soft Skills”, Orient Black Swan, Hyderabad, 2010.

REFERENCES

1. Murphy, “English Grammar with CD”, Cambridge University Press, New Delhi, 2004.
2. Rizvi Ashraf M., “Effective Technical Communication”, Tata McGraw Hill, New Delhi, 2008
3. BaradwajKumkum, “Professional Communication”, I.K.International Publishing House Pvt.Lt., New Delhi, 2008.
4. Raman, Meenakshi and Sharma, Sangeeta, . “Technical Communication -Principles and Practice”.Third Edition. New Delhi: Oxford University Press. 2015.



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B.Tech. (II Sem.)

17FE06 - TRANSFORMATION TECHNIQUES AND VECTOR CALCULUS

L	T	P	Cr.
3	2	-	4

Pre-requisites : Basics of Integral Calculus and Vector Calculus

Course Educational Objective : In this course the students are introduced to Integral transformations which includes Laplace Transforms and Z – Transforms. They will also learn Multiple Integrals in different coordinate systems and Vector Calculus.

Course Outcomes : At the end of the course, the student will be able to :

CO1: Apply the concepts of Laplace Transforms to solve ordinary differential equations.

CO2: Apply Z - Transforms to solve difference equations

CO3: Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes.

CO4: Evaluate the directional derivative, divergence and angular velocity of a vector function.

CO5: Apply Vector Integration for curves, surfaces and volumes and relationship among themselves.

UNIT – I**Laplace Transforms**

Laplace transforms of standard functions –Linear Property - Shifting Theorems, Change of Scale Property – Multiplication and Division by 't' - Transforms of derivatives and integrals – Unit step function –Dirac's delta function..

Inverse Laplace Transforms

Inverse Laplace transforms– Linear Property - Shifting Properties - Convolution theorem, Applications of Laplace transforms to ordinary differential equations.

UNIT – II**Z-Transforms**

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse Z –transform - Convolution theorem – Solution of difference equation by Z-transforms.

UNIT – III**Multiple Integrals**

Multiple integrals - double and triple integrals (Cartesian, polar, spherical coordinates) – Changing of order of Integration and applications to areas and volumes.

UNIT – IV**Vector Differentiation**

Vector Differentiation: Gradient- Directional Derivatives -Divergence – Solenoidal fields- Curl – Irrotational fields-potential surfaces - Laplacian and second order operators and related properties of sums and products

UNIT – V**Vector Integration**

Vector Integration - Line integral – work done –area - surface and volume integrals. Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems



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TEXT BOOKS

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. Dr. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH, New Delhi, 2010.

REFERNCES

1. Michael D. Greenberg , "*Advanced Engineering Mathematics*", 2nd Edition, TMH, New Delhi, 2011.
2. Erwin Krezig, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley & Sons, New Delhi, 2011.



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B.Tech. (II Sem.)

17FE14 - APPLIED CHEMISTRY

L	T	P	Cr.
4	-	-	4

Pre-requisites : Knowledge of atomic weights, molecular weights, equivalent weights, galvanic cell, working principle of battery, concept of polymerization .

Course Educational Objectives

In this course, students will learn the concepts and applications of chemistry in engineering. It aims at strengthening the students with the fundamental concepts of chemistry. It provides them with the knowledge of water specification for different industries along with solutions to the problems that arise due to hardness of water.

It enables the students to know analysis of fuels and alternate fuels used in diverse fields. It makes the students to effectively use the knowledge of electrochemistry, battery technology, and corrosion science in engineering applications It enables the students to identify the role of polymers and lubricants in various fields.

Course Outcomes : After completion of course, students will be able to

- CO1: Identify the troubles due to hardness of water and its maintenance in industrial applications.
- CO2: Analyze issues related to conventional fuels and apply the concepts of advanced fuels like bio, nuclear and rocket fuels in energy production.
- CO3: Analyze different types of electrodes and batteries for technological applications..
- CO4: Apply principles of corrosion for design and effective maintenance of various equipments.
- CO5: Identify the important applications of engineering materials like plastics, rubbers and lubricants.

UNIT – I : WATER TECHNOLOGY

Introduction: Sources of water and quality.

Hardness: Hardness of Water - Temporary and permanent hardness, units and their inter relation, problems on hardness and disadvantages of hard water in industries.

Boiler troubles: Reasons, disadvantages and methods of prevention for scale and sludge formation, caustic embrittlement, boiler corrosion and carryover(priming and foaming).

Water softening: Ion- Exchange Process, merits and demerits.

Desalination of brackish water: Electro dialysis and reverse osmosis.

UNIT – II : CONVENTIONAL FUELS

Introduction: Definition and classification of fuels(solid,liquid and gaseous fuels, merits and demerits) and characteristics of a good fuel.

Calorific value: Definition, gross and net calorific values (definition only).

Solid fuels: Coal – Origin, proximate analysis of coal and significance.

Liquid Fuels: Petroleum-origin, types of crude oil and refining of petroleum. Cracking – moving bed catalytic cracking and synthetic petrol –Fischer Tropsch's process.

Gaseous fuels: Natural gas composition and C.N.G - advantages.

ADVANCED FUELS

Bio fuels: Characteristics of bio fuels, sources of bio mass and advantages, - Production of bio diesel from rape seed oil.

Nuclear fuels: Nuclear fission, fusion, differences between chemical and nuclear fuel, Charecterstics of fuel elements.

Rocket propellants: Characteristics of good propellants, classification, examples and mechanism of propulsion.

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UNIT – III : ELECTRO CHEMISTRY & BATTERIES

Introduction: Electrode potential, standard reduction and oxidation potentials (S.R.P and S.O.P), E.M.F/cell potential of a cell.

Nernst equation: Derivation and problems.

Reference Electrode: Standard hydrogen electrode (S.H.E), calomel electrode, measurement of electrode potential, electro chemical series and applications.

Types of batteries: Primary, secondary and reserve batteries, dry battery (Leclanche cell), Nickel-Cadmium battery, Magnesium - Copper reserve battery.

Fuel Cells: Hydrogen- Oxygen fuel cells.

UNIT – IV : SCIENCE OF CORROSION

Introduction: Definition, examples.

Dry Corrosion (Direct Chemical corrosion): Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule, corrosion by other gases and liquid metal corrosion.

Wet Corrosion (Electro Chemical corrosion): Mechanism - Oxygen absorption, Hydrogen evolution, Types of wet corrosion, galvanic corrosion, concentration cell corrosion, passivity, galvanic series.

Factors Influencing Corrosion: Nature of metal (purity, position in galvanic series, relative area of cathode and anode, nature of surface film) and nature of environment (temperature, humidity, atmospheric pollution and nature of ions in the medium).

Control of Corrosion: Cathodic protection (sacrificial anode and impressed current methods), electro plating and metal cladding.

UNIT – V : CHEMISTRY OF ENGINEERING MATERIALS

Polymers: Definition, basic terminology, differences between thermosets & thermoplasts, types of polymerization (addition, condensation and co-polymerisation), preparation, properties and engineering applications of Teflon and bakelite, conducting polymers-extinsic and intrinsic conducting polymers.

Rubbers: Definition, processing of natural rubber, draw backs, vulcanization and advantages, preparation, properties and applications of BUNA-S and thiokol.

Lubricants: Characteristics of a good lubricant and properties of lubricants (viscosity, flash and fire points, cloud and pour points, aniline point) and applications.

TEXT BOOKS

1. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 3rd Edition, 2003.
2. Jain, Jain, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 16th Edition, 2015.

REFERENCES

1. Shikha Agarwal, "A text book of Engineering Chemistry", Cambridge University Press, New Delhi, 1st Edition, 2015.
2. S.S. Dara, S.S. Umare, "A Text book of Engineering Chemistry", S. Chand Publications, New Delhi, 12th Edition, 2010.
3. Y. Bharathi Kumari, Jyotsna Cherukuri, "A Text book of Engineering Chemistry", VGS Publications, Vijayawada, 1st Edition, 2009.



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B.Tech. (II Sem.)

17ME51 - THERMAL AND HYDRO PRIME MOVERS

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Pre-requisites :

Course Educational Objective: In this course student will learn about to understand the basic functions of prime movers and analyze the performance characteristics of prime movers(IC engines, hydraulic turbines), pumps.

Course Outcomes: At the end of the course, the student will be able to

CO1: Comprehend the laws of Basic Thermodynamics and Fluid Mechanics

CO2: Analyze the performance of steam turbines and gas turbines using principles of thermodynamics

CO3: Demonstrate working of different types of IC engines

CO4: Illustrate Pressure and Flow measurement devices with concepts of Fluid mechanics

CO5: Evaluate the performance of Hydraulic machines

UNIT-I

BASIC THERMODYNAMICS

Fundamental concepts-Thermodynamic System-types State, Path, Process and Cycle. Work done in Constant pressure, Constant Volume, Constant Temperature and Reversible Adiabatic, Polytrophic Process-Problems.

ZEROTH LAW: Equality of temperature.

FIRST LAW: First Law of Thermodynamics: Statement-Internal Energy-Enthalpy-Specific Heat-Steady Flow Energy Equation-Problems

SECOND LAW: Second Law of Thermodynamics: Kelvin –Plank and Clausius Statements, Reversible Process-Carnot Cycle-Qualitative treatment

UNIT-II

INTERNAL COMBUSTION ENGINES

Classification-Working principle of Spark Ignition and Compression Ignition Engines-2 Stroke &4 Stroke Engines, Valve and Port timing diagrams-Parameters of performance-Brake power, Determination of Frictional power and Indicated power, Performance tests

GAS TURBINES

Introduction, Classification of Gas Turbines, Analysis of Closed and Open cycle Gas Turbine plants, Application of Gas turbines, Performance parameters, Basic problems

UNIT-III

STEAM TURBINES

Introduction, Working principle, Classification ,Impulse turbine-Mechanical details, Velocity diagram-effect of friction-power developed, axial thrust, blade efficiency, Pressure compounding, Velocity compounding, Applications of Steam turbines

UNIT-IV

FUNDAMENTALS OF FLUID MECHANICS

Introduction-Properties of fluids-Pressure, Density, Specific Weight, Specific Gravity, Viscosity-Types of fluids-Types of fluid flows-Continuity, Momentum and Bernoulli's equation

PRESSURE AND FLOW MEASUREMENT

Simple manometers-Piezometer, U-tube manometer, Single column manometer, Differential U-tube manometer, Orifice meter, Venturi meter



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UNIT-V

HYDRAULIC TURBINES

Classification of Turbines, Pelton Wheel, work done and efficiencies of Pelton Wheel, Working proportions of Pelton Wheel, Francis Turbine, work done and efficiencies of Francis Turbine, Working proportions of Francis Turbine, Kaplan Turbine, work done, heads& efficiencies

TEXT BOOKS

1. Rajput "Thermal Engineering ",8th Edition, Lakshmi publications,2010
2. P.N.Modi and S.M.Seth, Hydraulics, "Fluid Mechanics and Hydraulic Machinery", 15th Edition, Standard Book House, 2004

REFERENCES

- 1 R.K.Bansal, "Fluid Mechanics and Hydraulic Machines", 9th Edition, laxmi publications.
2. Banga& Sharma, " Hydraulic Machine"s, Edition, Khanna publishers, 6th Edition,1999
3. RamaDurgaiah, "Fluid Mechanics and Machinery", Edition, New Age International, 1st edition,2006



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A handwritten signature in blue ink, appearing to be "S. R. Reddy".

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B.Tech. (II Sem.)

17EE01 - ELECTRONIC CIRCUITS AND DEVICES

Pre-requisites: Applied Physics (17FE12)**Course Educational Objective:** This course enables the student to interpret the concepts of basic and special semiconductor devices and their applications.**Course Outcomes:** At the end of the course, the student will be able to:

- CO1 : Illustrate the working of different types of semiconductor devices and their characteristics
 CO2 : Analyse the diode and transistor circuits
 CO3 : Design transistor stabilizing circuits

UNIT – I: JUNCTION DIODE CHARACTERISTICS

Review of semi conductor Physics – n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level of semiconductors, Energy band diagram of PN diode, PN diode-biasing, The current components, Diode equation, V-I characteristics, Temperature dependence of VI characteristic, Transition and Diffusion capacitances, Breakdown Mechanisms in p-n Diode, Zener diode, Tunnel Diode, Varactor Diode, LED.

UNIT – II: RECTIFIERS AND FILTERS

Half wave rectifier, Full wave rectifier, Bridge rectifier , Ripple factor Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, Π - section filter, Multiple L- section and Multiple Π section filter, and comparison of various filter circuits in terms of ripple factors, basics of regulators, Analysis using software tools.

UNIT – III: TRANSISTOR AND FET CHARACTERISTICS

Junction transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Current components in a transistor, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation between Alpha, Beta and gamma, Small signal model of Transistor, JFET, MOSFET characteristics (Enhancement and depletion mode), Comparison of Transistors,

UNIT – IV: BIASING AND STABILISATION

BJT biasing, DC equivalent model, criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for stabilization, Stabilization factors, (S, S', S''), Compensation techniques, (Compensation against variation in V_{BE} , I_{co}), Thermal run away, Thermal stability FET Biasing, Analysis using software tools.

UNIT – V: AMPLIFIERS AND SPECIAL SEMICONDUCTOR DEVICES

Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of A_i , R_i , A_v , R_o . FET Amplifier (CD and CS). **SPECIAL SEMICONDUCTOR DEVICES:** Introduction to special diodes- PIN diode, Schottky diode, Photo diode, Power diode and LCD V-I characteristics of SCR, UJT, IGBT, DIAC and power MOSFET.

TEXT BOOKS

1. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson/Prentice Hall, 9th Edition, 2006
2. Jacob Millman, Christos C Halkias and Satyabrata Jit, Millman's Electronic Devices and Circuits, Tata McGraw Hill, Second Edition, New Delhi, 2008.

REFERENCES

1. S Salivahanan, N.Suresh Kumar and A Vallavaraj, Electronic Devices and Circuits, McGraw Hill, 5th edition, 2010.
2. J.B Gupta Electronic Devices and Circuits, S.K. Kataria & Sons, 2nd Edition, 2013.
3. Mohammad H. Rashid, "Spice for Circuits and Electronics using PSPICE", PHI, 2e, 2006.

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B.Tech. (II Sem.)

17FE64 - APPLIED CHEMISTRY LAB

Pre-requisites : Knowledge of volumetric titration.

Course Educational Objectives:

The primary objective of Applied Chemistry is to make the students analyze water sample for hardness and alkalinity. It makes the students to perform and distinguish different types of volumetric titrations. It also provides them with an overview of preparation of polymers. It makes the students to find important properties of fuels and lubricants for their effective use.

Course Outcomes: After completion of the course, the students will be able to

CO1: Assess quality of water based on the procedures given.

CO2: Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus.

CO3: Acquire practical knowledge related to preparation of polymers.

CO4: Exhibit skills in performing experiments based on theoretical fundamentals.

Introduction

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
2. Preparation of standard solutions, concept of standardisation of solutions, dilution to get solution of required normality.
3. Model experiment - Determination of amount of HCl using standard Na_2CO_3 solution.

Water analysis

4. Determination of alkalinity of water sample.
5. Determination of total hardness of water by EDTA method.
6. Determination of permanent hardness of water by EDTA method.

Preparation of polymers

7. Preparation of Urea Formaldehyde resin.
8. Preparation of Phenol Formaldehyde resin.

Redox titrations

9. Estimation of Mohr's salt by using potassium permanganate.
10. Estimation of Mohr's salt by using potassium dichromate.
11. Estimation of KMnO_4 by using Oxalic acid.

Demonstration Experiments

12. Determination of pH of the given sample solution/ soil using pH meter.
13. Determination of turbidity of the given sample water.

Fuels

14. Determination of flash and fire points of a given fuel/lubricant.
15. Determination of cloud and pour point of a given fuel/lubricant.
16. Determination of Aniline point of a given lubricant.

REFERENCES

Lab manual



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B.Tech. (II Sem.)

**17ME76 - THERMAL AND HYDRO PRIME MOVERS
LAB**

Pre-requisites :

Course Educational Objective : In this course student will learn about to gain practical knowledge on performance of IC engines, pumps, turbines and flow measuring devices.

Course Outcomes : After completion of the course students are able to:

- CO1: Evaluate performance of an I C engine for a given set of conditions and to draw the valve timing and port timing diagrams
 CO2: Realize the need to minimize the losses in engines by conducting Morse test
 CO3: Calibrate general purpose flow measurement devices
 CO4: Analyze performance of hydraulic machines and Forces due to impact of jet on vanes by impulse-momentum theorem

SECTION A - THERMAL ENGINEERING LAB

1. I.C. Engines valve / port timing diagrams
2. Performance Test on single cylinder 4 -Stroke Diesel Engine by using Mechanical Dynamometer
3. Performance Test on single cylinder 2-Stroke Petrol Engine
4. Performance test on twin cylinder 4-stroke diesel engine
5. Evaluation of Engine friction power by conducting Morse test on Multi cylinder 4-Stroke Petrol Engine
6. I.C. Engine Heat Balance

SECTION B – HYDRAULIC MACHINES LAB

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Impact of jets on Vanes
4. Performance Test on Pelton Wheel
5. Performance Test on Kaplan Turbine
6. Performance Test on Single Stage Centrifugal Pump

REFERENCES

Lab Manual



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B.Tech. (II Sem.)

17ME75 - COMPUTER AIDED ENGINEERING DRAWING
LAB

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Pre-requisites : NIL**COURSE EDUCATIONAL OBJECTIVE:**

The main objectives of this course are to familiarize various commands used in Auto-CAD and to visualize the isometric and orthographic views of any solid object.

COURSE OUTCOMES: After completion of the course students are the able to:

- CO1: Apply Auto-CAD basics to solve practical problems used in industries where the speed and accuracy can be achieved.
- CO2: Apply the principle of Orthographic projections of points, lines, planes and solids.
- CO3: Evaluate their ability in applying various concepts to solve practical problems related to engineering drawing.
- CO4: Convert orthographic to isometric vice versa.

At least 10 Exercises are to be conducted using Auto Cad software:**BASIC AUTO CAD COMMANDS:**

1. Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).
2. Edit commands (copy, move, erase, zoom).
3. Array commands (polar array, rectangular array, P-edit, divide a line, offset).
4. Hatching & line commands (hatching with different angles & different types of lines).
5. Mirror & trim commands (mirror an object, trim, extend a line, chamfer & fillet, explode).
6. Dimensioning & text commands (linear, angular, radius, diameter & text).

PROJECTION OF POINTS AND LINES:

1. Projection of points (I, II, III, & IV quadrants).
2. Projection of lines parallel to both reference planes.
3. Projection of lines parallel to one reference plane & inclined to other reference plane.

ORTHOGRAPHIC PROJECTIONS:

1. Conversion of plane objects.
2. Conversion of circular objects.
3. Conversion of both combination of plane figures and circular objects.

ISOMETRIC PROJECTIONS:

1. Conversion of plane objects.
2. Conversion of circular objects.
3. Conversion of both combination of plane figures and circular objects.

REFERENCES:

1. M. Kulkarni, A.P Rastogi, and A.K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
2. Bethune, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
3. N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar Publishers, 2012.



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B.Tech. (II Sem.)

17EE60 - ELECTRONIC CIRCUITS AND DEVICES
LAB

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Pre-requisites : Electronic Circuits and Devices (17EE01)

Course Educational Objective:

This lab course enables the student to demonstrate characteristics of semiconductor devices.

Course Outcomes: At the end of the course, the student will be able to:

- CO1 : Analyse the characteristics of semi-conductor devices
 CO2 : Identify a suitable electronic circuit for a particular application
 CO3 : Design transistor amplifier circuits

List of Experiments

1. Study the characteristics of PN junction diode.
2. Study the characteristics of Zener diode.
3. Calculation of Ripple factor and regulation of Full wave rectifier with & without filters.
4. Determination of h-parameters of transistor from CE characteristics.
5. Determination of h-parameters of transistor from transistor CB characteristics.
6. Determination of h-parameters of transistor from FET transfer characteristics.
7. Calculation of parameters from FET characteristics.
8. Calculation of Band width of CE Amplifier.
9. Calculation of Band width of CC Amplifier.
10. Study the characteristics SCR Characteristics.

Additional Experiments

11. Calculation of Band width of Common Source FET Amplifier.
12. Calculation of Band width of CD FET amplifier.



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B.Tech. (III Sem.)

17FE07 - NUMERICAL METHODS AND FOURIER ANALYSIS

Pre-requisites : None

Course Educational Objective : The main objective of this course is to enable the students learn Numerical Techniques for solving the equations, interpolation, differential equations and fitting of various curves. They will also learn about the Fourier analysis of single valued functions.

Course Outcomes : At the end of the course, the student will be able to :

- CO1: Compare the rate of accuracy between various methods in approximating the root of the equation and Distinguish among the criteria of selection and procedures of various Numerical Integration Rules.
- CO2: Estimate the best fit polynomial for the given tabulated data using the methods of Newton's Interpolation formulae and Lagrange's Interpolation.
- CO3: Apply various Numerical methods in solving the initial value problem involving the ordinary differential equation.
- CO4: Estimate the unknown dependent variables using curve fitting methods..
- CO5: Generate the single valued functions in the form of Fourier series and obtain the Fourier Transforms

UNIT – I**Solution of Algebraic and Transcendental Equations and Numerical Integration**

Solutions of Algebraic and Transcendental Equations – Regula Falsi method and Newton Raphson Method in one variable.

Numerical Integration

Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – II**Interpolation and Finite Differences**

Interpolation: Introduction – Finite differences- Forward Differences- Backward Differences- Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Lagrange's Interpolation formula.

UNIT – III**Numerical solution of Ordinary Differential Equations**

Numerical solution of Ordinary Differential equations, Solution by Taylor's series - Picard's Method of successive approximations - Euler's Method - Runge- Kutta Methods.

UNIT – IV**CURVE FITTING**

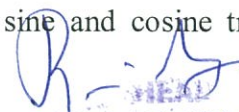
Curve fitting by the principle of Least Squares: Fitting of a straight line – Second degree parabola- other polynomial curves-Fitting of exponential curves –Fitting of a power curve

UNIT – V**Fourier Series and Fourier Transforms**

Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series

Fourier Transforms

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


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TEXT BOOKS

1. S. S. Sastry, "*Introductory Methods of Numerical Analysis*", 5th Edition, PHI, New Delhi, 2005.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH, New Delhi, 2010.

REFERENCES

1. B.S. Grewal , "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. Steven. C. Chopra, Ra. P. Canale, "*Numerical Methods for Engineers with programming and software application*", 4th Edition, TMH, New Delhi, 2002.
3. M. K. Jain, S. R. K. Iyengar, R.K. Jain, "*Numerical Methods for Scientific and Engineering Computation*", 5th Edition, New Age International Publishers, New Delhi, 2007.



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B.Tech. (III Sem.)

17CI05 - DATA STRUCTURES

Pre-requisites : C LANGUAGE.**Course Educational Objective:** To make students familiar with:

Writing algorithms to implement operations involved in different data structures like linked list & different types of trees and Implement various searching and sorting techniques.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Compare normal data type with abstract data type (ADT), explore the sections of ADT. Analyse example programs with data structures using analysing tools.

CO2: Develop &analyse the algorithms for stack and queue operations leading to applications.

CO3: Analyse, implement and compare searching and sorting Techniques.

CO4: Design &analyse algorithms for operations on Binary Search Trees & AVL Trees data structures.

CO5: Evaluate Graph traversal and minimum cost spanning tree algorithms and compare hashing methods on hash table data structure.

UNIT – I**Algorithm Analysis:**

Mathematical Background, Model, Analysis and Run Time Calculations, Lists: Abstract Data Types, List using arrays and pointers, Singly Linked, Doubly Linked, Circular Linked Lists, Polynomial ADT.

UNIT – II

Stacks: The Stack: Definition, operations, implementation using arrays, linked list and Stack

Applications: Infix to postfix expression conversion, Evaluation of Postfix expressions,

Balancing the symbols. Queue: definition, operations, implementation using arrays, linked

List&it'sApplications.Circular queue: definition its operations, implementation, DE queue:

Definition& its types, implementation

UNIT – III

Searching: Linear, Binary & Fibonacci searching

Sorting: Bubble sort, Insertion Sort, Merge Sort, Quick Sort & Heap Sort

UNIT – IV

Trees: Terminology, Binary Trees: definition, types of binary trees, Representation,

Implementation (linked list), Tree traversals: Recursive techniques, Expression Tress,

Search Tree: Binary Search Tree-Search, Insert, Deletion (all the three cases), Balanced Tree –Introduction to AVL tree and Rotations

UNIT – V

Graphs: Fundamentals, Representation of graphs, Graph Traversals: BFS, DFS.

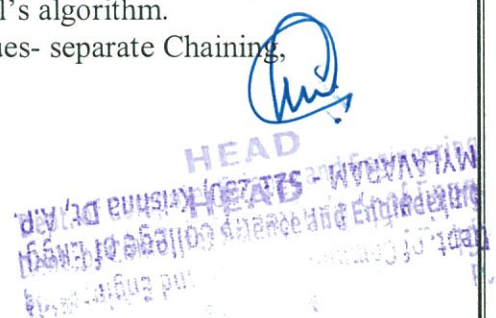
MinimumCost spanning tree: Definition, Prim's Algorithm, Kruskal's algorithm.

Hashing: Hash Table, Hash Function, Collision resolution Techniques- separate Chaining,

Open addressing, rehashing.



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TEXT BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd edition.
2. Reema Thareja, Data Structures using c, Oxford Publications.

REFERENCES

1. Langson, Augenstein & Tenenbaum, 'Data Structures using C and C++', 2nd Ed, PHI.
2. Robert L. Kruse, Leung and Tando, 'Data Structures and Program Design in C', 2nd edition, PHI.



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B.Tech. (III Sem.)

17EE02 - ELECTRIC AND MAGNETIC FIELDS

Pre-requisites: Applied Physics (17FE12),
Transformation Techniques and vector calculus(17FE06)

Course Educational Objective: This course enables the students to interpret the concepts of static electric and magnetic fields and their applications in Electrical Machines and Power Systems

Course Outcomes: At the end of the course, the student will be able to:

- CO1. Analyze static electric fields due to various charge distributions
- CO2. Describe the boundary conditions for conductor and dielectric interfaces
- CO3. Analyze static magnetic fields due to various current carrying elements
- CO4. Apply Maxwell's equations to diverse engineering problems

UNIT – I: ELECTRO STATICS-I

Coordinate systems-Introduction to Coordinate systems, Rectangular, Cylindrical and Spherical coordinate Systems. Coulomb's Law and Electrostatic Field Intensity- Coulomb's Law, Electric Field, Electric Field Intensity (EFI), Electric Fields due to continuous charge distributions-Volume charge, surface charge, line charge. EFI due to a line and a surface charge.

Electric Flux density and Gauss's Law: Electric Flux, Electric Flux density, Gauss's law, Application of Gauss's Law, Maxwell's equation

UNIT – II: ELECTRO STATICS-II

Electric Potential-Work done in moving a point charge in an electrostatic field, Electric Potential, Properties of potential function, Potential gradient. Conductors and Dielectrics-Conductors - Current, Current density, Equation of continuity, Conduction Current, Ohm's law in point form, behaviour of conductors in an electric field. Dielectrics – polarization, Displacement and Convection current, electric field inside a dielectric material. Electric dipole – Dipole moment, potential and EFI due to an electric dipole.

Boundary Conditions- Conductor-Free space and Dielectric- Dielectric boundary conditions.

Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics. Laplace's and Poisson's equations – Solution of Laplace's equation in one variable. Capacitance calculation in static electric field.

UNIT – III: MAGNETO STATICS-I

Biot-Savart's Law and its applications: Static magnetic fields –Biot-Savart's law – 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 equation.

Ampere's circuital law and its applications: MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's equation. Field due to a circular loop, rectangular and square loops.

UNIT-IV: MAGNETO STATICS-II

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element– Force on a straight and a long current carrying conductor– 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.

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.

Inductance-Self and Mutual inductance – determination of self-inductance of a solenoid and toroid, Neumann's formulae- mutual inductance between a straight long wire and a square loop wire in the same plane. Inductance calculation in static magnetic field.

UNIT – V: ELECTRO-DYNAMIC FIELDS

Faraday's laws of electromagnetic induction – Induced EMF – static and dynamic induced EMF, Maxwell's equations- modification of Maxwell's equations for time varying fields, differential and integral forms, Poynting theorem and Poynting vector, Simple problems.

Note: Analyze the core concepts using software tools wherever applicable.

TEXT BOOKS:

1. "William Hayt, "Engineering Electromagnetics", McGraw Hill, New York, 7thedition, 2011.
2. Gangadhar.K.A, "Field theory", Khanna Publishers, New Delhi, 15th edition, 2004.

REFERENCES:

1. Matthew. N.O. Sadiku, "Elements of Electromagnetics", sixth Edition, Oxford University Press, 2015.
2. David K Cheng, "Field and Wave Electromagnetics", Pearson Education, 2ndedition, 2004.
3. John D. Kraus, "Electromagnetics" McGraw Hill, 5th Edition, 1999.
4. Narayana Rao.N, "Elements of Engg. Electro Magnetics", Prentice Hall of India, 6rd Edition, 2008
5. Bhag Guru and Huseyin Hiziroglu, " Electromagnetic Field Theory Fundamentals", 2nd Edition, Cambridge university press, 2017.



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B.Tech. (III Sem.)

17EE03 - NETWORK THEORY – I

Pre-requisites: Transformation Techniques and vector calculus (17FE06)

Course Educational Objective: This course enables the student to illustrate the behaviour of primitive circuit elements and analysis of methods of circuits for steady state and transient conditions.

Course Outcomes: At the end of the course, the student will be able to :

CO1. Evaluate steady state behaviour of single phase networks for DC & AC excitations

CO2. Analyze magnetic circuits.

CO3. Analyze transient behaviour of single phase networks for DC & AC excitations

CO4. Demonstration of Resonance and Filter circuits

UNIT – I: INTRODUCTION TO ELECTRICAL CIRCUITS

Circuit Elements–Linear and Non-Linear, Active and Passive, Unilateral and Bilateral, Lumped and Distributed, Independent and Dependent Sources, Voltage - Current relationship for passive bilateral elements (for different input signals-square, ramp, saw tooth, triangular)-Ohm's law, Kirchhoff's laws, Source transformation. Network reduction techniques-Series, parallel, star-to-delta and delta-to-star transformation. Nodal analysis, mesh analysis, super node and super mesh analysis for D.C excitations.

UNIT – II: MAGNETIC CIRCUITS

Magnetic circuits-Basic terminology, Analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction-concept of self and mutual inductance-dot convention-coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits.

UNIT – III: NETWORK TOPOLOGY

Definitions – Graph – Tree, Basic Cutset and Basic Tieset matrices for planar networks –Tree and Nodal analysis , Link and Loop Analysis of Networks with dependent & independent voltage and current sources – Duality & Dual networks.

Filters-Filter fundamentals, High Pass, Low Pass, Band Pass and Band Reject filters (Qualitative Treatment Only).

UNIT – IV: SINGLE PHASE A.C CIRCUITS

Peak, R.M.S, average, instantaneous values, Form factor and Peak factor for different periodic wave forms – sinusoidal alternating quantities – Phase and Phase difference – Complex and polar forms of representations, Steady state analysis of R,L and C (in series, parallel and series parallel combinations) with sinusoidal excitation-Concept of Reactance, Impedance, Susceptance and Admittance, Real , Reactive and Apparent Power, Power Factor, Computer aided circuit analysis. Resonance-series, parallel circuits, concept of band width and Q factor .Locus diagrams – series and parallel (R-L, R-C combination).

UNIT – V: TRANSIENT ANALYSIS

Initial conditions, Transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitation- Analysis using classical and Laplace transform methods

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS

1. William Hayt and Jack E.Kemmerley, "Engineering Circuit Analysis" ,Mc Graw Hill Company, 8th edition,2015.
2. Robert L. Boylestad. "Introductory Circuit Analysis", Pearson Education, Canada, 13thedition,2015.

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2. M.S.Sukhija and T.K. Nagasarkar, " Circuits and Network- Analysis, Design and Synthesis", 2nd edition, Oxford higher education, 2016.
3. A. Sudhakar and Shyammohan S Palli, "Circuits and Networks-Analysis and Synthesis" Tata McGraw- Hill, 5e,2015.
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B.Tech. (III Sem.)

17EE04 - DIGITAL LOGIC CIRCUIT DESIGN

Pre-requisites : --

Course Educational Objective: This course enables the student to interpret number systems, Boolean algebra, Logic Gates and design of combinational and sequential logic circuits.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Interpret the number systems

CO2: Design logic gates.

CO3: Analyze combinational and sequential logic circuits

CO4: Realize Memory Organization

UNIT I: NUMBER SYSTEMS

Number system, complements, signed Binary numbers. Binary Arithmetic, Binary codes –BCD, Excess 3 code, Gray code, Error detecting and correcting code – Hamming code, conversion from one code to another.

UNIT II: BOOLEAN ALGEBRA & LOGIC GATES

Boolean postulates –De-Morgan's Theorem, Principle of Duality, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS)- Minterm and Maxterm, Canonical forms – Conversion into canonical form–Karnaugh map Minimization (up to 5 variables)- Don't care conditions.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive –OR and Exclusive – NOR, positive logic and negative logic, Realization of Boolean Functions using logic gates (Multi level gate implementations- AND -OR, OR - AND, NAND -NAND, NOR -NOR, NAND-NOR & NOR - NAND realizations. AND, OR, NOT, NAND and NOR gates using Resistors, Diodes and Transistor.

UNIT III: COMBINATIONAL LOGIC CIRCUITS

Design procedure, Adders and Subtractors – Serial adder/ Subtractor, Parallel adder/ Subtractor- Carry look ahead adder, BCD adder, Magnitude Comparator, Decoder, encoder, Multiplexer, Demultiplexer, Parity checker, code converters, Design and Analysis using Software tools.

Memories: Read Only memory and types of ROM, Random access Memory and types of RAM; Programmable Logic Devices–Programmable Logic Array, Programmable Array Logic. Implementation of combinational logic using MUX, PROM, PAL and PLA.

UNIT IV: SEQUENTIAL LOGIC CIRCUITS

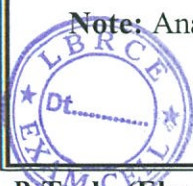
Latches, Flip flops-SR, JK, T, D and Master slave – Characteristic and excitation tables, characteristic equations. Modes of triggering – Edge and Level Triggering, Realization of one flip flop using other flip flops, Registers and their operation, synchronous and Asynchronous counters, modulo – n counters, Race around condition.

UNIT V: ASYNCHRONOUS SEQUENTIAL CIRCUITS

Sequence detector. Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines.

Algorithmic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations.

Note: Analyze the core concepts using software tools wherever applicable.



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1. Morris Mano, Michael D. Ciletti, "Digital Design with an Introduction to the Verilog HDL", Pearson Education, New Jersey, 5th edition, 2013.
2. Zvi Kohavi, Niraj K. Jha, "Switching and Finite Automata Theory", Cambridge University Press, New York, 3rd edition, 2010.

