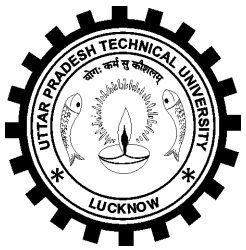
U.P. TECHNICAL UNIVERSITY
LUCKNOW



Syllabus

2nd Year, 3rd Year and 4th Year

[Effective from the session : 2009-10]

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

U.P.TECHNICAL UNIVERSITY, LUCKNOW

STUDY AND EVALUATION SCHEME

B-Tech. Electrical Engg./Electrical & Electronics Engineering

(EFFECTIVE FROM SESSION : 2009-10) **YEAR: 2nd SEMESTER-III**

Sl.No.	COURSE NO	SUBJECT	PERIOD			EVALUATION SCHEME				SUBJECT TOTAL	CREDIT
						SESSIONAL EVALUATION			EXAM ESE		
			L	T	P	CT	TA	TOTAL			
THEORY SUBJECTS											
1	EME-309	Thermal & Hydraulic Machines	3	1	0	30	20	50	100	150	4
2	EAS-301/-EOE031 - EOE038	Mathematics III/Science Based Open Elective	3	1	0	30	20	50	100	150	4
3	EHU-301/ EHU-302	Industrial Psychology/Industrial Sociology	2	0	0	15	10	25	50	75	2
4	EEE-301	Basic System Analysis	3	1	0	30	20	50	100	150	4
5	EEE-302	Electrical Meas.& Measuring Instruments	3	1	0	30	20	50	100	150	4
6	EEC-309	Analog & Digital Electronics	3	1	0	30	20	50	100	150	4
7	EHU-111	*Human Values & Professional Ethics	2	2	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	EEE-351	Numerical Techniques Lab	0	0	2	5	5	10	15	25	1
9	EEE-352	Electrical Measurement Lab	0	0	3	10	10	20	30	50	1
10	EEC-359	Electronics Lab	0	0	2	10	10	20	30	50	1
11	GP-301	General Proficiency Lab	-	-	-	-	-	50	-	50	1
		Total	**19**	**7**	**7**	**190**	**135**	**375**	**625**	**1000**	**26**

***** Human values & professional Ethics will be offered as compulsory Audit Course for which passing marks are 40% in theory & 50% in aggregate. Students will be required to audit it within the period of their study. There will not be carry over facility for this course and a failure student will be required to repeat this course.

Note: Numbers of departmental subjects/labs in any semester may vary as per requirement keeping subject total and credit total unchanged.

U.P.TECHNICAL UNIVERSITY, LUCKNOW

STUDY AND EVALUATION SCHEME

B-Tech. Electrical Engg./Electrical & Electronics Engineering

(EFFECTIVE FROM SESSION : 2009-10) **YEAR: 2nd SEMESTER-IV**

Sl.No.	COURSE NO	SUBJECT	PERIOD			EVALUATION SCHEME				SUBJECT TOTAL	CREDIT
						SESSIONAL EVALUATION			EXAM ESE		
			L	T	P	CT	TA	TOTAL			
THEORY SUBJECTS											
1	EHU-402/ EHU-401	Industrial Sociology/Industrial Psychology	2	0	0	15	10	25	50	75	2
2	EOE-041-EOE-048/ EAS-401	Science Based Open Elective/Mathematics III	3	1	0	30	20	50	100	150	4
3	EEE-401	Electromechanical Energy Conversion-I	3	1	0	30	20	50	100	150	4
4	EEE-402	Network Analysis and Synthesis	3	1	0	30	20	50	100	150	4
5	EEE-403	Electrical& Electronics Engineering Materials	2	1	0	15	10	25	50	75	3
6	EEE-404	Microprocessors	3	1	0	30	20	50	100	150	4
7	EHU-111	*Human Values & Professional Ethics	2	2	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	EEE-451	Electromechanical Energy Conversion-I Lab	0	0	3	10	10	20	30	50	1
9	EEE-452	Network Lab	0	0	2	10	10	20	30	50	1
10	EEE-453	Electrical Simulation Lab	0	0	2	10	10	20	30	50	1
11	EEE-454	Microprocessor Lab	0	0	2	10	10	20	30	50	1
12	GP-401	General Proficiency	-	-	-			50	-	50	1
		Total	**18**	**7**	**9**	**190**	**140**	**380**	**620**	**1000**	**26**

U.P.TECHNICAL UNIVERSITY, LUCKNOW
STUDY AND EVALUATION SCHEME
B-Tech. Electrical & Electronics Engineering

(EFFECTIVE FROM SESSION : 2010-11) **YEAR:3rd SEMESTER-V**

Sl.No.	COURSE NO	SUBJECT	PERIOD			EVALUATION SCHEME				SUBJECT TOTAL	CREDIT
						SESSIONAL EVALUATION			EXAM ESE		
			L	T	P	CT	TA	TOTAL			
THEORY SUBJECTS											
1	EHU-501	Engineering & Managerial Economics	3	0	0	30	20	50	100	150	3
2	EEC-508	Fundamentals of E.M. Theory	2	1	0	15	10	25	50	75	3
3	EEE-501	Electromechanical Energy Conversion-II	3	1	0	30	20	50	100	150	4
4	EEE-502	Control System	3	1	0	30	20	50	100	150	4
5	EEE-503	Elements of Power System	3	1	0	30	20	50	100	150	4
6	EEC- 509	Analog Integrated Electronics	3	1	0	30	20	50	100	150	4
7	EHU -111	*Human Values & Professional Ethics	2	2	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	EEE-551	Electromechanical Energy Conversion-II Lab	0	0	3	10	10	20	30	50	1
9	EEE-552	Control System Lab	0	0	2	10	10	20	30	50	1
10	EEC-559	Analog IC Lab	0	0	2	5	5	10	15	25	1
11	GP-501	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	**19**	**7**	**7**	**190**	**135**	**375**	**625**	**1000**	**26**

U.P.TECHNICAL UNIVERSITY, LUCKNOW

STUDY AND EVALUATION SCHEME

B-Tech. Electrical & Electronics Engineering

(EFFECTIVE FROM SESSION : 2010-11) **YEAR: 3rd SEMESTER-VI**

Sl.No.	COURSE NO	SUBJECT	PERIOD			EVALUATION SCHEME				SUBJECT TOTAL	CREDIT
						SESSIONAL EVALUATION			EXAM ESE		
			L	T	P	CT	TA	TOTAL			
THEORY SUBJECTS											
1	EHU-601	Industrial Management	3	0	0	30	20	50	100	150	3
2	EEE-011-EEE-014	Departmental Elective-I	3	1	0	30	20	50	100	150	4
3		Departmental Elective-II	2	1	0	15	10	25	50	75	3
4	EEE-601	Power System Analysis	3	1	0	30	20	50	100	150	4
5	EEE-602	Power Electronics	3	1	0	30	20	50	100	150	4
6	EEC-609	Analog & Digital Communication	3	1	0	30	20	50	100	150	4
7	EHU-111	*Human Values & Professional Ethics	2	2	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	EEE-651	Power Electronics Lab	0	0	3	10	10	20	30	50	2
9	EEC-659	Analog & Digital Communication Lab	0	0	2	10	10	20	30	50	1
10	EEE-652	Seminar	0	0	2	-	-	25	-	25	1
11	GP-601	General Proficiency	-	-	-	-	-	50	-	50	
		Total	**19**	**7**	**7**	**185**	**130**	**390**	**610**	**1000**	**26**

U.P.TECHNICAL UNIVERSITY, LUCKNOW

STUDY AND EVALUATION SCHEME

B-Tech. Electrical & Electronics Engineering

(EFFECTIVE FROM SESSION : 2011-12) **YEAR: 4th, SEMESTER-VII**

Sl. No.	COURSE NO	SUBJECT	PERIOD			EVALUATION SCHEME				SUBJECT TOTAL	CREDIT
						SESSIONAL EVALUATION			EXAM ESE		
			L	T	P	CT	TA	TOTAL			
THEORY SUBJECTS											
1	EOE-071 EOE-074	Open Elective-I	3	1	0	30	20	50	100	150	4
2	EEE-031 EEE-034	Departmental Elective-III	3	1	0	30	20	50	100	150	4
3		Departmental Elective-IV	3	1	0	30	20	50	100	150	4
4	EEE-701	Switch Gear & Protection	3	1	0	30	20	50	100	150	4
5	EEN-701/ EEE-504	Electrical Instrumentation & Process Control	3	1	0	30	20	50	100	150	4
6	EHU-111	*Human Values & Professional Ethics	2	2	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
7	EEE-751	Power System Lab	0	0	3	10	10	20	30	50	1
8	EEN-751/ EEE-553	Electrical Instrumentation Lab	0	0	2	10	10	20	30	50	1
9	EEN-753	Project	0	0	3	-	50	50	-	50	2
10	EEN-754	Industrial Training	0	0	2	-	-	50	-	50	1
11	GP-701	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	**15**	**7**	**10**	**170**	**170**	**440**	**560**	**1000**	**26**

U.P.TECHNICAL UNIVERSITY, LUCKNOW

STUDY AND EVALUATION SCHEME

B-Tech. Electrical & Electronics Engineering

(EFFECTIVE FROM SESSION : 2011-12) **YEAR: 4th SEMESTER-VIII**

Sl.No.	COURSE NO	SUBJECT	PERIOD			EVALUATION SCHEME				SUBJECT TOTAL	CREDIT
						SESSIONAL EVALUATION			EXAM ESE		
			L	T	P	CT	TA	TOTAL			
THEORY SUBJECTS											
1	EOE-081 EOE-084	Open Elective-II	3	1	0	30	20	50	100	150	4
2	EEE-051 EEE-054	Departmental Elective-V	3	1	0	30	20	50	100	150	4
3		Departmental Elective-VI	3	1	0	30	20	50	100	150	4
4	EEC-809	Data Communication Networks	3	0	0	30	20	50	100	150	3
5	EHU-111	*Human Values & Professional Ethics	2	2	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
6	EEN-801	Project	0	0	12	-	100	100	250	350	8
7	GP-801	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	**12**	**5**	**12**	**120**	**180**	**350**	**650**	**1000**	**24**

DEPARTMENTAL ELECTIVES

ELECTIVE – I

Course No.	Sl. No	Subject
ECS-019	1	Data Base Management System, Data Mining and Warehousing
EEE-011	2	Digital Control System
EEN-011	3	Fundamental of Digital Signal Processing.
EEE-012	4	Special Electrical Machines

ELECTIVE – II

Course No.	Sl. No	Subject
EEC-027	1	VLSI Design
EEC-028	2	Wireless Communication
EEC-029	3	Antena & Wave Propogation
EEN-021	4	Mechatronics

ELECTIVE – III

Course No.	Sl. No	Subject
ECS-039	1	Object Oriented Systems and C^{++}
EEE-031	2	Power System Operation & Control
EEE-032	3	Advanced Microprocess and Microcontroller
EEE-033	4	Electric Drives

ELECTIVE – IV

Course No.	Sl. No	Subject
EEC-046	1	Telemetry & Data Transmission
EEC-047	2	Embedded System
EEC-048	3	Digital System Design Using VHDL
EEC-049	4	Optical Fibre Communication

ELECTIVE – V

Course No.	Sl. No	Subject
EEE-051	1	Bio Instrumentation
EEE-052	2	Advanced Control System
EEE-053	3	Reliability Engineering
EEE-054	4	Energy Efficiency & Conservation

ELECTIVE – VI

Course No.	Sl. No	Subject
EEC-066	1	Microwave & Radar
EEC-067	2	Speech Processing
EEC-068	3	Image Processing
EEC-069	4	Satellite Communication

SCIENCE BASED OPEN ELECTIVE

EOE-031 / EOE-041	Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)
EOE-032 / EOE-042	Nano Sciences
EOE-033 / EOE-043	Laser Systems and Applications
EOE-034 / EOE-044	Space Sciences
EOE-035 / EOE-045	Polymer Science & Technology
EOE-036 /EOE-046	Nuclear Science
EOE-037 / EOE-047	Material Science
EOE-038 / EOE-048	Discrete Mathematics
OPEN ELECTIVE-I	
EOE -071	Entrepreneurship Development
EOE-072	Quality Management
EOE-073	Operations Research
EOE-074	Introduction to Biotechnology
OPEN ELECTIVE-II	
EOE-081	Non Conventional Energy Resources
EOE-082	Nonlinear Dynamic Systems
EOE-083	Product Development
EOE-084	Automation & Robotics

EME-309 : THERMAL AND HYDRAULIC MACHINES

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UNIT-I

Thermodynamic equilibrium, cyclic process, enthalpy, Zero, first and second laws of thermo-dynamics, carnot cycle, concept of entropy, properties of steam, processes involving steam in closed and open systems, Enthalpy.

Vapour Pressure Cycles:

Rankine cycle, reheat cycle, Regenerative cycle

UNIT-II

Steam Turbine:

Classification, impulse and reaction turbines their velocity diagrams and related calculations, work-done and efficiencies, re-heat factor, staging, bleeding and governing of turbines.

Gas Turbine:

Classification, Brayton cycle, working principle of gas turbine, gas turbine cycle with intercooling, reheat and regeneration, stage and polytrophic efficiencies.

UNIT-III

Compressors:

Classification, single and multistage reciprocating compressors, isothermal and volumetric efficiencies, centrifugal and axial flow compressors, surging, choking and stalling.

I.C. Engines:

Otto, Diesel . and Dual cycles, introduction to 2-stroke and 4-stroke SI and CI engines, indicator diagram and power measurement.

UNIT-IV

Impact of Jet:

Introduction to hydrodynamic thrust of jet on a fixed and moving surface (flat and curve), effect of inclination of jet with the surface.

Hydraulic Turbines:

Classification, heads and efficiencies, construction, working, work done and efficiency of impulse and reaction turbines.