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1. John F. Wakerly, "Digital Design", Pearson Education, New Delhi, 4th edition, 2014.
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4. M.V. Subramanyam, "Switching Theory and Logic Design", Laxmi Publications (P) Ltd. New Delhi.
5. A. Anand Kumar, "Switching Theory and Logic Design", PHI Publishers, New Delhi, 2nd edition, 2014.
6. Comer, "Digital Logic and State Machine Design", Oxford Higher Education, 3rd edition, 2012.
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B.Tech. (III Sem.) 17EE05 - POWER GENERATION AND UTILIZATION

Pre-requisites : Thermal and Hydro Prime Movers (17ME51)

Course Educational Objective: This course enables the students to illustrate key concepts of Non-Renewable and renewable power generation methods and economic aspects of power generation and utilization.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Explore various energy sources available for generation of electric power.

CO2: Analyze economic aspects of power generation.

CO3: Differentiate between different types of power generating plants.

CO4: Outline utilization of electrical energy.

UNIT-I: HYDEL AND THERMAL POWER GENERATION

The growth of electrical power generation, transmission and distribution systems in India. Typical layout of power system. Layout of hydro electric power station - types of hydro electric power stations - penstocks water hammer, surge tank, head and tail races. Selection of site for a hydel station, Advantages and disadvantages.

Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers. Selection of site for Thermal power station. Advantages and disadvantages, Comparison of hydel and thermal power stations.

UNIT-II: NUCLEAR AND RENEWABLE POWER GENERATION

Nuclear Power Stations: Nuclear Fission and Chain reaction- Nuclear fuels- Principle of operation of Nuclear reactor-Reactor Components: Moderators, Control rods, Reflectors and Coolants. Radiation hazards: Shielding and Safety precautions- Types of Nuclear reactors and brief description of PWR, BWR and FBR. Selection of site for Nuclear power plant. Advantages and disadvantages.

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

Principles of Electric power generation using renewable energy sources- Solar, Wind and Wave energy (Qualitative treatment only)

UNIT III: ECONOMICAL ASPECTS OF POWER GENERATION AND TARIFF

Load curve, load duration and integrated load duration curves-connected load, maximum load, average load, demand factor. Load factor, diversity factor, plant capacity factor, utilization and plant use factors, number and size of generating units – base load and peak load plants .Numerical Problems.

Tariff Methods

Cost of electrical energy – fixed cost – depreciation methods, running cost. Tariff Methods: Flat Rate, Block-Rate, two-part, three-part and power factor. Numerical Problems.

UNIT-IV: ILLUMINATION

Terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Illumination Methods - Tungsten, filament, Discharge lamps, Mercury Vapour and Solar Vapour lamps -relative comparison between the above methods, basic principles of light control, Types and design of lighting ,flood lighting .Efficient lighting systems- Aviation and transport lighting, lighting for displays and signalling- neon signs, LED-LCD displays beacons and lighting for surveillance.

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UNIT-V: ELECTRIC HEATING & WELDING

Electric Heating-Advantages and classification of electric heating, detailed study of resistance, induction and dielectric heating methods. Electric welding, Types - resistance and arc welding, and Electric welding equipment, comparison between A.C. and D.C. Welding.

TEXT BOOKS

1. C.L.Wadhawa, "Generation Distribution and Utilization of Electrical Energy", New Age International (P) Limited, 2011.
2. Godfrey Boyle, "Renewable Energy Power for a Sustainable Future", Oxford University Press, 2nd Edition.

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1. M.V. Deshpande , "Elements of Power Station design and practice", Wheeler Publishing.
2. E. Openshaw Taylor, "Utilisation of Electric Energy", Orient Longman, 2006.
3. V.K Mehta and Rohit Mehta, "Principles of Power Systems", S.CHAND& COMPANY LTD., New Delhi 2004.
4. J.B.Gupta, "A Course in Power Systems", S.K.Kataria & Sons, 11th Edition.



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B.Tech. (III Sem.)

17CI63 – DATA STRUCTURES LAB

Pre-requisites: Computer Programming

Course Educational Objective: This course content enables students to:
Write and implement algorithms of different data structures like Lists, Stacks, Queues and Trees.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Implement & test the performance of data structures like linked list, stacks, queues.
CO2: Implement & test the performance of searching and sorting techniques.
CO3: Implement & test the performance of trees and graph traversal techniques.

Lab Exercises

I) Exercise programs on List ADT:

- a) Write a C program to implement various operations on List using arrays.
- b) Write a C program to implement various operations on Single linked List using pointers.
- c) Write an interactive C program to create a linear linked list of customer names and their telephone numbers. The program should be menu-driven and include features for adding a new customer, deleting an existing customer and for displaying the list of all customers.
- d) Write a C program to create a circular linked list so that the input order of data items is maintained. Add the following functions to carry out the following operations on circular single linked lists. a) Count the number of nodes. b) insert a node c) delete a node
- e) Write a C program that will remove a specified node from a given doubly linked list and insert it at the end of the list on an existing list. Also write a function to display the contents of the list.

II) Exercise programs on Stack & Queue ADT:

- a) Write a C program to implement a stack using array & linked list in which Push, Pop and display can be performed.
- b) Write a program to convert infix expression to post fix expressions using array implementation of stack
- c) Write a program for evaluating postfix expressions using array implementation of stack
- d) Write a C program to implement a queue using arrays and linked list in which insertions, deletions and display can be performed.

III) Exercise programs on Searching Techniques:

- a. Write a C program to implement Linear Search.
- b. Write a C program to implement Binary Search.
- c. Write a C program to implement Fibonacci Search.

IV) Exercise Programs on Sorting Techniques:

- a) Write a C program to implement insertion sort & Bubble sort
- b) Write a C program to implement Quick sort.
- c) Write a C Program to implement Merge Sort
- d) Write a C program to Heap sort

V) Exercise Programs on Binary & Binary Search Trees:

- a) Write a C program to construct a binary tree and do inorder, preorder and post order traversals, printing the sequence of nodes visited in each case.
- b) Write a C program to implement BST operations- insertion, search and deletion.

VI) Exercise Programs on Graphs:

- a) Write a C program to implement the following graph Traversals a) DFS b) BFS

Contents beyond Syllabus:

- a) Write a C program to implement Circular Double Linked List.
- b) Write a C program to implement Radix Sort.
- c) Write a C program to reverse double linked list.
- d) Write a C program to implement Shell Sort.
- e) Write a C program to implement Hash table with separate chaining.



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B.Tech. (III Sem.)

17EE61 - DIGITAL LOGIC CIRCUIT DESIGN LAB

Pre-requisites: Digital Logic Circuit Design (17EE04)

Course Educational Objective:

This laboratory course enables the students to demonstrate the design and application of digital logic circuits in day-to-day life.

Course Outcomes: At the end of the course, the student will be able to :

CO1: Optimize logic circuits

CO2: Analyze simple combinational and sequential logic circuits

CO3: Demonstrate different application of ICs

LIST OF EXPERIMENTS

1. a) Basic Gates Function Verification using truth tables.
 - i) AND Gate using 7408 IC ii) OR Gate using 7432 IC
 - iii) NOT Gate using 7404 IC
- b) Universal Gates Functional Verification
 - i) NAND Gate using 7400 IC ii) NOR Gate using 7402 IC
- c) Special Gates Functional verification
 - i) XOR Gate using 7486 IC
 - ii) XNOR Gate using XOR followed by NOT Gate
2. Realization of following gates using universal gates and its functional verification.
AND, OR, XOR, NOT
3. Design Half-adder and Full-adder circuits and verify its functionality.
4. Design a four bit comparator and verify its functionality (using logic gates or IC's)
5. Design a BCD to Excess-3 code converter and verify its functionality using logic gates.
6. Design a BCD to Gray code converter and verify its functionality using logic gates.
7. Design and verify the functionality of Decoders with different inputs.
8. Verify the functionality of following Flip-Flops.
 - a) SR Flip-Flop b) JK Flip-Flop c) D Flip-Flop d) T Flip-Flop
9. Design and verify the functionality of multiplexers with different inputs
10. a) Design and verify UP-Counter using JK/T Flip-Flops.
b) Design and verify MOD-3 Counter.

Additional Experiments:

11. Design and verify Bi-directional Counter using JK/T Flip-Flop.
12. Verify the functionality of four bit ripple carry adder for signed and unsigned integers with the verification of overflow condition.



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B.Tech. (III Sem.)

17EE62 – ELECTRICAL WORKSHOP

Pre-requisites : --

Course Educational Objective: This course enables the student to familiarize with various renewable energy technologies, measurement and protection of electrical and electronic equipment and earthing practices. It also demonstrates the working of various electrical tools and home appliances.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Identify and enumerate importance of various electrical & electronic components

CO2: Design basic electric and electronic circuit

CO3: Demonstrate the characteristics of renewable energy technologies

CO4: Demonstrate various electrical wirings involved in home appliances

CO5: Acquire knowledge on various electrical and electronic tools used in day to day life

List of Experiments

1. Study and plot the characteristics of solar PV cell
2. Study and plot Fuel cell and its characteristics
3. Demonstrate the working of hybrid energy system(Solar & wind)
4. Study and plot the characteristics of solar PV cell under shading conditions
5. Simulation of solar PV cell for different geographical data.
6. Study of electrical protection devices(Fuse, MCB, Contactor etc)
7. Study of fluorescent lamp and determination of its parameters
8. Study of UPS and SMPS.
9. Design and develop circuits on PCB
10. Study of electrical and electronic equipment earthing methods.
11. Study of electrical & electronic measuring devices (wattmeter, multi meter, Tong tester, Lux meter, anemometer, pressure gauge and clamp meter)
12. Study of windings used in home appliances.



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B.Tech. (III Sem.) 17PD03 - PROFESSIONAL ETHICS AND HUMAN VALUES

Pre requisite: Basic Sciences and Humanities**COURSE EDUCATIONAL OBJECTIVES:**

1. To create an awareness on engineering ethics and human values.
2. To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.
3. To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth.
4. To explicate the professional and societal responsibilities of the engineers.
5. To make the student realize the sensitiveness associated with experimentation process

COURSE OUTCOMES: At the end of the course, the student

- CO1 : Acquires the basic concepts of human values & also gain the connotations of ethical theories.
- CO2: Knows the basic concepts of Professional ethics and handling Dilemma in decision making.
- CO3: Knows the duties and rights towards the society in an engineering profession
- CO4: Would realize the importance and necessity of intellectual property rights.
- CO5: Can take all the necessary precautions while conducting the experiments, which may reduce the risk.

UNIT –I: ETHICS

Senses of 'Engineering Ethics' -Variety of moral issues - Types of inquiry -Moral dilemmas Moral autonomy -Kohlberg's theory Gilligan's theory -Consensus and controversy – Models of Professional Roles -Theories about right action- Self interest - Customs and religion -Uses of Ethical theories.

UNIT - II: HUMAN VALUES

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning - Civic Virtue –Respect for Others–Living Peacefully – Caring – Sharing - Honesty – Courage– Valuing Time - Cooperation – Commitment – Empathy – Self Confidence – Character – Spirituality

UNIT – III: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation- Engineering Projects VS. Standard Experiments - Engineers as responsible experimenters – Codes of ethics - Industrial Standards - Abalanced outlook on law- The challenger case study.

UNIT – IV: SAFETY AND RESPONSIBILITIES

Safety and risk- Assessment of safety and risk- Risk benefit analysis and reducing risk- Three Mile Island and Chernobyl case study - Collegiality and loyalty -Respect for authority- Collective bargaining – Confidentiality- Conflicts of interest- Occupational crime-Professional Rights- Employee Rights –Intellectual Property Rights(IPR) discrimination.

UNIT – V: GLOBAL ISSUES

Multinational Corporation's -Environmental ethics-computer ethics -weapons development Engineers as managers - consulting engineers-engineers as expert witnesses and advisors, Moral leadership - sample code of Ethics (Specific to a particular Engineering Discipline).



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TEXT BOOKS

1. R.S.Nagarajan, a Textbook on “Professional Ethics and Human Values”, New Age Publishers – 2016.
2. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.
3. “Professional Ethics and Human Values” by A.Alavudeen, R.Kalil Rahman and M. Jayakumaran- Laxmi Publications.
4. “Ethics in Engineering” by Mike W. Martin and Roland Schinzinger – Tata McGraw- Hill – 2003.

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1. Govindarajan M, Natarajan S, Senthil Kumar V. S, “ Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
2. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)
3. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available).
4. John R Boatright, “Ethics and the conduct of business”, Pearson Education, New Delhi,2003.
5. Edmund G Seebauer and Robert L Barry, “Fundamentals of ethics for scientists and engineers”, Oxford University Press, Oxford, 2001.
6. “Fundamentals of ethics for scientists and engineers” Edmund G Cseebauer and Robert L Barey,Oxford University Press, 2001.
7. “Text book on Intellectual Property rights”, N K Acahrya, Asian Law House, 7th edition,2014.
8. “An Introduction to Intellectual Property Rights”, Dr.J.P.Mishra,Central law House, 3rd edition,2012.



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B.Tech. (IV Sem.)

17FE03 - ENVIRONMENTAL SCIENCE

Pre-requisites : None**Course Educational Objective :**

To provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities.

To enable the students in understanding how human activities influence our air, water and soil and it also helps in developing a right attitude about our use of fossil fuels and effect on climate and sustainable management of natural resources.

Course Outcomes : At the end of the course, the student will be able to :

CO1: Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.

CO2: Evaluate local, regional and global environmental issues related to resources and their sustainable management.

CO3: Identify the importance of ecosystem and biodiversity for maintaining ecological balance.

CO4: Acknowledge and prevent the problems related to pollution of air, water and soil.

CO5: Interpret the significance of implementing environmental laws and abatement devices for environmental management.

UNIT – I**Nature and scope of Environmental Problems**

- Introduction, components of Environment
- Scope and importance of environmental studies
- Population explosion, variations among nations
- Resettlement and Rehabilitation - Issues and possible solutions
- Environment and human health
- HIV-AIDS
- Environmental ethics
- Role of Information Technology in environmental management and human health

UNIT – II**Natural Resources and Conservation**

- Introduction and classification of Natural Resources
- Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, interlinking of rivers, dams-benefits and problems. Rain water harvesting, watershed management
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, soil salinity
- Energy resources: Growing energy needs renewable, non-renewable and alternate energy resources

UNIT – III**Ecology and Biodiversity**

- Definition, structure and functions of an ecosystem
- Food chains and Food webs, Ecological succession, Ecological pyramids
- Biogeochemical cycles, Major Types of Ecosystems – Forest, Grassland, Desert Land & Aquatic Ecosystem, Ecological Niche and Keystone Species

- Definition and levels of measuring biodiversity - genetic, species, community and ecosystem diversity
- Bio geographical classification of India
- India as a mega diversity nation
- Values of biodiversity- Direct and Indirect values
- Threats to biodiversity; Man and wild life conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation methods

UNIT – IV

Environmental Pollution

- Introduction to Environmental Pollution Causes, effects and control measures of:
- Air pollution
- Water pollution
- Soil pollution
- Noise pollution
- Nuclear hazards
- Solid Waste Management – Sources, Classification, effects and control measures of Municipal solid waste, Biomedical waste & Hazardous and e-waste
- Environmental Issues relating to Climate change, global warming, acid rain, ozone layer depletion
- Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.

UNIT – V

Environmental Management

- Sustainable development and unsustainability
- Stockholm and Rio Summit
- Environmental Impact Assessment (EIA)
- Green building
- Consumerism and Waste products
- Carbon credits and carbon trading
- Environmental Law- Air, Water, Wild life, Forest, and Environmental protection act


TEXT BOOKS

1. Anubha Kaushik, C.P.Kaushik, “Perspectives in Environmental Studies”, New age international publishers, Delhi, 5th edition, 2016.
2. Mahua Basu, S.Xavier, “Fundamentals of Environmental Studies”, Cambridge University Press, Delhi, 1st edition, 2016.

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1. S.Deswal, A. Deswal, “A Basic course in Environmental Studies”, Educational & Technical Publishers, Delhi, 2nd Edition, 2014.
2. R. Rajagopalan, “Environmental Studies (From Crisis to Cure)”, Oxford University Press, New Delhi, 3rd Edition, 2012.
3. De, A.K, “Environmental Chemistry”, New Age International (P) Limited, New Delhi, 5th Edition, 2003.
4. Dr.K.V.S.G. Murali Krishna, “Environmental Studies”, VGS Techno Series, Vijayawada, 1st Edition, 2010.
5. G. Tyler Miller, Scott Spoolman, “Introduction to Environmental Studies”, Cengage Learning, New Delhi, 13th Edition, 2009.




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B.Tech. (IV Sem.) 17FE10 - COMPLEX VARIABLES AND STATISTICAL METHODS

Pre-requisites: Basics of Complex numbers and Partial Differentiation

Course Educational Objective : The main objective of the course is to make student learn the concepts related to the complex functions and probability distributions. Students learn in detail about analyticity and how to construct the analytic function, expand complex functions in Taylor's and Laurent series and integrate a complex function using Residue theorem. They also learn the probability methods and their distributions and perform tests on different samples.

Course Outcomes : At the end of the course, the student will be able to :

- CO1: Construct an analytic function by Milne Thomson's method when the real or imaginary part is given.
 CO2: Apply the knowledge of Residues in evaluating real integrals
 CO3: Solve the probabilistic situations using probability distributions.
 CO4: Discuss hypothetical problems by using sample tests.
 CO5: Evaluate correlation and regression for a bivariate data.

UNIT – I

FUNCTIONS OF A COMPLEX VARIABLE AND COMPLEX INTEGRATION

Introduction – Continuity –Differentiability – Analyticity – Properties – Cauchy Riemann equations in Cartesian and Polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thomson method.

Integration of complex functions – Line Integrals, Cauchy's Integral theorem, Cauchy Goursat theorem, Cauchy's Integral Formula and Generalized Cauchy's Integral formula.

UNIT – II

POWER SERIES AND INTEGRATION USING RESIDUES

Sequence, Series and Power series of complex functions, Region of Convergence of the series, Taylor's series, Maclaurin's series and Laurent series of the complex functions.

Zeroes and singularities of an analytic function – Types of singularities, Residues – Residue theorem, Calculation of residues and evaluation of integrals using residue theorem. Evaluation of

Real Definite Integrals of types $\int_0^{2\pi} f(\cos\theta, \sin\theta) d\theta$ and $\int_{-\infty}^{\infty} f(x) dx$ using Residue theorem.

UNIT – III

PROBABILITY AND DISTRIBUTIONS

Conditional probability – Multiplication theorem-Bayes's theorem. Random variables, Binomial distribution, Poisson distribution, Normal Distribution – related properties.

UNIT – IV

TESTS OF HYPOTHESIS

Null and Alternative Hypothesis, One tail and two tailed tests, Type I and Type II errors. Testing of hypothesis concerning means, proportions and their differences using Z-test, tests of hypothesis using Student's t-test, F-test and χ^2 -test.

UNIT – V

CORRELATION AND REGRESSION

Simple Bivariate Correlation: Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient.

Linear Regression: Regression lines, Regression coefficients, Properties of Regression coefficients.

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TEXT BOOKS

1. Dr. B.S. Grewal, “*Higher Engineering Mathematics*”, 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. S.C.Gupta, V.K.Kapoor, “*Fundamentals of Mathematical Statistics*”, 11th Edition, Sultan Chand and sons, New Delhi, 2014

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1. M. D. Greenberg , “*Advanced Engineering Mathematics*”, 2nd Edition, TMH Publications, New Delhi, 2011.
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3. Miller, Freund, “*Probability and Statistics for Engineers*”, 8th edition, PHI, New Delhi, 2011.
4. Dr. B. V. Ramana, “*Higher Engineering Mathematics*”, 1st Edition, TMH Publications, New Delhi, 2010.



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B.Tech. (IV Sem.)

17EE06 - CONTROL SYSTEMS

Pre-requisites : Differential equations and linear algebra(17FE04),
Transformation Techniques and vector calculus(17FE06),
Network Theory-I (17EE03)

Course Educational Objective: This course enables the students to explore the modelling of linear systems using differential equations and transfer functions and to analyze control systems in time and frequency domains. It also deals with methods of classical stability and design of controllers.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Develop mathematical models of linear control systems

CO2: Analyze transient and steady state behavior of systems

CO3: Design suitable controllers to meet desired specifications

UNIT-I: MATHEMATICAL MODELLING OF CONTROL SYSTEM

Concepts of Control Systems- Classification - Open Loop and closed loop control systems and their differences- Different examples of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra, Signal flow graph - Reduction using Mason's gain formula.

UNIT – II: TIME RESPONSE ANALYSIS-I

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

UNIT – III: TIME RESPONSE ANALYSIS-II

The concept of stability – R-H stability criterion – qualitative stability and conditional stability – limitations of Routh's stability, The root locus concept - construction of root loci-effects of adding poles and zeros to $G(s)H(s)$ on the root loci.

UNIT – IV: FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications Polar Plots -Bode diagrams-Determination of Frequency domain specifications and Transfer function from the Bode Diagram-Phase margin and Gain margin, Stability Analysis from Bode Plots .Nyquist Plots, Nyquist Stability criteria, Stability Analysis from Nyquist Plots.

UNIT – V: 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.

CONTROLLERS AND COMPENSATORS: Introduction to PID controller, effect of P, PI, PD and PID controllers. Compensation techniques – Lag, Lead, Lead-Lag Compensator design in frequency Domain.

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS

1. B. C. Kuo , “Automatic Control Systems” John Wiley and Sons ,9th edition.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International (P) Limited Publishers,7th edition.

REFERENCES

1. Katsuhiko Ogata , “Modern Control Engineering”, Prentice Hall of India Pvt. Ltd., 5th edition,2010
2. Norman S. Nise, Control Systems Engineering, 6th Edition, John Wiley, New Delhi,
3. Richard C Dorf, Robert H Bishop, Modern control systems , 12thedition, Prentice Hall (Pearson education, Inc.), New Delhi 2003.
4. Benzamin C. Kuo and Farid Golnaraghi, Automatic Control Systems, 9th Edition, John Wiley, New Delhi, 2003.
5. Rao V. Dukupati,”Analysis and Design of Control Systems using MATLAB”, NewAge Publishers, 2e, 2009.



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L	T	P	Cr.
2	2	-	3

B.Tech. (IV Sem.)

17EE07 - NETWORK THEORY - II

Pre-requisites: Network Theory-I (17EE03)
Transformation Techniques and vector calculus(17FE06)

Course Educational Objective: This course enables the student to analyze three phase AC circuits and single-phase electrical circuits to non-sinusoidal excitations. It also deals with network theorems, two port networks analysis and network synthesis.

Course Outcomes: At the end of the course, the student will be able to:

- CO1. Analyze single phase and three phase electrical circuits
- CO2. Analyze Two-port networks
- CO3. Apply Fourier transforms to electric circuit analysis
- CO4. Synthesise electrical networks

UNIT – I: NETWORK THEOREMS (WITHOUT PROOF)

Superposition, Thevenin, Norton, Maximum Power Transfer, Millman, Tellegen, Reciprocity and Compensation theorems for D.C and sinusoidal excitations.

UNIT – II: THREE PHASE BALANCED AND UNBALANCED CIRCUITS

Three phase circuits: Phase sequence(A-B-C & A-C-B) of source and load- Star and delta connections-Relation between line and phase voltages and currents in balanced three phase source phasor diagrams-Analysis of three phase balanced load circuits- Calculation of Active Reactive power, apparent power in balanced three phase systems.

Analysis of three phase unbalanced load circuits-Loop Method- Millman's Theorem method- Star Delta Transformation methods, phasor diagrams.

UNIT – III: TWO PORT NETWORK ANALYSIS

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations. Concept of transformed network – Two port network parameters using transformed variables-Cascaded networks and analysis of Two-Port networks using the above parameters.

UNIT – IV: AC CIRCUIT ANALYSIS FOR NON SINUSOIDAL EXCITATION

Fourier theorem- Trigonometric and exponential form of Fourier series – conditions of symmetry-line spectra and phase angle spectra- Analysis of Electrical Circuits to Non sinusoidal periodic waveforms.

UNIT – V: NETWORK SYNTHESIS

Identification of network synthesis-, Brune's positive and real function (PRF), properties of PRF, testing of driving point functions, even and odd function, one terminal pair network driving point synthesis with LC elements, RC elements, RL elements Foster and Cauer forms.

Note: Analyze the core concepts using software tools wherever applicable.

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TEXT BOOKS

1. William Hayt and Jack E.Kemmerley, "Engineering Circuit Analysis" ,Mc Graw Hill Company, 8th edition,2015.
2. M.S.Sukhija and T.K. Nagasarkar, "Circuits and Networks- Analysis, Design and Synthesis", 2nd edition, Oxford higher education, 2016.

REFERENCES

1. C.L.Wadhwa, "Network Analysis And Synthesis", New Age International publication, 5thedition,2014.
2. Van Valkenburg, "Network Analysis and Synthesis", Prentice-Hall of India Private Ltd, 3rd edition,2004.
3. A. Sudhakar ,Shyammohan, S Palli, "Electrical Circuits Analysis-2" Tata McGraw-Hill,2015.
4. N.C.Jagan, C.Lakshmi Narayana, "Network Analysis", BS publications 2nd edition,2008.
5. Charles K Alexander, Mathew. N.O.Sadiku, "Fundamental of Electric Circuits", Tata McGraw-Hill, 3rd edition, 2008.
6. Chakrabarti A,"Electric Circuits Analysis & Synthesis " Dhanpat Rai & Co (p) Ltd, 6th edition,2014.



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B.Tech. (IV Sem.)

17EE08 - ELECTRONIC CIRCUIT ANALYSIS

L	T	P	Cr.
2	2	-	3

Pre-requisite : Electronic Circuits and Devices(17EE01)
Network Theory- 1(17EE03)

Course Educational Objective : This course enables the student to analyze various electronic circuits like large signal amplifiers, feedback amplifiers, high pass, low pass RC circuits, clippers, clampers comparators etc.

Course Outcomes: At the end of the course, the student will be able to :

CO1: Analyze different types of feedback amplifiers

CO2: Design oscillators for different frequencies

CO3: Analyze High pass, low pass RC circuits

CO4: Apply LP/HP RC circuit for linear/Non-linear wave shaping

UNIT – I : TRANSISTOR AT HIGH FREQUENCY

The hybrid Π Common Emitter Transistor model. Hybrid Π conductance in terms of low frequency h parameters- Transconductance, Input Impedance, Feedback conductance, Base spreading resistance, output conductance and hybrid Π capacitances. The CE short circuit current gain obtained with the hybrid- Π model- Bandwidth f_{β} and parameter f_T . Current gain with resistive load.

UNIT – II: LARGE SIGNAL AMPLIFIERS

Classification of large signal Amplifiers, Distortion in Amplifiers- Second harmonic Distortion and Higher order harmonic distortion. Class A power amplifier- Direct coupled and Transformer Coupled Power Amplifier, Class B power amplifier- Push Pull and Complementary Symmetry power Amplifier., Class AB power amplifier, Class C power amplifier, Class D and S power Amplifiers.

UNIT – III: FEEDBACK AMPLIFIERS

Open loop Amplifiers- Voltage Amplifier, Current Amplifier, Transresistance Amplifier and Transconductance Amplifier. Closed loop Amplifiers- Classification of Negative Feedback Amplifiers and their analysis, Characteristics of Negative Feedback Amplifiers.

UNIT – IV: OSCILLATORS

Oscillators-Introduction- Barkhausen Criterion, Classification of Oscillators, RC Oscillators- RC Phase shift Oscillator using FET, RC Phase shift Oscillator using BJT, Wein Bridge Oscillator. LC Oscillators- Hartley Oscillator, Colpitts Oscillator, Clapp Oscillator, Crystal Oscillator, Frequency and Amplitude Stability of Oscillators.

UNIT – V: LINEAR & NON-LINEAR WAVESHAPING

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator, integrator and attenuators.

NON-LINEAR WAVE SHAPING: Diode clippers, Transistor clippers, clipping at two independent levels, Zener diode clippers, Comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem.

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS

1. Jacob Millman, Christos C Halkias and SatyabrataJit, Millman's“ Electronic Devices and Circuits”, Tata McGraw Hill, Second Edition, New Delhi, 2008.
2. J. Millman and H. Taub–“Pulse, Digital and Switching Waveforms” - McGraw-Hill, 1991

REFERENCES

1. R.L. Boylestad and Louis Nashelsky,” Electronic Devices and Circuits”, Pearson/Prentice Hall,9th Edition,2006.
2. S Salivahanan, N.Suresh Kumar and A Vallavaraj, “Electronic Devices and Circuits”, McGraw Hill, 5th edition, 2010.
3. T.F. Bogart Jr., J.S.Beasley and G.Rico, “Electronic Devices and Circuits”, Pearson Education, 6th edition, 2004.
4. Anand Kumar –“Pulse and Digital Circuits” – PHI, 2005.



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L	T	P	Cr.
2	2	-	3

B.Tech. (IV Sem.)

17EE09 - ELECTRICAL MACHINES – I

Pre-requisite : Network Theory-1(17EE03),
Electric and magnetic fields (17EE02)

Course Educational Objective: This course enables the student to learn the principle, construction and performance characteristics of DC Machines and Transformers, methods of speed control of a DC motor and different connections of poly-phase transformers.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Illustrate electromechanical energy conversion principles.

CO2: Demonstrate the operational performance of static and rotating machines.

CO3: Distinguish different connections of poly phase transformers.

UNIT – I: BASIC ENERGY CONVERSION & D.C. GENERATORS

Electromechanical Energy Conversion, Basic principle Energy, Force and Torque in single and multiple excited systems, Construction & Principle of Operation of D.C. Generators –E.M.F Equation- Types of D.C Generators –Armature reaction –Methods of reducing the effects of armature reaction– Compensating winding–Commutation– Methods of improving commutation.– losses in a dc machine-power stages-condition for maximum efficiency-problems.

UNIT – II: CHARACTERISTICS OF DC GENERATORS

O.C.C-Voltage build up in generators-Critical field resistance and critical speed - Causes for failure to self excite and Remedial measures–Load characteristics of shunt, series and compound generators.

UNIT –III: D.C MOTORS

Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation–Speed control methods, starters-3 point and 4 point starters–Constant and Variable losses-calculation of efficiency – condition for maximum efficiency-problems, Test on dc motors- Brake test – Swinburne’s test – Hopkinson’s test- Retardation Test.

UNIT – IV: SINGLE PHASE TRANSFORMER

Constructional details-core, windings, insulation, bushings, cooling, Transformer types, emf equation - operation on no-load and on-load - phasor diagrams– Equivalent circuit – losses, efficiency and regulation. All day efficiency-effect of frequency & supply voltage on core losses-minimization of hysteresis and eddy current losses. Parallel operation with equal and unequal voltage. Testing-Polarity test, O.C and S.C tests - Sumpner’s (back to back) test - predetermination of efficiency and regulation-separation of losses, load test, Industrial tests- core insulation test, measurement of winding resistance, magnetic current, insulation resistance and no-load loss.

UNIT – V: AUTO TRANSFORMERS & POLY PHASE TRANSFORMERS

Auto transformers- comparison with two winding transformers-Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ - open Δ-Scott connection -three winding transformers-tertiary windings-off load and on load tap changing.

Note: Analyze the core concepts using software tools wherever applicable.

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TEXT BOOKS

1. P.S. Bimbra, "Electrical Machinery", Khanna Publishers, 7th Edition, 2014.
2. I.J.Nagrath & D.P.Kothari, "Electric Machines", Tata Mc Graw Hill, 7th Edition.2005

REFERENCES

1. M.G. Say, "Alternating Current Machines", John Wiley & Sons, 5th edition, 1984.
2. A. E. Fitzgerald, C. Kingsley, S. Umans, "Electric Machinery", Tata Mc Graw Hill, 7th edition, 2013.
3. Ashfaq Husain, "Electric Machines", Dhanapati Rai & Co, New Delhi, 2nd edition, 2014.
4. Clayton. A.E, "Performance and Design of Direct Current Machines" CBS Publishers, 1st edition, 2004.



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L	T	P	Cr.
-	-	2	1

B.Tech. (IV Sem.)

17EE63 - NUMERICAL METHODS LAB

Pre-requisites : Differential equations and linear algebra(17FE04),
Numerical methods and Fourier Analysis(17FE07),
Computer Programming

Course Educational Objective: This course enables the student to apply the numerical methods for developing algorithms and implementing through programming languages for engineering applications.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Develop Algorithms for Numerical methods

CO2: Solve Algorithms using programming language

CO3: Apply iterative methods to solve engineering problems

List of Experiments

Implement the following using 'C' code.

1. Develop Newton-Raphson algorithm to find the roots of the algebraic and transcendental equations.
2. Implement the Bisection algorithm to find the roots of the algebraic and transcendental equations.
3. Build Regular- falsi algorithm to find the roots of the algebraic and transcendental equations.
4. Implement Langrange's Interpolation Formula.
5. Implement Newton's formulae for interpolation.
6. Implement Gauss formulae for interpolation.
7. Implement Trapezoidal and Simpson's methods.
8. Implement Taylor's method.
9. Build an algorithm for Runge- Kutta Method
10. Implement Euler's Method.

Additional Experiments

11. Solve the system of linear equations using Gauss - Seidal iteration method.
12. Solve the system of linear equations using Jordan method.



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L	T	P	Cr.
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B.Tech. (IV Sem.)

17EE64 - ELECTRICAL NETWORKS LAB

Pre-requisites: Network Theory-I (17EE03),
Network Theory-II (17EE07).

Course Educational Objective: This laboratory course enables student to demonstrate the steady state and transient analysis of electric circuits.

Course Outcomes: At the end of the course, the student will be able to :

CO1: Analyze two port networks

CO2: Analyse electric and magnetic circuits

CO3: Evaluate transient response of simple circuits

CO4: Apply simulation tools for analysis of electrical circuits

List of Experiments

1. Verification of Kirchhoff's voltage and current laws
2. Verification of Thevenin's and Norton's theorems.
3. Verification of Superposition and Maximum Power Transfer theorem (both AC and DC excitations).
4. Verification of Two port network parameters (Z and Y).
5. Experimental determination of Resonance frequency, Band Width, Quality factor for Series and Parallel resonant circuits.
6. Determination of self Inductance, Mutual Inductances and Coefficient of coupling for a coupled coil.
7. Experimental determination of time constant of series R-C electric circuits.
8. Measurement of power and power factor of a single phase inductive load and to study the effect of capacitance on the load power factor.
9. Measurement of 3- ϕ active and reactive power using two-wattmeter and single wattmeter methods.
10. Simulation of three phase balanced and unbalanced networks circuits.

Additional Experiments

11. Simulation analysis of RL and RC Transient circuits
12. Verification of Reciprocity & Millman's Theorem
13. Locus diagram of R-L, R-C and RLC circuits.



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L	T	P	Cr.
-	-	2	1

B.Tech. (IV Sem.)