UNIT-V

Centrifugal Pump::

Classification, construction, working, work-done, efficiencies, cavitation and priming; jet pump

Reciprocating Pump:

Classification,construction, working, work-done, slip and coefficient of discharge.

Text Books:

1. Onkar Singh “Applied Thermodynamics” New Age International, 2006
2. R.K.Rajput “ A Text Book of Hydraulic Machines” S. Chand & Co.,2008.

Reference Books:

3. P.L.Ballany “Thermal Engineering “ Khanna Publishers, 2003
4. R.K.Bansal “A Text Book of Fluid Mechanics and Hydraulic Machines” Laxmi Publications, 2006.

EAS-301/EAS-401: MATHEMATICS –III

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Unit – I : Function of Complex variable
Analytic function, C-R equations, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic function, Taylor's and Laurent's series, singularities, Residue theorem, Evaluation of real integrals of the type $\int_0^{2\pi} f(Cos\,\theta, Sin\,\theta)\,d\theta$ and $\int_{-\infty}^{+\infty} f(x)\,dx$ **10**

Unit – II : Statistical Techniques - I
Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non –linear and multiple regression analysis, Probability theory. **08**

Unit – III : Statistical Techniques - II
Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations: Chi-square test, t-test, Analysis of variance (one way) , Application to engineering, medicine, agriculture etc.
Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, $\bar{X}$, R, p, np, and c charts. **08**

Unit – IV : Numerical Techniques – I
Zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods.
Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation , Lagrange's and Newton's divided difference formula for unequal intervals. **08**

Unit – V : Numerical Techniques –II
Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration , Trapezoidal , Simpson's one third and three-eight rules, Solution of ordinary differential (first order, second order and simultaneous) equations by Euler's, Picard's and forth-order Runge-Kutta mehthods. **08**

Test Books :-

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
2. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi , 2003.
3. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd.,2000

Reference Books :-

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House, 2002.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. E. Kreysig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
5. Devi Prasad, An introduction to Numerical Analysis, Narosa Publication house, New Delhi 2006.
6. T. Veerajan & T. Ramchandrandran, Theory & Problems in Numerical Methods, TMH, New Delhi, 2004.
7. S.P.Gupta, Statistical Methods, Sultan and Sons, New Delhi, 2004.
8. Devore, Probability and Statistics, Thomson(Cengage) Learning, 2007.
9. Walpole, Myers, Myers & Ye, Probability and Statistics for Engineers & Scientists, Pearson Education, 2003.

EEE-301: BASIC SYSTEM ANALYSIS

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UNIT I

Introduction to continuous time signals and systems: Basic continuous time signals, unit step, unit ramp, unit impulse and periodic signals with their mathematical representation and characteristics. Introduction to various types of systems.

Analogous System: Linear mechanical elements, force-voltage and force-current analogy, modeling of mechanical and electro-mechanical systems: Analysis of first and second order linear systems by classical method. **(9)**

UNIT II

Fourier Transform Analysis : Exponential form and Trigonometric form of Fourier series, Fourier symmetry, Fourier Integral and Fourier Transform. Transform of common functions and periodic wave forms: Applications of Fourier Transform to network analysis. **(8)**

UNIT III

Laplace Transform Analysis : Review of Laplace Transform , Laplace Transform of periodic functions, Initial and Final Value Theorems, Inverse Laplace Transform , Convolution Theorem, Superposition Integral , Application of Laplace Transform to analysis of networks, waveform synthesis and Laplace Transform of complex waveforms. **(8)**

UNIT IV

State – Variable analysis : Introduction, State Space representation of linear systems, Transfer Function and state Variables , State Transition Matrix, Solution of state equations for homogeneous and non-homogeneous systems , Applications of State-Variable technique to the analysis of linear systems **(8)**

UNIT V

Z-Transform Analysis : Concept of Z-Transform, Z-Transform of common functions, Inverse Z-Transform, Initial and Final Value theorems , Applications to solution of difference equations, Pulse Transfer Function. **(7)**

Text Books:

1. David K.Cheng; "Analysis of Linear System", Narosa Publishing Co.
2. ME Van-Valkenberg; " Network Analysis", Prentice Hall of India
3. C.L.Wadhwa, "Network Analysis and Synthesis", New Age International Publishers,2007.
4. Samarajit Ghosh, "Network Theory: Analysis and Synthesis" Prentice Hall of India, 2008

Reference Books:

5. Choudhary D.Roy, "Network & Systems", Wiley Eastern Ltd.
6. Donald E.Scott, "Introduction to circuit Analysis" Mc. Graw Hill
7. B.P. Lathi, "Linear Systems & Signals" Oxford University Press, 2008.
8. I.J. Nagrath, S.N. Saran, R. Ranjan and S.Kumar, "Singnals and Systems, "Tata Mc. Graw Hill, 2001.
9. Taan S. Elali & Mohd. A. Karim, "Continuous Signals and Systems with MATLAB" 2nd Edition, CRC Press.

EEE-302: ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

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UNIT I:–

(1) Philosophy Of Measurement: Methods of Measurement, Measurement System**,** Classification of instrument system, Characteristics of instruments & measurement system**,** Errors in measurement & its analysis, Standards. **(3)**

(2) Analog Measurement of Electrical Quantities : Electrodynamic ,Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters , Electrodynamic Wattmeter, Three Phase Wattmeter, Power in three phase system , errors & remedies in wattmeter and energy meter. **(5)**

UNIT II:

Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed , frequency and power factor. **(6)**

UNIT III:

Measurement of Parameters: Different methods of measuring low, medium and high resistances**,** measurement of inductance & capacitance with the help of AC Bridges, Q Meter. **(7)**

UNIT IV:

(1) AC Potentiometer: Polar type & Co-ordinate type AC potentiometers , application of AC Potentiometers in electrical measurement **(3)**

(2) Magnetic Measurement: Ballistic Galvanometer , **f**lux meter **,** determination of hysteresis loop, measurement of iron losses**.** **(4)**

UNIT V:

(1) Digital Measurement of Electrical Quantities: Concept of digital measurement, block diagram Study of digital voltmeter, frequency meter Power Analyzer and Harmonics Analyzer; Electronic Multimeter.

(2)Cathode Ray Oscilloscope : Basic CRO circuit (Block Diagram),Cathode ray tube (CRT) & its components **, a**pplication of CRO in measurement ,Lissajous Pattern.; Dual Trace & Dual Beam Oscilloscopes. **(3)**

Text Book:

1. E.W. Golding & F.C. Widdis, “Electrical Measurement &Measuring Instrument”, A.W. Wheeler& Co. Pvt. Ltd. India.
2. A.K. Sawhney,“Electrical & Electronic Measurement & Instrument”, Dhanpat Rai & Sons , India .

Reference Books:

3. Forest K. Harries,“Electrical Measurement”,Willey Eastern Pvt. Ltd. India .
4. M.B. Stout ,“Basic Electrical Measurement” Prentice hall of India,India.
5. W.D.Cooper,” Electronic Instrument & Measurement Technique “ Prentice Hall International.
6. Rajendra Prashad ,“Electrical Measurement &Measuring Instrument” Khanna Publisher.
7. J.B. Gupta, “Electrical Measurements and Measuring Instruments”, S.K. Kataria & Sons.

EEC-309 : ANALOG AND DIGITAL ELECTRONICS

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ANALOG ELECTRONICS:

UNIT-I:

Special Diodes-

LED, Varactor diode, Photo diode, Schottky diode, Tunnel diode; their characteristics and applications.

Transistors as a switch.

UNIT-II

Frequency Response:

Amplifier transfer function, low and high frequency response of common emitter and common source amplifiers.

Feedback:

General feedback structure; properties of negative feedback; series-series, series-shunt, shunt-series and shunt-shunt feedback amplifiers.

UNIT-III:

Basic principle of sinusoidal oscillator, R-C Phase Shift and Wein Bridge oscillators, tuned oscillators- Collpits and Hartley; Crystal oscillator

DIGITAL ELECTRONICS:

UNIT-IV

Combinational Logic Circuits: Multiplexers/Demultiplexures, Encoders/Decoders.

Sequential Logic Circuits: latches, flip-flops- S-R, T, D, J-K.

Shift Registers: Basic principle, serial and parallel data transfer, shift left/right registers, universal shift register.

Counters: Mode N Counters, ripple counters, synchronous counters, ring/Johnson counters.

UNIT-V

OP-AMP applications - Astable, Monostable and Bistable multivibrators, Schmitt trigger, IC-555 Timer, A/D and D/A converters.

Voltage Regulators: Series, shunt and switching regulators, op-amp based configurations.

Memories: Introduction to ROM, RAM; Sequential Memory, Memory organization.

Text Books:

1. A.S. Sedra and K.C. Smith “Microelectronics Circuits” Oxford University Press (India)
2. Malvino & Leach, “Digital Principles and applications” Tata Mc. Graw Hill
3. R.A. Gayakwad “Op amps and Linear Integrated Circuits” Prentice Hall of India.
4. Balbir Kumar and Shail B.Jain, “Electronic Devices and Circuits” Prentice Hall of India,2007

Reference Books:

1. Taub & Schilling “Digital Electronics”- Tata Mc Graw Hill
2. Anil K. Maini, “Digital Electronics: Principles and Integrated circuits” Wiley India Ltd, 2008.
3. Millman, J. and Grabel A, “Microelectronics” Mc Graw Hill
4. Anand Kumar, “Switching Theory and Logic Design” Prentice Hall of India, 2008.
5. Aloke. K. Dutta, “Semiconductor Devices and circuits”, Oxford University Press, 2008.

EEE-351: NUMERICAL TECHNIQUE LAB

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0	0	2

Note: Minimum seven experiments out of the following list:

MATLAB Based Experiments

1. Solution of linear equations for under damped and over damped cases.
2. Determination of eigen values and eigenvectors of a square matrix.
3. Determination of roots of a polynomial.
4. Determination of polynomial using method of least square curve fitting.
5. Determination of polynomial fit, analyzing residuals, exponential fit and error bounds from the given data.
6. Solution of differential equations using 4^{th} order Runge-Kutta method.
7. Solution of differential equation using revised Euler method.
8. Solution of difference equations.
9. Determination of time response of an R-L-C circuit.
10. College may add any three experiments in the above list.

Text/Reference Books:

1. Almos Gilat, "MATLAB: An Introduction with Applications" Wiley India Ltd., 2004.

2. R.P. Singh, "Getting Started with MATLAB" Oxford University Press.

EEE-352: ELECTRICAL MEASUREMENT LAB

L	T	P
0	0	3

Note: Minimum of nine experiments from the following:

1. Calibration of ac voltmeter and ac ammeter
2. Measurement of form factor of a rectified sine wave and determine source of error if r.m.s.value is measured by a multi-meter
3. Measurement of phase difference and frequency of a sinusoidal ac voltage using C.R.O.
4. Measurement of power and power factor of a single phase inductive load and to study effect of capacitance connected across the load on the power factor
5. Measurement of low resistance by Kelvin's double bridge
6. Measurement of voltage, current and resistance using dc potentiometer
7. Measurement of inductance by Maxwell's bridge
8. Measurement of inductance by Hay's bridge
9. Measurement of inductance by Anderson's bridge
10. Measurement of capacitance by Owen's bridge
11. Measurement of capacitance by De Sauty bridge
12. Measurement of capacitance by Schering bridge
13. Study of Frequency and differential time counter
14. College may add any two experiments in the above list

EEC-359 : ELECTRONICS LAB

L	T	P
0	0	2

ANALOG ELECTRONICS:

Note: Select at least any five out of the following:

1. To Plot V-I characteristics of junction diode and zener diode.
2. To draw wave shape of the electrical signal at input and output points of the half wave, full wave and bridge rectifiers.
3. To Plot input / output characteristics for common base transistor.
4. To Plot input /output characteristics of FET and determine FET parameters at a given operating point.
5. To determine voltage gain, current gain, input impedance and output impedance of common emitter amplifier.
6. To determine voltage gain, current gain, input impedance and output impedance and frequency response of R-C coupled common emitter amplifier.
7. To design R-C Phase shift / Wein Bridge oscillator and verify experimentally the frequency of oscillation.
8. To study transistor as a switch and determine load voltage and load current when the transistor is ON.

ANALOG IC & DIGITAL ELECTRONICS:

Note: Select at least any five out of the following:

9. To study application of Operational Amplifier as summer integrator and voltage comporator
10. To study operation of Op-Amp based astable and monostable multivibrators.
11. To study operation IC 555 based astable and monostable multibrators.
12. To study operation of (a) multiplexer using IC 74150 (b) demultiplexer using IC 74138.
13. To study operation of Adder / Subtractor using 4 bit / 8 bit IC 7483.
14. To study operation of (a) J K Master – slave flip – flop using IC 7476 (b) Modulo N counter using programmable counter IC74190.
15. To verify experimentally output of A/D and D/A converters.
16. To study regulation of unregulated power supply using IC 7805/7812 voltage regulator and measure the load and line regulations

EEE – 401: ELECTRO-MECHANICAL ENERGY CONVERSION –I

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Unit – I

Principles of Electro-mechanical Energy Conversion - Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems(defining energy & Co-energy) , Singly Excited Systems; determination of mechanical force, mechanical energy, torque equation , Doubly excited Systems; Energy stored in magnetic field, electromagnetic torque , Generated emf in machines; torque in machines with cylindrical air gap . (7)

Unit – 2

D.C. Machines:- Construction of DC Machines, Armature winding, Emf and torque equation , Armature Reaction ,Commutation , Interpoles and Compensating Windings, Performance Characteristics of D.C. generators. (9)

Unit –3

D.C. Machines (Contd.):- Performance Characteristics of D.C. motors ,Starting of D.C. motors ; 3 point and 4 point starters , Speed control of D.C. motors: Field Control , armature control and Voltage Control (Ward Lenonard method); Efficiency and Testing of D.C. machines (Hopkinson's and Swinburn's Test). (8)

Unit –4.

Single Phase Transformer: Phasor diagram, efficiency and voltage regulation, all day efficiency.

Testing of Transformers: O.C. and S.C. tests, Sumpner;s test, polarity test.

Auto Transformer: Single phase and three phase auto transformers, volt-amp, relation, efficiency, merits & demerits and applications.

Unit –5

Three Phase Transformers: Construction, three phase transformer phasor groups and their connections, open delta connection, three phase to 2 phase, 6 phase or 12 phase connections, and their applications, parallel operation and load sharing of single phase and three phase transformers, excitation phenomenon and harmonics in transformers, three winding transformers.

Text Books:

1 I.J. Nagrath & D.P.Kothari," Electrical Machines", Tata McGraw Hill

2 Husain Ashfaq ," Electrical Machines", Dhanpat Rai & Sons

3 A.E. Fitggerald, C.Kingsley Jr and Umans,"Electric Machinery" 6th Edition McGraw Hill, International Student Edition.

4 B.R. Gupta & Vandana Singhal, "Fundamentals of Electrical Machines, New Age International.

Reference Books:

5 Irving L.Kosow, "Electric Machine and Tranformers", Prentice Hall of India.

6 M.G. Say, "The Performance and Design of AC machines", Pit man & Sons.

7 Bhag S. Guru and Huseyin R. Hizirogulu, "Electric Machinery and Transformers" Oxford University Press, 2001.

EEE- 402:NETWORK ANALYSIS AND SYNTHESIS

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3	1	0

Unit – I:

Graph Theory : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Nodal methods of analysis. (7)

Unit – II:

Network Theorems (Applications to ac networks): Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem. (8)

Unit – III :

Network Functions :

Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot. (8)

Unit – IV :

Two Port Networks:

Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & ∏ Representation. (8)

Unit – V :

(a) Network Synthesis :

Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

(b) Filters:

Image parameters and characteristics impedance, passive and active filter fundamentals, low pass, highpass, (constant K type) filters, and introduction to active filters. (9)

Text Books:

1 M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India

2 A.Chakrabarti, "Circuit Theory" Dhanpat Rai & Co.

3 C.L Wadhwa, "Network Analysis and Synthesis" New Age International Publishers, 2007.

4 D.Roy Choudhary, "Networks and Systems" Wiley Eastern Ltd.

5 Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill

Reference Books:

6 M.E. Van Valkenburg, "An Introduction to Modern Network Synthesis",Wiley Eastern Ltd.

7 N.C. Jagan and C. Lakshminarayana, "Newwork Analysis" B.S. Publications, 2008.

8 K.S. Suresh Kumar, "Electric Circuits and Networks" Pearson Education, 2009.

9 A Ramakalyan, "Linear Circuits: Analysis and Synthesis" Oxford University Press, 2005.

EEE-403: ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

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2	1	0

UNIT – I

1 Crystal Structure of Materials:

A. Bonds in solids, crystal structure, co-ordination number, atomic packing factor, Miller Indices, Bragg's law and x-ray diffraction, structural Imperfections, crystal growth

B. Energy bands in solids, classification of materials using energy band. (6)

UNIT – II

2 Conductivity of Metals:

Electron theory of metals, factors affecting electrical resistance of materials, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, superconductivity and super conducting materials, Properties and applications of electrical conducting and insulating materials, mechanical properties of metals (7)

UNIT – III

3 Mechanism of Conduction in semiconductor materials:

Types of semiconductors, current carriers in semiconductors, Half effect, Drift and Diffusion currents, continuity equation, P-N junction diode, junction transistor, FET & IGFET, properties of semi-conducting materials. (6)

UNIT – IV

4 Magnetic Properties of Material:

Origin of permanent magnetic dipoles in matters, Classification Diamagnetism, Paramagnetism, Ferromagnetism,AntiferromagnetismandFerrimagnetism, magnetostriction, properties of magnetic materials, soft and hard magnetic materials, permanent magnetic materials. (7)

Text Books :

1 A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India
2 R.K. Rajput," Electrical Engg. Materials," Laxmi Publications.
3 C.S. Indulkar & S.Triruvagdan "An Introduction to Electrical Engg. Materials, S.Chand & Co.

References :

4 Solymar, "Electrical Properties of Materials" Oxford University Press.
5. Ian P. Hones," Material Science for Electrical and Electronic Engineering," Oxford University Press.
8 G.P. Chhalotra & B.K. Bhat, "Electrical Engineering Materials" Khanna Publishers.
9 T. K. Basak, "Electrical Engineering Materials" New age International.

EEE-404: MICROPROCESSORS

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3 1 0

UNIT-I:

Introduction to Digital Computer and Microprocessor:

Digital Computers: General architecture and brief description of elements, instruction execution, instruction format, and instruction set, addressing modes, programming system, higher lever languages.

Buses and CPU Timings: Bus size and signals, machine cycle timing diagram, instruction timing, processor timing.

Microprocessor and Microprocessor Development Systems: Evolution of Microprocessor, Microprocessor architecture and its operations, memory, inputs-outputs (I/Os), data transfer schemes interfacing devices, architecture advancements of microprocessors, typical microprocessor development system.

UNIT-II:

8-bit Microprocessors.

8085 microprocessor: pin configuration, internal architecture.

Timing & Signals: control and status, interrupt: ALU, machine cycles,

Instruction Set of 8085:

Addressing Modes: Register addressing, direct addressing; register indirect addressing, immediate addressing, and implicit addressing.

Instruction format, op-codes, mnemonics, no. of bytes, RTL, variants, no. of machine cycles and T states, addressing modes.

Instruction Classification: Data transfer, arithmetic operations, logical operations, branching operation, machine control; Writing assembly Language programs, Assember directives.

UNIT-III:

16-bit Microprocessors:

Architecture:

Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation,

Operating Modes

Instruction Set of 8086

Addressing Modes**:** Instruction format:

Discussion on instruction Set: Groups: data transfer, arithmetic , logic string, branch control transfer, processor control.

Interrupts: Hardware and software interrupts, responses and types.

UNIT-IV

Fundamental of Programming: development of algorithms, flowcharts in terms of structures,(series, parallel, if-then-else etc.)

Assembler Level Programming: memory space allocation (mother board and user program) Assembler level programs (ASMs)

UNIT-V

Peripheral Interfacing:

I/O programming: Programmed I/O, Interrupt Driven I/O, DMA I/O interface: serial and parallel communication, memory I/O mapped I/Os. Peripheral Devices: 8237 DMA controller, 8255-Programmable peripheral interface, 8253/8254 Programmable timer/counter.
8259 programmable Interrupt Controller.

Text Books:

1. Gaonkar, Ramesh S, "Microprocessor Architecture, programming and applications with the 8085" Pen ram International Publishing 5th Ed.
2. Uffenbeck, John, "Microcomputers and Microprocessors" PHI/ 3rd Edition.
3. Ray, A.K. & Burchandi, K.M., "Advanced Microprocessors and Peripherals: Architecture, Programaming and Interfacing" Tata Mc. Graw Hill.
4. Krishna Kant, "Microprocessors and Microcontrollers" PHI Learning.

Reference Books:

5. Brey, Barry B. "INTEL Microprocessors" Prentice Hall (India)
6. ADitya P Mathur, "Introduction to Microprocessor" Tata Mc Graw Hill
7. M. Rafiquzzaman, "Microprocessors- Theory and applications" PHI
8. B. Ram, "Advanced Microprocessor & Interfacing" Tata McGraw Hill
9. Renu Singh & B.P.Singh, "Microprocessor and Interfacing and applications" New Age International
10. Hall D.V., "Microprocessors Interfacing" Tata Mc Graw Hill
11. Liu and Gibson G.A., "Microcomputer Systems: The 8086/8088 Family" Prentice Hall (India)

EEE-451: ELECTROMECHANICAL ENERGY CONVERSION- I LAB

L	T	P
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Note : Minimum eight experiments are to be performed from the following list :

1 To obtain magnetization characteristics of a d.c. shunt generator
2 To obtain load characteristics of a d.c. shunt generator and compound generator (a) Cumulatively compounded (b) Differentially compounded
3 To obtain efficiency of a dc shunt machine using Swinburn's test
4 To perform Hopkinson's test and determine losses and efficiency of DC machine
5 To obtain speed-torque characteristics of a dc shunt motor
6 To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control
7 To obtain speed control of dc separately excited motor using Conventional Ward-Leonard/ Static Ward –Leonard method.
8 To study polarity and ratio test of single phase and 3-phase transformers
9 To obtain equivalent circuit, efficiency and voltage regulation of a single phase transformer using C.C. and S.C. tests.
10 To obtain efficiency and voltage regulation of a single phase transformer by Sumpner's test.

11 To obtain 3-phase to 2-phase conversion by Scott connection.
12 To determine excitation phenomenon (B.H. loop) of single phase transformer using C.R.O.

EEE-452: NETWORK LABORATORY

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Note: Minimum eight experiments are to be performed from the following list.

1. Verification of principle of superposition with dc and ac sources.
2. Verification of Thevenin, Norton and Maximum power transfer theorems in ac circuits
3. Verification of Tellegin's theorem for two networks of the same topology
4. Determination of transient response of current in RL and RC circuits with step voltage input
5. Determination of transient response of current in RLC circuit with step voltage input for underdamp, critically damp and overdamp cases
6. Determination of frequency response of current in RLC circuit with sinusoidal ac input
7. Determination of z and h parameters (dc only) for a network and computation of Y and ABCD parameters
8. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values
9. Determination of image impedance and characteristic impedance of T and ∏ networks, using O.C. and S.C. tests Write Demo for the following (in Ms-Power point)
10. Verification of parameter properties in inter-connected two port networks : series, parallel and cascade also study loading effect in cascade.
11. Determination of frequency response of a Twin – T notch filter.
12. To determine attenuation characteristics of a low pass / high pass active filters.
13. to 15 College may add any three experiments in the above list.

EEE-453: ELECTRICAL SIMULATION LAB
(List of Experiments (PSPICE based)

L	T	P
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Note: Select any 10 out of the following:

1. Study of various commands of PSPICE.
2. To determine node voltages and branch currents in a resistive network.
3. To obtain Thevenin's equivalent circuit of a resistive network.
4. To obtain transient response of a series R-L-C circuit for step voltage input.
5. To obtain transient response of a parallel R-L-C circuit for step current input.
6. To obtain transient response of a series R-L-C circuit for alternating square voltage waveform.
7. To obtain frequency response of a series R-L-C circuit for sinusoidal voltage input.
8. To determine line and load currents in a three phase delta circuit connected to a 3-phase balanced ac supply.
9. To plot magnitude, phase and step response of a network function.
10. To determine z,y,g,h and transmission parameters of a two part network.
11. To obtain transient response of output voltage in a single phase half wave rectifier circuit using capacitance filter.
12. To obtain output characteristics of CE NPN transistor.

13. To obtain frequency response of a R-C coupled CE amplifier.
14. To obtain frequency response of an op-Amp integrator circuit.
15. To verify truth tables of NOT, ANDor OR gates implemented by NAND gates by plotting their digital input and output signals.

Reference Books:

1. Irvine, Calif, "PSPICE Manual" Microsim Corporation, 1992.
2. Paul W. Tuinenga, "SPICE : A guide to circuit Simulation and Analysis Using PSPICE", Prentice Hall, 1992.
3. M.H. Rashid, "SPICE for Circuits and Electronics Using PSPICE" Prentice Hall of India, 2000.

EEE-454: MICROPROCESSOR LABORATORY

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A. Study Experiments

1. To study 8085 based microprocessor system
2. To study 8086 and 8086A based microprocessor system
3. To study Pentium Processor

B. Programming based Experiments (any four)

4. To develop and run a program for finding out the largest/smallest number from a given set of numbers.
5. To develop and run a program for arranging in ascending/descending order of a set of numbers
6. To perform multiplication/division of given numbers
7. To perform conversion of temperature from ^{0}F to ^{0}C and vice-versa
8. To perform computation of square root of a given number
9. To perform floating point mathematical operations (addition, subtraction, multiplication and division)

C. Interfacing based Experiments (any four)

10. To obtain interfacing of RAM chip to 8085/8086 based system
11. To obtain interfacing of keyboard controller
12. To obtain interfacing of DMA controller
13. To obtain interfacing of PPI
14. To obtain interfacing of UART/USART
15. To perform microprocessor based stepper motor operation through 8085 kit
16. To perform microprocessor based traffic light control
17. To perform microprocessor based temperature control of hot water.

YEAR III

EEC-508 : FUNDAMENTALS OF E.M.THEORY

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Unit I
Review of Vector analysis, Rectangular, Cylindrical and Spherical coordinates and their transformation, divergence, gradient and cvrl in different coordinate systems, Electric field intensity, Electric Flux density, Energy and potential.

Unit-II
Current and conductors, Dielectrics and capacitance, Poisson's and Laplace's equations.

Unit-III
Steady magnetic field, magnetic forces, materials and inductance, Time varying field and Maxwell's equation.

Unit-IV
Uniform Plane waves, Plane wave reflection and dispersion

Text Books:
1. Mayt, W.H. and Buck, J.A., "Engineering Electromagnetic" Tata Mc.Graw Hill Publishing

Reference Books:
1. Jordan E.C. and Balmain K.G., "Electromagnetic Wave and radiating Systems" Prentice Hall International , 2nd Edition.
2. Kraus, F. "Electromagnetic" Tata Mc. Graw Hill 5th Edition

Ramo S, Whinnery T.R. and Vanduzer T, "Field and Waves in Communication Electronics" John Wiely and Sons 3rd Edition

EEE-501: ELECTRO-MECHANICAL ENERGY CONVERSION - II

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UNIT-I

Synchronous Machine I
Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage Regulation using Synchronous Impedance Method, MMF Method, Potier's Triangle Method, Parallel Operation of synchronous generators, operation on infinite bus, synchronizing power and torque co-efficient

UNIT-II

Synchronous Machine II:
Two Reaction Theory, Power flow equations of cylindrical and salient pole machines, operating characteristics

Synchronous Motor:
Starting methods, Effect of varying field current at different loads, V- Curves, Hunting & damping, synchronous condenser

UNIT-III:

Three phase Induction Machine – I
Constructional features, Rotating magnetic field, Principle of operation Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, Induction generator & its applications.