17EE65 - CONTROL SYSTEMS LAB

Pre-requisites : Control Systems (17EE06)

Course Educational Objective: This laboratory course enables the student to implement the mathematical techniques used in linear control systems to solve real world problems through experimentation and simulation tools.

Course Outcomes: At the end of the course, the student will be able to :

- CO1. Simulate the physical control system for stability studies
- CO2. Demonstrate feedback controllers
- CO3. Develop logic gates using PLC

LIST OF EXPERIMENTS

CYCLE-I(Simulation)

1. Modelling of Physical Systems (Mechanical and Electrical systems).
2. Block Diagram Reduction of Linear Systems
3. Time response analysis of Linear Systems for impulse and step inputs
4. Frequency response analysis of Linear Systems
5. Stability and relative stability analysis of Linear Systems Using (Root Locus, Bode and Nyquist plot).

CYCLE-II (Hardware)

6. Time Response analysis of Second Order System.
7. Study the Effect of P, PD, PI, PID controllers on second order systems.
8. Magnitude and phase plot of Lag and lead compensators.
9. Determination of transfer function and effect of feedback on DC servo motor.
10. Study of logic gates using PLC

Additional Experiments

11. Design of Lag and Lead Compensators for a given system
12. Stepper motor control using LABVIEW.
13. Study the effect of P, PD, PI, PID controllers on DC servomotor system using PLC.
14. Study the effect of P, PD, PI, PID controllers on Temperature control system using PLC.



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B.Tech. (V Sem.)

17HS01 - ENGINEERING ECONOMICS AND
ACCOUNTANCY

L	T	P	Cr.
3	-	-	3

Prerequisite: Basic Sciences and Humanities

Course Objective: The objective of this course is to inculcate basic knowledge to students relating to concepts of Engineering Economics and Accountancy to make them effective business decision makers.

Other course educational objectives of this course:

1. To know the concepts of engineering economics and to make them effective business decision makers.
2. To understand the concepts of production and cost for various business decision.
3. To understand the different types of market, market structures & pricing strategies and their applications in business decision making.
4. To explain the strategies of raising and utilization of business capital.
5. To understand the Fundamental of accounting and analysis of accounting statements for managerial decision making.

Course Outcomes: After completion of the course, students will be able to

CO1: Capable of analyzing fundamentals of economics concepts which helps in effective business administration.

CO2: Discuss cost- output relationship in business operations.

CO3: Analyze the features of market structures and present the pricing policies.

CO4: Identify the types of Business organization of the company and the implementation requirements of each one.

CO5: Financial position of the company can be analyzing with the help of financial statements.

UNIT - I

Introduction to Engineering Economics: Economics – Definitions- Nature and Scope -Branches economics – Engineering Economics-features & Scope

Demand Analysis: Demand- Types of demand- Determinants- Law of Demand -Elasticity of demand – significance -Types of Elasticity of Demand.

Demand Forecasting-Types- Factor governing - Methods of demand Forecasting.

UNIT - II

Theory of Production and Cost Analysis: Production Function – Isoquant and Isocost, MRTS, Least Cost Combination of Inputs. Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Cost & output relationship in short run & long run, Break-even Analysis (BEA)-Determination of Break-Even Point - Significance and limitations.

UNIT – III

Markets & Pricing Policies:

Market structures: Markets-Types of markets - Features and price out determinations under Perfect competition, Monopoly, Monopolistic Competition, oligopoly markets.

Pricing –Pricing polices & its Objectives – Pricing Methods and its applications in business.

UNIT - IV

Capital and Capital Budgeting: Capital and its significance-Types of Capital-Estimation of Fixed and Working capital –working capital -Components of working capital & Factors determining the need of working capital.- Sources of raising capital

Capital budgeting-Significance –Process- Techniques of Capital Budgeting (non-discounted cash flow techniques and discounted cash flow of techniques).



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UNIT - V

Financial Accounting and analysis: Accounting –significance -- Book Keeping-Double entry system –Journal- Ledger- Trial Balance- Final Accounts with simple adjustments.

Financial Statement Analysis through ratios: Ratio-analysis of financial statement using different ratios (Liquidity -Profitability- Solvency -Activity ratios).

TEXT BOOK

Aryasri: Managerial Economics and Financial Analysis, MHE, 2014.

REFERENCES

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
2. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
3. Lipey & Chrystel, Economics, Oxford University Press.
4. Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Thomson.



 
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B.Tech. (V Sem.)

17EE10 - LINEAR AND DIGITAL INTEGRATED
CIRCUITS

L	T	P	Cr.
2	2	-	3

Pre-requisites: Digital Logic Circuit Design (17EE04).

Course Educational Objective: This course enables the student to
 ➤ Understand the Linear and Digital IC's and their applications.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Analyze linear IC's for engineering applications

CO2: Design various filters using their frequency bands

CO3: Design all combinational and sequential circuits using digital ICs

CO4: Compare various memory devices

UNIT – I : OPERATIONAL AMPLIFIER

Classification of Integrated circuit and Block diagram of Op-amp, Ideal Op-amp characteristics-DC and AC characteristics, 741 op-amp and its features. Basic applications of op-amp- Adder, Subtractor, Adder-Subtractor, instrumentation amplifier, log and antilog amplifier, sample & Hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators.

UNIT - II: 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 bridge and Quadrature type, waveform generators-triangular, sawtooth, square wave.

UNIT – III : TIMERS & A/D-D/A CONVERTERS

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, VCO, PLL-introduction, block schematic, principles and description of individual blocks of 565. 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 type and dual slope ADC. DAC and ADC specifications.

UNIT-IV: LOGIC FAMILIES & COMBINATIONAL CIRCUITS

Classification of 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. Decoder-74X138 IC, Demultiplexer, Encoder, priority Encoder-74X148 IC, multiplexer-74X151 IC and 74X157 IC, parity generators-74X280 IC, Magnitude comparator:74X85 IC & their applications. 4-bit binary adder:74X283 IC.

UNIT-V: SEQUENTIAL CIRCUITS & MEMORIES

74XX series of IC counters ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS:

1. D. Roy Choudhury, "Linear Integrated Circuits", New Academic science, 5th Edition, 2017.
2. John F. Wakerly, "Digital Design: Principles and Practices", Pearson education, 5th edition, 2017.

REFERENCES:

1. Robert F. Coughlin and Fredrick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Prentice Hall publisher, 6th edition, 2001.
2. Denton J. Dailey, "Operational Amplifiers and Linear Integrated circuits: Theory and Applications", TMH, 1990.
3. Sergio Franco, "Design with Operational amplifiers and Analog Integrated circuits", McGraw Hill, 3rd edition, 2002.
4. Thomas L. Floyd, "Digital Fundamentals", Pearson Education, 10th edition, 2011.
5. Ramakanth A. Gayakwad, "Op-amps and Linear Integrated Circuits", PHI, 4th edition 2000.



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B.Tech. (V Sem.)

17EE11 - ELECTRICAL MACHINES – II

L	T	P	Cr.
2	2	-	3

Prerequisite: Network Theory-II(17EE07) and Electrical Machines-I(17EE09)

Course Educational Objectives: This course enables the student to

- Understand the analysis and performance of single phase and poly phase Induction motors which are the major part of domestic appliances, control systems, drives and agricultural pump sets.
- Deal with detailed analysis of synchronous generators and motors which are the prime sources of electrical power generation.

Course Outcomes: At the end of the course, the student will be able to:

- CO1:** Interpret the construction and principle of operation of Induction and synchronous machines
- CO2:** Analyze the performance of poly phase Induction and synchronous machines.
- CO3:** Analyze the performance of Single phase Induction Machine
- CO4:** Investigate the effect of excitation and load on synchronous machine operation

UNIT-I: THREE PHASE INDUCTION MOTORS

Three-phase Induction motors-construction details-Production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and power factor- equivalent circuit - phasor diagram - crawling and cogging.

UNIT-II: PERFORMANCE OF INDUCTION MOTORS

Power stages -Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation- expressions for starting torque and running torque-condition for maximum torque-torque slip characteristics- losses and efficiency – starting methods-no load and blocked rotor tests –equivalent circuit – circle diagram, operation of induction motor as induction generator.

UNIT-III: SINGLE PHASE INDUCTION MOTORS

Single phase Induction motors – principle of operation - double field revolving theory -split phase induction motor, capacitor start and run induction motors, shaded pole induction motor– equivalent circuit.

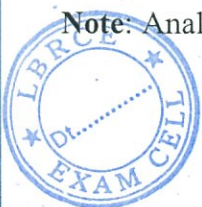
UNIT-IV: SYNCHRONOUS GENERATORS

Synchronous generator – construction, working principle- emf equation–types of rotors-armature reaction –phasor diagrams-regulation methods – EMF, MMF,ZPF methods – synchronizing to infinite bus bars – two reaction theory – parallel operation of synchronous generators-synchronous machine Constants(X_d , X_q).

UNIT-V: SYNCHRONOUS MOTORS

Synchronous motor – constructional features, principle of operation of synchronous motor – methods of starting - soft starters, Damper winding– power developed by a synchronous motor – synchronous motor with different excitations – effect of increased load with constant excitation, effect of changing excitation with constant load – torque equation – V curve and inverted V curve – hunting.

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS

1. P.S. Bimbra. ,”Electrical Machines”, Khanna Publishers, 7th Edition. 2011.
2. I.J.Nagrath & D.P.Kothari, “Electric Machines”, Tata Mc Graw Hill, 7th Edition.2010

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1. M.G. Say ,”Alternating Current Machines”, John Wiley & Sons, 1976.
2. A. E. Fitzgerald, C. Kingsley and S. Umans, “Electric Machinery”, Mc Graw-Hill Companies, 6th edition 2017.
3. Ashfaq Husain ,”Electric Machines”, Dhanapati Rai&Co, New Delhi, 3rd edition ,2017.
4. Soft Starter Handbook, ABB Group.



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B.Tech. (V Sem.)

17EE12 - ELECTRICAL POWER TRANSMISSION

L	T	P	Cr.
2	2	-	3

Pre-requisites : Power Generation & Utilization (17EE05)

Course Educational Objective: This course enables the student to

- Make familiar with the different modes of transmission of electrical energy from the places of production to consumer areas
- Appreciate the relative electrical and mechanical design procedures of the transmission system and insulators from the technical, economic and social point of view
- Understand the various factors influencing the performance of transmission lines and analyze their performance

Course Outcomes: At the end of the course, the student will be able to:

- CO1:** Differentiate various modes of power transfer and types of transmission systems
CO2: Identify devices and materials used for the transmission of electricity
CO3: Evaluate the Inductance and capacitance of single and double circuit transmission lines
CO4: Analyze the effects of line charging current, corona, and electrostatic field of EHVAC Lines on transmission line performance
CO5: Understand the per-unit calculations

UNIT – I: ELECTRICAL DESIGN OF TRANSMISSION LINES

Types of conductors - calculation of resistance for solid conductors –Skin & Proximity Effects-effect on Resistance of solid conductor. 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, 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.

UNIT – II: PERFORMANCE OF TRANSMISSION LINES

Classification of Transmission Lines - Representation of short transmission lines using generalized parameters (A, B, C, D), Performance of Short lines, Representation of Medium Lines-Nominal-T, Nominal- π . Representation of Medium lines using generalized parameters (A, B, C, D), Performance of Medium lines. Representation of Long Transmission lines-Rigorous Solution. Interpretation of the long line equations, Incident, Reflected, Refracted Waves-Surge Impedance and Surge Impedance Loading of long line, Wave length & Velocity of propagation of waves. Equivalent T & Equivalent π Representation of long lines. Representation of long lines using generalized parameters (A, B, C, D). Performance of Long line-Charging current-Ferranti Effect-Expressions for Active & Reactive powers in terms of A, B, C, D parameters with sending end and receiving end quantities, Numerical Problems.

UNIT – III: MECHANICAL DESIGN OF TRANSMISSION LINES & UG CABLES

Sag and Tension- calculations with equal & unequal heights of towers, effect of wind, temperature and ice on weight of conductor-numerical problems.

Types of Cables - Construction-Types of insulating materials. Calculations of Insulation resistance and Dielectric Stress. Capacitance of Single-core and 3-Core belted cables. Grading of Cables, Types - Capacitance grading, Inter-sheath grading- numerical problems.

UNIT-IV: OVERHEAD LINE INSULATORS & CORONA

Types of Insulators, String efficiency and Methods for improvement, voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Numerical Problems. Corona - Description of the phenomenon, factors affecting corona, Critical voltages and power loss, Methods to reduce corona loss, Interference with nearby communication lines.

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UNIT – V: TRAVELLING WAVES AND PER-UNIT SYSTEM

Transients in power systems – Causes of over voltages: lightning, switching, insulation failure and arcing grounds. Travelling waves on transmission lines - Line terminated through resistance, inductance, capacitance, short circuit, open circuit, attenuation of travelling waves. Line connected to a cable, Bewley lattice diagram.

PER-UNIT SYSTEM: Per Unit quantities and advantages, change in the base of per unit quantities, single line or one line diagram, impedance and reactance diagram, Numerical problems.

Note: Analyze the core concepts using software tools wherever applicable.

TEXT BOOKS

1. John J Grainger, William D Stevenson Jr, “Power System Analysis”, TMH Company, 4th Edition. 2003.
2. J.B.Gupta, “A Course in Power System”, S. K. Kataria & Sons publications, 11th Edition, 2011.

REFERENCES

1. Colin Bayliss and Brian Hardy, “Transmission And Distribution Electrical Engineering”, Elsevier Publication, 4th Edition, 2012.
2. C.L.Wadhwa, “Electrical Power Systems” New age International (P) Limited, 7th Edition,2017.
3. P S R Murthy, “Electrical Power Systems”, BS Publications, 2017.
4. Hadi Saadat, “Power System Analysis”, McGRAW-HILL International Editions, 3rd Edition,2011.
5. D P Kothari and I J Nagrath, “Power System Engineering”, McGraw-Hill Education, 2nd Edition,2008



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B.Tech. (V Sem.)

17EC22 - MICROPROCESSORS AND
MICROCONTROLLERS

L	T	P	Cr.
3	-	-	3

Pre-requisites : Digital Circuits, Computer organization

Course Educational Objective : In this course student will learn about the Architecture of 8086 Microprocessor and 8051 Microcontroller and their Assembly Language Programming, interfacing Memory and Various Peripherals with 8086 Microprocessor/8051 Microcontroller and concepts of Interrupts and Serial Communication in reference to 8086

Course Outcomes (COs): At the end of the course, students will be able to

CO1:	Understand the architecture and operation of 8086 microprocessor & 8051 microcontroller
CO2:	Apply the instructions of 8086/8051 for various applications.
CO3:	Analyze the operation of peripherals and devices for different applications.
CO4:	Design a system by interfacing memory, peripherals and I/O devices to 8086/8051

UNIT – I

Microprocessor Architecture: Introduction to Microprocessors-Purpose of a Microprocessor, different types of Microprocessors, their features and their comparison; 8086 Microprocessor-Architecture, Special functions of General purpose registers, 8086 flag register and function of 8086 Flags, Addressing modes of 8086.

Instruction Set: Instruction set of 8086, Assembly language programs involving logical, Branch and Call instructions, Sorting, Evaluation of Arithmetic Expressions, String manipulation, Assembler directives, simple programs, procedures and macros.

UNIT – II

8086 Memory and I/O Interfacing: Pin diagram of 8086, Minimum mode and maximum mode of operation, Timing diagram, Memory (Static RAM & EPROM) and I/O interfacing to 8086. Interrupt structure of 8086, Interrupt Vector table, Interrupt service routines.

UNIT – III

Peripherals and Devices: DMA Controller 8237, Interrupt Controller 8259 and Cascading, USART 8251 8255 PPI – various modes of operation, Keyboard, D/A and A/D converter interfacing.

UNIT – IV

Microcontroller: 8051 Microcontroller Architecture, Pin Diagram, Addressing modes, Instruction Set and Programs, 8051 Memory and I/O interfacing.

UNIT – V

8051 Interfacing: Modes of timer operation, Serial port operation, Interrupt structure of 8051, Interfacing of Seven segment Displays, Stepper Motor and Serial/Parallel Printer



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TEXT BOOKS

1. Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007.
2. A. K. Ray and K.M. Bhurchandi, Advanced Microprocessor And Peripherals, 2nd Edition TMH Publishers.
3. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay "Microcontrollers and Embedded System", Pearson Education Publishers, 2nd Edition

REFERENCES

1. Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education Publishers.
2. J. K. Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.
3. Ajay Deshmukh, "Micro Controllers-Theory and Applications", Tata McGraw Hill Publishers.
4. Kenneth J. Ayala, "The 8051 Micro Controller", Cengage Learning Publishers, 3rd Edition, 2000.



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B.Tech. (V Sem.)

17EE13 - CLASSICAL AND HEURISTIC
OPTIMIZATION TECHNIQUES

L	T	P*	Cr.
3	-	-	3

Pre-requisites : None**Course Educational Objective:** This course enables the student to

- Understand the need of optimization methods
- Familiarize with various solution methods of un-constrained and constrained decision-making problems.
- Solve multi objective optimization problems.

Course Outcomes: At the end of the course, the student will be able to:

- CO1: Solve various constrained and unconstrained problems in single variable as well as multivariable
- CO2: Apply the concept of optimality criteria for various types of optimization problems
- CO3: Interpret nontraditional optimization techniques
- CO4: Identify a suitable technique to solve a particular engineering problem

UNIT – I: Introduction to optimization

An overview of optimization problem, concepts and terms related to optimization, necessary and sufficient conditions for a multivariable function, Effects of scaling or adding a constant to an objective function, understanding of constrained and unconstrained optimization problems, local & global optima, properties of convex function and definiteness of a matrix and test for concavity of a function, Numerical examples.

UNIT – II: Linear Programming (LP)

Simplex method, matrix form of simplex method, solution of linear programming problems in tabular form via simplex method, Two-Phase simplex method, Duality in simplex method, Sensitivity analysis.

UNIT – III: Non-Linear Programming

Lagrange multipliers, gradient descent method, steepest descent method, Newton's method, Davison-Fletcher-Powell method, Exterior point method, Numerical examples.

UNIT – IV: Non-Linear Programming

Karush-Kuhn-Tucker(KKT) conditions, convex optimization, quadratic optimization, numerical examples.

Dynamic programming-principle of optimality, concept of time optimal control problem and mathematical formulation of problem, numerical examples.

UNIT – V: HEURISTIC METHODS

Introduction, modern heuristic search techniques, introduction to genetic algorithms, encoding, fitness function, basic operators. Introduction to particle swarm optimization, variations of particle swarm optimization-discrete PSO, hybrid PSO, research areas and applications, introduction to ant colony search algorithm, major characteristics of ant colony search algorithm.

Note: Analyze the core concepts using software tools wherever applicable.*M. Challa*

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TEXT BOOKS:

1. S.S. Rao ,“Engineering Optimization – Theory and Practice”, John Wiley & Sons, 4th edition 2009, New Age International Publishers; Third edition (1 January 2013)
2. Kwang Y.Lee, Mohamed A.El-Sharkawi, “Modern Heuristic Optimization Techniques- Theory and Application to Power Systems” John Wiley & Sons, 2008

REFERENCES:

1. K.V. Mittal and C Mohan, “Optimization Methods in Operations Research and Systems Analysis”, New Age International Publishers, New Delhi, 3rd edition 2005,
2. Kalyanmoy Deb, “Optimization for Engineering Design - Algorithms and Examples”, PHI Learning Private Ltd, New Delhi, 2nd edition,2012.
3. Zbigniew Michalewicz, David B.Fogel, “How to solve it: Modern Heuristics”, Springer, 2nd edition, 2000.
4. D.E. Goldberg, “Genetic Algorithms in Search, optimization and machine learning: Reading, Mass”, Addison-Wesley, 1989.
5. Winston, WL and Venkataramanan,M.,“Introduction to Mathematical Programming”, 4th Edn., Duxbury Press, 2002.
6. Jasbir S.Arora, “Introduction to optimum design”, Academic press, 4th edition, 2016.



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B.Tech. (V Sem.)

17EE14 - RENEWABLE ENERGY TECHNOLOGIES

L	T	P	Cr.
3	-	-	3

Pre-requisites : Power Generation and Utilization

Course Educational Objective: This course enables the student to

- Introduce, analyze and synthesize a variety of energy technologies

COURSE OUTCOMES: At the end of the course, the student will be able to:

- CO1:** Compare the conventional and sustainable energy resources & their control methods
CO2: Illustrate the planning and operation of renewable energy systems.
CO3: Analyze various factors for the erection of the wind power plant.
CO4: Compare photovoltaic system, Fuel cell and thermo solar power.
CO5: Illustrate micro plants and micro turbines design considerations

UNIT – I: ALTERNATIVE SOURCES OF ENERGY: Renewable Sources of Energy, Renewable Energy versus Alternative Energy, Planning and Development, Renewable Energy Economics, Modern Electronic Controls of Power Systems.

WIND POWER PLANTS: Introduction, Appropriate Location, Wind Power, General Classification of Wind Turbines, Generators and Speed Control Used in Wind Power Energy Analysis of Small Generating Systems.

UNIT – II: THERMOSOLAR POWER PLANTS: Water Heating by Solar Energy, Heat Transfer Calculation of Thermally Isolated Reservoirs, Heating Domestic Water, Thermo solar Energy, Economical Analysis of Thermo solar Energy.

UNIT – III: PHOTOVOLTAIC POWER PLANTS AND FUEL CELLS : Generation of Electricity by Photovoltaic Effect ,Dependence of a PV Cell Characteristic on Temperature , Solar Cell Output Characteristics, Photovoltaic Systems, Applications of Photovoltaic Solar Energy, The Fuel Cell, Constructional Features of Proton Exchange Membrane Fuel Cells and Solid Oxide Fuel Cells

UNIT – IV: INTEGRATION OF RENEWABLE ENERGY SOURCES: Introduction, Principles of Power Interconnection- Power Converters for Power Injection into the Grid, Instantaneous Active and Reactive Power Control Approach, Integration of Multiple Renewable Energy Sources-DC Link Integration, AC Link Integration.

UNIT – V: MICROPLANTS AND MICROTURBINES: Fuel from Biomass, Biomass for Biogas, Biological Formation of Biogas, Construction of Biodigester, Characteristics of Biodigesters, Micro turbine Fuel, Control and Operation of Micro turbine, Control of Micro turbines, Storage Systems: Lead–Acid Batteries, Ultra capacitors, Flywheels, Superconducting Magnetic Storage System, Geothermal Energy - Classification- Fundamentals of geophysics

TEXT BOOKS

- 1) Felix a. Farret, M. Godoy simoes, “Integration of Alternative Sources of Energy”, a John Wiley & sons, inc., publication, Second Edition, 2017.
- 2) John Twidell and Tony Weir “Renewable Energy Resources” Taylor & Francis, Third Edition 2015

REFERENCES

1. D.O.hall and R.P. Overeed, “Biomass Renegerable Energy”, John Wiley and Sons, Newyork, 1987.
2. Spera D.A, “Wind Turbine Technology” Fundamental concepts of wind turbine technology, ASME Press, NY, 1994.
3. Handbook: “Batteries and Fuel cell” – Linden, Mc.Graw Hill.

B.Tech. (V Sem.) 17EE15 - ELECTRICAL ENGINEERING MATERIALS

L	T	P	Cr.
3	-	-	3

Pre-requisites: Applied Physics (17FE12)

Course Educational Objective: This course enables the student to

- Get exposure on the materials used in various electrical machines, transmission lines and renewable energy technologies.
- Understand the behaviour of various nano materials

Course Outcomes: At the end of the course, the student will be able to:

CO1: Illustrate the properties of materials used in electrical devices.

CO2: Apply the knowledge of the materials in different engineering applications.

CO3: Acquire knowledge about insulating materials and dielectrics

CO4: Illustrate the properties of nano materials and CNT's

UNIT – I :MAGNETIC MATERIALS

Basics Results of Field Theory, Magnetic Parameters, Classification of Magnetic materials, Magnetic Anisotropy, Magnetostriction, Application of ferromagnetic materials, Magnetic materials for Electric Devices, Soft Magnetic materials-Eddy currents, losses in Electrical Machines, steel, Special alloys, soft Ferrites. Hard magnetic materials-Operation of permanent magnets, rare earth magnets, Nitride magnets, ALNICO, Barium and Strontium Ferrite, ductile permanent magnets, Bonded magnets.

UNIT – II: COMPONENTS

Resistors, Capacitors and Cables (HV& EHV), Display units: LED, LCD and Monitors, effect of environment on components.

UNIT – III: PROCESSES

Basic processes used in the manufacture of integrated circuits such as Epitaxy, masking, photolithography, diffusion, oxidation, etching, metallization, Scribing, wire bounding and Encapsulation. Induction and Dielectric heating. Electron beam welding and cutting.

UNIT – IV :RENEWABLE ENERGY TECHNOLOGIES

Materials required for power generation from renewable sources and storage systems-Solar Cells, wind, fuel cells & micro turbines.

UNIT – V :NANO MATERIALS & MEMS

Introduction – synthesis of nano materials, plasma arcing, chemical vapor deposition, solgels, electro deposition, ball milling, properties of nano materials, carbon nano tubes, types and structure of CNT, Fabrication of CNTs: Electric arc discharge Method, pulsed laser deposition, chemical vapor deposition, properties and applications.

TEXT BOOKS

1. B.D.Cullity, C.D.Graham, "Introduction to Magnetic Materials", Wiley Publications, 2nd edition 2008.
2. Dekker Adrianus J, "Electrical Engineering Materials", PHI, 2003.



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B.Tech. (V Sem.)

17EE16 - ADVANCED LOGIC DESIGN

L	T	P	Cr.
3	-	-	3

Pre-requisites: Digital Logic Circuit Design (17EE04)

Course Educational Objective: This course enables the student to

- Understand the concepts of CMOS logic families and VHDL Program.
- Make use of VHDL for designing the combinational and sequential circuits.

Course Outcomes: At the end of the course, student will be able to:

- CO1: Design the logic circuits using CMOS logic.
 CO2: Implement combinational logic circuits using VHDL.
 CO3: Realize sequential logic circuits using VHDL.
 CO4: Outline the internal architecture of different memories.

UNIT-I: LOGIC FAMILIES

Introduction to logic families, CMOS logic and implementation of logic gates using CMOS logic, CMOS Logic Levels, AOI, OAI Circuit Diagrams and Functional Tables, steady state and dynamic electrical behavior of CMOS logic families, TTL families, CMOS/ TTL interfacing, Emitter coupled logic, comparison of logic families.

UNIT-II:INTRODUCTION TO VHDL

Design Flow, Program Structure, Types and Constants, Arrays, Functions and Procedures, Libraries and Packages, Structural Design Elements, Data Flow Design Elements, Behavioral Design Elements, Implementation of logic gates using VHDL using data flow and behavioral models.

UNIT-III: COMBINATIONAL LOGIC DESIGN USING VHDL

Decoders-74x138, 74x139, Encoders-74x148 Priority Encoder, Multiplexers-74x151 MUX, Barrel shifter, comparators, 74x85 magnitude comparators , Dual parity encoder, floating point encoder, EX-OR gates, Parity circuits, 9-bit parity generator; Three state devices, octal three state transceiver.

UNIT-IV: SEQUENTIAL LOGIC DESIGN USING VHDL

8-Bit Latch 74x373, Flip Flops-D Flip Flop, JK Flip Flop, Registers, 4-bit register , Counters, 4-Bit Binary Counter, 74X163 as Mod-11 & Mod-193 Counter, universal Shift Register 74x194, 3-bit LFSR counters, Shift registers-Universal shift register ,serial in parallel out 8-bit shift register, parallel in serial out 8-bit shift register

UNIT-V: MEMORIES

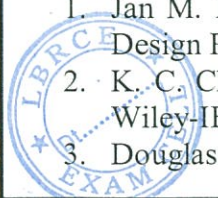
ROM internal structure, Implementation of logic circuits using ROM, Static RAM- Internal structure, SRAM timing diagram, synchronous RAM, Dynamic RAM- Internal structure, DRAM timing diagram, synchronous RAM

TEXT BOOKS

1. John F. Wakerly, "Digital Design: Principles and Practices", Pearson education, 5th edition, 2017.
2. Charles H. Roth Jr., "Digital Systems Design using VHDL", PWS Publications, USA, 3rd edition, 2016.

REFERENCES

1. Jan M. Rabaey, Anantha Chandrakasan, and Borivoje Nikolic, "Digital Integrated Circuits: A Design Perspective", Prentice Hall Publishers, illustrated 2nd edition 1996.
2. K. C. Chang, "Digital Systems Design with VHDL and Synthesis: An Integrated Approach", Wiley-IEEE Computer Society Press, illustrated edition 1999.
3. Douglas. J. Smith, "HDL Chip Design", Doone Publications, USA, illustrated edition, 1996.



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B.Tech. (V Sem.)

17FE61 - PRESENTATION SKILLS LAB

L	T	P	Cr.
-	-	2	1

Pre-requisites: Students should have fundamental knowledge in making Conversations in English and be with readiness to speak

Course Educational Objective: To help students make oral presentations, power point presentations, participate in group discussions and Write project/research reports/technical reports/ formal letters by gathering information and organizing ideas relevantly and coherently.

Course Outcomes: At the end of the course, the student will be able to

CO1: Make power point presentations and oral presentations.

CO2: Use standard vocabulary contextually.

CO3: Manage skilfully through group discussions.

CO4: Negotiate skilfully for better placement.

Syllabus: English Communication Skills Lab (ELCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self- study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise – I

CALL Lab:

Understand: synonyms and antonyms, one-word substitutes, analogy, idioms and phrases.

ICS Lab:

Practice: Ice-Breaking Activity and JAM Session – Introducing Oneself – Extempore - Public Speeches.

Exercise – II

CALL Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

ICS Lab: Group Discussion

Exercise – III

CALL Lab:

Understand: Data collection – Organizing data - Making Poster – Making slides.

ICS Lab:

Practice: Poster Presentation – Power Point Presentations.

Exercise – IV

CALL Lab:

Understand: Types of Résumé – Letter Writing.

ICS Lab:

Practice: Writing Résumé & Letters

Exercise – V

CALL Lab:

Understand: Reading comprehension – Listening Comprehension – scanning, skimming, reading between lines and critical reading.

ICS Lab:

Practice: Reading comprehension - Listening Comprehension – scanning, skimming, reading between lines and critical reading.

Exercise - VI

CALL Lab:

Understand: Interview Skills

ICS Lab:

Practice: Mock Interviews

Lab Manual:

Board of Editors, "ELCS Lab Manual – A Workbook of CALL and ICS Lab Activities", Orient Black Swan Pvt. Ltd., Hyderabad, 2016.

SUGGESTED SOFTWARE:

1. Digital Mentor: Globarena, Hyderabad, 2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA, 2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company, USA, 2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008



A handwritten signature in blue ink, appearing to be "P. N. Srinivas" or similar.

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B.Tech. (V Sem.)

17EE66 - ELECTRICAL MACHINES - I LAB

L	T	P	Cr.
-	-	2	1

Prerequisite: Electrical Machines-I (17EE09)

Course Educational Objectives: This course enables the student to

- Analyze the operation of dc machines and transformers
- Give practical exposure on the performance of DC machines and transformers

Course Outcomes: At the end of the course, the student will be able to:

- CO1:** Develop the Equivalent circuit of Transformer.
CO2: Analyze the performance of DC machines and Transformers.
CO3: Control the speed of a DC Motor.
CO4: Identify a suitable machine for real time application.

LIST OF EXPERIMENTS

<u>S.No</u>	<u>Name of the Experiment</u>
1	Predetermination of Efficiency & Regulation of 1-phase transformer
2	Predetermination of Efficiency & Regulation of two identical 1-phase transformers
3	<u>Determination of Efficiency & Regulation of 1-phase Transformer by direct test</u>
4	Conversion of Three phase to two phase by using two identical transformers
5	Determination of Stray losses in a DC Shunt Motor by Retardation test
6	Determination of critical resistance and critical speed of D.C. shunt generator
7	Predetermination of Efficiency of D.C. shunt machine & Speed control of D.C. shunt motor
8	Performance characteristics of D.C. shunt motor
9	Determination of efficiency of DC shunt machine by conducting back to back test
10	Separation of stray losses in a D.C. shunt motor.
	<u>Additional Experiments</u>
11	Load characteristics of a separately excited D.C. Generator
12	Calculation of voltage regulation for a 1-phase transformer using lab-view



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17EE67 - ELECTRONIC CIRCUITS AND ICS LAB

L	T	P	Cr.
-	-	2	1

Pre requisites: Electronic Circuits and Devices(17EE01), Digital Logic Circuit Design(17EE04).

Course Educational Objective: This course enables the student to

- Familiar design concepts of different linear and digital ICs
- Gain practical exposure on different electronic circuits and ICs

Course Outcomes: At the end of the course, the student will be able to:

CO1: Analyze Op-Amp circuits

CO2: Design filter circuits using Op-amp

CO3: Synthesize Oscillators using Op-amp

CO4: Design multivibrators and Voltage regulators

LIST OF EXPERIMENTS

CYCLE-I

1. Realisation of adder, subtractor, comparator circuits using op-Amp.
2. Design of LPF, HPF (first order) using Op-Amp.
3. Design of Differentiator and Integrator using Op-Amp.
4. Realization of RC phase shift oscillator using Op-Amp.
5. Realization of Wien bridge oscillator using Op-Amp.

CYCLE-II

6. Design Monostable and Astable multivibrator circuits using IC 555 timer.
7. Design of Voltage regulator using IC 723.
8. PLL characteristics and frequency multiplier using PLL IC 565.
9. Implementation of 3-bit DAC using Op-Amp.
10. Design Voltage controlled oscillator using IC 566.

ADDITIONAL EXPERIMENTS

11. Voltage regulator using LM723
12. Design of Schmitt trigger.



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B.Tech. (V Sem.)

17EE90 - ELECTRICAL SAFETY
 (*Add on course – I)

L	T	P	Cr.
3	-	-	3

Pre-requisites:- None

Course Educational Objective: This course enables the student to deal with

- A comprehensive exposure to electrical hazards.
- Various grounding techniques of electrical equipments.
- Safety procedures and various electrical maintenance techniques.
- Reviews the IE rules in implementing the Electrical Safety procedures

Course Outcomes: At the end of the course, the student will be able to:

- CO1 : Describe electrical hazards and safety equipment.
 CO2 : Analyze various grounding and bonding techniques.
 CO3 : Carry out proper maintenance of electrical equipment on various standards.
 CO4 : Outline the IE rules and acts in electrical safety.

UNIT I: ELECTRICAL HAZARDS AND SAFETY EQUIPMENTS

Primary and secondary hazards- arc, blast, shocks-causes and effects-safety equipment- flash and thermal protection, head and eye protection-rubber insulating equipment, hot sticks, insulated tools, barriers and signs, safety tags, locking devices- voltage measuring instruments- proximity and contact testers-safety electrical one line diagram- electrician's safety kit.

UNIT II: GROUNDING OF ELECTRICAL SYSTEMS

General requirements for grounding and bonding- definitions- grounding of electrical equipment bonding of electrically conducting materials and other equipment-connection of grounding and bonding equipment- system grounding- purpose of system grounding- grounding electrode system grounding conductor connection to electrodes-use of grounded circuit conductor for grounding equipment- grounding of low voltage and high voltage systems.