UNIT-IV

Three phase Induction Machine- II

Starting, Deep bar and double cage rotors, Cogging & Crawling, Speed Control (with and without emf injection in rotor circuit.)

UNIT-V

Single phase Induction Motor:

Double revolving field theory, Equivalent circuit, No load and blocked rotor tests,
Starting methods, repulsion motor

AC Commutator Motors:

Universal motor, Single phase a.c. series compensated motor, stepper motors

Text Books:

1. D.P.Kothari & I.J.Nagrath, "Electric Machines", Tata Mc Graw Hill
2. Ashfaq Hussain"Electric Machines" Dhanpat Rai & Company
3. Fitzerald,A.E.,Kingsley and S.D.Umans"Electric Machinery", MC Graw Hill.

Reference Books:

4. P.S.Bimbhra, "Electrical Machinery", Khanna Publisher
5. P.S. Bimbhra, " Generalized Theory of Electrical Machines", Khanna Publishers
6. M.G.Say, "Alternating Current Machines",Pitman & Sons

EEE-502: CONTROL SYSTEM

L	T	P
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Unit-I

The Control System:

Open loop & closed control; servomechanism, Physical examples. Transfer functions, Block diagram algebra, Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback

Unit-II

Time Response analysis:

Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants

Design specifications of second order systems: Derivative error, derivative output, integral error and PID compensations, design considerations for higher order systems, performance indices

Unit-III

Control System Components:

Constructional and working concept of ac servomotor, synchros and stepper motor

Stability and Algebraic Criteria concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations.

Root Locus Technique:

The root locus concepts, construction of root loci

Unit-IV

Frequency response Analysis: Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots

Stability in Frequency Domain:

Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles

Unit-V

Introduction to Design:

The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain**.**
Review of state variable technique:
Review of state variable technique, conversion of state variable model to transfer function model and vice-versa, diagonalization, Controllability and observability and their testing.

Text Book:

1. Nagrath & Gopal, "Control System Engineering", 4th Edition, New age International.
2. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
3. B.C. Kuo & Farid Golnaraghi, "Automatic Control System" Wiley IndiaLtd, 2008.
4. D.Roy Choudhary, "Modern Control Engineering", Prentice Hall of India.

Reference Books:

5. Norman S. Mise, Control System Engineering 4th edition, Wiley Publishing Co.
6. Ajit K Mandal, "Introduction to Control Engineering" New Age International,2006.
7. R.T. Stefani, B.Shahian, C.J.Savant and G.H. Hostetter, " Design of Feedback Control Systems" Oxford University Press.
8. N.C. Jagan, " Control Systems", B.S. Publications,2007.

EEE-503: ELEMENTS OF POWER SYSTEM

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Unit-I

Power System Components:
Single line Diagram of Power system,
Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator

Supply System
Different kinds of supply system and their comparison, choice of transmission voltage

Transmission Lines:
Configurations, types of conductors, resistance of line, skin effect, Kelvin's law.Proximity effect

Unit-II

Over Head Transmission Lines
Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines,
Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading

Unit-III

Corona and Interference:
Phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference.
Electrostatic and electromagnetic interference with communication lines

Overhead line Insulators:
Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency

Unit-IV

Mechanical Design of transmission line:
Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers

Insulated cables:
Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables

Unit-V

Neutral grounding:
Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices

Electrical Design of Transmission Line:
Design consideration of EHV transmission lines, choice of voltage, number of circuits, conductor configuration, insulation design, selection of ground wires.

EHV AC and HVDC Transmission:
Introduction to EHV AC and HVDC transmission and their comparison, use of bundle conductors, kinds of DC links, and incorporation of HVDC into AC system

Text Books

1. W. D. Stevenson, "Element of Power System Analysis", McGraw Hill,
2. C. L. Wadhwa, "Electrical Power Systems" New age international Ltd. Third Edition
3. Asfaq Hussain, "'Power System", CBS Publishers and Distributors,
4. B. R. Gupta, "Power System Analysis and Design" Third Edition, S. Chand & Co.
5. M. V. Deshpande, "Electrical Power System Design" Tata Mc Graw Hill.

Reference Books

6. M. V. Deshpandey, "Elements of Power System Design", Tata McGraw Hill,
7. Soni, Gupta & Bhatnagar, "A Course in Electrical Power", Dhanpat Rai & Sons,
8. S. L. Uppal, "Electric Power", Khanna Publishers
9. S.N.Singh, " Electric Power Generation, Transmission& distribution." PHI Learning

EEC :509 ANALOG INTEGRATED ELECTRONICS

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Unit-I

Frequency response & stability of an Op-Amp:
Frequency response, compensating Networks, Frequency response of internally compensated and uncompensated Op-Amps, High frequency Op-Amps. Equivalent circuit, stability in constant GBP Op-Amp. Circuits. 8

Unit-II

Op-Amp Circuits: Applications
Current to voltage converters, V to I converters, current amplifier, difference Amplifiers, Instrumentation Amplifiers, integrators and differentiators. 8

Unit-III

Active filters & Converters:
First and second order low pass & High pass filters, Band Pass & Band-Reject filters, All-Pass filter, Filter using MATLAB.
Voltage to Frequency and Frequency to voltage Converters, Analog to Digital and Digital to Analog Converters. 8

Unit-IV

Non Linear Circuits & Regulators:
Voltage Comparators, Precision Rectifiers, Schmitt Triggers, Analog Switches, Peak detectors, Sample and Hold circuit, Square and Triangular Wave Generators, Linear Regulators, Switching Regulators. 8

Unit-V

Non Linear Amplifiers & Phase-Locked Loops:
Log/Antilog Amplifiers, Analog Multipliers, Operational Trans conductance Amplifiers, Phase-Locked loops, Monolithic PLLs,Noise in integrated circuits. 8

Text Books:

1. Franco Sergio, "Design with Operational Amplifiers and Analog Integrated Circuits" Tata McGraw-Hill
2. Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits" Prentice Hall of India.

Reference Books :

1. James M.Fiore,"Op-Amps and Linear Integrated Circuits: Theory and Applications" Thomson Asia Pvt. Ltd. Singapore
2. Millman J.&Halkias C.C., "Integrated Electronics Analog and Digital Circuits & Systems" McGraw Hill.
3. Soclof,S.,"Application of Analog Integrated Circuits" Prentice Hall of India.
4. Bell, David A., "Operational Amplifiers & Linear ICS" Prentice Hall of India.

EEE- 551: ELECTRO-MECHANICAL ENERGY CONVERSION – II LABORATORY

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Note: The minimum 8 experiments are to be performed from the following, out of which there should be at least two software based experiments.

1. To perform no load and blocked rotor tests on a three phase squirrel cage induction motor and determine equivalent circuit.
2. To perform load test on a three phase induction motor and draw:
   (i) Torque -speed characteristics
   (ii) Power factor-line current characteristics
3. To perform no load and blocked rotor tests on a single phase induction motor and determine equivalent circuit.
4. To study speed control of three phase induction motor byKeeping V/f ratio constant
5. To study speed control of three phase induction motor by varying supply voltage.
6. To perform open circuit and short circuit tests on a three phase alternator and determine voltage regulation at full load and at unity, 0.8 lagging and leading power factors by (i) EMF method (ii) MMF method.
7. To determine V-curves and inverted V-curves of a three phase synchronous motor.
8. To determine Xd and Xq of a three phase salient pole synchronous machine using the slip test and draw the power-angle curve.
9. To study synchronization of an alternator with the infinite bus by using:
   (i) dark lamp method (ii) two bright and one dark lamp method

Software based experiments (Develop Computer Program in 'C' language or use MATLAB or other commercial software)

10. To determine speed-torque characteristics of three phase slip ring induction motor and study the effect of including resistance, or capacitance in the rotor circuit.
11. To determine speed-torque characteristics of single phase induction motor and study the effect of voltage variation.
12. To determine speed-torque characteristics of a three phase induction motor by (i) keeping v/f ratio constant (ii) increasing frequency at the rated voltage.
13. Draw O.C. and S.C. characteristics of a three phase alternator from the experimental data and determine voltage regulation at full load, and unity, 0.8 lagging and leading power factors.
14. To determine steady state performance of a three phase induction motor using equivalent circuit.

EEE – 552: CONTROL SYSTEM LABORATORY

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Note: The minimum of 10 experiments are to be performed from the following, out of which at least three should be software based.

1. To determine response of first order and second order systems for step input for various values of constant 'K' using linear simulator unit and compare theoretical and practical results.
2. To study P, PI and PID temperature controller for an oven and compare their performance.
3. To study and calibrate temperature using resistance temperature detector (RTD)
4. To design Lag, Lead and Lag-Lead compensators using Bode plot.
5. To study DC position control system
6. To study synchro-transmitter and receiver and obtain output V/S input characteristics
7. To determine speed-torque characteristics of an ac servomotor.
8. To study performance of servo voltage stabilizer at various loads using load bank.
9. To study behaviour of separately excited dc motor in open loop and closed loop conditions at various loads.
10. To study PID Controller for simulation proves like transportation lag.

Software based experiments (Use MATLAB, LABVIEW software etc.)

11. To determine time domain response of a second order system for step input and obtain performance parameters.
12. To convert transfer function of a system into state space form and vice-versa.
13. To plot root locus diagram of an open loop transfer function and determine range of gain 'k' fir stability.
14. To plot a Bode diagram of an open loop transfer function.
15. To draw a Nyquist plot of an open loop transfer functions and examine the stability of the closed loop system.

Reference Books:

1. K.Ogata,"Modern Control Engineering" Prentice Hall of India.
2. Norman S.Nise, "Control System Engineering", John Wiley & Sons.
3. M.Gopal, "Control Systems: Principles & Design" Tata Mc Graw Hill.

EEC -509 : ANALOG INTEGRATED ELECTRONICS LAB

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1. To determine CMRR of a differential amplifier.
2. To study op-amp based inverting and non-inverting amplifiers, voltage comparator and zero crossing detector.
3. To study op-amp based Adder and integrator circuits.
4. To study RC low pass and high pass active filters and draw outlput voltage waveform for square wave input.
5. To study Op-Amp based triangular wave generator.
6. To study operation of IC74123 as monostable multivibrator.
7. To design and fabricate Op-Amp. Base astable multivibrator and verify experimentally frequency of oscillation.

8. To study operation of IC NE/SE 566 voltage controlled oscillator and determine output frequency for various voltage levels.
9. To study Op-Amp. Based V to I and I to V converters.
10. To study a PLL circuit and determine the free running frequency.
11. To study Op-Amp. based sample and hold circuit.
12. To study Instrumentation Amplifier circuit.

13 to15 The Institute /college may add three more experiments at its level.

EEE-601 : POWER SYSTEM ANALYSIS

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Unit-I

Representation of Power System Components:

Synchronous machines, Transformers,Transmission lines, One line diagram, Impedance and reactance diagram, per unit System

Symmetrical components:

Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks.

Symmetrical fault analysis:

Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions

Unit-II

Unsymmetrical faults:

Analysis of single line to ground fault, line-to-line fault and Double Line to ground fault on an unloaded generators and power system network with and without fault impedance.

Formation of Z_{bus} using singular transformation and algorithm, computer method for short circuit calculations

Unit-III

Load Flows:

Introduction, bus classifications, nodal admittance matrix (Y_{BUS}), development of load flow equations, load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R method, line flow equations and fast decoupled method

Unit-IV

Power System Stability:

Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method. Factors affecting steady state and transient stability and methods of improvement

Unit-V

Traveling Waves:

Wave equation for uniform Transmission lines, velocity of propagation, surge impedance, reflection and transmission of traveling waves under different line loadings. Bewlay's lattice diagram, protection of equipments and line against traveling waves

Text Books:

1. W.D. Stevenson, Jr. " Elements of Power System Analysis", Mc Graw Hill.
2. C.L. Wadhwa, "Electrical Power System", New Age International.
3. Chakraborthy, Soni,Gupta & Bhatnagar, "Power System Engineering", Dhanpat Rai & Co.
4. T.K Nagsarkar & M.S. Sukhija, "Power System Analysis" Oxford University Press,2007.

Reference Books:
5. L. P. Singh; "Advanced Power System Analysis & Dynamics", New Age International
6. Hadi Sadat; "Power System Analysis", Tata McGraw Hill.
7. D.Das, " Electrical Power Systems" New Age International, 2006.
8. J.D. Glover, M.S. Sharma & T.J.Overbye, "Power System Analysis and Design" Thomson, 2008.
9. P.S.R. Murthy " Power System Analysis" B.S. Publications,2007.
10. Stagg and El-Abiad, "Computer Methods in Power System Analysis" Tata Mc Graw Hill
11. Kothari & Nagrath, "Modern Power System Analysis" Tata Mc. Graw Hill.

EEE-602: POWER ELECTRONICS

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Unit-I

Power semiconductor Devices:

Power semiconductor devices their symbols and static characteristics

Characteristics and specifications of switches, types of power electronic circuits

Operation, steady state and switch characteristics & switching limits of Power Transistor

Operation and steady state characteristics of Power MOSFET and IGBT

Thyristor – Operation V- I characteristics, two transistor model, methods of turn-on

Operation of GTO, MCT and TRIAC

Unit-II

Power Semiconductor Devices(Contd)

Protection of devices.

Series and parallel operation of thyristors

Commutation techniques of thyristor

DC-DC Converters:

Principles of step-down chopper, step down chopper with R-L load Principle of step-up chopper, and operation with RL load, classification of choppers

Unit-III

Phase Controlled Converters

Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode.

Single phase fully controlled and half controlled bridge converters.