UNIT III: SAFETY PROCEDURES AND METHODS

The six step safety methods- pre job briefings - hot-work decision tree-safe switching of power system- lockout-tag out- flash hazard calculation and approach distances- calculating the required level of arc protection-safety equipment , procedure for low, medium and high voltage systems- the one minute safety audit

UNIT IV: ELECTRICAL MAINTENANCE AND ITS RELATIONSHIP TO SAFETY

Safety related case for electrical maintenance- reliability centered maintenance (RCM) - eight step maintenance programme- frequency of maintenance- maintenance requirement for specific equipment and location- regulatory bodies- national electrical safety code- standard for electrical safety in work place- occupational safety and health administration standards.

UNIT V: 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, Indian Electricity Acts related to Electrical Safety.



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TEXT BOOKS:

1. John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, Al Winfield, 'Electrical Safety Handbook', McGraw-Hill Education, 4thEdition, 2012.
2. Indian Electricity Act and Rules, Government of India, 2003.

REFERENCES

1. Maxwell Adams.J, 'Electrical Safety- a guide to the causes and prevention of electric hazards', The Institution of Electric Engineers, IET 1994.
2. Ray A. Jones, Jane G. Jones, 'Electrical Safety in the Workplace', Jones & Bartlett Learning, 2000.
3. Accident prevention manual for industrial operations, N.S.C., Chicago, 1982.
4. Power Engineers – Handbook of TNEB, Chennai, 1989.



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B.Tech. (V Sem.)

17PD05 - EMPLOYABILITY ENHANCEMENT
SKILLS - I

L	T	P	Cr.
1	-	-	0

Prerequisite: NIL

Course Educational Objective (CEO): This course will make students proficient in Quantitative techniques, language & communication skills to qualify in placement tests, demonstrate industry-readiness skills by applying concepts and tools that will serve as building blocks for analytical thinking and professional development.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Apply Quantitative techniques and logical thinking to qualify in recruitment tests and other professional tasks.

CO2: Communicate effectively in various professional and social contexts.

CO3: Apply Verbal skills effectively in Job Interviews as well other professional contexts.

CO4: Demonstrate various principles involved in Quantitative problem solving, thereby reducing the time taken for performing job functions.

CO5: Practice lifelong learning through personal effectiveness as well as leadership.

UNIT – I

Quantitative Aptitude: Numbers, L.C.M & H.C.F of numbers, Decimal Fractions, Simplification, Square root & cube root-Practice tests.

Verbal Ability: Introduction to Vocabulary-Root words (Prefixes, Suffixes) - Practice tests

UNIT – II

Quantitative Aptitude: Averages, Problems on Ages, Problems on Numbers, Surds and Indices-Practice tests.

Verbal Ability: Advanced vocabulary- Model tests for GRE/TOEFL/IELTS

UNIT – III

Quantitative Aptitude: Percentages, Profit and Loss- Practice tests

Verbal Ability: Synonyms & Antonyms, Idiomatic expressions-Practice tests

UNIT – IV

Quantitative Aptitude: Ratio And Proportion, Partnership, Chain rule- Practice tests

Verbal Ability: Words often confused & misused, One-word substitutes & Flash card activity-Practice tests

UNIT – V

Quantitative Aptitude: Number Series, Letter Series, Blood Relations, Coding and Decoding, Direction sense test- Practice tests

Verbal Ability: Phrasal verbs, Word analogies, Reading Comprehension-Practice tests

TEXT BOOKS

1. R.S.AGGARWAL, *Objective Arithmetic*, S. CHAND Publishers.
2. R.S.AGGARWAL, *Verbal & Non-Verbal Reasoning*, S. CHAND Publishers
3. *Objective English*. Edgar Thorpe, Pearson Education, New Delhi.2009
4. Sanjay kumar, Pushp Lata: *Communication skills*. Oxford, Delhi, 2012

REFERENCES

1. Meenakshi Raman, Sangeetha: *Technical Communication*, Oxford University Press, 2008
2. Baron's Guide on GRE
3. Dinesh Khattar, *The Pearson Guide to Quantitative Aptitude*, Pearson Education
4. M. Tyra, *Magical Book on Quicker Maths*, BSC Publishers
5. *Quantitative Aptitude* by Arun Sharma
6. *Vocabulary Builder for Students of Engineering and Technology (A self – study manual for vocabulary Enhancement)* Y.Saloman Raju, Maruthi Publishers

HOD - CSS

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B.Tech. (VI Sem.)

17EE17 - ANALOG AND DIGITAL SIGNAL PROCESSING

Prerequisites: Differential Equations and linear algebra (17FE04), Transformation techniques and vector calculus(17FE06), Numerical methods and fourier analysis(17FE07)

Course Educational Objective: This course enables the student to

- Understand Discrete Fourier Transform and its computation.
- Deal with Discrete Fourier Series, Fast Fourier Series, Z-Transforms
- Know the concepts of filter design

Course Outcomes: At the end of the course, the student will be able to:

CO1: Illustrate properties of continuous and discrete-time signals

CO2: Analyze DFT and FFT

CO3: Analyze discrete time signals.

CO4: Design digital filters & wavelet filters using different techniques.

UNIT - I : CLASSIFICATION OF SIGNALS AND SYSTEMS

Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - CT systems and DT systems- Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable, Linear constant coefficient difference equations, Sampling Theorem, Convolution theorem

UNIT – II: DISCRETE FOURIER SERIES & FAST FOURIER TRANSFORM

Properties of discrete Fourier series, DFS representation of periodic sequences- Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT- Computation of DFT. Relation between Z-transform and DFS-Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency- FFT Algorithms- Inverse FFT- and FFT for composite N

UNIT – III: 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- Continuous Wavelet Transforms-Definition and properties-concept of scale and its relation with Frequency.

UNIT – IV: IIR DIGITAL FILTERS

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

UNIT – V: 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. Wavelet Filters-Inverse discrete wavelets transform computation by filter banks-Basic properties of filter coefficients-Choice of wavelet function coefficients.

TEXT BOOKS

1. John G. Proakis, Dimitris G. Manolakis, “Digital Signal Processing, Principles, Algorithms, and Applications”, Pearson Prentice Hall, illustrated 4th edition, 2007.
2. A.V.Oppenheim and R.W. Schaffer, “Discrete Time Signal Processing”, Pearson education, 3rd edition, 2013.



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REFERENCES

1. Andreas Antoniou "Digital Signal Processing", TATA McGraw Hill edition, 2006.
2. MH Hayes, Schaum's , "Digital Signal Processing: Outlines", TATA Mc-Graw Hill professional, 1999.
3. C. Britton, Rorabaugh, "DSP Primer", Tata McGraw Hill edition, 2005.
4. Robert J. Schilling, Sandra L.Harris "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007.
5. Lonnie, C.Ludeman, " Fundamentals of DSP", Wiley India Pvt. Limited, 2009
6. Rao R M and A S Bopardikar, "Wavelet Transofrmations Introduction to theory and Applications",Pearson Education, Asia, 2000.



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L	T	P	Cr.
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B.Tech. (VI Sem.)

17EE18 - POWER SYSTEM ANALYSIS

Pre-requisites : Electrical Power Transmission (17EE12)**Course Educational Objective:** This course enables the student to

- Model and analyze large power systems
- Familiarize with calculation of power flow in a power system network using various techniques

Course Outcomes: At the end of the course, the student will be able to:

- CO1 : Formulate the network matrices required for power flow and short circuit studies.
 CO2 : Apply appropriate power flow method to power system problems
 CO3 : Analyze the various faults occurring on power systems
 CO4 : Illustrate the power system stability problem.

UNIT – I: POWER SYSTEM NETWORK MATRICES

Graph Theory: Definitions, relevant concepts in graph theory, Network Matrices, Y_{bus} formation by Direct Inspection and Singular Transformation Methods, Z_{bus} building algorithm. Numerical Problems.

UNIT – II: POWER FLOW METHODS

Review of per-unit system, power flow problem formulation, solution of non-linear algebraic equations by Gauss-Seidel and Newton-Raphson methods, Power flow solution by Newton's method in polar coordinates, flow charts, solution of small systems.

UNIT – III: POWER FLOW METHODS CONTINUED

Sensitivities of system operating parameters, derivation of Fast Decoupled Load flow, comparison with Newton-Raphson method, DC Load flow and applications, Introduction to optimal ordering of system of equations, triangular factors, sparsity.

UNIT – IV: NETWORK FAULTS AND FAULT CALCULATIONS

Symmetrical Fault (LLL) Analysis: Short circuit of synchronous machine unloaded, Short circuit of loaded synchronous machine. Calculation of symmetrical short circuit currents for simple systems, short circuit current computation through Thevenin's theorem. Symmetrical components transformation, phase shift in Y/ Δ transformers, sequence impedance of transmission lines, sequence impedance and networks of power system, sequence impedance and network of synchronous machine, sequence impedance and networks of transformers, construction of sequence networks of a power system, computation of circuit breaker capacities - Short Circuit Current and MVA Calculations, Numerical Problems. **Unsymmetrical Fault Analysis:** LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT – V: POWER SYSTEM STABILITY

Elementary concepts of Steady State, Dynamic and Transient Stabilities-Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability. Formulation of Swing Equation and its solution, determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation, Methods to improve Steady State and Transient Stability

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS:

1. W D Stevenson Jr., "Power System Analysis", T M H, 4thedition,1982.
2. D.P. Kothari, I.J. Nagrath, "Modern Power System Analysis", T M H New Delhi,4th Edition 2011

REFERENCES:

1. G.W. Stagg & A.H. El-Abiad, "Computer Methods in Power System Analysis", 1983.
2. Prabha Kundur, "Power System Stability and Control", T M H, 10th reprint 2010.
3. M.A. Pai, "Computer Techniques in Power System Analysis", TMH, 3rd edition, 2014
4. Hadi Saadat, "Power System Analysis"– TMH , 3rd Edition, 2011.
5. Abhijit Chakraborty, Sunita, Halder, "Power System Analysis: Operation and Control", PHI Learning Pvt Ltd., New Delhi, III Edition., 2010.



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B.Tech. (VI Sem.)

17EE19 - POWER ELECTRONICS

Prerequisite: Electronic circuits and Devices(17EE01), Network Theory-II (17EE07)

Course Educational Objective: This course enables the student to

- Make use of different power converters & their enhancement in performance of power transmission, distribution and utilization systems.
- Analyze the performance of various power electronic converters by applying different control mechanisms

Course Outcomes: At the end of the course, the student will be able to :

CO1: Illustrate the operation of various power semiconductor devices.

CO2: Evaluate the performance of power converters.

CO3: Design the protection and control circuits for various converters.

CO4: Analyze different firing and commutation circuits

UNIT – I: POWER SEMI-CONDUCTOR DEVICES

Power semiconductor switches–Characteristics of SCR–Two transistor model- Static and dynamic characteristics–Turn on and Turn off methods-Series and Parallel operation of thyristors-Gate triggering circuits-Rating and protection-Snubber circuits-Characteristics of GTO & IGBT.

UNIT – II: COMMUTATIONS & PHASE-CONTROLLED RECTIFIERS

Commutation circuits: Natural commutation, Forced commutation circuits–Self, Impulse, Resonant pulse, complimentary and external pulse commutation

Single phase and three phase- Half wave, Full wave and bridge controlled rectifiers with R and RL loads–continuous and discontinuous modes-effect of freewheeling diode-Dual converters(both single phase and three phase)–Effect of Source impedance, Problems.

UNIT – III: AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

AC voltage controllers–single phase ac voltage controller with R and RL loads– continuous and discontinuous modes- Principle of operation of Cyclo-converter -Single phase to single phase cyclo converters -Step up and step-down cyclo converters –Problems.

UNIT – IV: DC TO DC CONVERTERS

Principle of operation-Control Strategies, Step-up and step-down chopper–Chopper classification-Derivation of average load voltage, load current for continuous/discontinuous current operation-Analysis of Class A chopper –Problems.

UNIT – VI: INVERTERS

Single phase inverter–Voltage Source Inverter (VSI)-Current source inverters(CSI) - Comparison between VSI and CSI- Analysis with R & RL loads-3-phase inverters–180 and 120 degree mode of operation-PWM Techniques, Single Pulse Width Modulation, Multiple Pulse Width Modulation, Sinusoidal & Modified Sinusoidal PWM-Hysteresis Current Controlled PWM techniques-Applications.

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS:

1. Md.H.Rashid "Power Electronics", Pearson Education fourth Edition, first Indian Reprint-2014.
2. Dr.P.S. Bhimbra, "Power Electronics", Khanna Publishers, 5th Edition, 2012.

REFERENCES:

1. Ned Mohan, T.M. Undeland and William P.Robbins, "Power Electronic Converters-Applications", John Wiley & Sons, 3rd Edition, , 2009
2. M D Singh, K B Khanchandani "Power Electronics", Tata MC Graw Hill Publishers,2nd edition 2006.



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B.Tech. (VI Sem.)

17EE20 - MEASUREMENTS AND INSTRUMENTATION

Prerequisite: Network Theory-I(17EE03), Network Theory-II (17EE07), Applied Physics(17FE12)

Course Educational Objectives: This course enables the students to

- Understand the construction and working principle of different types of meters
- Provide knowledge to design and create novel products and solutions for real life problems.

Course Outcomes: At the end of the course, the student will be able to:

- CO1. Compare the performance of MC, MI and Dynamometer types of measuring instruments and Energy meters
- CO2. Determine the circuit parameters using AC and DC bridges
- CO3. Compute the errors in CTs and PTs
- CO4. Identify suitable transducers for the measurement of temperature, displacement and Strain
- CO5. Illustrate operating principles of electronic measuring instruments

UNIT - I: MEASURING INSTRUMENTS

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration. Classification of measuring instruments-Analog and Digital their modes of operation, Essentials of indicating instruments: deflecting, controlling and damping systems. Construction, working, torque equation, various advantages and disadvantages of MI (attraction and repulsion), and PMMC. Ammeter and Voltmeter theory: Extension of range of ammeters and voltmeters using shunt, multiplier. Universal shunt, Universal multiplier.

UNIT – II: MEASUREMENT OF R, L, C

Measurement of Resistance: Voltmeter-ammeter method. Kelvin’s Double Bridge, Megger. A.C. Bridges: sources & detectors for A.C bridge, General equation for bridge at balance. Measurement of Inductance: Maxwell’s Inductance – Capacitance Bridge, Andersons Bridge. Measurement of Capacitance: Schering Bridge.

UNIT – III: SPECIAL PURPOSE MEASURING INSTRUMENTS:

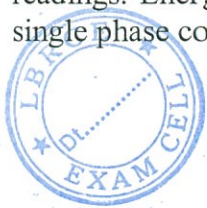
Instrument Transformers: Construction, connection of CT & PT in the circuit, advantages of CT / PT over shunt and multipliers for range extension, transformation ratio, turns ratio, nominal ratio, burden etc, and ratio and phase angle error. Power factor meter, Frequency meter Resonance type and Weston type.

Potentiometers

Potentiometers: Principle of A.C (polar and coordinate type), D.C. Potentiometer (only Crompton’s type) standardization & its applications. Grounding techniques.

UNIT – IV: MEASUREMENT OF POWER AND ENERGY

Wattmeter theory: Construction, working, torque equation, errors and their compensation in dynamometer type wattmeter, low power factor wattmeter, poly-phase wattmeter. Measurement of reactive power, determination of power factor of the load and its nature in terms of two wattmeter readings. Energy meter theory: Construction, working, torque equation, errors and adjustments of single phase conventional (induction type) energy meter. Three phase energy meters.



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UNIT - V: INSTRUMENTATION

Transducers, classification & selection of transducers, strain gauges, inductive transducers, LVDT, capacitive transducers, piezoelectric and Hall-effect transducers, photo-voltaic & photo-conductive cells. Measurement practices in substation.

Optical and digital transducers – Elements of data acquisition system – A/D, D/A converters – Smart sensors(Elementary treatment only).

TEXT BOOKS

1. A. K. Sawhney, DhanpatRai& Sons “A Course in Electrical and Electronic measurements & Instrumentation” , Education & Technical publishers New Delhi , 4th Edition 2015.
2. U.A.Bakshi,&A.V.Bakshi “Electrical measurement” Technical publications Pune, 2nd Edition 2010.

REFERENCES

1. Nakra&Chaudhari “Instrumentation: Measurement and Analysis” TMH, New Delhi, 4th edition, 2006.
2. D.V.S. Moorthy, “Transducers and Instrumentation”, PHI Ltd New Delhi 2nd edition 2011.



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B.Tech. (VI Sem.)

17EC51 - DIGITAL CONTROLLERS**Pre-requisites:** Microprocessors & Microcontrollers (17EC22)**Course Educational Objective:** This course enables the student to

- Illustrate the structure and instructions of advanced microprocessors like 80286/80386, 8051/PIC microcontrollers
- Understand the architecture of digital signal processors & their programming for real time industrial applications.

Course Outcomes: At the end of the course, student will be able to:

CO1: Examine the architectures of various microprocessors

CO2: Analyze instruction set and addressing modes of microcontrollers

UNIT I: 80286 PROCESSOR

Overview of Microprocessors - Architecture – Evolution of 16 and 32 bit processors, Functional block diagram-modes of operation-real and protected mode-memory management and protection features.

UNIT II: 80386 PROCESSOR

Functional block diagram – programming model –addressing modes and instruction set address translation-modes of operation-80486 processor-functional block diagram comparison of 80386 and 80486 processors.

UNIT -III: MICRO CONTROLLERS

Introduction to Intel 8-bit and 16-bit Micro controllers, 8051-Architecture, memory organization, Addressing modes, Instruction formats, Instruction sets, Interrupt structure and interrupt priorities, Port structures, and Operation Linear Counter functions, Different modes of operation and programming examples.

UNIT- IV: OVERVIEW OF PIC MICROCONTROLLERS

Introduction to PIC micro controllers -Advantage of PIC micro controllers – Types and products of PIC. Applications- LCD, LED and 7 Segment Interfacing with different peripheral devices - Different types of display units.

UNIT V: ARM PROCESSORS

Introduction, ARM Architecture, Register Structure, Addressing modes, Instruction sets-arithmetic, data transfer, branch, subroutine lining instructions, assembly language programming.

TEXT BOOKS

1. Barry b Brey, “The Intel Microprocessors, Architecture, Programming and interfacing”, 8th edition, Pearson publisher, 2008.
2. John .B.Peatman , “Design with PIC Microcontroller”, Prentice Hall, 1st Edition 1997

REFERENCES

1. Andrew N.Sloss, Dominic Symes and Chris Wright“ ARM System Developer’s Guide: Designing and Optimizing System Software” , 1st edition, Morgan Kaufmann Publishers, 2004.
2. Daniel Tabak , “Advanced Microprocessors”, Mc Graw Hill. Inc., 2nd Edition,2012



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B.Tech. (VI Sem.)

17EC29 - EMBEDDED SYSTEM DESIGN

Pre-requisites : Microprocessors and Microcontrollers, Computer Organization.

Course Educational Objective : This course provides the knowledge on typical embedded system design methodologies, characteristics and design metrics, computational models for describing embedded system behavior, standard single purpose processors, various communication protocols and design technology for implementing embedded system.

Course Outcomes (COs): At the end of the course, students will be able to

- CO1:** Understand different design methodologies for embedded system design
- CO2:** Design Control unit and data path using computational models
- CO3:** Describe the basic functionality of several standard single purpose processors commonly found in embedded systems
- CO4:** Analyze various communication protocols
- CO5:** Develop embedded system using IC and Design Technology

UNIT - I:

Embedded System Introduction: Embedded systems overview, design challenge, processor technology, IC technology, Design Technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic(RT level), custom single purpose processor design(RT – level), optimizing custom single purpose processors.

UNIT - II:

State Machine and Concurrent Process Models: Introduction, models Vs languages, finite state machines with data path model(FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, Implementation, data flow model, real-time systems.

UNIT - III:

Standard Single-Purpose Processors: Introduction, Timers, Counters, and watchdog timers, UART, LCD Controllers, Stepper Motor Controllers, Analog-to-Digital Converters, Real-Time Clocks, **Memory:** Common memory types, Memory hierarchy and cache, Advanced RAM

UNIT - IV:

Interfacing: Introduction, Communication basics, Microprocessor Interfacing: I/O Addressing, Interrupts, Direct memory access, Arbitration, Multilevel bus architectures, Advanced communication principles, Serial Protocols, Parallel Protocols, Wireless Protocols

UNIT - V:

IC and Design Technology: IC Technology: Full-Custom(VLSI) IC Technology, Semicustom(ASIC) IC Technology, Programmable logic device(PLD) IC technology, Design technology: automation: synthesis, verification: Hardware/Software Co-Simulation, Reuse: Intellectual Property cores, Design Process Models

TEXT BOOKS:

Frank Vahid/Tony Givargis, “Embedded System Design A unified Hardware/Software Introduction” John Wiley & Sons, Inc.

REFERENCES

1. James K Peckol, “Embedded Systems- A Contemporary Design Tool” John Wiley, 2008
2. Joseph Yiu, “The Definitive Guide to the ARM Cortex-M3”, Newnes, Elsevier, 2008.

HEAD

Department of Electronics &
Communication Engineering

L	T	P	Cr.
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B.Tech. (VI Sem.)

17EC52 - DATA COMMUNICATIONS AND NETWORKING

Pre-requisites: Communication Systems

Course Educational Objective: This course enables the student to

- Gain knowledge on basics of data communication
- Introduce the basic concepts of error control techniques and protocols used in data communication & networking.

Course Outcomes: At the end of the course, the student will be able to :

- CO1: Illustrate the basic concepts of data communication and networking.
- CO2: Examine the issues in wireless communication and telecommunication systems.
- CO3: Analyze data communication equipment and error control techniques.
- CO4: Interpret various data link protocols.

UNIT-I: Introduction to Data Communications and Networking

Standard organizations for data communication, Layered network architecture, Open system interconnection, Data communication circuits, Serial and parallel data transmission, Data communication circuit arrangements, Data communication networks, Alternate protocol suites.

UNIT-II: Wireless Communication Systems

Electromagnetic polarization, Rays and wave fronts, Spherical wavefronts and the Inverse square law, Wave attenuation and absorption, Optical properties of radio waves, Terrestrial propagation of electromagnetic waves, Skip distance, Free-space path loss, Microwave communications systems, Satellite communications systems.

UNIT-III: Telephone Instruments and Signals

The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems. Introduction to wireless telecommunication systems and Networks: History and evolution different generations of wireless cellular networks 1G, 2G, 3G, 4G and 5G Networks.

UNIT-IV: Data Communications Equipment

Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems- Compatible Voice- Band Modems, Voice- Band Modern Block Diagram, Voice-Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, ITU-T Voice- Band Modem Specifications, 56K Modems, Modem Control: The AT Command Set, Cable Modems, Probability of Error and Bit Error Rate.

UNIT-V: Data Link Protocols

Data Link Protocol Functions, Character and Bit Oriented Protocols, Data Transmission Modes, Asynchronous Data Link Protocols, Synchronous Data Link Protocols, Synchronous Data Link Control, High Level Data Link Control.



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TEXT BOOKS

1. Wayne Tomasi," Introduction to Data Communication and Networking", Pearson Education, 2005.
2. Gary J.Mullett, "Introduction to Wireless Telecommunications Systems and Networks", Cengage India, 2013.

REFERENCES

1. Behrouz A Forouzan, "Data Communications and Networking", TMH higher education, Fourth Edition, 2007.
2. Gallow, "Computer Communications and Networking Technologies", Thomson Learning EMEA publisher, Second Edition, 2001.
3. Fred Halsall, Lingana Gouda Kulkarni, "Computer Networking and the Internet", Pearson Education, Fifth Edition, 2007.



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B.Tech. (VI Sem.)

17EC16 - VLSI DESIGN

Pre requisite: Analog Electronics and Digital Electronics.

Course Educational Objective: This course provides the knowledge on IC Fabrication Technologies and gives a complete idea about combinational and sequential sub system CMOS circuit designs used in VLSI Design. The course also gives the complete information regarding Floor planning methods in Chip Design.

Course Outcomes (COs): At the end of the course, students will be able to

CO1:	Remember IC fabrication process and properties of MOSFET
CO2:	Understand CMOS, NMOS design rules and layouts
CO3:	Apply the concepts of logic gates and combinational circuits used in ICs
CO4:	Create sub system using combinational and sequential circuits.
CO5:	Analyze chip design methods.

UNIT-I

IC fabrication Technology: Silicon semiconductor technology—wafer processing, oxidation, epitaxy, lithography, ion implantation, and diffusion, the silicon gate process; NMOS fabrication, CMOS fabrication, BICMOS technology, Comparison between CMOS and bipolar technologies.

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 ω_0 ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-II

VLSI Circuit Design Processes: VLSI design flow, MOS Layers, Stick Diagrams, Design Rules and Layout, $5\mu m$ CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS, CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

Basic Circuit Concepts: Sheet Resistance R_s and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fanout.

UNIT-III

Gate level Design: Logic gates: combinational logic functions, static complementary gates, switch logic, alternative gate circuits, low power gates, delay through resistive inter connect and delay through inductive inter connect.

Combinational Logic Networks: standard cell based layout, simulation combinational network delay, logic and interconnect design, and power optimization.

UNIT-IV

Sequential Machines: Latches and Flip-Flops Sequential Systems and Clocking Disciplines, Sequential System Design, Power Optimization, Design Validation, Sequential Testing.

Subsystem Design: Sub system design flow, carry look ahead adder, 4×4 array multiplier, Shifters—design of 4×4 barrel shifter, Zero/One Detectors, Design of 4bit ALU using adder, synchronous up/down counters, registers and High Density Memory.

UNIT-V

Floor planning: Introduction, Floor planning Methods, Global interconnect, Floor plan designs and Off-Chip Connections.

Chip Design: Design methodologies, Kitchen timer chip and Microprocessor data path. Concepts of FPGA and CPLD.

Department of Electronics &

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TEXT BOOKS

1. Kamran Eshraghian, Eshraghian Douglas and A.Pucknell, Essentials of VLSI circuits and systems, PHI Publishers, 2005.
2. Wayne Wolf, Modern VLSI Design (3/e), Pearson Education Publishers.

REFERENCES

1. Neil. H. E. Weste and Kamaran Eshraghian, Principles of CMOS VLSI Design (2/e), Pearson Education Publishers, 3rd Edition.
2. John .P. Uyemura, Introduction to VLSI Circuits and Systems, JohnWiley Publishers.
3. M.SZE, VLSI Technology, 2nd Edition, TMH Publishers



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B.Tech. (VI Sem.)

17EE68 - ELECTRICAL MACHINES - II LAB

Prerequisite: Electrical Machines-II(17EE11).

Course Educational Objectives: This course enables the student to

- Know the operation of various ac machines
- Give practical exposure on the performance of various AC machines like induction motors and synchronous machines.

Course Outcomes:

At the end of the course, the student will be able to:

- CO1 Develop the Equivalent circuit of Induction Motor.
- CO2 Analyze the performance of AC machines
- CO3 Demonstrate different regulation methods of alternator
- CO4 Identify a suitable machine along with ratings for a specific applications

LIST OF EXPERIMENTS

1. Performance characteristics of squirrel cage induction motor
2. Regulation of 3-phase alternator by synchronous impedance & MMF method
3. Separation of core losses in a Single Phase Transformer
4. Plot the circle diagram of three-phase induction motor
5. Plot the V & inverted V curves of a synchronous motor
6. Calculation of equivalent circuit parameters for a single-phase induction motor
7. Regulation of three-phase alternator by ZPF Method
8. Determination of efficiency and regulation of three-phase alternator by direct test
9. Performance characteristics of single phase induction motor
10. Performance characteristics of three-phase slip ring induction motor

ADDITIONAL EXPERIMENTS

11. Calculation of direct and quadrature axis reactances of a salient pole synchronous machine
12. Torque-Speed characteristics of Induction motors using Lab- view
13. Speed control of Induction motor using MATLAB / Simulink
14. Demonstration of high rating synchronous machine with soft starter using software tool.



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B.Tech. (VI Sem.)

**17EC70 - MICROPROCESSORS AND
MICROCONTROLLERS LAB**

Pre-requisites: Pulse and switching circuits lab

Course Educational Objective: In this course, student will understand working of instructions by practicing programs of 8086 / 8051 and develop applications by interfacing devices.

Course Outcomes (COs): At the end of the course, students will be able to

- CO1:** Demonstrate program proficiency using the various instructions of the 8086 microprocessor / 8051 microcontroller.
- CO2:** Apply different programming techniques like loops, subroutines for various applications.
- CO3:** Design systems for different applications by interfacing external devices.

LIST OF EXPERIMENTS

Part-1: 8086 programs:

1. Program to demonstrate data transfer operation
2. Program to demonstrate arithmetic operation
3. Program to demonstrate logical operation
4. Program to demonstrate shift operation
5. Program to demonstrate string operation
6. Program to demonstrate looping operation
7. Program to demonstrate decision making operations

PART-2: 8051 PROGRAMS:

1. Programs to demonstrate bit-manipulation operations.
2. Programs using Interrupts
3. Programming timer / counter.
4. Programming Serial communication application.
5. Program to demonstrate decision making operations
6. Program to demonstrate looping operations

PART-3: INTERFACING PROGRAMS (using 8086 & 8051 Kits)

1. Interfacing ADC
2. Interfacing DAC.
3. Interfacing stepper motor.
4. Interfacing 7-segment display.
5. Interfacing keyboard.
6. Interfacing serial/parallel Printer.



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B.Tech. (VI Sem.)

**17EE91 - ELECTRICAL RELIABILITY
ENGINEERING
(*Add On Course – II)**

Pre-requisites: Complex Variables and Statistical methods (17FE10)

Course Educational Objectives: This course enables the student to

- Interpret the language of power system reliability analysis
- Illustrate analytical models for power system reliability analysis
- Implement algorithms for power system reliability analysis

Course Outcomes At the end of the course, students will be able to:

CO1: Illustrate the main principles in power system reliability analysis

CO2: Analyze different methods and tools for power system reliability

UNIT – I: BASICS OF PROBABILITY THEORY & DISTRIBUTION

Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probabilities density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution. Network Modelling and Reliability Analysis-Analysis is of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

UNIT – II: RELIABILITY FUNCTIONS

Reliability functions $f(t)$, $F(t)$, $R(t)$, $h(t)$ and their relationships – exponential distribution – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

UNIT – III : MARKOV MODELLING

Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities. – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

UNIT –IV: FREQUENCY & DURATION TECHNIQUES

Frequency and duration concept – Evaluation of frequency of encountering state, mean cycletime, for one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

UNIT – V: GENERATION SYSTEM RELIABILITY ANALYSIS

Reliability model of a generation system– recursive relation for unit addition and removal – load modeling - Merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

TEXT BOOKS:

1. Reliability Evaluation of Engg. System – R. Billinton, R.N.Allan, Plenum Press, New York, reprinted in India by B.S.Publications, 2nd Edition 2008.
2. New Computational Methods in Power System Reliability-Elmakias, David ,Springer 2008.



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REFERENCES:

1. Handbook of Software Reliability Engineering Edited by Michael R.Lyu, published by IEEE Computer Society Press and McGraw-Hill Book Company,2013.
2. Dr. Shailendra Jain, "Modeling and Simulation using MATLAB - Simulink" ,Wiley Publication, 2 Edition,2011.
3. Dr. Vikramaditya Dave,"Electric Power Transmission & Distribution System with PSCAD (Basic) S", Himanshu Publications ,2017.
4. Atousa Yazdani,"Modern Distribution Systems with PSCAD Analysis", CRC Press, 1st edition,2018 .
5. Tharangika Bambaravanage, "Modeling, Simulation and Control of a Medium-Scale Power System ", Springer, 1st edition, 2017.



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B.Tech. (VI Sem.) 17PD08 - EMPLOYABILITY ENHANCEMENT SKILLS – II

Prerequisite: NIL

Course Educational Objective (CEO): This course will make students proficient in Quantitative techniques, language & communication skills to qualify in placement tests, demonstrate industry-readiness skills by applying concepts and tools that will serve as building blocks for analytical thinking and professional development.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: To identify, analyze and apply quantitative techniques related to qualify in Placement tests.

CO2: To effectively utilize verbal ability & communication skills to qualify in Placement tests.

CO3: To effectively communicate in professional as well as social contexts.

CO4: To apply key soft skills effectively in Job Interviews as well in other professional contexts

CO5: Inculcate lifelong learning through personal effectiveness as well as leadership.

UNIT – I:

Verbal Ability: Tenses & Conditional Clauses

Quantitative Aptitude: Alligation or Mixture, Simple Interest and Compound Interest

UNIT – II:

Verbal Ability: Sentence Completions

Quantitative Aptitude: Time and work, Pipes and Cistern, Permutations and Combinations, Probability

UNIT – III:

Verbal Ability: Spot the Errors

Quantitative Aptitude: Time and Distance, Problems on trains, Boats and Streams, Races and Games of Skill

UNIT – IV:

Verbal Ability: Jumbled Sentences, Cloze Tests

Quantitative Aptitude: Area, Volume and Surface Areas, Progressions

UNIT – V:

Verbal Ability: Advanced Reading Comprehension

Quantitative Aptitude: Clocks and Calendars, Cubes and Dice

TEXT BOOKS:

- Objective Arithmetic, S. CHAND Publishers.
- R.S.AGGARWAL, *Verbal & Non-Verbal Reasoning*, S. CHAND Publishers.
- Objective English. Edgar Thorpe, Pearson Education, New Delhi.2009.
- Sanjay Kumar, Pushpa Lata: Communication skills. Oxford, Delhi, 2012.
- Vocabulary Builder for Students of Engineering and Technology (A self – study manual for vocabulary Enhancement) Y.Saloman Raju, Maruthi Publishers



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REFERENCES:

1. Meenakshi Raman, Sangeetha: Technical Communication, Oxford University Press, 2008
2. Baron's Guide on GRE
3. Dinesh Khattar, *The Pearson Guide to Quantitative Aptitude*, Pearson Education
4. M. Tyra, *Magical Book on Quicker Maths*, BSC Publishers
5. Quantitative Aptitude by Arun Sharma
Vocabulary Builder for Students of Engineering and Technology (A self – study manual for vocabulary Enhancement) Y.Saloman Raju, Maruthi Publishers



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B.Tech. (VII Sem.)

17EE21 - POWER SYSTEM PROTECTION

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Pre-requisites : Electrical Power Transmission(17EE12)

Course Educational Objective: This course enables the student to

- Understand working and operation of different types of circuit breakers, electro-magnetic and electro-static relays
- Identify the protection schemes for different electrical equipment in the power system.
- Introduce the concepts of microprocessor based protective relaying system.

Course Outcomes: At the end of the course, the student will be able to:

- CO1. Illustrate the different types and functions of protective relays of power systems.
 CO2. Analyze the operation and working of electromechanical static and numerical relays.
 CO3. Design relevant protection schemes for the main elements of power system.
 CO4. Illustrate the fundamental concepts and types of circuit breakers.