Performance Parameters

Three phase half wave converters

Three phase fully controlled and half controlled bridge converters, Effect of source impedance

Single phase and three phase dual converters

Unit-IV

AC Voltage Controllers

Principle of On-Off and phase controls

Single phase ac voltage controller with resistive and inductive loads

Three phase ac voltage controllers (various configurations and comparison only)

Single phase transformer tap changer.

Cyclo Converters

Basic principle of operation, single phase to single phase, three phase to single phase and three phase to three phase cyclo converters, output voltage equation

Unit-V

Inverters

Single phase series resonant inverter

Single phase bridge inverters

Three phase bridge inverters
Voltage control of inverters
Harmonics reduction techniques
Single phase and three phase current source inverters

Text Books:

1. M.H. Rashid,"Power Electronics: Circuits, Devices & Applications", Prentice Hall of India Ltd. 3rd Edition,2004.
2. M.D. Singh and K.B.Khanchandani, "Power Electronics"Tata MC Graw Hill, 2005
3. V.R. Moorthy, " Power Electronics : Devices, Circuits and Industrial Applications" Oxford University Press,2007.

Reference Books:

4. M.S. Jamil Asghar, "Power Electronics" Prentice Hall of India Ltd., 2004
5. Chakrabarti & Rai, "Fundamentals of Power Electronics &Drives"Dhanpat Rai & Sons.
6. Ned Mohan, T.M.Undeland and W.P.Robbins, "Power Electronics:Converters, Applications and Design", Wiley India Ltd,2008.
7. S.N.Singh, "A Text Book of Power Electronics" Dhanpat Rai & Sons

EEC-609 : Analog & Digital Communication

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3 1 0

Unit No.	Topic Name	Text Book Nos	Chapter Nos	Page Nos	No. of Lectures
1	**Elements of communication system and its limitations**	1	1	1-10	4
	Amplitude Modulation:				
	Amplitude modulation and detection,	1	2	90-92	4
	Generation and detection of DSB-SC, SSB and vestigial side band modulation, carrier acquisition	1 2	2 3,6	93-101 43-52	2 4
	AM transmitters and receivers, super hetrodyne receiver, IF amplifiers, AGC circuits	2	15	120-144 564-566	1
	Frequency Division multiplexing				
2	**Angle Modulation:**				
	Basic definitions	1	2	107-109	1
	Narrow band and wideband frequency modulation, transmission bandwidth of FM signals	1 1	2 2	109-119 120-124	2 2
	Generation and detection of frequency modulation	2	2	15-25	2
	Noise :				
	External noise, internal noise	1	2	132-147	2
	Noise calculations, signal to noise ratio				
	Noise in AM and FM systems				
3	**Pulse Modulation:** Introduction, sampling process Analog Pulse Modulation Systems-Pulse Amplitude Modulation, Pulse width modulation and Pulse Position Modulation.	1	3	183-193	3
	Waveform coding Techniques:	1	3	193-208,	5

	Discretization in time and amplitude, Quantization process, quantization noise, Pulse code Modulation, Differential Pulse code Modulation, Delta Modulation and Adaptive Delta Modulation.			218-233	
4	**Digital Modulation Techniques:** Types of digital modulation, waveforms for amplitude, frequency and phase shift keying, methods of generation of coherent and non-coherent, ASK,FSK and PSK, comparison of above digital techniques.	3	5	172-215	7
5	**Time Division Multiplexing:** Fundamentals, Electronic Commutator, Bit/byte interleaving, TI carrier system, synchronization and signaling of TI, TDM and PCM hierarchy, synchronization techniques **Introduction to Information Theory:** Measure of information, Entropy & Information rate, channel capacity, Hartley Shannan law, Huffman coding, shannan Fano coding.	1 1	3 9	211-217 568-575, 578-580, 587-589	4 3

Text Books:

1. Simon Haykin," Communication Systems" John Wiley & Sons 4th Edition
2. G.Kennedy and B. Davis,"Electronic Communication Systems" 4th Edition, Tata McGraw Hill
3. Simon Haykin, "Digital Communications" John Wiley & Sons

Reference Books:

1. B.P. Lthi, "Modern Analog & Digital Communication Systems" Oxford University Press.
2. Taub & Schilling, "Communication System: Analog and Digital" Tata Mc Graw Hill
3. R.P.Singh & S.D. Sapre, "Communication Systems Analog and Digital" Tata McGraw Hill.

EEE-651: POWER ELECTRONICS LABORATORY

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Note: The minimum of 10 experiments is to be performed out of which at least three should be software based.

1. To study V-I characteristics of SCR and measure latching and holding currents.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with (i) resistive load (ii) inductive load with and without free wheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.
6. To study single-phase ac voltage regulator with resistive and inductive loads.
7. To study single phase cyclo-converter
8. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor

9. To study operation of IGBT/MOSFET chopper circuit
10. To study MOSFET/IGBT based single-phase series-resonant inverter.
11. To study MOSFET/IGBT based single-phase bridge inverter.

SOFTWARE BASED EXPERIMENTS (PSPICE/MATLAB)

12 To obtain simulation of SCR and GTO thyristor.

13 To obtain simulation of Power Transistor and IGBT.To obtain simulation of single phase fully controlled bridge rectifier and draw load voltage and load current waveform for inductive load.

14 To obtain simulation of single phase full wave ac voltage controller and draw load voltage and load current waveforms for inductive load.

15 To obtain simulation of step down dc chopper with L-C output filter for inductive load and determine steady-state values of output voltage ripples in out put voltage and load current.

Reference Books:

1. M.H.Rashid, "Power Electronics: Circuits, Devices and Applications", 3rd Edition, prentice Hall of India.
2. D.W. Hart, "Introduction to power Electronics" prentice hall Inc. 1997.
3. Randal Shaffer, "Fundamentals of Power Electronics with MATLAB" Firewall Media, 2007.

EEC-659 : ANALOG AND DIGITAL COMMUNICATION LAB

L	T	P
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Note: The minimum 10 experiments are to be performed from the following:

1. To study amplitude modulation using a transistor and determine depth of modulation.
2. To study generation of DSB-SC signal using balanced modulator.
3. To study generation of SSB signal
4. To study envelope detector for demodulation of AM signal and observe diagonal peak clipping effect.
5. To study super heterodyne AM receiver and measurement of sensitivity, selectivity and fidelity.
6. To study frequency modulation using voltage controlled oscillator.
7. To detect FM signal using Phase Locked Loop.
8. To measure noise figure using a noise generator.
9. To study PAM, PWM and PPM.
10. To realize PCM signal using ADC and reconstruction using DAC and 4 bit/8bit system. Observe quantization noise in each case.
11. To study Delta Modulation and Adaptive Delta Modulation.
12. To study PSK-modulation system.
13. To study FSK-modulation system.
14. To study sampling through a Sample-Hold circuit and reconstruction of the sampled signal and observe the effect of sampling rate & the width of the sampling pulses.
15. To study functioning of colour television
16. Fabricate and test a PRBS generator
17. Realization of data in different forms, such as MRZ-L,NRZ - M&N,NRZ-S.
18. Manchester coding & decoding (Biphase L) of NRZ-L data.

EEE – 701: SWITCHGEAR AND PROTECTION

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Unit I:

Introduction to Protection System:

Introduction to protection system and its elements, functions of protective relaying, protective zones, primary and backup protection, desirable qualities of protective relaying, basic terminology.

Relays:

Electromagnetic, attracted and induction type relays, thermal relay, gas actuated relay, design considerations of electromagnetic relay.

Unit-II:

Relay Application and Characteristics:

Amplitude and phase comparators, over current relays, directional relays, distance relays, differential relay

Static Relays:

Comparison with electromagnetic relay, classification and their description, over current relays, directional relay, distance relays, differential relay.

Unit-III

Protection of Transmission Line:

Over current protection, distance protection, pilot wire protection, carrier current protection, protection of bus, auto re-closing,

Unit-IV:

Circuit Breaking:

Properties of arc, arc extinction theories, re-striking voltage transient, current chopping, resistance switching, capacitive current interruption, short line interruption, circuit breaker ratings.

Testing Of Circuit Breaker:

Classification, testing station and equipments, testing procedure, direct and indirect testing

Unit-V

Apparatus Protection:

Protection of Transformer, generator and motor.

Circuit Breaker:

Operating modes, selection of circuit breakers, constructional features and operation of Bulk Oil, Minimum Oil, Air Blast, SF6, Vacuum and d. c. circuit breakers.

Text Books:

1. S. S. Rao, "Switchgear and Protection", Khanna Publishers.
2. B. Ravindranath and M. Chander, Power system Protection and Switchgear, iley Eastern Ltd.

Reference Books:

3. B. Ram and D. N. Vishwakarma, "Power System Protection and Switchgear", Tata Mc. Graw Hill
4. Y. G. Paithankar and S R Bhide, "Fundamentals of Power System Protection", Prentice Hall of India.
5. T.S.M Rao,"Power System Protection: Static Relays with Microprocessor Applications" Tata Macgraw Hill".
6. A.R. Van C. Warringtaon , " Protective Relays- Their Theory and Practice, Vol. I & II" Jhon Willey & Sons.

EEN – 701/EEE-504: ELECTRICAL INSTRUMENTATION AND PROCESS CONTROL

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Unit-I:

Transducer – I:

Definition, advantages of electrical transducers, classification, characteristics, factors affecting the choice of transducers, Potentiometers, Strain guages, Resistance thermometer, Thermistors, Thermocouples, LVDT,RVDT

Unit-II

Transducer – II :

Capacitive, Piezoelectric Hall effect and opto electronic transducers.
Measurement of Motion, Force pressure, temperature, flow and liquid level.

Unit-III:

Telemetry :

General telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter. Data

Acquisition System:

Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.

Unit-IV:

Display Devices and Recorders:

Display devices, storage oscilloscope, spectrum analyzer, strip chart & x-y recorders, magnetic tape & digital tape recorders.

Recent Developments:

Computer aided measurements, fibre optic transducers, microsessors, smart sensors, smart transmitters.

Unit-V:

Process Control :

Principle, elements of process control system, process characteristics, proportional (P), integral (I), Derivative (D), PI, PD and PID control modes. Electronic, Pneumatic & digital controllers.

Text Books:

1. A.K.Sawhney, "Advanced Measurements & Instrumentation", Dhanpat Rai & Sons
2. B.C. Nakra & K.Chaudhry, "Instrumentation, Measurement and Analysis", Tata Mc Graw Hill 2nd Edition.
3. Curtis Johns, "Process Control Instrumentation Technology", Prentice Hall

Reference Books:

4. E.O. Decblin, "Measurement System – Application & design", Mc Graw Hill.
5. W.D. Cooper and A.P. Beltried, "Electronics Instrumentation and Measurement Techniques" Prentice Hall International
6. Rajendra Prasad,"Electronic Measurement and Instrumentation Khanna Publisher
7. M.M.S. Anand, "Electronic Instruments and Instrumentation Technology" PHI International.

EEE – 751: POWER SYSTEM LAB

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Note: - At least 10 experiments should be performed out of which 3 should be simulation based.

(A) Hardware Based:

1. To determine direct axis reactance (x_d) and quadrature axis reactance (x_q) of a salient pole alternator.
2. To determine negative and zero sequence reactances of an alternator.
3. To determine sub transient direct axis reactance (x_d) and sub transient quadrature axis reactance (x_q) of an alternator
4. To determine fault current for L-G, L-L, L-L-G and L-L-L faults at the terminals of an alternator at very low excitation
5. To study the IDMT over current relay and determine the time current characteristics
6. To study percentage differential relay
7. To study Impedance, MHO and Reactance type distance relays
8. To determine location of fault in a cable using cable fault locator
9. To study ferranty effect and voltage distribution in H.V. long transmission line using transmission line model.
10. To study operation of oil testing set.

(B) Simulation Based Experiments (using MATLAB or any other software)

11. To determine transmission line performance.
12. To obtain steady state, transient and sub-transient short circuit currents in an alternator
13. To obtain formation of Y-bus and perform load flow analysis
14. To perform symmetrical fault analysis in a power system
15. To perform unsymmetrical fault analysis in a power system

Text Books:-

1. Hasdi Sadat, "Power System Analysis" Tata Mc.Graw Hill.
2. T. K. Nagsarskar & M.S. Sukhija,' Power System Analysis' Oxford Universitry Press.

EEN – 751/EEE-553: ELECTRICAL INSTRUMENTATION LAB.

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Note: Minimum ten experiments should be performed from the following

1. Measurement of displacement using LVDT.
2. Measurement of displacement using strain gauge based displacement transducer.
3. Measurement of displacement using magnetic pickup.
4. Measurement of load using strain gauge based load cell.
5. Measurement of water level using strain gauge based water level transducer
6. Measurement of flow rate by anemometer
7. Measurement of temperature by RTD.
8. Measurement of temperature by thermocouple
9. Study of P,PI and PID controllers
10. Study of storage oscilloscope and determination of transient response of RLC circuit.
11. Determination of characteristics of a solid state sensor/fibre-optic sensor
12. Design and test a signal conditioning circuit for any transducer
13. Study of data acquisition system using "**lab view**" software and test all signal points

14. Measurement of sine, triangular ,square wave signal of function generator and verify its frequency at 100 Hz tap point using "**labview**" software.
15. Measurement of voltage and current signal of programmable power supply using **Lab view** GPIB interface.

Note: - Three more software based experiments may be added in place of experiments nos.13 to 15.at the institute level.

EEN -753: PROJECT

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Project shall be assigned to students at the start of VIIth semester. There should not usually be more than 3 students in batch. The project should be based on latest technology as far as possible and it may be hardware or/and software based. The assessment of performance of students should be made at least twice in the semester. Students should be encouraged to present their progress of project using overhead projector or LCD projector.

EEN – 754 PRACTICAL & INDUSTRIAL TRAINING PRESENTATION

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Students will go practical & Industrial training of four weeks in any industry or reputed organization after the VIth semester examination in summer. They will also prepare an exhaustive technical report of the training which will be duly signed by the officer under whom training was taken in the industry/organization. They will have to present about the training before a committee consisting of faculty members constituted by the concerned Head of the Department.