UNIT – I: GENERAL INTRODUCTION TO POWER SYSTEM PROTECTION

Need for protective systems, nature and causes of faults, types of faults and their effects, evolution of protective relays, zones of protection, primary and backup protection, essential qualities of protection. Classification of Protective Relays based on technology, function, Classification of protective schemes.

UNIT – II: OPERATING PRINCIPLES AND RELAY CONSTRUCTION

Electromagnetic relays - attracted armature, induction disc, Induction cup, permanent magnet, Moving coil, Moving iron, balanced beam relay, auxiliary relay. Thermal relays, Static relays – Merits and demerits of static relays, comparators-amplitude and phase, duality between amplitude and phase comparators, types of amplitude and phase comparators, micro processor based protective relays.

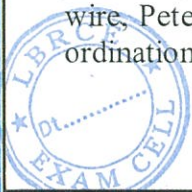
UNIT – III: PROTECTIVE SCHEMES

Over current protection: Time-Current characteristics- current and time settings Protection Schemes, Reverse power or directional relay, protection of feeders, ring mains, earth fault and phase fault protection. **Distance protection:** Impedance, reactance and MHO relays, input quantities for various types of distance relays, effect of arc resistance, power surges or power swings and line length on the performance of distance relays, selection of distance relays, distance relay characteristics. Choice of characteristics for different zones of protection.

AC Machines and bus zone protection: Generator protection – protection against stator and rotor faults and abnormal operating conditions such as unbalanced loading, loss of excitation, over speeding. Generator - transformer unit protection. Transformer protection - types of faults, over current protection, differential protection, differential relay with harmonic restraint, protection against high resistance ground faults, interturn faults. Bucholz relay.

UNIT-IV: MICROPROCESSOR BASED PROTECTIVE RELAYS AND OVERVOLTAGE PROTECTION

Over current, distance (Impedance and Reactance) and directional relays. Generalized mathematical expression for distance relays, measurement of R & X. Causes of over voltages: lightning, switching, insulation failure and arching grounds. Methods of over voltage protection – ground wire, Peterson coils, surge absorbers and diverters, location of protective apparatus - insulation co-ordination; neutral earthing.



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UNIT – V: CIRCUIT BREAKERS

Arc voltage, arc interruption theories, restriking and recovery voltages, resistance switching, current chopping, interruption of capacitive currents, classification of circuit breakers- oil, air blast, air break, SF₆. Operating mechanism, selection of circuit breakers, high voltage DC circuit breakers, rating of circuit breakers, testing of circuit breakers.

TEXT BOOKS:

1. Badri Ram, D.N.Vishwakarma, 'Power System Protection and Switchgear' TMH publications 2nd Edition, 2011
2. T.S.Madhava Rao, 'Power system protection –Static relays with microprocessor applications' TMH publications 2nd Edition, 2008

REFERENCES:

1. C.R.Mason, 'Art and science of protective relaying' Wiley publications, 1956
2. C.L.Wadhwa, "Electrical Power Systems", New Age international(P)Limited, Third Edition, 2004.
3. Sunil S. Rao, Switchgear Protection and Power Systems: Theory, Practice and Solved Problems – 11th Edition, Khanna Publishers, 1999.



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B.Tech. (VII Sem.)

17EE22 - POWER SYSTEMS OPERATION AND CONTROL

L	T	P	Cr.
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Pre-requisite course: Power System Analysis(17EE18)

Course Educational Objectives: This course enables the student to

- Familiarize economic operation of power system.
- Introduce emphasizes on single area and two area load frequency control and
- Understand reactive power control methods.

Course Outcomes At the end of the course, students will be able to

CO1: Illustrate the fundamental concepts of economic operation of power

CO2 :Realize the operations of AGC and reactive power control.

CO3 :Outline the fundamental concepts of de-regulation.

UNIT – I: ECONOMIC OPERATION

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation without line losses, Optimum generation allocation including the effect of Transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – II: UNIT COMMITMENT

Unit commitment problem, Priority order scheduling, Dynamic programming approach to Unit commitment problem , Hydro-Thermal coordination.

UNIT – III:AUTOMATIC GENERATION CONTROL (AGC)

Generator - Steady State and Transient Models, Description of Simplified Network Model of a Synchronous Machine (Classical Model), load, prime-mover and governor models, steady state performance of speed governing system, Restricted governing mode of operation. Primary load-frequency loop, steady state and dynamic response, with and without integral control loop, modelling and performance of secondary load-frequency loop, extension to two-area system, tie-line power flow model, interfacing AGC with economic dispatch.

UNIT – IV: REACTIVE POWER CONTROL AND VOLTAGE STABILITY

Reactive power flow and voltage collapse, V-Q sensitivity analysis, Reactive Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation. FACTS devices(Elementary Treatment).

UNIT – V: DEREGULATION

Introduction of Market structure, Spot market, forward markets and settlements, Pricing, location marginal prices(LMP), Introduction to financial rights.

Note: Analyze the core concepts using software tools wherever applicable.

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TEXT BOOKS

1. William D Stevenson Jr, "Elements of Power System Analysis", McGraw-Hill Series in Electrical & Computer Engineering, Fourth Edition, 1982.
2. P S R Murty, "Operation and Control in Power System", BS Publications, Second Edition, 2009.

REFERENCES

1. O.I. Elgerd, "Electric Energy Systems Theory: An Introduction", Tata McGraw-Hill Publications, 2nd Edition, 2017.
2. A.J. Wood and B.F. Wallenberg, "Power Generation, Operation and Control", John Wiley & sons Publications, 2nd Edition, 2010.
3. Hadi Saadat, "Power System Analysis", Tata McGraw-Hill Publications, 3rd Edition, 2011.
4. Dr. Shailendra Jain, "Modeling and Simulation using MATLAB - Simulink", Wiley Publication, 2nd Edition, 2011.
5. Dr. Vikramaditya Dave, "Electric Power Transmission & Distribution System with PSCAD (Basic) S", Himanshu Publications, 2017.
6. Atousa Yazdani, "Modern Distribution Systems with PSCAD Analysis", CRC Press, 1st edition, 2018.
7. Tharangika Bambaravanage, "Modeling, Simulation and Control of a Medium-Scale Power System", Springer, 1st edition, 2017.
8. Operating Procedures for National Grid, NLDC "Power System Operation Corporation Ltd", July 2013.



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B.Tech. (VII Sem.)

17EE23 - SOLID STATE DRIVES

Prerequisites: Power Electronics (17EE19), Electrical Machines-I(17EE09),
Electrical Machines II (17EE11)

Course Educational Objective: This course enables the student to

- Know the operation of various converter controlled dc and ac motor drives
- Provide the controlling of dc motor drives with single phase/three phase converters and choppers
- Understand AC motor drive control with variable frequency and variable voltage.

Course Outcomes: At the end of the course, the student will be able to :

CO1 Interpret various operating regions of electrical drives

CO2 Analyze suitable controllers for DC Drives

CO3 Analyze suitable controllers for AC Drives

UNIT – I :RECTIFIER CONTROLLED DC MOTOR DRIVES

Significance of variable speed drives-Controlled rectifiers circuits- Single-phase and three-phase, semi-fully controlled rectifier fed separately excited DC motors and DC series motors– continuous and discontinuous modes of operations – freewheeling diode operation-speed-torque characteristics, problems, performance of dc motor using software tools with rectifier controller.

UNIT – II :CHOPPER CONTROLLED DC MOTOR DRIVES

Principle of operation and control techniques – motoring operation of separately excited dc motor and dc series motor-regenerative braking, dynamic braking and plugging of separately excited dc motor and dc series motor - multi quadrant control of chopper fed dc motors.

UNIT – III :CONTROL OF INDUCTION MOTOR DRIVES

stator voltage control-stator frequency control-Open loop V/f control -control of induction motor by ac voltage controller, voltage source inverter, current source inverter and cyclo converter-comparison of voltage source and current source inverter drives-problems

UNIT – IV :SLIP POWER CONTROLLED WOUND ROTOR INDUCTION MOTOR DRIVES

Static rotor resistance control-Slip-power recovery schemes- Static Scherbius and Static Kramer drive drive- Phasor diagram-Torque expression–closed loop speed control of static Scherbius drive-Modes of operation of Static Scherbius –applications, problems

UNIT – V :CONTROL OF SYNCHRONOUS MOTOR DRIVES

Synchronous motors– variable frequency control-operation of self controlled Synchronous motors-by VSI, CSI and Cyclo converters-Load commutated CSI fed Synchronous Motor, speed-torque characteristics, Closed Loop control operation of synchronous motor drives (Block Diagram Only).

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS

1. G K Dubey "Power Semiconductor Drives", Prentice Hall , 1988.
2. B.K.Bose "Modern Power Electronics and AC Drives", Prentice Hall India Learning Private Limited , 2005.

REFERENCES

1. Vedam Subramanyam "Thyristor Control of Electric drives", Tata McGraw Hill Publications 2017.
2. S K Pillai "A First course on Electrical Drives", New Age International(P) Ltd. 3rd Edition, 2012.



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B.Tech. (VII Sem.)

17EE24 - INTELLIGENT CONTROL SYSTEMS

L	T	P	Cr.
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Pre-requisites: Control Systems

Course Educational Objectives : This course enables the student to

- Familiarize fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- Introduce concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.

Course Outcomes: At the end of the course, the students will be able to:

- CO1 Apply artificial Intelligence techniques.
- CO2 Understand different types of perception models.
- CO3 Understand different types of fuzzy sets, membership functions and their Implementation methods.
- CO4 Solve the problems by applying a suitable search method.

UNIT-I: INTRODUCTION TO NEURAL NETWORKS

Evolution of neural networks; Artificial Neural Network: Basic model, Classification, Feed forward and Recurrent topologies, Activation functions; Machine Learning algorithms: Supervised, Un-supervised and Reinforcement; Fundamentals of connectionist modeling: Mc Culloch – Pits model, Perceptron, Adaline, Madaline.

UNIT-II: CLASSIFICATION TAXAMONY OF ANN & MEMORY

Topology of Multi-layer perceptron, Back propagation learning algorithm, limitations of Multi-layer perceptron. Radial Basis Function networks: Topology, learning algorithm; Kohonen's self-organising network: Topology, learning algorithm; Bidirectional associative memory Topology, learning algorithm.

UNIT-III: RECURRENT NETWORK & APPLICATIONS OF ANN

Recurrent neural networks: Basic concepts, Dynamics, Architecture and training algorithms, Applications; Hopfield network: Topology, learning algorithm, Applications to power electronics.

UNIT-IV: INTRODUCTION TO FUZZY LOGIC SYSTEM

Classical and fuzzy sets: Introduction, Operations and Properties, Fuzzy Relations: Cardinality, Operations and Properties, Equivalence and tolerance relation, Value assignment: cosine amplitude and max-min method; Fuzzification: Membership value assignment- Inference, rank ordering, angular fuzzy sets. Defuzzification methods, Fuzzy measures, Fuzzy integrals, Fuzziness and fuzzy resolution; possibility theory and Fuzzy arithmetic; composition and inference; Considerations of fuzzy decision-making.

UNIT-V: FUZZY LOGIC CONTROLLER

Basic structure and operation of Fuzzy logic control systems; Design methodology and stability analysis of fuzzy control systems; Applications of Fuzzy controllers, control of phase controlled dc motor drive by using fuzzy logic controllers, Applications of fuzzy theory.

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS:

1. Jacek M. Zurada, "Introduction to Artificial Neural Systems", Jaico Publishing House, 1st edition, 1999.
2. Timothy J Ross, "Fuzzy logic with engineering application", Wiley publications, Third edition, 2010.

REFERENCES:

1. James A Freeman and Davis Skapura, "Neural Networks", Pearson Education, 2nd edition 2009.
2. Rajasekharan and Pai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 1st edition, 2003.
3. Samir Roy, Udit Chakraborty, "Introduction to Soft Computing: Neuro Fuzzy & Genetic Algorithms", Pearson Publications, 1st edition, 2013.
4. S.N.Sivanandam, S.Sumathi, S.N.Deepa, "Introduction to neural networks using MATLAB 6.0, TMH, 2nd Edition, 2008



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B.Tech. (VII Sem.)

17EE25 - DIGITAL CONTROL SYSTEMS

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Pre Requisite: Control Systems (17EE06)

Course Educational Objective: This course enables the students to

- Revise the importance of sample data control system.
- Provide adequate knowledge about signal processing in digital control.
- Study the importance of modeling and stability analysis of discrete systems
- Learn about the concept of controllers such as pole-assignment controllers.

Course Outcomes: At the end of the course, the student will able to:

- CO1. Identify the basic elements and structures of digital control systems
 CO2. Develop mathematical model of discrete time system
 CO3. Analyze the stability, controllability and observability of digital control systems
 CO4. Design feedback controller and state observer for discrete time system

UNIT – I :INTRODUCTION

Introduction and signal processing Introduction to analog and digital control systems, Advantages of digital systems, Typical examples of Signals and processing, Sample and hold devices, Sampling theorem and data reconstruction, Frequency domain characteristics of zero order hold.

UNIT – II :Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM

Z-Transforms, Theorems, Finding inverse z-transforms, Formulation of difference equations and solving, Block diagram representation, Pulse transfer functions and finding open loop and closed loop responses.

UNIT – III :STATE SPACE ANALYSIS

State Space Representation of discrete time systems, Pulse Transfer Function, solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state space equations,

UNIT – IV: CONTROLLABILITY, OBSERVABILITY AND STABILITY

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

Stability Analysis-Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Stability Analysis- Jury stability test, the Bilinear Transformation, Controllability, Observability and Stability of Discrete Time Systems.

UNIT – V :DESIGN OF FEEDBACK CONTROLLER

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

Note: Analyze the core concepts using software tools wherever applicable.



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TEXT BOOKS

1. B. C. Kuo, Digital Control Systems, Oxford University Press, 2nd edition, Indian Edition, 2012.
2. K. Ogata, Discrete Time Control Systems, Prentice Hall, 3rd Edition.2015.

REFERENCES

1. M. Gopal, Digital Control and State Variable Methods, Tata Mcgraw Hill, 4th edition, 2017.
2. G. F. Franklin, J. D. Powell and M. L. Workman, Digital Control of Dynamic Systems, Addison Wesley, 1998, Pearson Education, Asia, 3rd edition, 2000.
3. K. J. Astroms and B. Wittenmark, Computer Controlled Systems - Theory and Design, Prentice Hall, 3rd edition, 2012.



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17EE26 - ADVANCED CONTROL SYSTEMS

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Pre requisite: Control Systems (17EE06)

Course Educational Objective: This course enables the students to

- Provide knowledge on design in state variable form
- Provide knowledge in phase plane analysis.
- Give basic knowledge in describing function analysis.
- Design the optimal controller.
- Learn about the adaptive and robust controllers

Course Outcomes: At the end of the course, the student will be able to:

- CO1. Apply the state space modelling concepts to a given system
- CO2. Design state observer and controller
- CO3. Analyze the non linear systems for stability studies
- CO4. Illustrate the adaptive and robust controllers

UNIT – I: STATE VARIABLE ANALYSIS

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement – State observer Design of Control Systems with observers,

UNIT – II: PHASE PLANE ANALYSIS

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non-linear systems - Concept of phase portraits – Singular points – Limit cycles – Construction of phase portraits – Phase plane analysis of linear and non-linear systems – Isocline method.

UNIT – III : DESCRIBING FUNCTION ANALYSIS

Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT – IV : STABILITY ANALYSIS

Introduction – Lyapunov's Stability Criteria, The direct method of Lyapunov, Methods of constructing Lyapunov Function for Non-linear Systems.

UNIT – V: OPTIMAL CONTROL

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation. Introduction to adaptive and robust controls.

Note: Analyze the core concepts using software tools wherever applicable.

TEXT BOOKS

1. I.J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International Publishers, 6th Edition, 2007.
2. Ashish Tewari, "Modern control Design with Matlab and Simulink", John Wiley, 1st edition, New Delhi, 2002.



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REFERENCES

1. Jinzhi Wang, Zhisheng Duan, Ying Yang, Lin Huang, "Analysis and Control of Nonlinear Systems with Stationary sets-Time domain and Frequency domain methods", World Science publishing co.Pvt Ltd, 1st edition, 2009.
2. George J. Thaler, "Automatic Control Systems", Jaico Publishers, 1st edition, 2006.
3. M.Gopal, "Modern control system theory", New Age International Publishers, 9th edition 2014.
4. Gene F. Franklin, J. David Powell and Abbasemami-Naeini, "Feedback Control of Dynamic Systems", Fourth edition, Pearson Education, Low price edition, 2014.
5. Zhou, J.C. Doyle, K. Glover : "Robust and Optimal Control", Prentice Hall, 1st edition, 1996.
6. J. Astrom and B. Wittenmark, "Adaptive Control", Addison-Wesley, 2nd Edition, 2008.



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B.Tech. (VII Sem.)

17EE27 - INDUSTRIAL PROCESS CONTROL

Prerequisite: Control systems**Course Educational Objectives:** This course enables the student to

- Understand the key concepts in automatic control of process plants
- Describe the control principle in the Industrial Process System application.
- Perform the measurement for temperature, pressure, fluid flow and level.
- Tune the PID with the right technique for optimization of the system.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Illustrate the basic principles & importance of process control in industrial process plants

CO2: Design PID controllers to meet desired specification parameters

CO3: Analyze the Multi loop Control Systems

CO4: Identify control valves as per requirement

UNIT – I: PROCESS CHARACTERISTICS

Need for process control, Process Variables types and selection criteria, Process degree of freedom. The period of Oscillation and Damping, mathematical model of first order level, pressure and thermal processes, Modeling considerations for control purposes.

Types of processes- Dead time, Single /multi-capacity, Interacting /non-interacting, Linear/non linear, self-regulation – servo and regulator operations.

UNIT – II: CONTROL ACTIONS AND CONTROLLERS

Basic control actions- characteristics of two position, three position, single speed and multiple speed floating, proportional, integral, and derivative control modes, P+I, P+D, P+I+D control modes. Pneumatic, hydraulic and electronic controllers to realize various control actions.

UNIT – III : OPTIMUM CONTROLLER SETTINGS

Evaluation criteria- 1/4th decay ratio, IAE, ISE, ITAE, Determination of optimum settings for mathematically described process using time response and frequency response.

Tuning-process reaction curve method, continuous oscillation method, damped oscillation method, Process Identification.

UNIT –IV :MULTI LOOP CONTROL SYSTEMS

Feed-forward control, ratio control, cascade control, inferential control, and split-range control. Introduction to multivariable control – examples from distillation column and boiler systems.

UNIT – V: FINAL CONTROL ELEMENTS

I/P converter, P/I converter- pneumatic, electric and hydraulic actuators. Control valves- characteristics of control valves, Globe, Butterfly, diaphragm and ball valves, control valve sizing- capitation and flashing, selection criteria.



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TEXT BOOKS

1. Stephanopoulos, G, "Chemical Process Control", Prentice Hall of India, New Delhi, 1st edition, 2008.
2. Eckman. D.P., "Automatic Process Control", Wiley Eastern Ltd., New Delhi, 1st edition, 2009.

REFERENCES

1. Pollard A., "Process Control", Heinemann educational books, London, 1st edition, 1971.
2. Harriott. P., "Process Control", Tata McGraw-Hill Publishing Co., New Delhi, 1st edition, 2008.



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B.Tech. (VII Sem.)

17EE28 - ENERGY CONSERVATION AND AUDIT

L	T	P	Cr.
3	-	-	3

Pre-requisite course: Power System Analysis

COURSE OBJECTIVES: This course enables the student to

- Introduce the need of energy auditing and devise energy efficient control strategies.
- Learn reactive power management, energy efficient lighting schemes and energy conservation methods.

COURSE OUTCOMES: After completion of the course, students will be able to:

CO1: Illustrate the different parameters for energy auditing

CO2 : Interpret the controlling of energy management and energy efficiency

CO3: Analyse the Reactive power management strategies.

CO4: Analyze energy conservation measures for economic aspects.

UNIT-I: BASIC PRINCIPLES OF ENERGY AUDIT

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

UNIT-II: ENERGY MANAGEMENT

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language.

UNIT-III: ENERGY EFFICIENT MOTORS

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

UNIT-IV: POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor, power factor motor controllers - Good lighting system design and practice, lighting control ,lighting energy audit - Energy Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC's.

UNIT-V: ECONOMIC ASPECTS AND ANALYSIS

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

TEXT BOOKS:

1. W.R. Murphy & G. Mckay Butter worth , “Energy Management”, Elsevier publications. 2012
2. Energy Efficient Electric Motors by John. C. Andres, Marcel Dekker Inc. Ltd – 2nd Edition, 1995



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REFERENCES:

1. Energy management by Paulo' Callaghan, Mc – Graw Hill Book company – 1st edition, 1998
2. Energy management hand book by W.C. Turner, John wiley and son, 2001.
3. Energy management and good lighting practice: fuel efficiency booklet12 – EEO.
4. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill Publishing Company Ltd, New Delhi.
5. K.S.K.Weranga, SisilKumarawadu, D.P.Chandima-“Smart Metering Design and Applications”, Springer Publications, 1st Edition, 2014.



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L	T	P	Cr.
3	-	-	3

B.Tech. (VII Sem.)

17EE29 - PLC AND AUTOMATION

Pre-requisites: Digital Logic Circuit Design(17EE04)**Course Educational Objective:** This course enables the student to

- Understand Ladder diagrams & applications of programmable logic controllers in Industries.
- Understand the SCADA and Industrial Automation
- Familiarize the control strategies in industrial Automation
- Develop the basic technical level skills required by industry.

Course Outcomes: At the end of the course, the student will be able to :**CO1:** Illustrate the principle of operation and hardware components of PLC.**CO2:** Implement ladder programming with Boolean expressions and functions of PLC timers & counters**CO3:** Describe register instructions, control systems and SCADA**CO4:** Identify the various control technologies in Automation**UNIT – I: PROGRAMMABLE LOGIC CONTROLLERS**

Introduction, Parts of a PLC, Principles of Operation, Modifying the Operation, PLCs versus Computers, PLC Size and Application.

PLC Hardware Components: The I/O Section, Discrete I/O Modules, Analog I/O Modules, Special I/O Modules, I/O Specifications, The Central Processing Unit (CPU), Memory Design, Memory Types, Programming Terminal Devices, Recording and Retrieving Data, Human Machine Interfaces (HMIs).**UNIT – II: FUNDAMENTALS OF LOGIC**

The Binary Concept, AND, OR and NOT functions, Boolean Algebra, Developing circuits from Boolean Expression, Producing the Boolean equation from given circuit, Hardwired logic versus programmed logic, Programming word level logic instructions. Converting Relay schematics and Boolean equation into PLC Ladder Programs, Writing a ladder logic program directly from a narrative description

UNIT – III : PROGRAMMING TIMERS

Mechanical Timing Relays, Timer Instructions, On-Delay Timer Instruction, Off-Delay Timer Instruction, Retentive Timer, Cascading Timers.

Programming Counters: Counter Instructions, Up-Counter, Down-Counter, Cascading Counters, Incremental Encoder-Counter Applications, Combining Counter and Timer Functions.**UNIT-IV: SEQUENCER AND SHIFT REGISTER INSTRUCTIONS**Mechanical Sequencers, Sequencer Instructions, Sequencer Programs, Bit Shift Registers, Word Shift Operations. **Process Control, Network Systems, and SCADA:** Types of Processes, Structure of Control Systems, On/Off Control, PID Control, Motion Control, Data Communications, Supervisory Control and Data Acquisition (SCADA).**UNIT – V : AUTOMATION**

Introduction: Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations. Flow lines & Transfer Mechanisms, Fundamentals of Transfer Lines.

Control Technologies in Automation: Industrial Control Systems, Process Industries Versus Discrete-Manufacturing Industries, Continuous Versus Discrete Control, Computer Process and its

Forms.

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TEXTBOOKS

- 1 Programmable Logic Controllers Frank D Petruzella, McGraw Hill, 4th Edition, 2011
- 2 Automation, Production Systems and Computer Integrated Manufacturing- M.P.Groover, Pearson Education.5thedition, 2009.

REFERENCES

1. Programmable Controllers An engineer's guide by E.A.Parr, Elsevier Newnes publication 3rd edition, 2013
2. Programmable Logic Controllers: Principles and Applications by John W. Webb and Ronald A. Reis, Prentice – Hall India publication, 5th edition
3. Introduction Programmable Logic Controllers Gary Dunning Cengage 3rd Edition, 2006
4. Computer Based Industrial Control- Krishna Kant, EEE-PHI, 2nd edition,2010



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B.Tech. (VII Sem.)

17EE30 - ENERGY STORAGE SYSTEMS

L	T	P	Cr.
3	-	-	3

Pre-requisites : - Applied Chemistry(17FE14), Electric and Magnetic Fields(17EE02)

Course Educational Objective: This course enables the student to

- Understand the concept of and analyze the various types of energy storage.
- Study the various applications of energy storage systems.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Knows the necessity and usage of different energy storage schemes for different applications.

CO2: Analyze preliminary thermal and electrochemical storage systems.

CO3: familiarize the operations of fuel cell and hybrid storage systems

CO4: Specify appropriate energy storage technology for a particular context involving renewable energy resources.

UNIT I: NECESSITY OF ENERGY STORAGE

Need for energy storage, Types of energy storage-Thermal, electrical, magnetic, chemical and super conducting magnetic storage systems ,comparison of energy storage technologies – Applications,

UNIT II : THERMAL STORAGE

Types - Modelling of thermal storage units - Simple water and rock bed storage pressurized water storage system–Modelling of phase change storage system–Simple units, packed bed storage units-Modelling using porous medium approach.

UNIT III: FUNDAMENTAL CONCEPTS OF BATTERIES

Measuring of battery performance - Charging and discharging of a battery - Storage density - Energy density - Safety issues - Types of batteries - Lead Acid, Nickel, Cadmium, Zinc Manganese dioxide and modern batteries - Zinc-Air, Nickel Hydride, Lithium ion Battery.

UNIT IV: HYBRID STORAGE DEVICES

Flywheel - Super capacitors - Principles & Methods – Applications - Compressed air Energy storage - Concept of Hybrid Storage - Applications. Super Conducting Magnetic Storage systems-system capabilities, Developments in Super Conducting Magnetic Storage systems .

UNIT V : FUEL CELL


Fuel Cell–History of Fuel cell, Principles of Electrochemical storage–Types–Hydrogen oxygen cells, Hydrogen air cell, Hydrocarbon air cell, alkaline fuel cell, detailed analysis–advantage and drawback of each type.

TEXT BOOKS

1. Ibrahim Dincer and Mark A. Rosen, “Thermal Energy Storage Systems and Applications”, John Wiley & Sons 2002.
2. Ru-shiliu, Leizhang, Xueliang sun, ”Electrochemical technologies for energy storage and conversion”, Wiley publications, 2012 .

REFERENCES

1. Viswanathan B and M Aulice Scibioh, “Fuel Cells – Principles and Applications”,Universities Press (2006).
2. Rebecca L. and Busby, Penn Well Corporation, “Hydrogen and Fuel Cells: A Comprehensive Guide”, Oklahoma (2005).
3. Bent Sorensen, “Hydrogen and Fuel Cells: Emerging Technologies and Applications”, Elsevier, UK (2005).


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L	T	P	Cr.
3	-	-	3

B.Tech. (VII Sem.)

17EE31 - DISTRIBUTION SYSTEM PLANNING AND AUTOMATION**Pre-requisites:** Electrical Power Transmission**Course Objective:** This course enables the student to

- Know the basic fundamentals of distribution system planning and automation.
- Provide the knowledge about the transmission of power from the generating stations to distribution substation.
- Learn the basics of distribution automation.

Course outcomes: At the end of the course the student will be able to:

CO1: Interpret different types of loads and their characteristics along with system planning

CO2: Evaluate the voltage drops in DC & AC Feeders

CO3: Design a distribution system for a given geographical service area and layout of substation with busbars.

CO4: Analyze the communication systems and management in distribution and automation

UNIT-I :DISTRIBUTION SYSTEM PLANNING &LOAD CHARACTERISTICS

Introduction, system planning, factors effecting system planning, Techniques and models used in system planning, Role of computer, Future nature of planning.

Load Characteristics: 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.

DC & AC Distribution Systems - Classification of Distribution Systems- Requirements & Design features of Distribution systems-voltage drop in DC distribution system-Radial and Ring Main Distributor. Voltage drop in AC distribution-power factors referred to receiving end, power factors referred to respective load points, Numerical Problems.

UNIT – III: SUBSTATIONS

Selection of site for substation, Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substation 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 with relevant diagrams, Introduction to Gas Insulated Substations (GIS) and its advantages.

Distribution Substations - Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT – IV:DISTRIBUTION AUTOMATION

Introduction to Distribution Automation (DA), control system interfaces, control and data requirements, DA Hardware, DAS software. DA capabilities, Automation system computer facilities, management processes, Information management, system reliability management, system efficiency management, voltage management, Load management, automated demand management.

COMMUNICATION SYSTEMS: DA communication requirements, 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, fibre optics, Hybrid Communication systems, Communication systems used in field tests.*M. Chellaw*

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UNIT-V:SCADA

Supervisory Control and Data Acquisition Systems (SCADA), Consumer Information Service(CIS), Geographical Information System (GIS), Automatic Meter Reading (AMR), Automation system.

TEXT BOOKS

- 1) TuranGonen, “Electric Power Distribution system, Engineering”, Tata McGraw-Hill Publication, 2nd Edition, 2007.
- 2) James Northcote-Green and Robert Wilson,“Control and Automation of Electric Power Distribution Systems”, Taylor and Francis, 2017.

REFERENCES

- 1) V. Kamaraju, Electrical Power Distribution Systems, Tata McGraw-Hill Publication, 1st Edition, 2009.
- 2) C.L.Wadhwa, “Generation, Distribution and Utilization of Electrical Energy”, New Age International (P) Limited, 3rd Edition, 2005.



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L	T	P	Cr.
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B.Tech. (VII Sem.)

17EE69 - POWER ELECTRONICS LAB

Prerequisite: Power Electronics (17EE19)

Course Educational Objective:: This course enables the student to

- Understand the circuits and waveforms of various power electronic converters
- Make use of hardware modules and software tools to control the performance of various power electronic converters.

Course Outcomes: At the end of the course, the student will be able to :

CO1 Examine the characteristics of Power electronic devices.

CO2 Simulate various power converters using modern tools.

CO3 Analyze the performance of different power converters using hardware kits.

LIST OF EXPERIMENTS

1. Characteristics of SCR, IGBT & Power MOSFET.
2. Single phase AC voltage controller with R & RL Loads.
3. Single phase fully controlled bridge converter With R & RL Loads.
4. Single phase IGBT inverter with R and R-L Loads.
5. Three phase fully controlled bridge converter with R Load.
6. Single phase dual converter with RL load.
7. Four quadrant operation of chopper with R-load.
8. PWM control of Boost converter with R and R-L loads.
9. Single Phase ac to dc converter with LC filter using MATLAB/SIMULINK.
10. Single phase inverter with current controlled PWM technique using MATLAB/SIMULINK.

ADDITIONAL EXPERIMENTS

11. Single Phase ac voltage controller with R and R-L load using MATLAB/SIMULINK.
12. Single phase fully controlled PWM rectifier with R & RL loads using PSCAD.
13. Micro Controller based PWM pulse generation.



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B.Tech. (VII Sem.)

17EE70 - POWER SYSTEMS LAB

L	T	P	Cr.
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Pre-requisites : Electrical Power Transmission(17EE12), Power Systems Analysis(17EE18)

Course Educational Objective: This lab course enables the student to

Verify the theoretical concepts of power and energy systems through experimentation and analyze the same using simulation tools

Course Outcomes: At the end of the course, the student will be able to:

CO1: Analyse transmission systems under steady state and transient conditions

CO2: Perform fault calculation and network protection

CO3: Understand the performance of renewable energy systems

LIST OF EXPERIMENTS

Cycle-I: Simulation based

1. Determination of Receiving end quantities and the line performance of a medium/long transmission line using MATLAB
2. Using MATLAB code determine:
 - (i) Bus admittance matrix by inspection method for a 3-bus power system and obtain
 - (ii) Power flow solution by Newton-Raphson method.
3. Determination of Sequence components (Positive, Negative and Zero) of an alternator.
4. Transient analysis of a Single Machine Infinite Bus (SMIB) system.
5. Simulation of LG, LL, LLG and LLL faults on a simple power system using PSCAD/MATLAB.
6. Determine steady state frequency error and frequency deviation response for an
 - (i) Isolated power system and (ii) Interconnected power system.
7. Plot the Swing curve for a simple 3 or 4 bus power system using MATLAB / PSCAD.

Cycle-II: Experiment based

8. Plot V-I characteristics of Solar panel at various levels of insolation.
9. Study the effects of temperature and irradiance on Solar cell and plot the characteristics.
10. Study the performance of a Wind turbine system at different wind speeds and plot the characteristics.
11. Determination of Earth resistance in humid and dry earth conditions.
12. Study the Over current protection scheme using numerical relay.
13. Determination of Positive, Negative and Zero sequence reactances for a 3-phase alternator.
14. Determination of ABCD parameters and performance of a transmission line.

Note: Perform at least five experiments from each cycle.



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L	T	P	Cr.
3	-	-	3

B.Tech. (VII Sem.)

17EE92 - HIGH VOLTAGE ENGINEERING
(*Add on course – III)

Pre-requisite: Electrical Power Transmission, Electrical Engineering Materials

Course Educational Objectives: This course enables the student to

- Introduce basics of electrical breakdown and high voltage generation,
- Understand high voltage test systems, measurement and analysis techniques as applied to power system apparatus such as cables, insulators, transformers, and generators.

Course Outcomes: At the end of the course, the student will be able to :

CO1: Illustrate the fundamental concepts of electric breakdown in liquids, gases, and solids

CO2: Test the protection equipment in power system for high voltage applications

CO3: Analyze the concept of generation of high voltage AC, DC impulse voltages and currents and their measurements.

CO4: Compare the principles of insulation co-ordination on HV/EHV systems.

UNIT – I: INTRODUCTION

Electric Field Stresses–Gas/Vacuum as Insulator–Liquid Dielectrics–Solids and Composites, Estimation and Control of Electric Stress–Numerical methods for electric field computation, Surge voltages, their distribution and control–Conduction and Breakdown in Gases– Gases as insulating medium – Ionization process–Townsend’s criteria for breakdown–Paschen’s law.

UNIT – II: BREAK DOWN IN LIQUID DIELECTRICS

Liquid as Insulator– pure and commercial liquids–conduction and breakdown in pure liquids, conduction and breakdown in commercial liquids–Transformer oil, Break Down in Solid Dielectrics –Intrinsic breakdown–electromechanical breakdown–thermal breakdown–breakdown of solid dielectrics in practice–Breakdown in composite dielectrics–solid dielectrics used in practice.