TEC -809 : DATA COMMUNICATION NETWORKS

Unit	Topic	Lectures
I	INTRODUCTION: Network structure, network architectures. The OSI reference model, services, standardization, Other architectures, Connection oriented and connection less services, example networks. The Physical Layer: Transmission media, EIA RS-232C, EIA RS-449. Pulse code modulation. FDM & TDM. Circuit switching. Packet switching. Hybrid switching Polling. CCITT X.21. Ethernet.	11
II	The Data Link Layer: Basic link protocols. Character oriented and bit oriented protocols. The ALOHA protocols. IEEE standard 802 for LAN, framing, Error control, Flow control.	7
III	The Network Layer: Design Issues. Routing Algorithms. Congestion control Algorithms. Subnet concept, Virtual circuit and Data gram Subnet, Flow control, Internetworking, Bridges, Routers, Gateways and different level switches.	7

IV & V	The Transport Layer: Design Issues. Connection management. Study of Internet and ATM transport layer protocols. Internet Issues: Principles of bridges and routers. The TCP/IP Protocol suite: Overview of TCP/IP. Addressing, Subnetting and network layer protocols. Application layer services: DNS, DHCP, FTP, TFTP, SMTP, SNMP, HTTP, WWW.	11

References:

1. Andrew S. Tanenbaum: Computer Networks, PHI India.
2. Leon-Garcia,Widjaja: Communication Networks, TMH.
3. Forouzan: Data Communications & Networking, TMH.
4. William Stallings: Data & Computer Communication, Prentice Hall.

EEN – 851: PROJECT

L T P
0 0 12

Students should devote themselves to expedite progress of the project as soon as VIIIth semester starts. They are supposed to finish project work latest by middle of April and submit project report by the end of the April month. The assessment of performance of students should be made at least twice in the semester. The students should present project using overheads project or power point presentation using in the end semester project examination

DEPARTMENTAL ELECTIVES

ELECTIVE - I

ECS-019: DATABASE MANAGEMENT SYSTEM AND DATA MINING AND WAREHOUSING

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3 1 0

Unit-I:

Introduction:

An overview of database management system, database system v/s 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.

Data Modeling 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-II:

Relational data Model and Language:

Relational data model concepts, integrity constraints: entity integrity, referential integrity, keys constraints, domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL:
Characteristics of SQL-Advantage of SQL data types and literals, types of SQL commands, SQL operators and their procedure tables, views and indexes. queries and sub queries. aggregate functions. insert, update and delete operations. Joins, Unions, Intersection, Minus, cursors in SQL.

Unit-III:

Data Base Design & Normalization:
Functional dependencies, normal forms, first, second and third normal forms,BCNF,inclusion dependences, loss less join decompositions, normalization using FD,MVD,and JDs, alternative approaches to database design.

Unit-IV:
Foundation. Introduction to DATA Warehousing. Client / Server Computing model & Data Warehousing. Parallel processors & System. Distributed DBMS implementations.
Client /Server RDBMS Solutions.

Unit-V:
DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, cleanup & Transformation Tools. Metadata.

Data Mining:
Introduction to data mining

Text Books:
1. Korth ,Silbertz,Sudarshan, "Database Concepts",Mc Graw Hill
2. Date C.J., "An Introduction To Database System", Addition Wesley
3. Alex Berson & Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata MCGraw Hill.
4. Mallach, Data Warehousing Syatem", (MCGraw Hill)

Reference Books :
1. Elmasri,Navathe, "Fundamentals of Database Systems",Addition Wesley
2. Bipin C.Desai, "An Introduction to Database Systems, "Galgotia Publication
3. Majumdar & Bhattacharya, "Database Management System", Tata Mc Graw Hill
4. Ramakrishnan, Gehrke, "Database Management System", Mc Graw Hill.

EEE – 011: DIGITAL CONTROL SYSTEM

L T P
3 1 0

Unit No.	Topic Name	Text Book No	Chapter No.	No. of Lectures
1	**Signal Processing in Digital Control:** Basic digital control system, advantages of digital control and implementation problems, basic discrete time signals, z-transform and inverse z-transform, modeling of sample-hold circuit., pulse transfer function, solution of difference equation by z-Transform method.	1,2	2,3	7

2	**Design of Digital Control Algorithms:** Steady state accuracy, transient response and frequency response specifications, digital compensator design using frequency response plots and root locus plots.	1	4,8,9	8
3	**State Space Analysis and Design:** State space representation of digital control system, conversion of state variable models to transfer functions and vice versa, solution of state difference equations, controllability and observability, design of digital control system with state feedback.	1,2	10	8
4	**Stability of Discrete System:** Stability on the z-plane and Jury stability criterion, bilinear transformation, Routh stability criterion on rth plane. Lyapunou's Stability in the sense of Lyapunou, stability theorems for continuous and discrete systems, stability analysis using Lyapunor's method.	1,2 1,2	2,3 8	5 4
5	**Optimal digital control :** Discrete Euler Lagrange equation, max. min. principle, otpimality & Dynamic programming, Different types of problem and their solutions.	1	11	8

Text Books:

1. B.C.Kuo, "Digital Control System",Saunders College Publishing.
2. M.Gopal, "Digital Control and State Variable Methods", Tata McGraw Hill.

Reference Books:

3. R.Leigh, "Applied Digital Control", Prentice Hall, International
4. C.H. Houpis and G.B.Lamont, "Digital Control Systems:Theory, hardware, Software",Mc Graw Hill.

EEN - 011: FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING

L T P
3 1 0

Unit-I

Discrete-Time Signals And Systems:

Sequences, discrete time systems, LTI systems, frequency domain representation of discrete time signals and systems, discrete time signals and frequency domain representation, Fourier Transform.

Discrete Fourier Transform:

Discrete Fourier transforms, properties, linear convolution using DFT, DCT

Unit-II

Sampling of Continuous Time Signals:

Sampling and reconstruction of signals, frequency domain representation of sampling, discrete time processing of continuous time signals, continuous time processing of discrete time signals, changing the

sampling rate using discrete time processing, multi rate signal processing, digital processing of analog signals, over sampling and noise shaping in A/D and D/A conversion

Unit-III

Transform Analysis of LTI Systems:

Frequency response of LTI systems, system functions, frequency response for rational system functions, magnitude-phase relationship, all pass systems, minimum phase systems, and linear systems with generalized linear phase

Overview of finite precision numerical effects, effects of coefficient quantization,Effects of round-off noise in digital filters, zero-input limit cycles in fixed point realizations of IIR digital filters.

Unit-IV

Filter Design Techniques:

Design of D-T IIR filters from continuous – time filters, design of FIR filters by windowing, Kaiser Window method, optimum approximations of FIR filters, FIR equiripple approximation

Unit-V

Efficient computation of the DFT:

Goertzel algorithm, decimation in time and decimation in frequency, FFT algorithm, practical considerations, implementation of the DFT using convolution, effects of finite register length.

Fourier Analysis of Signals Using DFT :

DFT analysis of sinusoidal signals, time-dependent Fourier transforms: Block convolution, Fourier analysis of non – stationary and stationary random signals, spectrum analysis of random signals using estimates of the autocorrelation sequence

Text Books:

1. Oppenheim A.V., Schafer, Ronald W. & Buck, John R.,"Discrete Time Signal processing", Pearson Education ,2nd Edition

Reference Books:

2. Proakis, J.G. & Manolakis, D.G.," Digital Signal Processing: Principles Algorithms and Applications", Prentice Hall of India.
3. Rabiner, L.R. and Gold B., "Theory and applications of DSP", Prentice Hall of India.
4. Oppenheim, Alan V. & Willsky, Alan S. , "Signals and Systems" , Prentice Hall of India, 2nd Edition
5. Johnson, J.R. , "Introduction to Digital Signal Processing", Prentice Hall of India.
6. De Fatta, D.J.Lucas, J.G. & Hodgkiss, W. S.," Digital Signal Processing", John Wiley& Sons

EEE-012 :	SPECIAL ELECTRICAL MACHINES	L	T	P
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UNIT-I

Poly-phase AC Machines:

Construction and performance of double cage and deep bar three phase induction motors; e.m.f. injection in rotor circuit of slip ring induction motor, concept of constant torque and constant power controls, static slip power recovery control schemes (constant torque and constant power)

UNIT-II

Single phase Induction Motors:

Construction, starting characteristics and applications of split phase, capacitor start, capacitor run, capacitor-start capacitor-run and shaded pole motors.

Two Phase AC Servomotors:

Construction, torque-speed characteristics, performance and applications.

UNIT-III

Stepper Motors:

Principle of operation, variable reluctance, permanent magnet and hybrid stepper motors, characteristics, drive circuits and applications.

Switched Reluctance Motors:

Construction; principle of operation; torque production, modes of operation, drive circuits.

UNIT-IV

Permanent Magnet Machines:

Types of permanent magnets and their magnetization characteristics, demagnetizing effect, permanent magnet dc motors, sinusoidal PM ac motors, brushless dc motors and their important features and applications, PCB motors.

Single phase synchronous motor; construction, operating principle and characteristics of reluctance and hysteresis motors; introduction to permanent magnet generators.

UNIT-V

Single Phase Commutator Motors:

Construction, principle of operation, characteristics of universal and repulsion motors ; Linear Induction Motors. Construction, principle of operation, Linear force, and applications.

Text Books:

1. P.S. Bimbhra "Generalized Theory of Electrical Machines" Khanna Publishers.
2. P.C. Sen " Principles of Electrical Machines and Power Electronics" John willey & Sons, 2001
3. G.K.Dubey "Fundamentals of Electric Drives" Narosa Publishing House, 2001

Reference Books:

4. Cyril G. Veinott "Fractional and Sub-fractional horse power electric motors" McGraw Hill International, 1987
5. M.G. Say " Alternating current Machines"Pitman & Sons

ELECTIVE II

EEC-027 : VLSI DESIGN

L T P
2 1 0

Unit	Topic	Text Book	Lectures
1.	Introduction to integrated circuit technology. CMOS fabrication, the p-well process, n-well process, twin tub process. Bi-CMOS technology. Basic electrical properties of MOS circuits, I_{ds}-V_{ds} relationship, MOS transistor threshed voltage $V_{t,}$ Trans conductance and output conductance, MOS transistor figure of merit.	1	8
2.	The n-MOS inverter, pull-up to pull-down ratio, CMOS inverter and its characteristics, latch –up in CMOS circuits, stick diagrams, n-MOS design style, CMOS design style, lambda based design rules , Body effect, sheet resistance, capacitances of layers, Gate delays, Delay estimation, logical efforts, Scaling models and scaling factors, limitation of scaling, , Limits of miniaturization.	1	8
3.	n-MOS, CMOS NAND Gates, n-MOS, CMOS NOR gates. Combinational circuit design, sequential circuit design, design considerations, problems associated with VLSI Design, Design Methodology and Tools, Standard Cell Based Design, Design Flows, Automated Layout Generation, Placement, Floor planning, Routing, Parasitic Extraction, Timing Analyses.	1&2	8

4.	Full Custom Design, Semi Custom Design, Programmable Logic structures, Field Programmable Gate arrays (FPGA) , Configurable Logic Block (CLB), Application-Specific Integrated Circuits (ASICs)	2	8
5.	Design for Testability, Faults types and Models, Controllability and Observability, AD HOC Design Techniques, Scan-Based Techniques , Built-In self Test (BIST) Techniques, Current Monitoring I_{DDQ} Test. Packaging, Package Parasitics, Heat dissipation, Design Economics, Parametric yield.	2&3	8

Text Books:

1. Basic VLSI Design by Douglas A. Pucknell & Kamran Eshraghian, Prentice-Hall of India.
2. CMOS VLSI Design, A Circuits and Systems Perspective by Neil H.E. Weste, David Harris, Ayan Banerjee, Pearson Education.
3. CMOS Digital Integrated Circuits Analysis and Design by Sung-Mo Kang, Yusuf Leblebici. Tata Mc-Graw-Hill.

References:

1. Digital Integrated Circuits A Design Perspective by Jab M. Rabaey, Anantha Chandra kasan, Borivoje Nikolic, Prentice-Hall of India Pvt. Limited.
2. Principles of C-MOS VLSI Design A systems Perspective by Neil H.E. Weste, Kamrau Eshraghian, Pearson Education
3. Application-Specific Integrated Circuits by Michal John Sebastian smith, Pearson Education.

EEC-028 : WIRELESS COMMUNICATION

L T P
2 1 0

Unit-I

Evolution of mobile radio communication fundamentals. Large scale path loss: propagation models, reflection, diffraction, scattering, practical link budget design using path loss model.

Small scale fading & multi-path propagation and measurements, impulse response model and parameters of multi-path channels, types of fading, theory of multi-path shape factor for fading wireless channels.

Unit-II

Spread spectrum modulation techniques: Pseudo-noise sequence, direct sequence spread spectrum (DS-SS), frequency hopped spread spectrum(FH-SS), performance of DS-SS, performance of FH-SS, modulation performance in fading and multi-path channels, fundamentals of equalization, equalizer in communication receiver, survey of equalization techniques, linear equalizer, linear equalizer, non-linear equalizations, diversity techniques, RAKE receiver.

Unit-III

Characteristics of speech signals, quantisation techniques, vocoders, linear predictive coders, time division multiple access, space division multiple access, and frequency division multiple access.

Unit-IV

Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.

.

Text Book:

1. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson

Reference Books:

1. Willium C. Y. Lee, "Mobile communication Design and fundamentals"
2. D. R. Kamilo Fehar, "Wireless digital communication"
3. Haykin S & Moher M., "Modern wireless communication", Pearson, 2005.
4. R. Pandya, " Mobile and personal communication system", PHI.