UNIT – III: GENERATION OF HIGH VOLTAGES, CURRENTS AND TESTING

Generation of High DC Voltages–Generation of High AC voltages–Generation of Impulse Voltages–Generation of Impulse currents–Tripping and control of impulse generators. Testing of Insulators and bushings–Testing of Isolators and circuit breakers–Testing of cables–Testing of Transformers–Testing of Surge Arresters–Radio Interference measurements. Short circuit testing.

UNIT – IV: MEASUREMENT OF HIGH VOLTAGES AND CURRENTS

Measurement of High DC voltages–Measurement of High AC and impulse voltages Measurement of High DC, AC and Impulse currents–Oscilloscope for impulse voltage and current measurements. Partial discharge, acoustic measurement.

UNIT – V: INSULATION CO-ORDINATION AND GROUNDING OF EHV SYSTEMS

Principles of Insulation Coordination on High voltage and Extra High Voltage power systems, Generalized Grounding systems, Grounding Grids.

TEXT BOOKS

1. E.Kuffel, W.S.Zaengl, J.Kuffel, High Voltage Engineering, Elsevier Publications, 2nd Edition, 2008.
2. M.S.Naidu and V. Kamaraju High Voltage Engineering, TMH Publication, 3rd Edition, 2017.



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1. C.L.Wadhwa, High Voltage Engineering, New Age Internationals (P) Limited, 3rd Edition,2012.
2. Ravindra Arora, Wolfgang Mosch, High Voltage Insulation Engineering, New Age International (P) Limited, 3rd Edition,2011.
3. Dr. Shailendra Jain, "Modeling and Simulation using MATLAB - Simulink" ,Wiley Publication, 2nd Edition,2011.
4. Dr. Vikramaditya Dave,"Electric Power Transmission & Distribution System with PSCAD (Basic) S", Himanshu Publications ,2017.
5. Atousa Yazdani,"Modern Distribution Systems with PSCAD Analysis", CRC Press, 1st edition,2018 .
6. Tharangika Bambaravanage, "Modeling, Simulation and Control of a Medium-Scale Power System ", Springer, 1st edition, 2017.
7. Subir Ray, "An introduction to High Voltage Engineering", PHI Learning Pvt.Ltd,New Delhi, 2nd edition, 2013.



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B.Tech. (VIII Sem.)

17EE32 - SPECIAL ELECTRICAL MACHINES

L	T	P	Cr.
3	-	-	3

Prerequisite: Electrical Machines-II(17EE11), Control System(17EE06)

Course Educational Objective: This course enables the student to

- Understand the operation and control of various advanced electrical machines, like stepper Motor, Servo Motor, permanent magnet machines etc
- Acquire the knowledge on design of various advanced electrical machines

Course Outcomes: At the end of the course, the student will be able to :

- CO1 Illustrate the principle of operation and working of various advanced electrical machines.
 CO2 Identify control mechanisms for advanced electrical machines.
 CO3 Analyze performance of advanced electrical machines.
 CO4 Interpret the concepts of conventional machines with advanced electrical machines.

UNIT – I: SERVO MOTORS

Servomotors: General principle of operation, Types of Servomotors

D.C Servomotors: Armature controlled D.C Servomotor-Field controlled D.C Servomotor and their transfer functions, speed-torque characteristics Applications. A.C Servomotors: Principle of Operation, Construction and working, Speed-Torque Characteristics, Transfer function of an A.C servo motor,.

UNIT – II: STEPPER MOTORS

Introduction, Constructional features, Principle of operation, Variable Reluctance (VR) stepping motor, Characteristics of Stepper Motor in Open Loop Drive, open loop and closed loop control of stepper motor. Applications, problems.

UNIT – III: SWITCHED RELUCTANCE MOTORS

Introduction, Constructional features, Principle of operation, Power Converter for SR Motor, Drive and power circuits, Torque equation, Torque-speed Characteristics, and Control of SR Motor for Traction type load, Applications, Hysteresis motors, problems.,

UNIT – IV: PERMANENT MAGNET BRUSHLESS D.C MOTORS

Introduction, permanent magnetic material, magnetic characteristics, minor hysteresis loops and recoil line, evaluation of PMBLDC motor, comparison of PMBLDC motor with conventional DC motor and induction motor, stator frames of Conventional PM DC Motors, Equivalent circuit of a PM, PM Brushless D.C motor-principle of operation, construction, d-q analysis of BLDC motor, Applications, problems.

UNIT – V: COMMUTATOR MOTORS

Introduction-construction-Principle of operation-torque equation-Characteristics-Universal motor, Repulsion motor and linear motors – types (LIM, DCLM, LSM), Applications.

TEXT BOOKS

1. J.Gnanavadivel, Dr.S.Muralidharan, J.Karthikeyan, “ Principles of Special Electrical Machines”, Anuradha Publications, 2012
2. K.Venkataratnam, “Special Electrical Machines”, University Press, 1st edition, 2008.



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1. Naser A and Boldea I, "Linear Electric Motors: Theory, Design and Practical Application", Prentice Hall Inc., New Jersey, 1987
2. Charles I. Hubert, "Electric Machines-Theory, operation, Applications and control", Pearson Publications, 2nd edition, 2001.
3. P.S.Bimbhra, "Generalized Theory of Electrical Machines", Khanna Publishers, 5th edition, 2013.



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L	T	P	Cr.
3	-	-	3

B.Tech. (VIII Sem.)

17EE33 - MODELING AND ANALYSIS OF ELECTRICAL MACHINES

Prerequisites: Electrical Machines-I(17EE09), Electrical Machines-II(17EE11),

Course Educational Objective: This course enables the student to

- Gain knowledge on modelling of rotating machines
- Analyze the performance of rotating machines under dynamic and steady state conditions.

Course Outcomes: At the end of the course, student will be able to:

CO1: Develop models for linear and nonlinear magnetic circuits

CO2: Develop torque equation of an electrical machine using the concepts of field Energy

CO3: Construct machine models based on different reference frames

CO4: Synthesize equivalent circuit parameters for synchronous and asynchronous machines

UNIT – I: BASIC CONCEPTS OF MODELING

Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine-voltage, current and Torque equations.

UNIT – II: DC MACHINE MODELING

Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor-Mathematical model of D.C Series motor, Shunt motor-Linearization Techniques for small perturbations.

UNIT – III: MODELING OF 1-PHASE INDUCTION MOTOR

Linear transformation-Phase transformation - three phase to two phase transformation (abc to $\alpha\beta 0$) and two phase to three phase transformation ($\alpha\beta 0$ to abc) --Power equivalence.-Modelling of 1-Phase induction motor-cross field theory-mathematical modelling of 1-phase induction motor.

UNIT – IV: MODELING OF THREE PHASE INDUCTION MACHINE

Generalized model in arbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model-Synchronously rotating reference frame model-state space model with flux linkages as variables, small signal equations of induction motor-derivations-DQ flux linkage model derivation-control principles of induction motor.

UNIT – V: MODELLNG OF SYNCHRONOUS & SPECIAL MACHINES

Synchronous machine inductances – Mathematical model-transformation to the rotor's dq0 reference frame- Flux linkages in terms of winding currents-referring rotor quantities to the stator-voltage equations in the rotor's dq0 reference frame-electromagnetic torque-currents in terms of flux linkages-steady state operation- modelling of PM Synchronous motor, modelling of BLDC motor, modelling of Switched Reluctance motor.



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TEXT BOOKS

1. R.Krishnan “Electric Motor Drives - Modelling, Analysis& control”, Pearson Publications, 1st edition -2015
2. P.C.Krause, Oleg Wasynczuk, Scott D.Sudhoff “Analysis of Electrical Machinery and Drive systems”, IEEE Press, Second Edition, June 2013

REFERENCES

1. P.S.Bimbra “Generalized Theory of Electrical Machines “, Khanna publications, 2014.
2. Chee Mun Ong “Dynamic simulation of Electric machinery using Matlab / Simulink”, Prentice Hall, 1997.



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B.Tech. (VIII Sem.)

17EE34 - ADVANCED POWER CONVERTERS

L	T	P	Cr.
3	-	-	3

Pre-requisites : Power Electronics(17EE19)

Course Educational Objective: This course enables the student to

- Make use of advanced power converters & their enhancement in performance of power transmission, distribution and utilization systems.
- Understand the control mechanisms for converter topologies in modern power electronic systems.

Course Outcomes: At the end of the course, student will be able to :

CO1: Design control circuits for different power converters

CO2: Analyze different power electronic converters for engineering practices

UNIT- I: CONTROLLED RECTIFIERS

Standards for harmonics in single-phase rectifiers, single-phase boost rectifier, voltage doubler PWM Rectifier, PWM rectifier in bridge connection, applications of unity power factor rectifiers, three-phase controlled Rectifiers-line-commutated controlled rectifiers, power factor, harmonic distortion, special configurations for harmonic reduction, harmonic standards and recommended practices, force-commutated three-phase controlled rectifiers-basic topologies and characteristics, numerical problems.

UNIT-II: DC CHOPPERS

Principle of operation, control strategies, step up and step down choppers, analysis of class A and class B choppers, chopper classification, analysis of one quadrant, two quadrant and four quadrant choppers with voltage and current waveforms, derivation of load voltage and current expressions, numerical problems.

UNIT-III: AC-AC CONVERTERS

Single phase AC voltage controllers with PWM control-effects of source and load inductances-synchronous tap changers-three Phase AC voltage controllers-analysis of Controllers with star and delta connected R and RL load-effects of source and load inductances-analysis of single phase and three-phase cyclo converters with R and RL loads, numerical problems.

UNIT – IV: DC-AC CONVERTERS

Voltage source and current source inverters- voltage control of single-phase inverters-sinusoidal PWM-modified PWM-phase displacement control-trapezoidal, staircase, stepped, harmonic injection and delta modulation-voltage control of three-phase inverters- sinusoidal PWM-third harmonic PWM-hysteresis current control PWM- space vector modulation-Comparison of PWM techniques-current source inverters-variable dc link inverter- numerical problems.

UNIT – V: MULTI LEVEL INVERTERS

Introduction, multilevel concept, types of multilevel inverters-diode clamped multilevel inverter, principle of operation, features of diode clamped inverter, improved diode clamped inverter-flying capacitors multilevel inverter, cascaded multilevel inverter(Elementary treatment).



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TEXT BOOKS:

1. Ned Mohan, Undeland and Robbin, “Power Electronics: converters, Application and design”, John Wiley and sons Newyork, 3rd edition, 2009..
2. Md.H.Rashid “Power Electronics”, Pearson Education, 4th edition, 2014.

REFERENCES:

1. Joseph Vithayathil, “Power Electronics: Principles and Applications”, Delhi, Tata McGraw-Hill, 2017.
2. P.S. Bimbira, “Power Electronics”, New Delhi, Khanna Publishers, 2012.



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B.Tech. (VIII Sem.) 17EE35 - SWITCHED MODE POWER CONVERTERS

Pre-requisites: Power Electronics(17EE19)**Course Educational Objective:** This course enables the student to

- Understand principles and basic topologies of switched mode power converters which include isolated/non isolated, soft switching dc-dc converters
- Know the various power factor correction converter topologies.

Course Outcomes: At the end of the course, student will be able to:

CO1: Identify various types of switched mode converter topologies

CO2: Design DC-DC converters of different topologies

CO3: Analyze soft switching techniques

CO4: Analyze different types of power factor correction circuits

UNIT-I: NON ISOLATED SWITCH MODE POWER CONVERSION

Analysis & Designing of Buck converters, Boost converters, Buck-Boost converters, Cuk converters-continuous and discontinuous modes, applications, problems.(Elementary treatment)

UNIT-II: ISOLATED SWITCH MODE POWER CONVERSION

Requirement for isolation in the switch-mode converters, transformer connection, Forward and fly back converters, power circuit and steady state analysis-Applications. Push Pull Converters: Power circuit and steady state analysis-utilization of magnetic circuits in single switch and push-pull topologies- Applications, Half bridge and full bridge converters- Power circuit and steady state analysis-Utilization of magnetic circuits and comparison with previous topologies- Applications. (Elementary treatment)

UNIT -III: SOFT SWITCHING CONVERTERS

Classification of Resonant converters-Basic resonant circuits- Series resonant circuit-Parallel resonant circuits- Resonant switches, Concept of Zero voltage switching-Principle of operation, analysis of M-type and L-type Buck or boost Converters-Concept of Zero current switching-Principle of operation-Analysis of M-type and L-type Buck or boost Converters.

UNIT- IV: POWER FACTOR CORRECTION CIRCUITS

Introduction, Definition of PF and THD, Power Factor Correction , Energy Balance in PFC Circuits , Passive Power Factor Corrector, Basic Circuit Topologies of Active Power Factor Correctors , System Configurations of PFC Power Supply, CCM Shaping Technique , Current Mode Control, Voltage Mode Control, Other PFC Techniques.

UNIT- V: CONTROL METHODS FOR SWITCHING POWER CONVERTERS

Control methods for buck, boost and forward dc-dc converters using State-space Modelling, Converter Transfer Functions, Pulse Width Modulator Transfer Functions, and Linear Feedback Design Ensuring Stability.



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TEXT BOOKS:

1. Ned Mohan, Undeland and Robbin, 'Power Electronics: converters, Application and design', John Wiley and sons, Newyork, 3rd edition, 2009.
2. Robert Erickson and Dragon Maksivimovic "Fundamentals of Power Electronics", Springer Publications, 2nd edition, 2005.

REFERENCES:

1. Philip T.Krein "Elements of Power Electronics", Oxford University Press, 2nd edition, 2014.
2. L. Umanand "Power Electronics Essentials & Applications", Wiley India Private Limited, 2011.
3. Issa Batarseh "Power Electronics Circuits", John Wiely, 2006.
4. Md.H.Rashid "Power Electronics", Pearson Education, 4th edition, 2014.



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B.Tech. (VIII Sem.)

17EE36 - POWER QUALITY

Pre-requisites: --- Power System Analysis(17EE18), Electrical Power Transmission(17EE12), Power System Protection(17EE21)

Course Educational Objective: This course enables the student to

- Study the various issues affecting Power Quality and their production
- Address power quality issues and condition monitoring techniques used in electrical and industrial systems
- Introduce various power quality measurement devices

Course Outcomes: At the end of the course, the student will be able to:

CO1: Classify power quality issues in a power system

CO2: Understand the effects of various power quality phenomenon in various equipment and their impact on performance and economics

CO3: Apply appropriate solution technique for power quality mitigation based on the type of problem

CO4: Identify suitable device for power quality measurements

UNIT – I: INTRODUCTION TO POWER QUALITY

Definitions of Power quality, Power Quality – Voltage and Current Quality, Importance of Power Quality, Power Quality Evaluation. Terms and Definitions: General Classes of Power Quality Problems, Transients, Long-Duration Voltage Variations, Short-Duration Voltage Variations, Voltage Imbalance, Waveform Distortion, Voltage fluctuation, Power Quality Terms and Ambiguous terms, CBEMA and ITI Curves.

UNIT – II: VOLTAGE SAGS AND INTERRUPTIONS

Sources of sags and interruptions, Estimating voltage sag performance, Fundamental Principles of Protection, Solutions at the End-User Level, Effects of voltage sags and interruptions on different loads, Motor –Starting Sags. Mitigation of voltage sags at consumer level - active series compensators, Static transfer switches and fast transfer switches.

UNIT – III: OVERVOLTAGES

Sources of transient over voltages - Capacitor switching, Lightning, Ferro resonance. Mitigation of overvoltages - Surge Arresters, Low pass filters, Power conditioners. Lightning protection - Shielding, Line arresters, Effects of overvoltages in power system and protection of equipment from transients.

UNIT-IV: HARMONICS

Definition of Harmonics, Harmonic Distortion - Voltage vs Current Distortion, Harmonic Indices, Harmonic sources from commercial and industrial loads, Locating harmonic sources, Inter harmonics, Resonance. Effects of harmonics on power system equipment, Harmonic distortion evaluation, Devices for controlling harmonic distortion – passive and active filters. Harmonic analysis using simulation tools, IEEE and IEC standards.

UNIT – V: POWER QUALITY MONITORING

Monitoring considerations, monitoring and diagnostic techniques for various power quality problems, Power Quality measurement equipment - Power line disturbance analyzer, Harmonic / Spectrum analyzer, Oscilloscopes, Smart Power Quality meters, Wiring and Grounding testers.

Note: Analyze the core concepts using software tools wherever applicable



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TEXT BOOKS

1. Roger C Dugan, Surya Santoso, Mark F. McGranaghan, H. Wayne Beaty, "Electrical power systems quality", Tata McGraw-Hill Education, 3rd Edition.
2. C. Sankaran, "Power Quality" CRC Press, 2017.

REFERENCES

1. Math H J Bollen, "Understanding Power Quality Problems: voltage sags and interruptions", Wiley-IEEE Press, 1999.
2. Angelo Baggini, "Hand book of power quality", John Wiley & Sons, 2008.
3. J. Arrillaga, N.R Watson, S.Chen, "Power System Quality Assessment", John Wiley & Sons, 2000.
4. Turan Gonen, "Electric Power Distribution Engineering", CRC Press, 3rd Edition.



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B.Tech. (VIII Sem.)

17EE37 - HVDC AND FACTS

Pre-requisites : Power Electronics(17EE19)**Course Educational Objective:** This course enables the student to

- Familiarize with technical and economical aspects of HVDC transmission system
- Introduce reactive power compensating techniques.
- Study about multiple bridge converters for power flow enhancement in existing AC system with various FACTS devices.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Interpret the operation and modern trends in HVDC transmission systems.

CO2: Functioning of HVAC and HVDC Transmission systems with working principles of various FACTS devices.

CO3: Apply the series and shunt compensation techniques for HVAC Transmission systems.

CO4: Analyze various control schemes used for UPFC and identify the steady state model of static voltage regulators

UNIT – I: INTRODUCTION TO HVDC TRANSMISSION SYSTEMS & FACTS

Types of HVDC Links – Schematics of HVDC Station – Comparison of AC & DC Transmission, Applications of DC Transmission and operating problems -Modern trends in D.C. Transmission, FACTS Concepts: Transmission interconnections, power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers.

UNIT – II: CONVERTER THEORY AND PERFORMANCE

Valve characteristics, converter configuration, detailed analysis of 6-pulse converter, converter transformer rating, Multiple bridge converter, Numerical problems, current source converter, Multi terminal D.C (M.T.D.C) systems –types

UNIT – III: CONTROL OF HVDC SYSTEMS

Basic principle of control, Hierarchy of controls, control implementation, starting and stopping of dc links, converter control characteristics, converter firing angle control schemes -constant α -control, Inverse cosine control. Study and simulation of 6 pulse HVDC system.

UNIT – IV: SHUNT COMPENSATION

Principles of shunt compensation – Variable Impedance type & switching converter type- Static Synchronous Compensator (STATCOM) configuration, characteristics and control

SERIES COMPENSATION

Principles of static series compensation using GCSC, TCSC, TSSC configurations, characteristics, control- applications

UNIT – V: VOLTAGE REGULATORS

Principles of operation-Steady state model and characteristics of static voltage regulators and phase shifters- power circuit configurations.

UNIFIED POWER FLOW CONTROLLER (UPFC)

Basic Operating Principles, Conventional Transmission Control Capabilities, Independent Real and Reactive Power Flow Control, Basic Control system for P and Q Control. Study and simulation of Power Flow control in a five bus system using any one of the FACTS Controllers



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TEXT BOOKS:

1. K.R.Padiyar, "HVDC Power Transmissions Systems: Technology and System Interactions" , New Age International (P) Ltd., 2nd Revised edition, 2012.
2. N.G.Hingorani & L.Gyugyi, "Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems", IEEE Press, 1999.

REFERENCES:

1. J Arrillaga, "High Voltage Direct current Transmission", Peter Peregrinus Ltd, UK
2. E.W.Kimbark, "Direct Current Transmission", Wiley-Interscience, New York.
3. S Kamakshaiiah, V Kamaraju, " HVDC Transmission", *TMH*, 1st edition.
4. Y. H. Song and A. T. Johns, "Flexible AC Transmission Systems", IET, 1999.
5. K.R.Padiyar, "FACTS device", New Age International (P) Ltd, 4th Edition.
6. N.D.Enrique Acha,et al. "Facts-Modelling and simulation in power networks", John wiley publications.



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B.Tech. (VIII Sem.)

17EE38 - SMART AND MICRO GRID

Prerequisite:**Course Educational Objective** This course enables the student to:

- Illustrate the functions of smart and micro grid.
- Analyze the Issues for implementing the smart and Micro grid Concepts.
- Apply communication technology to smart and Micro grid.

Course Outcomes : At the end of the course, the student will be able to**CO1:** Illustrate the Smart Grid technologies, different smart meters and advanced metering infrastructure.**CO2:** Analyze the power quality management issues in Smart and Micro Grid.**CO3:** Apply the high performance computing for Smart Grid.**CO4:** To develop LAN, WAN and Cloud Computing for Smart & Micro Grid applications.**UNIT - I****INTRODUCTION TO SMART GRID**

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, National and International Initiatives in Smart Grid.

UNIT - II**SMART GRID TECHNOLOGIES**

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control. DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers.

UNIT - III**SMART METERS AND ADVANCED METERING INFRASTRUCTURE**

Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit (PMU), Intelligent Electronic Devices (IED) & their application for monitoring & protection.

UNIT - IV**HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS**

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

UNIT - V**MICRO GRIDS:**

Concept of micro grid, need & applications of micro grid, formation of micro grid, issues of interconnection, protection & control of micro grid. Islanding, need and benefits, different methods of islanding detection.



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TEXT BOOKS

1. Janaka Ekanayake, Nick Jenkins, "SmartGrid: Technology and Applications", A John Wiley & Sons, Ltd., Publication , 2012
2. .S. Chowdhury, "Microgrids and Active Distribution Networks." Institution of Engineering and Technology, 30 Jun 2009

REFERENCE BOOKS

1. Andres Carvallo, John Cooper, "The Advanced Smart Grid: Edge Power Driving Sustainability: 1", Artech House Publishers July 2011
2. Yang Xiao, "Communication and Networking in Smart Grids", CRC Press July 2009



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B.Tech. (VIII Sem.)

17EE39 - RESTRUCTURED POWER SYSTEMS

Pre-requisites: Power system Analysis, Electrical Power Transmission

Course Educational Objective: This course enables the student to

- Provide a comprehensive treatment towards understanding of the new dimensions associated with the power systems
- Understand the electricity power business and technical issues in a restructured power system in both Indian and world scenario
- Study about power system deregulation
- Study about new laws for pricing

Course Outcomes: At the end of the course, the student will be able to:

CO1: Understand the need for restructuring of Power Systems, and different market models

CO2: Know the reforms in Indian power sector

CO3: illustrate the functioning and planning activities of ISO

CO4: interpret transmission open access pricing issues

UNIT – I: INTRODUCTION TO RESTRUCTURING OF POWER INDUSTRY

Introduction, Reasons for restructuring / deregulation of power industry, Background to deregulation & current situation around world, Understanding the restructuring process- Entities involved-The levels of competition-The market place mechanisms-Sector-wise major changes required, Issues involved in deregulation.

UNIT – II: PHILOSOPHY OF MARKET MODELS

Introduction, Market models based on contractual arrangements; Monopoly model -Single buyer model -Wholesale competition model -Retail competition model, Comparison of various market models, Market architecture.

UNIT – III: POWER SYSTEM OPERATION IN COMPETITIVE ENVIRONMENT

Role of ISO, Operational planning activities of ISO, Operational planning activities of GENCO, Competitive bidding.

UNIT-IV: TRANSMISSION OPEN ACCESS AND PRICING ISSUES

Power wheeling, Transmission open access-Open Access issues-Operational Practices-Transmission pricing-Loss allocation-Reservation of Transmission Capacity and Congestion Management, Reactive power support.

UNIT – V: REFORMS IN INDIAN POWER SECTOR

Introduction, Frame work of Indian power sector- Historical Developments-The Institutional Framework-Operational Demarcation of the Power System-National and Transnational Grids, Reform initiatives during 1990-1995- The Independent Power Plants -Orissa Reform Model-Accelerated Power Development and Reforms Program (APDRP)-Public-Private Partnership- Other Developments, The Availability Based Tariff (ABT) power exchange- Why was ABT necessary? The Mechanism-Working of the mechanism-Effects of ABT-Intra-state ABT, The Electricity Act 2003-Provisions in the generation sector-Provisions in the transmission sector-Provisions in the distribution sector-Power trading-Other important changes, Reforms in near future.



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TEXT BOOKS

1. Kankar Bhattacharya, Math H J Bollen and Jaap E. Daalder, "Operation of Restructured Power Systems", Kulwer's Power Electronics and Power Systems Series, Series Editor: M.A. Pai, Springer Publications, 2012.
2. S.A. Khaparde and A.R. Abhyankar, "Restructured Power Systems", Alpha Science Publications, 2011 (<http://nptel.iitm.ac.in>).

REFERENCES

1. P. Venkatesh, B.V. Manikandan, S. Charles Raja and A. Srinivasan, "Electrical Power Systems: Analysis, Security and Deregulation", PHI Publications, 2012.
2. Loi Lei Lai, "Power System Restructuring and Deregulation: Trading, Performance and Information Technology", John Wiley & Sons, 2001.
3. Mohammed Shahidehpour, Hatim Yamin and Zuyi Li, "Market Operations in Electric Power Systems: Forecasting, Scheduling and Risk Management", Wiley-IEEE, John Wiley & Sons, 2003.



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B.Tech. (VI Sem.)

17MB80 - INDUSTRIAL ENGINEERING AND
MANAGEMENT

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Prerequisite: Principles of management, Human resources management, Production management, Project management

Course Description: In this course, students will learn fundamental concepts and contributions of management. This course also teaches human resources practices which play a vital role in the organisation it gives knowledge about use of improve quality of work and project management.

Course Objectives:

1. To make students understand management, its principles, contribution to management, organization, and its basic issues and types
2. To make students understand the concept of plant location and its factors and plant layout and types, method of production and work study importance
3. To understand the purpose and function of statistical quality control and material management techniques
4. To make students understand the concept of HRM and its functions
5. To make students understand PERT & CPM methods in effective project management and need of project crashing and its consequence on cost of project

Course Outcomes: At the end of the course, the student will be able to

- CO1:** Apply management principles to the particle situations to be in a position to know which type of business organisation structure suits
- CO1:** Able to make decision making relating to the problems in operations and production activities thereby improving the productivity by proper utilisation input factors by designing the better working methods and with better work study techniques.
- CO3:** Able to improve quality of working through SQC techniques and to take effective decision making relating to reduce the investment in materials through better control of inventory
- CO4:** Able to manage people in working environment with the practices of HRM across corporate businesses
- CO5:** Able to use PERT & CPM techniques in effective project management to identify critical path and try to complete projects on time as well as reducing the project durations if need arises.

UNIT - I

Introduction: Management - Definition, Nature, Importance of management Functions of Management - Taylor's scientific management theory, Fayal's principles of management, Contribution of Elton mayo, Maslow, Herzberg, Douglas MC Gregor, Basic Concepts Of Organisation - Authority, Responsibility Delegation of Authority, Span of control, Departmentation and Decentralization - Organisation structures(Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization)

UNIT - II

Operations Management: Plant location, Factors influencing location, Principles and types of plant layouts - Methods of production (job, batch and mass production), Work study - Basic procedure involved in method study and Work measurement



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UNIT - III

Statistical quality control –Concept of Quality & Quality Control-functions ,Meaning of SQC - Variables and attributes - X chart, R Chart, C Chart, P Chart,(simple Problems) Acceptance sampling, Sampling plans, Deming's contribution to quality.

Materials management –Meaning and objectives, inventory control-Need for inventory control, Purchase procedure, Store records, EOQ, ABC analysis, Stock levels

UNIT - IV

Human Resource management (HRM): Concepts of HRM, Basic functions of HR manager: Man power planning, Recruitment, Selection, Training and development, Placement, Wage and salary administration, Promotion, Transfers Separation, performance appraisal, Job evaluation and merit rating.

UNIT - V

Project management: Early techniques in project management - Network analysis: Programme evaluation and review technique (PERT), Critical path method (CPM), Identifying critical path, Probability of completing project within given time, Project cost analysis, project crashing (simple problems)

TEXT BOOK:

Dr. A.R.Aryasri, Management Science, TMH, 10th edition, 2012

REFERENCES:

1. Koontz & weihrich – Essentials of management, TMH, 10th edition, 2015
2. Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004
3. Bernard W. Taylor-Introduction to Management Science Twelfth Edition
4. O.P. Khana, Industrial engineering and Management L.S.Srinath, PERT & CPM



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B.Tech. (VI Sem.)

17MB81 - PROJECT MANAGEMENT

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Pre-Requisite:

The objective of this course is to lay an important foundation to students in managing projects with a special focus on every phase such as project planning, execution, monitoring and evaluation.

Course objectives:

1. To lay an important foundation to students in managing projects.
2. To focus on organization culture and creating a culture for Project Management.
3. To understand the importance of Project planning and controlling process.
4. To create an awareness on reporting objectives and execution Process.
5. Lay stress on building and leading a project team.

Course Outcomes: At the end of the course, the student will be able to

CO1: Understand the concept of project management.

CO2: Awareness on Organization strategy and structure and culture.

CO3: Knowledge on defining the project and its controlling process.

CO4: Ability in executing and evaluating the project.

CO5: Understand the importance of a team and achieving cross-functional co-operation.

UNIT-I

Introduction to Project management-What is Project Management-why Project Management-Project Lifecycle- Project Management Research in brief, Project Management today- future trends in project management.

UNIT-II

Organization strategy and structure and culture, Forma of organization structure, stake holder management, organization culture, creating a culture for Project Management.

UNIT-III

Project Planning Project Planning Defining the project, Approaches to project screening and selection, Work breakdown structure, financial Module, Getting Approval and compiling a project charter, setting up a monitoring and controlling process.

UNIT-IV

Project Execution Initiating the Project, Controlling and Reporting project objectives, conducting project Evaluation, Managing Risk-Four Stage Process, risk management an integrated approach, cost Management, Creating a project Budget.

UNIT-V

Leading Project Teams Building a project Team, Characteristics of an Effective project Team, achieving cross- functional co-operation, virtual project teams, Conflicts management, Negotiations

TEXT BOOKS:

1. Gray, Larson: Project Management-Tata McGraw Hill-2008.

2. Jeffery K.Pinto: Project Management-Pearson Education-2008.



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REFERENCES:

1. Enzo Frigenti: Project Management-Kogan, 2008
2. Larry Richman: Project Management-PHI, 2008
3. Scott Berkun: Project Management, SPD, 2008
4. Thomas M.Cappels: Financially Focused Project Management, SPD,2008.
5. Anita Rosen: Effective IT Project Management-PHI-2008.
6. R. Panneerselvam, P. Senthilkumar: Project Management, PHI, 2009
7. Guide to Project Management Body of Knowledge (PMBOK® Guide) of Project Management Institute, USA.



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B.Tech. (VI Sem.) 17MB82 - LOGISTICS AND SUPPLYMANAGEMENT

L	T	P	Cr.
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Pre-Requisite: Inventory management, production management, material management

Course Educational Objectives: The course aims to make the students to:

- Apply and gain in-depth knowledge on the integrated purchasing, logistics, materials and supply chain management
- Identify the integration between the various elements in the supply chain process
- Learn how to establish benchmark of the organization by taking best practices of the world class organisations.
- Design transportation networks and use of deferent modes of transportation.
- Apply the latest IT tools and techniques to evaluate supply chain systems

Course Outcomes: After completing of this course, the students should be able to:

- CO1:** Examine the design and performance of supply networks and processes in different business contexts.
- CO2:** Develop capabilities in logistics, coordination for supply chain integration, inventory management; risk pooling, procurement, product and process design, and international supply chain management.
- CO3:** Configure logistics networks and assess their performance impacts on efficiency and service levels
- CO4:** Design supply chain contracts for effective governance of supply chain relationships.
- CO5:** Diagnose information integration problems across the supply chain and their consequent impacts in deploying physical and financial resources optimally.

UNIT - I

Introduction to Supply Chain Management: Concept, Objectives, Scope and Functions of Supply Chain; Process view of a Supply Chain; Impact of Supply Chain Flows.

Supply Chain Drivers: Facilities, Inventory, Transportation, Information, Sourcing, Pricing; Obstacles to Achieve Strategic fit; Role of Aggregate Planning in Supply Chain, Methods and Managing Supply and Demand.

Supply Chain Performance: Competitive Advantage and Supply Chain Strategies, Achieving Strategic fit.

UNIT - II

Logistics Management: Introduction, Difference between Logistics and Supply Chain; Inbound, Inter and Outbound Logistics; Integrated Logistics Management; 3PL, 4PL, Intermodal and Reverse Logistics.

Supply Chain Customer Service: The Marketing and Logistics interface, Customer Service and Customer Retention, Service-Driven Logistics System, Setting customer Service Priorities and Service Standards.

UNIT - III

Supply Chain Relationship: Bench marking - Objectives, Bench marking Cycle, Process and types, Setting Bench marking Priorities.

Sourcing in Supply Chain: Role of Sourcing in Supply Chain Management, Supplier Scoring and Assessment; Supplier Selection and Controlling; The Procurement process, Sourcing Planning and Analysis; Global Sourcing.

Pricing and Revenue in Supply Chain: The role of Revenue Management in Supply Chain.



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UNIT - IV

Network design in Supply Chain: The role of distribution in the Supply Chain Management, factors influencing distribution network design; Transportation Fundamentals: The role of Transportation in Supply Chain, Factors influencing Transportation Decisions, Modes of transportation, Transportation documentation.

Coordination in Supply Chain: Introduction, Lack of Supply Chain Coordination and the Bullwhip effect, Impact of Lack of Coordination, Obstacles to Coordination in Supply Chain, Managerial levers to achieve Coordination.

UNIT - V

IT in Supply Chain: The role of IT in the Supply Chain, The Supply Chain IT framework; CRM, Internal SCM, SRM; The future of IT in Supply Chain, Supply Chain IT in Practice.

Global Logistics and Global Supply Chain: Logistics in Global Economy, Change in Global Logistics, Global Supply Chain business process; Global Strategy; Global Purchasing, Global SCM.

TEXT BOOK

1. K.Sridhara butt, "*Logistics and Supply Chain management*", Himalaya Publishers, New Delhi, 2009

REFERENCES

1. Sunil Chopra and Peter Meindl, "*Supply Chain Management: Strategy, Planning & Operations*", Pearson Education, New Delhi, 2004.
2. Donald J Bowerfox and David J Closs, "*Logistics Management: The integrated Supply Chain Process*", TMH, 2003.
3. D.K.Agarwal, "*Logistics and Supply Chain management*", Mc millan Publishers, 201
4. B.Rajasekhar, Acharyulu, "*Logistics and Supply Chain management*", Excel Books, New Delhi, 2009.



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HEAD

**Dept. of Business Administration
Lakireddy Bali Reddy College of Engg.
Mylavaram - 521230., Krishna Dt**

B.Tech. (VI Sem.)

17MB83 - BANKING AND
INSURANCE MANAGEMENT

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Pre-requisite: Banking management and banking and finance

Course objectives

1. To make students understand the relationship between bankers and customers for mutual benefit
2. To create awareness to the students on various functions of banking system
3. To update the students on the emerging trends and issues in banking sector
4. To educate the students the significance of coverage of insurance
5. To make students understand the credit worthiness of customers based on their financials

Course Outcomes: After completing of this course, the students should be able to:

1. Able to understand importance of relationship between bankers and customers
2. Able to get exposure on various functions of banking systems
3. Able to connect to the emerging trends and issues in banking sector
4. Able to identify the importance of coverage of insurance
5. Able to evaluate the credit worthiness of different customers based on their key financial details

UNIT - I

Bankers- customer relationship: definition and meaning of banker and customer, permitted activities of commercial banks in India- deposit accounts- opening operations and closure of fixed deposit accounts- bank accounts and types

UNIT - II

Banking investments- negotiable instruments, types of negotiable instruments and parties, banking services Safe custody, MICR hearing, ATM's, credit cards debit cards travelling cheques, ombudsmen and customer services.

UNIT - III

Emerging trends and issues- International banking euro bank and off-shore banking, overview of banking risks, Corporate governance, credit risk management in banks, liquidity risk management and asset liability management.

UNIT - IV

Principles and practices of insurance: introduction to risk and insurance, types of insurance- basic principles of general and life insurance- regulations on investments, insurance funds with respect to shareholders funds and policy shareholders funds.

UNIT - V

Types of insurance products: General insurance products - fire, marine, motor engineering and others.

Life insurance products: endowments, whole life plans, money back, ULIPs, pension plans, health plans, group insurance schemes. Risk management: risk & uncertainty

TEXT BOOKS

Banking and Insurance: by Shakti R. Mohapatra (Author), Debidutta Acharya (Author) Vaughan, E.J. and T. Vaughan, *Fundamentals of Risk and Insurance*, Wiley & Sons



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REFERENCES:

1. Agarwal, O.P., *Banking and Insurance*, Himalya Publishing House
2. Suneja, H.R., *Practical and Law of Banking*, Himalya Publishing House
3. Gupta, P.K., *Insurance and Risk Management*, Himalaya Publishing House
4. Black, K. and H.D. Skipper, *Life and Health Insurance*, Pearson Education



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HEAC
Dept. of Business Administration
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Mylavaram - 521 230., Krishna Dt

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B.Tech. (VII Sem.)

17AE80 - PRINCIPLES OF FLIGHT

Pre-requisites: Nil

Course Educational Objectives: To learn the components of airplane and different types of flight vehicles, the basic aspects of aerodynamics and airfoils, the elements of propulsive systems, function of structural components in wing and fundamental aspects of aircraft performance and stability.

Course Outcomes: At the end of the semester, the student will be able

CO1: To describe functions of various external and internal components of an airplane

CO2: To understand the basic aspects of aerodynamics, aircraft propulsion systems and aircraft structural components

CO3: To analyze the basic performance of an aircraft.

CO4: To analyze the elementary modes of stability and control aspects

UNIT- I

BASIC ASPECTS OF FLIGHTS: History of Aviation, Atmosphere and Its Properties, Classification of Aircrafts, Components of Aircraft and Their Functions, Aircraft Motions; Control Surfaces

UNIT- II

AERODYNAMICS AND PROPULSION: Aerofoil, Aerofoil Nomenclature, NACA Aerofoils, Aerodynamics Forces-Lift, Drag and Moment Co-Efficient, Generation of Lift and Drag, Centre of Pressure, Aerodynamic Center, Pressure Distribution Over Aerofoils Aircraft Power Plants, Working Principle of Turboprop, Turbojet and Turbofan Engines, Propellers, Working Principle of Rocket

UNIT- III

AIRCRAFT STRUCTURES: Introduction; General Types of Construction, Monocoque, Semi-Monocoque and Geodesic Structures, Typical Wing and Fuselage Structure, Metallic and Non-Metallic Materials for Aircraft Application.

UNIT- IV

AIRCRAFT PERFORMANCE: Equations of Motion of an Airplane in Flight, Drag Polar, Thrust Required and Available, Power Required and Power Available, Rate of Climb, Time to Climb, Range, Endurance, Gliding Flight, Absolute and Service Ceilings, Take-Off and Landing Performance

UNIT- V

AIRCRAFT STABILITY AND CONTROL: Forces and Moments Acting On an Airplane in Flight, Static and Dynamic Stability, Longitudinal, Lateral and Directional Stability, Neutral Point, Static Margin, Side-Slip, Dihedral Effect, Adverse Yaw Effects, Aileron Reversal, Rudder Requirements, Phugoid Motion, Spiral Divergence, Dutch Roll, Auto-Rotation and Spin.

REFERENCES

1. Anderson. J. D, Introduction to Flight, McGraw-Hill, Sixth Edition, 2010.
2. Kermode. A.C, Mechanics of Flight, 12th Edition, Pearson Education, 2012.

**Dr. P. Lovaraju**

Professor & Head

Department of Aerospace Engineering
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Mylavaram-521 230, Krishna Dt, A.P.

L	T	P	Cr.
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B.Tech. (VII Sem.)

17CE80 - BASIC CIVIL ENGINEERING

Prerequisites: Nil

Course Objectives: This course deals with the importance of building planning, properties and applications of various building materials, soil classification and different types of foundations, important aspects of surveying, levelling operations and identify the terminology in roadway and railway networks, principles of water resources and environmental engineering.

COURSE OUTCOMES : At the end of the course, the student will be able to

CO1: Recognize the importance of building planning for construction

CO2: Identify appropriate building materials for construction purposes

CO3: Distinguish the different types of soils and foundations required for specific usage

CO4: Evaluate the basics of surveying and levelling operations for field application and categorize the important elements of roadway and railway networks

CO5: Discriminate the importance of quantity and quality aspects of water in the society and priorities for sanitation management.

UNIT I: BUILDING PLANNING

Role of a Civil Engineer: Inter connection among specialisations in Civil Engineering

Elements of a Building: Elements of a Building, Basic Requirements of a Building, Planning- Hot and dry climates, Hot and wet climates, Cold climatic conditions, Aspect and Prospect, Roominess, Grouping, Privacy, circulation, Sanitation and ventilation, Orientation, Economy, Role of Bye-laws

UNIT II: BUILDING MATERIALS

Classification, Composition, Properties, Commercial forms, Uses of – Rocks, Bricks, Timber, Ply wood, Glass, Bitumen, Aluminium, Cement, Steel, Concrete, Mortar.

Concept of eco-friendly materials, examples.

UNIT III: SOIL CLASSIFICATION AND FOUNDATION

Types of soils, soil classification, engineering properties, Bearing capacity of soil, purpose and methods of improving bearing capacity – Foundations – Requirements, Loads, Types - Foundation for special structures-water tanks, silos, chimneys, cooling towers, telecommunication towers, transmission line towers.

UNIT IV: SURVEYING, LEVELLING & HIGHWAY NETWORK

Objective of surveying– Principles, applications and uses of - chain surveying, theodolite, levelling, contour maps, Planimeter, EDM concept- linear distance and area measurement, Total station- GIS-Concept and applications in civil engineering.

Indian highways- Basic terminology- Classification of roads - PIEV theory - Traffic signs - IRC Code provisions

Indian railways –Permanent way and components of railway track- Gauges – Rails -Sleepers – Ballast.



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UNIT V: WATER RESOURCES AND ENVIRONMENTAL ENGINEERING

Objectives of water supply system-Sources of water supply-Hydrologic cycle-Rainfall measurement - Purpose of dams, reservoirs, intakes, infiltration galleries – Water demands – Water quality parameters and their impacts - Principles of water treatment – Objectives and methods of water distribution systems – Sewage generation in a society –Wastewater characteristics and their impacts –Principles of sewage treatment – Disposal of sewage – Water quality standards for – drinking purpose, –irrigation, -making and curing of concrete.

TEXT BOOKS

1. M.S Palanichamy "Basic Civil Engineering", Tata McGraw Hill Publishing 2000.

REFERENCES

1. S S Bhavikatti "Basic Civil Engineering", New age International Publications, 2010.
2. C P Kaushik& S S Bhavikatti "Basic Civil Engineering", New age International Publications 2010.



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B.Tech. (VII Sem.)

17CS80 - JAVA PROGRAMMING

Pre-requisites: C, C++.

Course Educational Objective: Concentrates on the methodological and technical aspects of software design and Programming based on OOP. Acquire the basic knowledge and skills necessary to implement object-oriented Programming techniques in software development through JAVA. Know about the importance of GUI based applications and the development of those Applications through JAVA. Get sufficient knowledge to enter the job market related to Web development.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Identify Object Oriented concepts through constructs of JAVA.

CO2: Analyze the role of Inheritance, Polymorphism and implement Packages, Interfaces in Program design using JAVA.

CO3: Explore Exception handling and Multi-threading concepts in program design using JAVA.

CO4: Develop GUI based applications using Applet class and explore the concept of Event Handling using JAVA.

CO5: Design some examples of GUI based applications using AWT controls and Swings.

UNIT – I

Introduction: Drawbacks of POP, Object Oriented paradigm, OOP concepts.

Java Language: History of Java, Java Buzzwords, The Byte code, Simple types, Arrays, Type conversion and casting, simple java programs.

Introducing classes: Class fundamentals, declaring objects, access control and recursion, Constructors, garbage collection, Simple example programs of String and StringBuffer classes, Wrapper classes.

UNIT – II

Inheritance & Polymorphism: Inheritance basics, using super keyword, multilevel hierarchy, Method overloading, Method overriding, Dynamic method dispatch, abstract class, Object class and final keyword.

Packages: Defining a package, Accessing a Package, Understanding CLASSPATH, importing packages, exploring java.util package (StringTokenizer, date classes).

Interfaces: Defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Differences between classes and interfaces.

UNIT – III

Exception handling: Exception handling fundamentals, exception types, usage of try& catch, throw, throws and finally, Java Built-in Exceptions.

Multithreading: Differences between multi-threading and multitasking, java thread model, Creating thread, multiple threads and synchronizing threads.

UNIT – IV

Applet Class: Concepts of Applets, differences between applets and applications, applet architecture, skeleton, creating applets, passing parameters to applets, working with Graphicsclass.

Event Handling: Events handling mechanisms, Events, Event sources, Event classes, Event Listeners interfaces, Delegation event model, handling mouse and keyboard events, Adapterclasses, Inner classes.



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UNIT – V

AWT controls: label, button, scrollbars, text components, check box, check box groups, Choices controls, lists, scrollbar, text field, layout managers – border, grid, flow.

Introducing Swing:– Introduction, key features of swings, limitations of AWT, components & containers, swing packages, creating swing applet- JApplet class, JComponents- Labels, text fields, buttons – The JButton class, Tabbed Panes, Scroll Panes, Tables.

TEXT BOOKS

Herbert Schildt, “Java: The complete reference”, TMH Publications, 7th edition, 2006.

REFERENCES

1. Dr.R.Nageswara Rao, “Core JAVA: An Integrated Approach”, Dreamtech Press, 1st Edition, 2008.
2. E. Balaguruswamy, “Programming with JAVA”, TMH Publications, 2nd Edition, 2000.
3. Patrick Niemeyer & Jonathan Knudsen, “Learning Java”, O’REILLY Publications, 3rd Edition, 2005.
4. Benjamin J Evans & David Flanagan, “Java–in a Nutshell – A desktop quick reference”, O’REILLY Publications, 6th Edition, 2014.
5. David Flanagan, “Java Examples In a nutshell – A Tutorial companion to java in a nutshell”, O’REILLY Publications, 3rd Edition, 2004.



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L	T	P	Cr.
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B.Tech. (VII Sem.) 17CS81 - INTRODUCTION TO OPERATING SYSTEMS

Prerequisite: Knowledge of Computers fundamentals, Data structures & CO.

Course Educational Objective (CEO):

The main objective of the course is to provide basic knowledge of computer operating system structure and functioning. Students able to understand how Operating Systems evolved with advent of computer architecture. Comprehend the different CPU scheduling algorithms, page replacement algorithms and identify best one.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Identify the functional aspects and implementation methods (system call And System programs of different modules in a general purpose operating System).

CO2: Evaluate scheduling and communication methods of processes handled by Operating systems through examples.

CO3: Analyse the process synchronization methods and deadlock handling Approaches employed in operating systems.

CO4: Evaluate memory management strategies such as paging and segmentation, Virtual Memory, swapping, and page replacement algorithms.

CO5: Analyse the implementation strategies of file systems regarding directory, Allocation, free space management and file recovery.

UNIT – I:

Introduction: Computer-System Organization, Computer-System Architecture, Operating System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special-Purpose Systems

Operating-System Structures: Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, Virtual Machines, Operating-System Generation, System Boot.

UNIT – II:

Processes: Concept, Process Scheduling, Operations on Processes, Inter-process Communication, Examples of IPC Systems, Communication in Client-Server Systems.

Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues.

Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.

UNIT – III:

Synchronization-The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples, and Atomic Transactions.

Deadlocks- System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention. Deadlock Avoidance, Deadlock Detection, Recovery from deadlock.

UNIT – IV:

Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.

Virtual Memory Management: Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory.



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UNIT-V:

File-System- The Concept of a File, Access Methods, Directory Structure, File-System Mounting, File Sharing, Protection.

Implementing File System: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery.

TEXT BOOK:

1. Silberschatz & Galvin, "Operating System Concepts", Wiley, 7th edition, 2007.

REFERENCES:

1. William Stallings, "Operating Systems", PHI, 5th Edition, 2004.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", TMH Publications, 1998.
3. Andrew S.Tanenbaum, "Modern Operating Systems", PHI, 2nd edition, 1995.
4. <http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir/index.html>



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MYLAVARAM - 521 230, Krishna Dt, A.P.

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B.Tech. (VII Sem.)

17EC80 - SATELLITE TECHNOLOGY

Pre-Requisites: Basics related to Dynamics, Kinematics, Thermodynamics and Properties of an Ellipse.

Course Educational Objective: This course provides the knowledge on different laws associated with the motion of a satellite. The course gives the knowledge on launching a satellite into orbit with launch vehicles. The course also provides the knowledge on various subsystems, structures, thermal control and applications of a satellite.

Course Outcomes (COs): At the end of the course, student will be able to

CO1: Identify various applications of satellites, launch vehicles and basic functions of satellite system

CO2: Understand components, characteristics of a power subsystem and various aspects of spacecraft control

CO3: Evaluate the orbital model, parameters related to satellites and the requirements needed for the selection an earth station

CO4: Analyze the satellite structures, internal and external design issues of a spacecraft

UNIT - I

Introduction to Satellite Systems: Need of space communication, common satellite applications and missions, General structure of satellite communication system. Types of spacecraft orbits, Launch vehicles, Satellite system and their functions (structure, thermal, mechanisms, power, propulsion, guidance and control, bus electronics)

UNIT - II

Orbital Mechanics: Fundamentals of orbital dynamics – Kepler’s laws, Orbital parameters, Orbital perturbations-need for station keeping, Co-ordinate systems, GPS System- architecture, working principle, merits, demerits and applications, Ground/Earth station network requirements.

UNIT - III

Power System and Bus Electronics: Solar panels: Silicon and Ga-As cells, power generation capacity, efficiency-Space battery systems-battery types, characteristics and efficiency parameters-Power electronics. Telemetry, Tracking, command and monitoring (TTC&M) control functions. Generally employed communication bands (UHF/VHF, S, L, Ku, Ka etc), their characteristics and applications-Coding systems –Onboard computer –Ground checkout systems.

UNIT – IV

Spacecraft Control: Control requirements: attitude control and station keeping functions type of control maneuvers-Stabilization schemes: spin stabilization, gravity gradient methods, 3 axis stabilization-Commonly used control systems: mass expulsion systems, Momentum exchange Systems. Gyro and magnetic torque-sensors, star and sun sensor, earth sensor, magnetometers and inertial sensors.



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UNIT - V

Satellite Structures and Thermal Control: Satellite mechanical and structural configuration: satellite configuration choices, launch loads, separation induced loads, deployment requirements- Design and analysis of satellite structures-Structural materials and fabrication-The need of thermal control: externally induced thermal environment-Internally induced thermal environment-Heat transfer mechanism: internal to the spacecraft and external heat load variations –Thermal control systems, active and passive methods.

TEXT BOOKS

1. Timothy Pratt, Charles Bostian, Jeremy Allnut , “Satellite communications”, John Wiley & Sons, 2nd edition, 2003.
2. Dennis Roddy, “Satellite communications”, Tata McGraw Hills, 4th Edition, 2009.

REFERENCES

1. M. Richharia, “Satellite Communications Systems: Design principles”, BS Publications, 2nd Edition, 2005.
2. D.C Agarwal , “Satellite communications”, Khanna Publications, 5th Edition, 2006.
3. Richard.F, Filipowsky Euan I Muehllof, ‘Space Communication Systems’, Prentice Hall 1995.



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**Department of Electronics &
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Lakireddy Bali Reddy College of Engineering
MYLAVARAM, Krishna Dt., Andhra Pradesh**

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B.Tech. (VII Sem.)

17EC81 - ANALOG AND DIGITAL COMMUNICATIONS

Pre-requisites: Vector, Scalar, Approximation of a vector by another vector, Differentiation and Integration of signals.

Course Educational Objective: This course provides the knowledge on fundamental characteristics of signals in time and frequency domain. The course will give an idea about various analog modulation techniques like amplitude, frequency, phase, pulse modulations. The course also gives the complete information regarding digital modulation.

Course Outcomes (COs): At the end of the course, students will be able to

- CO1: Understand** the fundamentals of signals and their properties.
- CO2: Analyze** the analog communication systems using amplitude and angle modulation.
- CO3: Apply** various modulation techniques for pulse transmission.
- CO4: Evaluate** the performance of fundamental blocks constituting various analog and digital modulation techniques.

UNIT-I:

Signal analysis: Concept of Signal, Classification of Signals; Representation of various Signals- Impulse, Unit Step, Unit Ramp, Signum, Decaying Exponential, Raising Exponential, Double Exponential, Gate and Rectangular, Sinc and Sampling Signals; Operations on Signals- Time Shifting, Time Scaling, Time Reversal (Folding), Amplitude Scaling, Convolution; Graphical Method of Convolution; Introduction to Fourier series and Fourier transform.

UNIT-II:

Linear Modulation: Introduction to Electrical Communication System, Need for modulation, Classification of modulation schemes, Amplitude modulation: Definition, time domain and frequency domain representation, Single tone amplitude modulation, modulation index, Generation of AM waves: Square law modulation, Envelope Detection of AM waves. Double side band suppressed carrier modulation (DSBSC): Definition, time domain and frequency domain representation, Generation of DSBSC waves: Balanced modulator, Coherent detection of DSBSC waves, Limitations of Coherent detection: Frequency error, Phase Error, Single side band (SSB) Modulation: Definition, Generation of SSB waves: phase discrimination method, Coherent detection of SSB waves.

UNIT-III:

Angle modulation: Definition, types of angle modulation: Frequency modulation, Phase modulation; single tone frequency modulation, Narrow band FM: time and frequency domain representation, Wide band FM: time and frequency domain representation, Transmission bandwidth of FM, Generation of FM: direct method, indirect method. Detection of FM waves: Frequency discrimination method, Phase discrimination method.

UNIT-IV:

Pulse modulation: Sampling theorem for low pass signals, types of sampling, Pulse modulation: types of pulse modulation, Pulse amplitude modulation (PAM): definition, generation of PAM waves: Ideal, natural and flat top sampling. Demodulation of PAM waves, Pulse width modulation (PWM): Definition, generation of PWM, Demodulation of PWM waves, Pulse position modulation (PPM): Definition, generation of PPM, Demodulation of PPM.



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UNIT-V:

Digital modulation: (Qualitative treatment only) Advantages of digital communication over analog communication, Quantization, Pulse Code Modulation system, Delta Modulation, drawbacks of delta modulation, Adaptive delta modulation, Amplitude Shift Keying, Frequency Shift Keying, Binary Phase Shift Keying, Comparison of various digital modulations.


TEXT BOOKS

1. Simon Haykin, Communication Systems, Second Edition, John Wiley & Sons Publications, Singapore, 1983.
2. Kennedy, Davis, Electronic Communication Systems, 4th edition, Tata McGraw-Hill Publications, 2009.

REFERENCES

1. Herbert Taub , Donald L. Schilling, Principles of Communication Systems, Second Edition, Tata McGraw-Hill, New Delhi, 1991.
2. B.P.Lathi, Modern Digital and Analog Communication Systems, Third Edition, Oxford University
3. Hwei, P. Hsu, Analog and Digital Communications, Schaum's Outline series, Second Edition, TMH Publications, 1991.
4. R.P.Singh, S.D.Sapre, Communication Systems (Analog & Digital), Second Edition, Tata McGraw-Hill Publications, 2009.
5. Wayne Tomasi, Electronic communication systems, third edition, Pearson Education,2006.
6. Gary M. Miller, Jeffy S. Beasley, Modern Electronic Communication, Seventh Edition, Prentice Hall of India,2002.




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L	T	P	Cr.
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B.Tech. (VII Sem.)

17EE80 - BASIC CONTROL SYSTEMS

Pre Requisite: None**Course Educational Objective:** This course enables the students to

- Introduce the principles and applications of control systems in day to day life.
- Study the importance of modelling of different systems
- Test the Stability, Controllability and Observability of systems

Course Outcomes: At the end of the course, the students will be able to:

- CO1. Develop mathematical of electromechanical systems.
- CO2. Analyze for absolute stability, relative stability, Controllability and Observability
- CO3. Analyse linear control systems in time & frequency domain

UNIT-I: INTRODUCTION-MATHEMATICAL MODELLING OF CONTROL SYSTEM

Concepts of Control Systems- Classification of control systems, Open Loop and closed loop control systems - Different examples of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems, Block diagram representation of systems -Block diagram algebra, Signal flow graph - Reduction using Mason's gain formula.

UNIT - II: STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, Canonical state space models, Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

UNIT - III: TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Time response of second order systems - Time domain specifications, Steady state errors and error constants.

UNIT - IV: FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications, Polar Plot, Bode diagrams, Nyquist Plot -Phase margin and Gain margin (Elementary treatment only).

UNIT - V: STABILITY ANALYSIS

The concept of stability – R-H stability criterion, The root locus concept - construction of root loci- Stability Analysis from Bode Plots and Nyquist plot(Elementary treatment only).

TEXT BOOKS

1. B. C. Kuo , "Automatic Control Systems" John wiley and son's ,9th edition, 2009
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P) Limited Publishers, 6th edition , 2017

REFERENCES

1. Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd edition,1998.
2. Norman S. Nise, "Control Systems Engineering", John Wiley, New Delhi, 6th edition, 2012
3. Richard C Dorf and Robert H Bishop, "Modern control systems", Prentice Hall Pearson education, Inc. New Delhi, 12th edition, 2003.

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L	T	P	Cr.
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B.Tech. (VII Sem.) 17EE81 - UTILIZATION OF ELECTRICAL ENERGY

Pre-requisites : None

Course Educational Objective: This course enables the student to

- familiarize with characteristics of various drives,
- comprehend the different issues related to heating, welding and illumination.

Course Outcomes: At the end of the course, the student will be able to:**CO1:** Choose a drive for a particular application.**CO2:** Identify a heating/ welding scheme for a given application**CO3:** Illustrate the different schemes of traction and its main components**CO4:** Develop a lighting scheme for a given practical case**CO5:** Assess the economic aspects in utilisation of electrical energy**UNIT – I: ELECTRIC HEATING AND WELDING**

Introduction, classification of methods of electric heating, requirements of a good heating material, electric arc furnace, induction heating, dielectric heating.

Electric welding: Resistance welding, electric arc welding.

UNIT – II: ILLUMINATION ENGINEERING

Introduction, Nature of light, laws of illumination, lighting schemes, sources of light, fluorescent lamps, compact fluorescent lamps, LED lamps discharge lamps, mercury vapour lamps, sodium vapour lamps and neon lamps, comparison between tungsten filament lamps and fluorescent tubes, requirements of good lighting, street lighting,

UNIT – III: ELECTRIC DRIVES

Introduction, Factors affecting selection of motor, Types of loads, Steady state characteristics of drives, Transient characteristics, size of motor, Load equalization, industrial applications.

UNIT – IV: ELECTRIC TRACTION

Introduction, requirements of an ideal traction system, supply system for electric traction, train movement, mechanism of train movement, the traction motors, modern trends in electric traction, automation in electric traction.

UNIT – V: REFRIGERATION AND AIRCONDITIONING

Introduction, Types of refrigeration, compression refrigeration system, basic vapour compression cycle, absorption refrigeration system, operational features, household refrigerator, Airconditioning, Types of airconditioning system, room airconditioner, cooling capacity of an airconditioner, working of electrical system.

TEXT BOOKS:

1. C.L.Wadhwa, "Generation, Distribution and Utilization of Electrical energy", New Age International publishers, 3rd Edition 2015.
2. N.V.Suryanarayana, "Utilization of electric power including electric drives and electric traction", New Age International publishers New Delhi, 2nd Edition 2014



H. Challa

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REFERENCES:

1. G.C.Garg, "Utilization of electric power & electric traction", Khanna Publishers, 2014.
2. H.Partab, "Art & Science of utilization of electrical energy", Dhanpat Rai &co, 2017.
3. Tripathy S.C. "Electric energy utilization and conservation" TMH, 1991.
4. J.Upadhyay, S.N.Mukunda, "Electric Traction" Allied publishers Ltd, New Delhi, 1st edition, 2000.
5. Open Shaw Taylor, "Utilization of Electrical Energy", Orient Longman, 1st edition 2006 .



M. Challen

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B.Tech. (VII Sem.)

17EI80 - INSTRUMENTATION TECHNOLOGY

COURSE EDUCATIONAL OBJECTIVES:

In this course student will learn about the basic concepts of measurement and instrumentation and measurement of strain, pressure, flow and temperature

COURSE OUTCOMES: At the end of the course student will be able to

- CO1:** Illustrate the concepts of measurement, sources of error, different electrical Transduction principles and behaviour of first order and second order systems.
- CO2:** Summarize the theory of operation of strain measurement, types and materials for resistance strain gauges and gauging techniques.
- CO3:** Identify suitable methods for pressure measurement..
- CO4:** Categorize the flow measurement techniques.
- CO5:** Analyze the temperature measuring techniques.

UNIT – I**BASIC CONCEPTS OF MEASUREMENT AND INSTRUMENTATION SYSTEMS:**

Introduction, System Configuration, Problem Analysis, Basic Characteristics of measuring devices, Calibration, Electrical Transducer, Classification, Basic requirements of a transducer, Generalised measurements, zero order systems, first order systems, second order systems, dead time element, Specifications and testing of dynamic response

UNIT – II**MEASUREMENT OF STRAIN:**

Introduction, Factors affecting strain measurements, Types of strain gauges, Theory of operation of resistance strain gauge, Types of Electrical Strain gauge, Materials for Strain gauges, Gauging Techniques and other factors, Strain gauge Circuits, Temperature Compensation, Applications.

UNIT – III**MEASUREMENT OF PRESSURE:**

Introduction, Diaphragms, other elastic elements, Transduction methods, Force balance transducer, solid state devices, thin film pressure transducers, piezo electric pressure transducer, vibrating element pressure sensors.

UNIT – IV**MEASUREMENT OF FLOW:**

Introduction, Classification of flow meters, head type of flow meters, rotameters, electromagnetic flow meter, mechanical flow meters, anemometers, ultra sonic flow meters, vortex flow meters, other flow meters, mass flow meters.

UNIT – V:**MEASUREMENT OF TEMPERATURE:**

Introduction, Temperature scales, mechanical temperature sensors, resistance type temperature sensors, platinum resistance thermometers, thermistors, thermo couples, solid state sensors, Quartz thermometer, temperature measurement by radiation methods, optical pyrometer, Calibration of Thermometers.



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Head

Department of Electronics & Instrumentation Engg.
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TEXT BOOK

1. C S Ragan, G R Sarma, V S V Mani, "Instrumentation Devices & Systems-Second Edition", Tata Mc Graw hill publishing Company Ltd..

REFERENCES

1. B.E.NOLTINGK, "Jones' Instrument Technology-Volume 1 Mechanical Instruments"-Forth Edition, Butterworth Heinemann International Editions.
2. B.E.NOLTINGK, "Jones' Instrument Technology-Volume 2 Measurement of Temperature and Chemical Composition"-Forth Edition, Butterworth Heinemann International Editions.



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Head

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B.Tech. (VII Sem.)

17IT80 - INTRODUCTION TO DATABASE

Pre-requisite: Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

Course Educational Objective:

This course enables the students to know about DBMS basic concepts, Database Languages, Data base Design, Normalization process and Transaction processing AND Indexing.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Understand DBMS concepts, architecture.

CO2: Design entity relationship model and make them to data model.

CO3: Understand the usage of keys and constraints for relational data.

CO4: Apply the normalization process for data base design.

CO5: Analyze the issues in transaction processing and different recovery strategies.

UNIT – I: Introduction:

An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

UNIT –II: Data modelling using the Entity Relationship Model:

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

UNIT – III: Relational data Model and Language:

Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

UNIT – IV: Normalization:

Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

UNIT – V: Transaction Processing Concepts:

Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, log based recovery, checkpoints, ARIES algorithm, deadlock handling.

TEXT BOOK

1. Korth, Silbertz, Sudarshan, "Database Concepts", Tata McGraw Hill.
2. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley.

REFERENCES

1. Raghu Ramakrishnan, "Database Management System", McGraw Hill.
2. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi.
3. Date C.J, "An Introduction to Database System", Addison Wesley.



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B.Tech. (VII Sem.)

17ME80 - OPTIMIZATION TECHNIQUES

COURSE EDUCATIONAL OBJECTIVE: The main objective of this course is to understand the theory of optimization methods and algorithms developed to promote research interest in optimization models to apply for the numerical techniques and mathematical results of optimization theory for solving various types of optimization problems to Engineering problems.

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1: Understand the impact of optimization in Engineering.

CO2: Develop mathematical optimization models for a range of practical problems

CO3: Apply linear programming approach for optimizing the objectives of industrial oriented problems.

CO4: Apply the concepts of nonlinear programming techniques.

CO5: Resolve the complex problem into simple problems by dynamic programming approach.

UNIT-I

INTRODUCTION: Optimization – Historical Development – Engineering applications of optimization – Statement of an Optimization problem – Design vector, design space, design constrain and objective function

UNIT-II

CLASSICAL OPTIMIZATION TECHNIQUE: Single variable optimization, multivariable optimization with Equality and No constraints, Multi variable optimization with Inequality constraints. Convex programming problem.

UNIT - III

LINEAR PROGRAMMING: Linear programming - Graphical method – simplex method – Artificial variable methods-Big-M-Two Phase simplex method.

UNIT -IV

NON-LINEAR PROGRAMMING: Introduction – Lagrange on Method – Kuhn-Tucker conditions – Quadratic programming – Separable programming – Stochastic programming – Geometric programming

UNIT - V

DYNAMIC PROGRAMMING: Dynamic Programming – Formulation, Various applications using Dynamic Programming, Multistage Decision Processes, Concept of Sub optimization and Principle of Optimality

TEXT BOOKS

1. Engineering optimization-theory practice-fourth edition- Singiresu S. Rao, Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
2. Hamdy A. Taha, Operations Research – An Introduction, Prentice Hall of India, 9th edition, 2010.

REFERENCES

1. Ravindran, Philips and Solberg, Operations Research Principles and Practice, John, Wiley & Sons, Singapore, 2nd edition, 2007.
2. J.K.Sharma, Operations Research – Theory and Applications – Macmillan India Ltd. 4th edition, 1997. 4. P.K. Gupta and Man-Mohan, Problems in Operations Research – Sultan Chand & Sons, 3rd edition, 2009.



B. Udaya Lakshmi



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B.Tech. (VII Sem.)

**17ME81 - ELEMENTS OF AUTOMOBILE
ENGINEERING**

Course Education Objectives: The objective of this course is to make students learn about layout of an automobile, working of internal combustion engine, Cooling system, Transmission system, Steering system, Suspension system, Braking system, Fuel system and different Electrical systems.

Course Outcomes: After completion of the course students are able to

CO1: Understand the basic knowledge of internal combustion engines and their functioning.

CO2: Recognize the need of fuel supply systems and Cooling systems in Automobile.

CO3: Describe the functioning of different lubrication systems and various Electrical systems in Automobile.

CO4: Distinguish various transmission systems in automobiles.

CO5: Compare various types of Steering system, Braking system and Suspension system in Vehicles.

UNIT-I

INTRODUCTION: Components of Automobile, Classification of Automobiles, Chassis and Frame, Rear wheel drive- Front wheel drive-Four wheel drive.

ENGINE: Classification of Internal combustion engines, Basic Engine components, Basic terminology of Engines, Working principles of Four stroke and Two stroke engines, Engine construction Details- Cylinder Block and Crankcase- Cylinder Head- Oil Pan- Cylinder Liners- Piston- Connecting Rod- Crankshaft, Alternative Fuels, Application of IC Engines.

UNIT- II

FUEL SUPPLY SYSTEM IN PETROL AND DIESEL ENGINES: Fuel supply systems, Fuel pumps, Simple Carburettor, Petrol Injection- Types, Mechanical Petrol Injection, Electronic Petrol Injection, Types of Injection systems in Diesel Engines, Fuel Filters, Air cleaners, Fuel Injector.

COOLING SYSTEM: Methods of cooling- Air cooling and water cooling, Components of Water cooling system-Radiators-Thermostat- Fan-Coolant pump, Anti-freeze solutions.

UNIT - III

LUBRICATION SYSTEM: Objectives of Lubrication, Types of Lubrication systems- Dry sump and wet sump Lubrication, Oil filters and Oil pumps.

ELECTRICAL SYSTEMS: Types of Ignition systems, Battery Ignition system- Components of Battery Ignition system, Spark plug, Magneto Ignition system, Batteries- Types, Lead-acid battery, Charging system- Introduction- Principle of Generator and constructional details, Starting Motor, Starting drives- Bendix drives, Horn, Windscreen wiper, Central Locking facility.

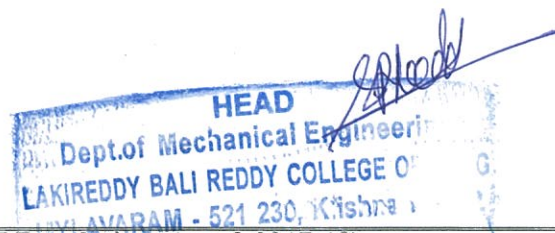
UNIT - IV

TRANSMISSION SYSTEM: Clutches- Introduction, Types- Single plate clutch-Multi plate clutch- Centrifugal clutch, Necessity of Transmission, Types of Transmission- Sliding Mesh Gear Box- Constant Mesh gear box, Propeller shaft, Final drive, Differential.

WHEELS AND TYRES: Types of Wheels, Wheel dimensions, Tyre- Types of Tyres, Carcass types, Tyre Materials, Tyre designations.



A. Naresh Kumar



UNIT - V

FRONT AXLE AND STEERING: Front Axle, Types of stub axle, Steering geometry- Camber- Kingpin inclination- Combined angle and scrub radius- Castor- Toe in and Toe out, Understeer and Oversteer, Power steering, Steering Linkages.