EEC-029 :ANTENA AND WAVE PROPOGATION

L T P
2 1 0

UNIT-I

Antena Principles: Potential functions & Electromagnetic field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance.
Network Theorems
Directional Properties of Dipole Antenna.
Antenna Gain, Effective Area, Antenna Terminal impedance, Practical Antennas and Methods of Excitation, Antenna Temperature and Signal. To Noise Ratio.

UNIT-II

Antenna Arrays: Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of Patterns, effect of the earth on vertical patterns, Binomial array.

UNIT-III

Wave Propagation: Modes of Propagation, Plane Earth Reflection. Space
wave and Surface Wave, Reflection and refraction waves by the lonosphere Tropospheric Wave.
Ionosphere Wave Propagation in the Inosphere , Virtual Height , MUF Critical frequency, Skip Distance, Duct Propagation, Space wave.

UNIT-IV

Practical Antenas:
VLF and LF tranmitting antennas, effect of antenna height, Field of short dipole, electric field of small loop antenna, Directivity of circular loop antenna with uniform current, Directivity of Circular loop antenna with uniform current, Yagi-Uda array: Square corner yagi-uda hybride, circular polarization
Rhombic Antenna Weight and Leg length
Parabolic Reflectors Properties, Comparison with corner reflectors
Horn Antenna: Length and Aperture.
Introduction to Turstile Antenna
Effect of ground on antenna performance.
Broadband Antenna: Frequency independent concept, RUMSEY'Ss Principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral Antenna.

Text Books:

1. Jordan Edwards C. and Balmain Keith G./ "Electromagnetic Waves and Radiating Systems"/ Prentice Hall (India)
2. Kraus, JohnD & Mashefka, Ronald J. / "Antennas: For All Applications" / Tata McGraw Hill, 3rd Ed.

Reference Books:

1. Prasad, K.D./ "Antennas and Wave Propagation" /Khanna Publications.
2. Collin, R./ "Antennas and Radiowave Propagation" /Tata McGraw-Hill
3. Hayt Jr. William H./ "Engineering Electromagnetics"/Tata McGraw-Hill.
4. Das, Annaparna & Das, Sisir K. / "Microwave Engineering"/Tata McGraw Hill.
5. Roy, Sitesh Kumar & Mitra, Monojit / "Microwave Semiconductor Devices" / Prentice Hall (India).

EEN-021 : MECHATRONICS

L T P
2 1 0

1. **Mechatronics and its scope:**
   Sensors and transducers- Displacement, position & proximity, velocity, force, pressure and level. Signal conditioning amplification, filtering & data acquisition.
2. **Pneumatic and Hydraulic actuation systems:**
   Directional control valves, pressure control valves and cylinders. process control valves. Mechanical actuation system-kinematic chains, cams, geartrains. Ratchet & Pawl, dampers, bearings. Electrical actuation system. Mechanical switches- solenoid operated solid state switches, DC, AC & stepper motors.
   Building blocks of Mechanical spring, mass and damper. Drives- Electrical Drives, Fluid systems, hydraulic, servo, closedloop controllers.
3. Elements of Microprocessors & Microcontrollers, Programmable **logic controllers &** Communication interface.
4. **Case Studies of Mechatronic Systems:**
   Industrial Robot and its control
   Automobile Engine Control
   Electromechanical disc-control.
5. **Vehicle suspension Control:**
   Micro mechanical systems. Computer Printer, VCR, Fax Machine, NC Machine.

References:

1. Rolf Isennann, " Mechatronics Systems", Springer, 2005.
2. W. Bolten, "Mechatronics", Pearson Education 2003.
3. HMT Ltd, "Mechatronics:, Tata McGraw Hill 1998.

ELECTIVE-III

ECS – 039 : OBJECT ORIENTED SYSTEMS AND C++

L T P
3 1 0

Unit-I

Object & classes, Links and Associations, Generalization and Inheritance, Aggregation, Abstract classes, Generalization, Multiple Inheritance, Meta data.

Unit-II

Events and States, Operations and Methods, Nested state diagrams, Concurrency, Relation of Object and Dynamic Models.

Unit-III

Functional Models, Data flow diagrams, Specifying Operations, Constraints, OMT Methodologies, examples and case studies to demonstrate methodology

Unit-IV

Principles of object oriented programming, Tokens, Expressions, classes, Functions, Constructors, Destructors,Functions overloading, Operator Overloading, I/O Operations.
Real life applications, Inheritance Extended Classes, Pointer. Virtual functions, Polymorphisms, Working with files, Class templates, Function templates,Exception handling, String manipulation. Translating object oriented design into implementations.

Unit-V:

Introduction to Unix/Linux operating systems. Concept of file system, handling ordinary files,concept of shell, vi editor, Basic ile attributes, concept of process, Basic system administration.

Text Books:

1. Rambaugh James etal, "Object Oriented Design and Modeling",PHI-1997
2. Balagurusamy E," Object Oriented Programming with C++", TMH,2001 '
3. Sumitabha Das “Unix concepts & application” TMH

Reference Books:

1. Dillon and Lee, "Object Oriented Conceptual Modeling", New Delhi PHI-1993
2. Lipman, Stanley B, Jonsce Lajoie, *C++* Primer Reading", AWL, 1999
3. Stephen R. Shah, "Introduction to Object Oriented Analysis and Design", TMH
4. Berzin Joseph, "Data Abstraction: the object oriented approach using *C++",* McGraw Hill
5. Budd, Timothy, "An Introduction to Object Oriented Programming", Pearson 2000

EEE –031: POWER SYSTEM OPERATION AND CONTROL

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UNIT-I

Introduction :

Structure of power systems,
Power system control center and real time computer control, SCADA system
Level decomposition in power system
Power system security
Various operational stages of power system
Power system voltage stability

UNIT-II

Economic Operation :

Concept and problems of unit commitment
Input-output characteristics of thermal and hydro-plants
System constraints
Optimal operation of thermal units without and with transmission losses, Penalty factor, incremental transmission loss, transmission loss formula (without derivation)
Hydrothermal scheduling long and short terms
Concept of optimal power flow

UNIT-III

Load Frequency Control :

Concept of load frequency control,

Load frequency control of single area system:

Turbine speed governing system and modeling, block diagram representation of single area system, steady state analysis, dynamic response, control area concept, P-I control, load frequency control and economic dispatch control.

Load frequency control of two area system:

Tie line power modeling, block diagram representation of two area system, static and dynamic response

UNIT-IV

Automatic Voltage Control :

Schematic diagram and block diagram representation, different types of Excitation systems & their controllers.

Voltage and Reactive Power control :

Concept of voltage control, methods of voltage control-control by tap changing transformer. Shunt Compensation, series compensation, phase angle compensation

UNIT-V

State Estimation:

Detection and identification, Linear and non-linear models.

Flexible AC Transmission Systems:

Concept and objectives

FACTs controllers: Structures & Characteristics of following FACTs Controllers.

TCR,FC-TCR, TSC, SVC, STATCOM, TSSC, TCSC, SSSC, TC-PAR, UPFC

Text Books:

1. D.P. Kothari & I.J. Nagrath, "Modern Power System Analysis" Tata Mc Graw Hill, 3rd Edition.
2. P.S.R. Murty, "Operation and control in Power Systems" B.S. Publications.
3. N. G. Hingorani & L. Gyugyi, " Understanding FACTs" Concepts and Technology of Flexible AC Transmission Systems"
4. A. J. Wood & B.F. Wollenburg, " Power Generation, Operation and Control " John Wiley & Sons.

Reference Books:

1. O.I. Elgerd, "Electric Energy System Theory" Tata McGraw Hill.
2. P. Kundur, " Power System Stability and Control Mc Graw Hill.
3 M.H. Rashid, "Power Electronics: Circuits, devices and Applications" Prentice Hall of India,3rd Edition.
4. T. K. Nagsarkar & M.S.Sukhiza,' Power System Analysis' Oxford University Press.

EEE-032: ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

L T P
3 1 0

Unit-I

Mode of operation of higher order processors: Real mode and protected mode

Real mode and protected mode memory addressing, access right byte, Memory paging, System descriptors, Multi Tasking & TSS.

Unit-II

Instruction Set of higher order processors(8086 to Pentium):

Comparison with 8086 in real mode: Generalized instruction set format

Addressing Mode: DRAM & BRAM

Categorization of instruction set of INTEL processors.

Integer instructions: Data transfer instructions, arithmetic and logical operations, string instructions, branch control instructions, procedure call instruction and return instruction.

Unit-III

Processing of CALLS, INTERRUPTS & EXCEPTIONS: Privilege levels; ENTER and LEAVE Instructions, INT N. IRET. Interrupt processing sequence, Protected mode interrupts.

Unit-IV

Assembly Level Programming: ROM BIOS Routines, MS DOS BIOS Routines, Assembling a progam using Assembler, exe and. com programs.

Mixed Language Programming: using Assembly with C/C ++

Unit-V

Microcontrollers: Introduction, basic functions, applications of 8-bit and 16-bit microcontrollers.

8-bit microcontrollers INTEL 8051: Internal Architecture, signals, memory organization and interfacing, Timing and control, port operations, interrupts and I/O addressing. Instruction Set and programming.

16-bit microcontrollers INTEL 8096: Architectural description, memory Organization and interfacing, I/O addressing, Interrupts, instruction set and programming.

Text Books:

1. Ray, A.K. & Burchandi, K.m., "Advanced Microprocessors and Peripherals: Architeacture, Programming and Interfacing" Tata Mc.Graw Hill.
2. Renu Sing & B.P.Singh, "Advanced Microprocessors and Microcontrollers" New Age International.
3. Krishna Kant,"Microprocessors and Microcontrollers" PHI Learning.
4. Brey, Barry B. "The INTEL Microprocessors" Pearson Education.

Reference Books:

5. Ayala, "The 8051 Micro Controller", Centage Learning.
6. Mazidi M.A., Maizidi J.G. Mckinlay R.D., "The 8051 Microcontroller and Embedded Systems" Pearson Education.
7. Rajkamal, "The concept and feature of microcontrollers 68HC11, 8051 and 8096", S.Chand Publisher, New Delhi
8. Peatman John, "Design with microcontroller", Mc.-Graw Hill Publishing.

EEE –702: ELECTRIC DRIVES

L T P
3 1 0

UNIT-I

Fundamentals of Electric Drive:

Electric Drives and its parts, advantages of electric drives
Classification of electric drives
Speed-torque conventions and multi-quadrant operations
Constant torque and constant power operation
Types of load,Load torque: components, nature and classification

UNIT-II

Dynamics of Electric Drive:

Dynamics of motor-load combination
Steady state stability of Electric Drive
Transient stability of electric Drive

Selection of Motor Power rating:

Thermal model of motor for heating and cooling, classes of motor duty, determination of motor power rating for continuous duty, short time duty and intermittent duty.
Load equalization

UNIT-III

Electric Braking:

Purpose and types of electric braking,

braking of dc, three phase induction and synchronous motors

Dynamics During Starting and Braking: Calculation of acceleration time and energy loss during starting of dc shunt and three phase induction motors, methods of reducing energy loss during starting.

Energy relations during braking, dynamics during braking

UNIT-IV

Power Electronic Control of DC Drives:

Single phase and three phase controlled converter fed separately excited dc motor drives (continuous conduction only), dual converter fed separately excited dc motor drive, rectifier control of dc series motor.

Supply harmonics, power factor and ripples in motor current

Chopper control of separately excited dc motor and dc series motor.

UNIT-V

Power Electronic Control of AC Drives: Three Phase induction Motor Drive:

Static Voltage control scheme, static frequency control scheme (VSI, CSI, and cyclo - converter based) static rotor resistance and slip power recovery control schemes.

Three Phase Synchronous motor:

Self controlled scheme

Special Drives:

Switched Reluctance motor, Brushless dc motor.

Selection of motor for particular applications

Text Books:

1. G.K. Dubey, “Fundamentals of Electric Drives”, Narosa publishing House.
2. S.K.Pillai, “A First Course on Electric Drives”, New Age International.

Reference Books:

1 M.Chilkin, “Electric Drives”,Mir Publishers, Moscow.
2 Mohammed A. El-Sharkawi, “Fundamentals of Electric Drives”, Thomson Asia, Pvt. Ltd. Singapore.
3 N.K. De and Prashant K.Sen, “Electric Drives”, Prentice Hall of India Ltd.
4 V.Subrahmanyam, “Electric Drives: Concepts and Applications”, Tata McGraw Hill.

ELECTIVE-IV

EEC-046 : TELEMETRY AND DATA TRANSMISSION

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Unit-1.

Sampling Fundamentals:

Introduction to sampling theorem and sampling process, convolution, computing minimum sampling rate. Alising Errors. **(2)**

Digital Modulation Techniques:

Review of PCM, DPCM, Methods of binary data transmission, Data Formats, DM code converters, PSK, QPSK, FSK, probability of error,phase ambiguity resolution and differential encoding, error detection, error correction, error correction codes. **(6)**

Unit- 2 & 3

Data Handling System:

Block schematic, Sensors, Signal conditioners, Multiplexing- high level and low level, ADC- range and resolution, Word Format, Frame format, Frame synchronizer codes, R. F. links, X24, RS 422, RS423, RS 232C interfaces, Multi terminal configuration, Multiplier & Concentrator, Data Modems, Data transmission over telephone lines. **(8)**

Data Reception Systems:

Bit synchronizers, frame synchronizers, subframe synchronizers, PLL, Display systems. **(4)**

Unit-4

Remote Control:

Communication based processing control systems, pipelines, Operational security systems components, Pipeline control, Power system control, Programmable controllers for factory automation. **(6)**

Command: Tone command system, Tone digital command system, ON/OFF command and data commands. **(3)**

Unit-5

Aerospace Telemetry:

Signal formation and conversion, Multiplexing techniques in tele-control, Industrial Tele-control installations, reliability in telecontrol installations. **(9)**

Text Books:

1. Patranabis," Telemetry Principles: Tata Mcgrew Hill.
2. Schweber," Data Communication " Mcgraw Hill.
3. Berder & Menjewlse," Telemetry Systems".