SUSPENSION SYSTEM: Introduction, Types of Suspension springs, Leaf springs, Coil springs, Torsion bars, Shock Absorbers, Independent suspension- Types, Air-suspension.

BRAKING SYSTEM: Braking Requirements, Types of Brakes, Drum brakes and Disc Brakes, Hydraulic Brakes, Air brakes, Anti-lock braking systems.

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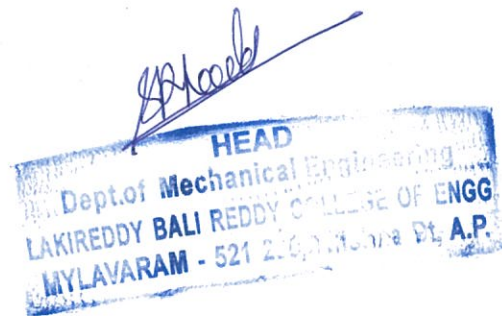
- 1) Dr. Kirpal Singh, Automobile Engineering-Vol I & II, 13th Edition, Standard Publishers Distributors, 2014.
- 2) K.K. Ramalingam, Automobile Engineering- Second edition, Scitech Publications, 2014.

REFERENCES

- 1) V.A.W Hillier and David R.Rogers, Hillier's Fundamentals of Motor Vehicle Technology, Book1, 5th edition- 2007.
- 2) R.B.Gupta, Automobile Engineering, 8th edition, Tech India publication series, 2013.
- 3) Heinz Heisler, Advanced Vehicle Technology, 2nd edition, Butterworth-Heinemann Series, 2002.
- 4) David A Crolla, Automotive Engineering, 1st edition, Butterworth-Heinemann series, 2009.



A. Narasimha Kumar
A. Narasimha Kumar



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B.Tech. (VIII Sem.)

17AE81 - SPACE TECHNOLOGY

Course Educational Objectives: To learn the space mission strategies and fundamental orbital mechanics, the flight trajectories of rockets and missiles, the fundamentals of atmospheric re-entry issues and satellite attitude.

Course Outcomes: At the end of the semester, the student will be able

CO1: To analyze the orbital elements and it's manoeuvring

CO2: To analyze the trajectories of rockets and missiles

CO3: To understand the re-entry and atmosphere

CO4: To analyze the dynamics of spacecraft attitude

UNIT - I

INTRODUCTION

Space Mission-Types-Space Environment-Launch Vehicle Selection, Introduction to Rocket Propulsion-Fundamentals of Solid Propellant Rockets- Fundamentals of Liquid Propellant Rockets-Rocket Equation

UNIT - II

FUNDAMENTALS OF ORBITAL MECHANICS & ORBITAL MANEUVERS

ORBITAL MECHANICS: Two-Body Motion-Circular, Elliptic, Hyperbolic, And Parabolic Orbits-Basic Orbital Elements-Ground Trace

ORBITAL MANEUVERS: In-Plane Orbit Changes-Hohmann Transfer-Bi-Elliptical Transfer-Plane Changes- Combined Maneuvers-Propulsion for Maneuvers

UNIT - III

ASCENT FLIGHT MECHANICS OF ROCKETS AND MISSILES

Two-Dimensional Trajectories of Rockets and Missiles-Multi-Stage Rockets-Vehicle Sizing-Two Stage Multi-Stage Rockets Trade-Off Ratios-Single Stage to Orbit- Sounding Rocket-Aerospace Plane-Gravity Turn Trajectories

UNIT - IV

ATMOSPHERIC REENTRY

Introduction-Steep Ballistic Reentry-Ballistic Orbital Reentry-Skip Reentry-"Doubledip" Reentry - Aero-Braking - Lifting Body Reentry

UNIT - V

SATELLITE ATTITUDE DYNAMICS

Torque Free Axi-Symmetric Rigid Body-Attitude Control for Spinning Spacecraft - Attitude Control for Non-Spinning, Spacecraft - The Yo-Yo Mechanism - Gravity - Gradient Satellite-Dual Spin Spacecraft-Attitude Determination

TEXT BOOKS

1. Wiesel. W. E, Spaceflight Dynamics, McGraw-Hill, 1997
2. Cornelisse. J. W, Schoyer H. F. R, Wakker K. F, Rocket Propulsion and Space Flight Dynamics", Pitman publications, 1984.
3. Sellers. J, Understanding Space: An Introduction to Astronautics, McGraw- Hill, 2000.
4. Francis J Hale., Introduction to Space Flight, Prentice-Hall, 1994.



Dr. P. Lovaraju

Professor & Head

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B.Tech. (VIII Sem.)

17CE81 - DISASTER MANAGEMENT

Prerequisites: Nil

Course Objectives: This course deals with different types of disasters, impacts of disasters, importance of technology in handling disaster management situations, importance of planning and risk prevention in case of occurrence of disaster, importance of education and community approach for the responsive actions to be taken in case of occurrence of disaster.

COURSE OUTCOMES: At the end of the course, the student will be able to

CO1: Identify the basic terms and types of disasters

CO2: Describe the impacts of disasters

CO3: Illustrate the role of technology in handling disaster management situations

CO4: Identify the stake-holders concerned and design the different action plans for responding in case of disaster occurrence.

CO5: Evaluate the importance of education and community approach for the responsive actions to be taken in case of disaster occurrence.

UNIT I: DEFINITIONS & TYPES OF DISASTER

Inter disciplinary–nature of the subject - Definitions – types of Disasters- Relationship between Disaster and Human and Development- Disaster Management Cycle

Various types of disasters: *Natural*: Drought, cyclone, extreme heat and cold, avalanche, earth quake, volcano, mudflow and landslide, hailstorm, Lightning, *Manmade and Industrial*: Engineering and Technical failure, Nuclear and Chemical disasters, Accident Related Disasters, Biological Disasters, Disasters Caused due to Social, Ethnic and Religious Conflicts, Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism - threat in mega cities, rail and air craft's accidents, High Power Committee on Disaster Management in India-Disaster Management Act 2005

UNIT – II: IMPACT OF DISASTERS

Life & livestock: Habitation, agriculture & livelihood loss-health hazards-malnutrition problems-contamination of water-impact on children-environmental loss.

UNIT – III: ROLE OF TECHNOLOGY IN DISASTER MANAGEMENT

Assessment of disaster impacts using Modern Technologies: Disaster management for infra structures - electrical substations – roads and bridges – mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment – multimedia technology in disaster risk management and training – transformable indigenous knowledge in disaster reduction.

UNIT – IV: PLANNING & RISK PREVENTION

Planning, early warning system-crisis intervention and management-Response and Rehabilitation after Disasters-temporary shelter – food and nutrition-safe drinking water –rehabilitation after cyclones- response to drought, response to river erosion, response after earth quake-response after Tsunami- Hunger and Disaster.



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UNIT – V: EDUCATION AND COMMUNITY PREPAREDNESS & CASE STUDIES

Essentials of disaster education –Community based disaster recovery - Building community capacity for action - Corporate sector and disaster risk reduction - A community focused approach

Case studies on different disasters in the world, Impacts, Technology usage, Risk prevention, Education and community preparedness

TEXT BOOKS

1. Tushar Bhattacharya, “Disaster Science and Management”, Tata McGraw Hill Publications, New Delhi, 2012.
2. Jagbir Singh (Ed.), “Disaster Management – Future Challenges and Opportunities”, IK International Publishing, 2007.

REFERENCES

1. G.K. Ghosh, “Disaster Management”, APH Publishing Corporation, 2006.
2. U.K. Chakrabarty, “Industrial Disaster Management and Emergency Response”, Asian Books Pvt. Ltd., New Delhi 2007.
3. H K Gupta (Ed.), “Disaster Management”, Universities Press, 2003
4. W.N. Carter, “Disaster Management: A Disaster Management Handbook”, Asian Development Bank, Bangkok, 1991.
5. Government of India website on Disaster Management: www.ndmindia.nic.in



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Head

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B.Tech. (VIII Sem.)

17CS82 - INTERNET TECHNOLOGIES

Pre-requisites: Java Programming Language.

Course Educational Objective: Students will be familiarized with the tools and web technologies necessary for business application design and development. This course covers client side and server side scripting languages to develop static and dynamic web applications

Course Outcomes: At the end of the course, the student will be able to:

CO1: Design web pages by using HTML and CSS.

CO2: Develop user defined tags by using XML, Validating form data by using JavaScript.

CO3: Create data driven web applications by applying database connectivity techniques.

CO4: Design and implement dynamic Web Pages using server side components like servlets.

CO5: Understand the concepts of JSP and apply them in solving real world problems.

UNIT-I: HTML & CSS

HTML: Introduction, Versions, Text Formatting Tags, Lists, Tables, Images, Links, Marquee, Forms, Frames.

CSS: Types of Cascading Style sheets; CSS Selectors, Properties: Text, Backgrounds, Font, Links, Borders, Margins, Cell padding, Layouts.

UNIT-II: JAVASCRIPT & XML

JAVASCRIPT: Introduction to JavaScript, Objects in Java Script, Form validation using JavaScript.

XML: Document Type Definition, XML Schema, Presenting XML, using XML Processors: DOM and SAX.

UNIT-III: JDBC

Introduction, Types of Drivers, **java.sql package** - Procedure to establish connection between java applications and database, Database operations - create, insert, delete & update using JDBC, Types of Statements, ResultSet types.

UNIT-IV: INTRODUCTION TO SERVLETS:

Lifecycle of a Servlet, **The Servlet API:** The **javax.servlet** Package- Servlet, ServletRequest, ServletResponse, GenericServlet, ServletConfig, ServletContext, RequestDispatcher. The **javax.servlet.http** package – HttpServlet, HttpServletRequest & HttpServletResponse, HttpSession, Cookie. Accessing different databases from Servlet programs.

UNIT-V: INTRODUCTION TO JSP:

Lifecycle of JSP, scripting elements, Implicit objects, directive elements, action elements. Error Handling and Debugging. Access database from JSP pages.

TEXT BOOKS

1. Chris Bates, "Web Programming building internet applications", WILEY Dreamtech, 2nd edition, 2002. (UNITS-1,2)
2. MartyHall, Larry Brown, "Core Servlets and Java Server Pages Volume 1: Core Technologies", Pearson, 2nd Edition, 2004. (UNITS – 3, 4, 5)



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HEAD

Dept. of Computer Science and Engineering
Lakireddy Bali Reddy College of Engg.
MYLAVARAM - 528 125, Mylavaram Dt, A.P.

REFERENCES

1. Robert W Sebesta, "Programming the World Wide Web", Pearson Education, 8th Edition, 2015.
2. A.A.Puntambekar, "Web Technologies", Technical Publications, 2009.
3. Harvey M. Deitel, Paul J. Deitel, "Internet and World Wide Web How to program", Pearson Education Asia, 5th Edition, 2008.
4. Subramnyam Allamraju, Cedit Buest, "Professional java server programming J2EE 1.3 Edition", Apress Publications, 1.3 Edition, 2001.
5. https://www.w3schools.com/html/html_intro.asp
6. <https://www.javatpoint.com/servlet-tutorial>
7. <https://www.tutorialspoint.com/jsp/index.htm>
8. <http://nsr-materials.blogspot.in/2017/02/>



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Dept. of Computer Science and Engineering
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B.Tech. (VIII Sem.)

17CS83 - SHELL PROGRAMMING

Pre-requisites: Knowledge in Operating Systems

Course Educational Objective: Introduce the student to Linux kernel programming techniques. Review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform. Discuss the Process, Inter-Process Communication Techniques.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Explore LINUX Ecosystem.

CO2: Apply of LINUX commands

CO3: Implement Shell scripting in LINUX Kernel.

CO4: Apply Regular Expressions for Pattern Matching.

CO5: Design AWK scripts for text processing and Design Scripts for Process Creation.

UNIT – I

Introduction to LINUX: Operating System concepts, Introduction to LINUX, Features of LINUX, LINUX Kernel, Terminal and shell.

Introduction to LINUX File System: The LINUX file System, File System Hierarchy, File system and inodes, File Attributes, File Permissions.

UNIT – II

LINUX Commands: man, echo, script, pwd, passwd, who, uname, date, sty, telnet, rlogin, ftp, more, printf, PATH, SU, ps, arp, mkdir, cd, rmdir, ls, cp, rm, mv, cat, wc, lp, od, ln, df, du, locate, tar, zip, chmod, unmask, mount, unmount, ulimit.

Introduction to Shell: Shell responsibilities, running a shell script, Pipes, Redirection, Command Substitution.

UNIT – III

Shell Programming: VI Editor, the shell as a programming Language, Shell Meta Characters, Shell Variables, Shell Commands, Control Structures, Various Shell Scripts.

UNIT – IV

Filters: simple filters and commands: pr, cmp, comm., ulink, diff, head, tail, find, cut, paste, sort, uniq, tr, w, finger.

Regular Expressions: grep, egrep, fgrep, Sed- line addressing, context addressing, text editing, substitution.

UNIT – V

Programming with awk: awk statements, variables and expressions, comparison and logical operators, Begin and End sections, decision and looping statements.

The Process: Process concept, Process Creation Mechanism, process attributes.

LINUX Internal: LINUX Kernel Structure, System Calls, Signals, Memory Management.

TEXT BOOKS

1. Sumitabha Das., Your “Unix The Ultimate Guide”, TMH Publications, 2001.
2. M.G. Venkatesh Murthy, “Introduction to UNIX & SHELL programming”, Pearson Education, First Edition, New Delhi, 2009.



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52-12, Krishna Dt., A.P.

REFERENCES

1. B.A. Forouzan & R.F. Giberg, "Unix and shell Programming", Thomson, First Edition, New Delhi, 2003.
2. E. Foster – Johnson & others, "Beginning shell scripting", John Wiley & sons, First Edition, New Delhi, 2008.
3. Sumitabha Das, "Unix concepts and applications", TMH Publications, 4th Edition,.
4. Gaham Glass & K. Ables, Unix for programmers and users, pearson education, 3rd edition,.




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B.Tech. (VIII Sem.)

17EC82 - ELEMENTS OF COMMUNICATION SYSTEMS

Pre-requisites: Concept of signals and modulation theory.

Course Educational Objective: This course provides the knowledge on fundamental properties of systems and random processes. The course will give an idea about radio transmitters, receivers and noise present in the communication channel. This course also gives a brief introduction regarding transmission lines and antennas used in communication systems.

Course Outcomes (COs): At the end of the course, students will be able to

- CO1:** Memorize the properties of systems, random signals, and concepts of noise in communication systems, RF transmitters, receivers, transmission lines and antennas.
- CO2:** Understand the performance of fundamental blocks of RF transmitter, receivers, transmission lines and antennas.
- CO3:** Analyze the response of linear systems, impact of noise in communication systems and performance of RF transmitters and receivers.
- CO4:** Evaluate the mathematical concepts on noise in communication systems.

UNIT - I

Introduction to Systems: Definition of System, Classification of Systems, Properties of Systems- Linear and Non Linear, Time Invariant and Variant, Causal and Non Causal, Stable and Unstable; Signal and System Bandwidth, Response of Linear Systems-Transfer Function, Impulse Response, Distortion less Transmission through a system, transmission of a signal through LTI system, Block diagram of a typical communication system and its description.

UNIT-II

Random Signals: Concept and types of random variables, random processes, Cumulative distribution function and properties, Probability density function and properties, Expectation, Moments, Moment about the origin, Central moments, Variance, Skew, Skewness.

UNIT-III

Noise in Communication Systems: Concept of noise, external noise, internal noise, White noise, Band limited white noise, Colored noise, noise calculations, noise figure, noise temperature, noise equivalent bandwidth, Narrow band noise and its mathematical representation, power spectral density of a inphase and quadrature components of a noise.


UNIT-IV

Radio Transmitters and Receivers:

Radio Transmitters: Classification of radio transmitters, carrier frequency requirements, AM transmitter, effect of feedback on the performance of AM transmitters, FM transmitter- Direct method of FM transmission, indirect method of FM transmission.

Radio Receivers: Classification of radio receivers, Types of radio receivers-Tuned Radio frequency receiver and its limitations, Super hetero dyne receiver , various sections present in super hetero dyne receiver-RF section , Concept of Intermediate frequency, Automatic gain control.




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UNIT-V

Transmission lines and Antennas:

Transmission lines: Fundamentals of transmission lines, characteristic impedance, losses in transmission lines, standing waves, Quarter and half wave length lines and reactance properties of transmission lines.

Antennas: Basic considerations, Terms and definitions, Directional High Frequency Antennas: Dipole Arrays, Folded dipole and applications, UHF and Microwave Antennas: Antennas with parabolic reflectors, Horn antennas, Lens antennas. (Qualitative Analysis Only)

TEXT BOOKS

1. Simon Haykin, Communication Systems, Second Edition, John Wiley & Sons Publications, Singapore, 1983.
2. Kennedy, Davis, Electronic Communication Systems, 4th edition, Tata McGraw-Hill Publications, 2009

REFERENCES

1. Gray M Miller, Jeffery S. Beasley, "Modern Electronic Communication", Seventh Edition, Prentice Hall of India Pvt Ltd, New Delhi.
2. Herbert Taub, Donald L. Schilling, "Principles of Communication Systems", Second Edition, Tata McGraw-Hill, New Delhi, 1991.
3. B.P.Lathi, "Modern Digital and Analog Communication Systems", Third Edition, Oxford University
4. Y Mallikarjuna Reddy, "Probability theory and Stochastic Processes", Universities Press (India), Pvt Ltd.



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B.Tech. (VIII Sem.)

17EC83 - SYSTEMS AND SIGNAL PROCESSING

Pre-requisite: Differentiation and Integration of signals.

Course Educational Objective: This course provides basic knowledge on signals and various operations on them. It also provides knowledge about representation of Signals in frequency domain using Fourier series and Fourier Transform. This course introduces underlying concepts of sampling and reconstruction. It also provides brief overview on various systems and their applications.

Outcomes (COs): At the end of the course, students will be able to

CO1: Understand various signals & systems with their properties.

CO2: Apply Fourier series, Fourier Transform on continuous and discrete signals

CO3: Analyze the Systems and observe the response of Linear Systems.

CO4: Evaluate DFT,FFT for the discrete time signals

UNIT – I

Signal Analysis: Concept of Signal, Classification of Signals-Continuous Time and Analog Signals, Discrete Time and Digital Signals; Representation of Signals- Impulse, Unit Step, Unit Ramp, Signum, Decaying Exponential, Raising Exponential, Double Exponential, Complex exponential signal, Gate and Rectangular, Sinc and Sampling Signals.

Operations on Signals: Time Shifting, Time Scaling, Time Reversal (Folding), Amplitude Scaling, Convolution; Graphical Method of Convolution, Properties of Signals- Even and Odd, Causal and Non Causal, Bounded and Unbounded, Periodic and Aperiodic, Energy and Power, Deterministic and Random Signals.

UNIT – II

Fourier Series: Concept of Fourier Series, Trigonometric Fourier Series, Exponential Fourier Series, Relations among coefficients of Trigonometric Fourier Series and Exponential Fourier Series,

Fourier Transforms: Need of Transform, Existence of Fourier Transform, Properties of Fourier Transform- Symmetry, Linearity, Scaling, Time Reversal, Time Shifting, Time Convolution, Frequency Convolution and Parsevalls Theorem; Fourier Transform of Aperiodic Signals, Fourier Transform of Periodic Signals.

UNIT – III

Sampling Theorem: Representation of continuous time signals by its samples, Reconstruction of signal from its samples, effect of under sampling- Aliasing.

Signal Transmission Through Linear Systems: Definition of System, Classification of Systems, Properties of Systems- Linear and Non Linear, Time Invariant and ^{Time}Variant, Causal and Non Causal, Stable and Unstable; Signal and System Bandwidth, Response of Linear Systems- Transfer Function, Impulse Response, Filter Characteristics of Linear System, Ideal Filter characteristics of LPF, HPF, BPF and BEF, Physically Realizable System.

Correlation Functions and Spectral Densities: Basics of Autocorrelation Function, Energy Spectral Density, Power Spectral Density and Cross Correlation Function.



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UNIT – IV

Discrete Fourier Transform: Introduction to DTFT, Concept of DFT, Computation of DFT, Computation of IDFT, Properties of DFT- Linear, Periodicity, Time Shifting, Frequency Shifting, Time Reversal, Conjugate, Basic Concept of Convolution, Linear Convolution, Circular Convolution, Circular Convolution through DFT and IDFT, Linear Convolution through DFT and IDFT.

UNIT – V

Fast Fourier Transform: Need of FFT, Radix-2 Decimation in Time FFT Algorithm, Radix-2 Decimation in Frequency FFT Algorithm, Comparison between DIT and DIF Algorithms, Inverse FFT.

Signal Processing: Digital Signal Processing System, Advantages of DSP, Limitations of DSP, Applications of DSP.

TEXT BOOKS

1. A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/Pearson publishers, 2nd Edition.

REFERENCES

1. John G. Proakis, Digital Signal Processing, Principles, Algorithms & Applications, Pearson education, Fourth edition, 2007
2. B P Lathi, Signals, Systems and Communications, BSP, 2003, 3rd Edition.
3. Manson H Hayes, Digital Signal Processing, Schaum's Outlines, TMH Publications, 2004
4. Michel J. Robert, Fundamentals of Signals and Systems, McGraw Hill Publishers.
5. Narayana Iyer, Signals and Systems, Cengage Learning Publishers, 2011.
6. A. Anand Kumar, Signals and Systems, 2nd Edition, PHI, 2012.




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B.Tech. (VIII Sem.)

17EE82 - ENERGY AUDITING

Prerequisite: Concepts of basics of electrical engineering, generating sources.

Course Educational Objective This course enables the student to

- Develop energy audit procedures
- Build energy efficient motors for energy audit.
- Analyze the energy crisis using energy audit

Course Outcomes: At the end of the course, the student will be able to

CO1: Analyze the energy data of industries.

CO2: Carry out energy accounting and balancing.

CO3: Suggest methodologies for energy savings for different sources

CO4: Apply the different energy instruments for auditing.

UNIT - I: INTRODUCTION

Types & Forms of Energy - Primary / Secondary Energy Sources – Energy Auditing: Types, classifications, energy index, cost index, pie charts, Sankey diagrams, load profiles, energy saving potential, energy audit of process industry.

UNIT - II: ENERGY COSTING, MONITORING & TARGETING

Data & Information Analysis – Cost / Energy Share Diagram – Data Graphing – Electricity Billing : Components & Costs – kVA – Need & Control – Determination of kVA demand & Consumption – Time of Day Tariff – Power Factor Basics – Penalty Concept for PF.

UNIT - III: ENERGY EFFICIENT MOTORS

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, motor energy audit.

UNIT - IV: LIGHTING SYSTEMS

Concept of lighting systems - The task and the working space - Light sources - Ballasts - Luminaries - Lighting controls - Optimizing lighting energy - Cost analysis techniques - Lighting and energy standards.

UNIT - V: ENERGY INSTRUMENTS

Energy Instruments wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers.

TEXT BOOK

1. W.C. turner, "Energy Management Hand book" Wiley press, New York, 1982
2. .Y. Y. Haimes (ed), 'Energy Auditing and Conservation' Hemisphere Publishing Corporation, New York, 1980

REFERENCES

1. W.R. Murphy and G. McKay "Energy Management" Butterworths, London 1987
2. Abbi.Y.P. and Shashank Jain, (Jan 30, 2009) Handbook on Energy Audit and Environment Management.

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B.Tech. (VIII Sem.)

17EE83 - RENEWABLE ENERGY SOURCES

Pre-requisite course: -**Course Educational Objective: This course enables the student to**

- Know the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.
- familiarize renewable energy technologies

COURSE OUTCOMES: At the end of the course, students will be able to :

- CO1:** Compare the conventional and sustainable energy resources
- CO2:** Illustrate the planning and operation of renewable energy systems.
- CO3:** Analyze various factors for the erection of the wind power plant.

UNIT I: PRINCIPLES OF SOLAR RADIATION

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT II: SOLAR ENERGY COLLECTION, STORAGE AND APPLICATIONS

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT III: WIND ENERGY

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

UNIT IV: BIO-MASS

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT V: OCEAN ENERGY

OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

TEXT BOOKS

1. Non-Conventional Energy Sources /G.D. Rai, Khanna Publishers, 6th edition, 2014
2. Renewable Energy Resources – Twidell & Wier, CRC Press(Taylor & Francis), 2015

REFERENCES

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa. 2004
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa 1997
3. Non-Conventional Energy Systems / K Mittal /Wheeler, 2003
4. Renewable energy sources and emerging technologies by D.P.Kothari, K.C.Singhal, P.H.I.



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B.Tech. (VIII Sem.)

17EI81 - NANO TECHNOLOGY

Pre-requisites: Engineering Physics, Engineering Chemistry

Course Educational Objectives (CEOs): In this Course student will learn about- Fundamentals of nanotechnology, size dependence of properties, synthesis approaches of nanomaterials, details of characterization instruments, quantum nanostructures, carbon nano tubes (CNTs), micro/nanoscale machines and devices.

Course Outcomes (COs): At the end of the course, the student will be able to:

- CO1: Acquire basic understanding on advanced materials and properties for technological applications.
- CO2: Illustrate the basic science behind the properties of nanomaterials and the principles involved in experimental techniques for studying nano materials.
- CO3: Familiar with fabrication techniques of quantum nanostructures and nano machines by means of size effects.
- CO4: Identify current nanotechnology solutions for design, fabrication and characterization.
- CO5: Realize the basics of instrumentation for nanoscale items, measurement, interpretation and analysis.

UNIT – I

SYNTHESIS METHODS

Definition of Nano-Science and Nano Technology, various nanomaterial synthesis approaches, RF plasma, sputtering, chemical methods, thermolysis, Pulsed Laser Methods.

UNIT – II

METHODS OF MEASURING PROPERTIES

Microscopy: Scanning Probe Microscopy (SPM), Atomic Force Microscopy (AFM), Field Ion Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy (TEM)

Spectroscopy: Infrared and Raman Spectroscopy, X-ray Spectroscopy, Magnetic resonance, Luminescence.

UNIT – III

CARBON NANOTUBES

Carbon molecules, nature of the carbon bond, carbon nanotubes, fabrication, types, electrical, vibrational and mechanical properties, Applications of carbon nanotubes: computers, fuel cells, chemical sensors.

UNIT - IV

QUANTUM WELLS, WIRES AND DOTS

Preparation of quantum nanostructures, size and dimensionality effects, size effects, conduction electrons and dimensionality, potential wells, partial confinement, Properties dependent on density of states, Excitons.

UNIT – V

NANOMACHINES AND NANODEVICES

Micro-electro-mechanical systems (MEMS), characteristics, Nano-electro-mechanical systems (NEMS), fabrication techniques, nano devices and nano machines, Molecular and supramolecular switches.


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TEXT BOOKS

1. Charles P. Poole, Frank J. Owens, "Introduction to Nanotechnology", Wiley Inter Science, 2003.
2. Mark A. Ratner, Daniel Ratner, "Nanotechnology: A gentle introduction to the next BigIdea", Prentice Hall P7R:1st Edition, 2002.

REFERENCES

1. Mick Wilson, KamaliKannargare., Geoff Smith, "Nano technology: Basic Science andEmerging technologies", Overseas Press, 2005.
2. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2002.
3. T. Pradeep, "Nano: The Essentials, Understanding of Nanoscience andNanotechnology," Tata McGraw-Hill, 2007.
4. KarkareManasi, "Nanotechnology Fundamentals and Applications" I.K. International,2008.



A handwritten signature in blue ink, appearing to be "P. R. Reddy".

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B.Tech. (VIII Sem.)

17IT81 - COMPUTER NETWORKS

Pre-requisites : Data communication

Course Educational Objective:

The Students will be able to learn the concepts, vocabulary and techniques currently used in the area of computer network, study protocols, network standards, the OSI model, IP addressing, cabling, networking components, and basic LAN design, accumulate existing state-of-the-art in network protocols, architectures, and applications, familiar with contemporary issues in networking technologies .

Course Outcomes: At the end of the course, the student will be able to:

CO1: Observe the concepts of various network architectures, physical media, and channel access techniques.

CO2: Interpret Data Link Layer and medium access protocols for direct link networks.

CO3: Analyse and implement internetworking and Routing Algorithms.

CO4: Visualize Adaptive Flow control, Adaptive retransmission and congestion avoidance mechanisms in TCP.

CO5: Examine various applications like e-mail, DNS, SNMP, and PGP.

UNIT - I

Introduction: Use of Computer Networks- Network Hardware- Network software-Reference models Example Networks- Network Standardization. Physical Layer: The theoretical basis for Data communication- Guided Transmission Media.

UNIT - II

Data link layer: design issues- framing, error detection and correction, CRC, Elementary data link protocols- Simplex, Stop & Wait protocols, Sliding window protocols-one-bit, go-back n, selective repeat. Medium Access Control Sub layer: Channel allocation problem- multiple access protocols-ALOHA, CSMA protocols, token bus, token ring, Ethernet, Collision free protocols, Data link layer switching, Bridges, Local internetworking, Overview of Two DLC Protocols: HDLC, PPP.

UNIT - III

Network layer: Network layer design issues- Routing algorithms- Shortest path, Flooding, Distance vector routing, Link State routing , Hierarchical Routing, Broadcast routing & Multicast Routing, ICMP, ARP,RARP, IPv4 Datagram Format, IPV4 Addresses notation , Classful Addressing, Classless Addressing,, Congestion control algorithms- Leaky Bucket, Token Bucket, Quality of service.

UNIT - IV

Transport layer: Transport service- Elements of transport protocols- Internet transport protocols: TCP & UDP, Flow control-Segments, TCP Timers.

UNIT - V

Application Layer: Domain Name System- Electronic Mail -the World Wide Web, Simple Network Management Protocol (SNMP), Multimedia, Network Security Standards.



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TEXT BOOKS

1. Andrews S. Tanenbaum, "Computer Networks", PHI, Fourth Edition.
2. Computer Networks: A Top -Down Approach, Behrouz A. Forouzan and Firouz, Mosharraf,2012 , Tata McGraw Hill.

REFERENCES

1. William Stallings, "Data and Computer Communications", Pearson Education, seventh Edition.
2. James F.Kurose, Keith W.ROSS, "Computer Networking a Top-Down Approach featuring the Internet", Pearson Education.



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B.Tech. (VIII Sem.)

17ME82 - ROBOTICS AND AUTOMATION

Course Educational Objectives (CEOs): To impart knowledge on the basic concepts of automation and robotics.

Course Outcomes (COs): At the end the student will be able to

CO1: Understand fundamentals in Automation.

CO2: Identify various robot configurations and components

CO3: Select and design of various end effectors.

CO4: Comprehend various Methods of robot programming.

CO5: Select appropriate actuators and sensors for a robot based on specific application

UNIT – I

AUTOMATION

Introduction, Types and strategies of automation, pneumatic and hydraulic components circuits. Automated Material Handling: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, Automated guided vehicle system.

UNIT – II

ROBOTICS

Introduction - Basic concepts – Robot anatomy –Components of robots- Robot motions-Number of D.O.F – Work volume – Classification of robots by control method-Specifications of robots.

UNIT – III

END EFFECTORS: Introduction – Types of end effectors – Mechanical grippers – Vacuum cups, magnetic grippers, adhesive grippers and others – Robot / End effectors interface – Considerations in gripper selection and design

UNIT – IV

ROBOT PROGRAMMING

Methods of robot programming – Lead through method.-Textual robot languages – Generations of programming languages – Robot language structure – Motion commands – End-effector and sensor commands – VAL II programming language.

UNIT – V

ACTUATORS

Pneumatic, Hydraulic Actuators, servo motors, stepper motors.

SENSORS

Feedback components: Position sensors – potentiometers, resolvers, encoders; velocity sensors

ROBOT APPLICATION: Robots in Manufacturing and Non-Manufacturing applications – Future applications.

TEXT BOOKS

1. Mikell P.Groover, "Automation, Production systems and computer Integrated Manufacturing", Prentice Hall of India Private Limited, New Delhi, 2008.
2. Mikell P.Groover, Mitchell Weiss, Roger N. Nagel & Nicholas G. Odrey; Industrial Robotics, McGraw- Hill International Editions, 1986.



REFERENCES

1. R.K.Mittal and IJ Nagrath, Robotics and Control, Tata Mc Graw – Hill publishing company Limited, New Delhi, 2003.
2. Robert J.Schilling, Fundamentals of robotics analysis & control, PHI learning private limited, New Delhi, 2009.
3. Saeed B.Niku, Introduction to robotics analysis systems Application, PHI learning private limited, New Delhi, 2004.
4. K.S.Fu, R.C Gonzalez and C.S.G.Lee, Robotics control, Sensing, vision, and intelligence; Mc Graw HILL International Editions, 1987.
5. Richard D.Klafter, Thomus A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, Prentice Hall India Private ltd, New Delhi, 2010.



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B.Tech. (VIII Sem.) 17ME83 - MECHANICAL HANDLING SYSTEMS AND EQUIPMENTS

PRE-REQUISITES : None

COURSE EDUCATIONAL OBJECTIVE:

The main objective of this course is to provide comprehensive understanding of the issues involved in the handling of Materials. It will cover the problems in, materials handling equipment selection.

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1: Understand various industrial layouts.

CO2: Select the appropriate transportation equipment for various applications

CO3: Analyse the AGVS used in industrial applications.

CO4: Select appropriate storage system for industrial application.

CO5: Analyse the design consideration of a material handling equipment.

UNIT-I

MATERIAL HANDLING: Introduction, Bulk material handling concept, plant layout and material handling, material handling systems, material handling principles, Classification of material handling equipment, Design considerations in material handling.

UNIT-II

MATERIAL TRANSPORTATION EQUIPMENT: Unit load concepts, Industrial trucks, Conveyors, cranes, hoists and Rail Guided Vehicles, Analysis of transportation equipment.

UNIT - III

AUTOMATED GUIDED VEHICLES: Introduction, classification of AGVS, vehicle guidance technology, vehicle management, AGVS applications, Analysis of AGVS, self-guided vehicles.

UNIT -IV

MATERIAL STORAGE EQUIPMENT: Storage system performance, location strategies, Manual storage equipment, carousel storage systems, automated storage and retrieval systems, Classification of AS/RS, Analysis of AS/RS, warehousing.

UNIT - V

IDENTIFICATION AND DATA CAPTURE SYSTEMS: Bar codes, RFID, Machine vision. Methods to minimize cost of material handling- Maintenance of Material Handling equipment, Safety in handling Ergonomics of Material Handling equipment. Design, Miscellaneous equipment.

TEXT BOOKS:

1. Materials Handling Handbook, by- Raymond A. Kulwiec, John Wiley & Sons, 2nd edition/2008.
2. Automation, production systems and computer integrated manufacturing/ Mikell. P.Groover/ PHI/ 3rd edition/2012.

REFERENCES

1. Apple, James. Materials Handling Systems Design. Ronald Press, 1972. [TS180.A66]
2. Allegri, Theodore. Materials Handling. Van Nostrand Reinhold, 1984.



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