EEC-047: EMBEDDED SYSTEM

L T P
3 1 0

Unit-I

1. Introduction: Embedded systems and its applications, Embedded Operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design
2. Hardware Fundamentals for the embedded developers Digital circuit parameters-Open collector outputs Tristate outputs I/O sinking and Sourcing, PLD's, Watchdog Timers, Hardware design and development.
3. Custom Single Purpose Processors: Optimizing program, FSMD, Data path & FSM.
4. General purpose processors and ASIP's (Application Specific Instruction set Programming): Software and operation of general purpose processors-Programmers View Development Environment-ASIPs Microcontrollers-DSP Chips.

Unit-II & III

5. Introduction to Microcontrollers and Micoprocessors, Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures.
6. 8051 Microcontrollers-Assembly language, architecture, registers, Addressing modes, Instruction set, I/O ports and memory organization Interrupts Timer/counter and serial communication.

Unit-IV

7. RTOS-Tasks, states, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes.
8. Advanced Processor-(only architectures) 80386, 80486 and ARM (References)

Unit-V

9. Communication basics, Microprocessor Interfacing I/O Addressing, Direct memory access, Arbitration, multilevel bus architecture, Serial protocols, Parallel protocols and wireless protocols.
10. Real world Interfacing: LCD, Stepping Motor, ADC, DAC, LED, Push Buttons, Key board, Latch Interconnection, PPI.

Text Books:

1. Embedded System Design-Frank Vahid/Tony Givargis, John Willey@2005.
2. Microcontroller (Theory and Applications) Ajay V Deshmukh,Tata McGraw- Hill@2005.
3. An Embedded Software Primer-David E.Simon, Pearson Education @ 1999.

References:

1. The 8051 Microcontroller and embedded systems-Muhammad Ali Mazidi and Janice Gillispie.
2. Microcontrollers (Architecture, Implementation & Programming) Kenneth Hintz, Daniel Tabak, Tata McGraw-Hill@2005.
3. 8051 Microcontrollers & Embedded Systems 2nd Edition-Sampath Kr, Katson Books@2006.

EEC–048: DIGITAL SYSTEM DESIGN USING VHDL

L T P
3 1 0

UNIT-I:

INTRODUCTION TO VHDL: VHDL description, combinational, networks, modeling flip flop using VHDL, VHDL model for multiplexer, compliance and simulation of VHDL, codes, modeling a sequential machine, variables, signals and constants, arrays VHDL operators, VHDL functions, VHDL procedures, packages and libraries, VHDL model for a counter.

ADVANCED VHDL: Attributes, transport and inertial delays, operator over loading, multi valued logic and signal resolution, IEEE-1164, standard logic, generic, generates statements, synthesis of VHDL codes, synthesis examples, file handling and TEXTIO.

UNIT-II:

DESIGN OF NETWORKS FOR ARITHMATIC OPERATIONS: Design of serial adder with accumulator, state graph for control networks design of binary multiplier, multiplication of signed binary numbers design of binary divider.

DIGITAL DESIGN WITH SM CHART: state machine charts, derivation of SM charts, realization of SM charts, implementation of dice game, alternative realization of SM charts using microprogramming, linked state machine.

UNIT-III:

FLOATING POINT ARITHMETIC: Representation of floating point numbers, floating point multiplication and other floating point operations.

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES: Xinx 3000 series FPGAs, Xinx 4000 series FPGAs, using one hot state assignment.

UNIT-IV:

MEMORY MODELS FOR MEMORIES AND BUSES: Static RAM, a simplified 486 bus model, interfacing memory to microprocessor bus.

UNIT-V:

DESIGN EXAMPLES: UART design, description of MC68HC05 microcontroller, and design of micro-controller CPU, complete microcontroller design.

Text Book:

1. Charles H Roth Jr, “Digital System Design using VHDL”, Thomson Learning, 2002.

Reference Books:

2. Stephen Brown & Zvonko Vranesic, “Fundamentals of digital logic design with VHDL”, TMH, 2nd Ed., 2007.

3. Jhon F Wakerly, “Digital design”, PHI, 4th Ed.

4, Volnei A. Pedroni, “Circuit Design with VHDL” PHI Learning

EEC-049 : OPTICAL FIBER COMMUNICATION

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3 1 0

UNIT-I

1. Introduction: Block diagram of optical fiber communication system, Advantages of optical fiber communication.

2. Optical fiber waveguides: structure of optical wave guide, light propagation in optical fiber using ray theory, acceptance angle, numerical aperture, skew rays, wave theory for optical propagation, modes in a planar and cylindrical guide, mode volume, single mode fibers, cutoff wavelength, mode field diameter, effective refractive index and group and mode delay factor for single mode fiber.

UNIT-II & III

3. Transmission Characteristics of Optical fiber, Attenuation in optical fibers, intrinsic and extrinsic absorption, linear and non linear scattering losses, fiber bend losses. Dispersion and pulse broadening, intramodal and intermodal dispersion for step and graded index fibers, modal noise, over all fiber dispersion for multimode and monomode fiber, dispersion shifted fibers, modal birefringence and polarization maintaining fibers

4. Optical Sources: Basic concepts Einstein relations and population inversion optical feedback and threshold conditions, direct and indirect band gap semiconductors spontaneous and stimulated emission in p-n junction, threshold current density, Hetero junction & DH structure, semiconductor injection lasers structure & Characteristics of injection laser. Drawback and advantages of LED, DH, LED, LED structures and characteristics.

5.Optical detectors: Requirement for photo detections p-n photodiode, characteristics of photo detections, p-i-n and avalanche photodiodes, phototransistors & photoconductors

UNIT-IV & V

6. Direct detection receiver performance considerations: Noise sources in optical fiber communication, noise in p-n, p-i-n and APD receivers, Receiver structures.

7. Optical fiber communication systems: Principal components of an optical fiber communication system, source laminations, optical transmitter circuits, LED and laser drive circuits, optical receiver block diagram, simple circuits for pre-amplifier, automatic gain control and equalization, Regenerative repeater, BER of optical receiver, channel losses, ISI penalty and optical power budgeting for digital optical fiber system, line coding, analog systems, Direct intercity and sub carrier intensity modulation using AM, FM and PM.

Block diagram and detection principle of coherent optical fiber system.

Text Book:

1. Optical fiber Communication: John M.S Senior PHI, 2nd Ed.

Reference Books:

1. Optical Communication: J. Gowar PHI, 2nd Ed.
2. Optical fiber Communication: G.E. Keiser Mc Graw-Hill, 3rd Ed.
3. Optoelectronics: Wilson & Hawkes PHI, 2nd Ed.

ELECTIVE V

EEE – 051: BIO-INSTRUMENTATION

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UNIT-I

Basic physiological system of the body:

Problems encountered in measuring living systems, bioelectric potentials, biomaterials

Basic Transducer Principles:

Active and passive transducers,

Transducers for biomedical applications.

Generation, propagation and distribution of bioelectric potentials (ECG, EEG and EMG).

UNIT-II

Bio-potential electrodes:

Basic types (micro, skin surface and needle electrodes) biochemical transducers. (PH, blood, gas and specific ions electrodes).

The cardiovascular system and measurements:

Heart and cardiovascular system and circulation block diagram, blood pressure and measurement, characteristics of blood flow and heart sounds.

Electrocardiography, ECG lead configurations, ECG recording and their types

UNIT-III

The Nervous System

The anatomy of nervous system, Neuronal communication, EPSP & IPSP

Organization of the brain,

Measurements from the nervous system

Systemic Body & Skin Temperature Measurement

Temperature measurements

Brief idea about ultrasonic measurements

UNIT-IV

Patient care monitoring:

Elements of intensive care,

Organization of the Hospital for patient-care monitoring

Pace-makers-types, systems, modes and generators,

Defibrillators-types.

Bio telemetry & applications of telemetry in patient care

UNIT-V

Automation of chemical tests,

Instrumentation for diagnostic X Rays,

Interfacing computer with medical instrumentation and other equipments, biomedical computer applications.

Shock hazards from electrical equipments, methods of accident prevention

Text Book:

1. T. Cromwell, F.J. Weibell & F.A.Pfieffer, “Biomedical Instrumentation & Measurements” Prentice Hall International

Reference Books:

1. R.S. Khanpur, “Handbook of Biomedical Instrumentation” Tata Mc Graw Hill
2. H.E. Thomas, “Handbook of Biomedical Instrumentation and Measurement” Restone Publishing Company
3. J.G. Webester, “Medical Instrumentation”, Houghton Mifflin.

EEE – 052: ADVANCED CONTROL SYSTEM

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Unit-I

State Space Analysis of Continuous System:

Review of state variable representation of continuous system, conversion of state variable models to transfer function and vice-versa, solution of state equations and state transition matrix, controllability and obsrvability, design of state observer and controller

Unit-II

Analysis of Discrete System:

Discrete system and discrete time signals, state variable model and transfer function model of discrete system, conversion of state variable model to transfer function model and vice-versa, modeling of sample-hold circuit, solution of state difference equations, steady state accuracy, stability on the z-plane and Jury stability criterion, bilinear transformation, Routh-Hurwitz criterion on rth planes

Unit-III

Stability:

Lyapunov's stability theorems for continuous and discrete systems, methods for generating Lyapunov function for continuous and discrete system, Popov's criterion.

Non linear System:

Types of non linearities, phenomena related to non - linear systems.

Analysis of non linear systems-Linearization method, second order non-linear system on the phase plane, types of phase portraits, singular points, system analysis by phase-plane method, describing function and its application to system analysis.

Unit-IV

Optimal Control:

Introduction, formation of optimal control problem, calculus of variations minimization of functions, constrained optimization.Pontryagin's Minimum Maximum Principle, Linear Quadratic Problem-Hamilton Jacobi equation, Riccati equation and its solution.

Unit-V

Adaptive Control:

Introduction, modal reference adaptive control systems, controller structure, self tuning regulators.

Introduction to neural network, fuzzy logic and genetic algorithms

Text Books:

1. M.Gopal, "Digital Control and State variable Methods", Tata Mc Graw Hill
2. Ajit K.Madal, "Introduction to Control Engineering: Modelling, Analysis and Design" New Age International.
3. D.Landau, "Adaptive Control", Marcel Dekker Inc.
4. S.Rajasekaran & G.A.Vjayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Alogorithms: Synthesis and Applications" Prentice Hall of India.

Reference Books:

1. Donald E. Kiv, "Optimal Control Theory: An Introduction" Prentice Hall
2. B.C. Kuo, "Digital Control Systems" Sounders College Publishing
3. C.H.Houpis and G.B.Lamont,"Digital Control Systems:Theory,Hardware, Software"Mc Graw Hill.

EEE – 053: RELIABILITY ENGINEERING

L T P
3 1 0

1. Introduction:

Definition of reliability, types of failures, definition and factors influencing system effectiveness, various parameters of system effectiveness.

2. Reliability Mathematics :

Definition of probability, laws of probability , conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis procedures, empirical reliability calculations.

3. Reliability:

Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie-set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

4. Reliability Improvements:

Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series - parallel, stand by and hybrid, effect of maintenance.

5. Reliability Testing:

Life testing, requirements, methods, test planning, data reporting system, data reduction and analysis, reliability test standards.

Text Books :

1. R.Billintan & R.N. Allan,"Reliability Evaluation of Engineering and Systems", Plenum Press.
2. K.C. Kapoor & L.R. Lamberson,"Reliability in Engineering and Design", John Wiely and Sons.

Reference Books:

3. S.K. Sinha & B.K. Kale,"Life Testing and Reliability Estimation", Wiely Eastern Ltd.
4. M.L. Shooman, "Probabilistic Reliability, An Engineering Approach", McGraw Hill.
5. G.H.Sandler,"System Reliability Engineering", Prentice Hall.

EEE-054: ENERGY EFFICIENCY AND CONSERVATION

L T P
3 1 0

UNIT -I

Energy conservation:-

Principles of Energy Conservation, Energy conservation Planning, Energy conservation in small scale industries, Large scale industries and in electrical generation, transmission and distribution. Energy conservation Legislation. **4**

Energy Audit:-

Aim of energy Audit, Strategy of Energy Audit, Energy management Team Considerations in implementing energy conservation Programme, Instruments for energy audit, Energy audit of Electrical System, HVAC, Buildings, Economic analysis. **4**

UNIT -II

Demand Side Management:-

Concept and Scope of Demand Side Management, Evolution of Demand Side Management, DSM Strategy ,Planning, Implementation and its application. Customer Acceptance & its implementation issues. National and International Experiences with DSM. **8**

UNIT –III

Voltage and Reactive power in Distribution System:-

Voltage and reactive power calculations and control: Voltage classes and nomenclature, voltage drop calculations, Voltage control, VAR requirements and power factor, Capacitors unit and bank rating, Protection of capacitors and switching, Controls for switched capacitors and fields testing. **10**

UNIT –IV

Efficiency in Motors and Lighting system:-

Load scheduling/shifting, Motor drives- motor efficiency testing, energy efficient motors, and motor speed control. Lighting- lighting levels, efficient options, fixtures, day lighting, timers, Energy efficient windows.UPS selection, Installation operation and maintenance.

Indian Electricity Act 1956, Distribution Code and Electricity Bill 2003 **14**

Text / Reference Books

1. Tripathy S. C., "Electric Energy Utilization and conservation", Tata McGraw Hill.
2. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982.
3. "The Efficient Use of Energy", Edited by I.G.C.Dryden, Butterworths, London, 1982.
4. Energy Management Handbook, Edited by W.C.Turner, Wiley, New York, 1982.
5. L.C.Witte, "P.S.Schmidt, D.R. Brown, Industrial Energy Management and Utilization", HemispherePubl, Washington, 1988
6. Power Capacitor Handbook, Butterworth & Co (Publishers) Ltd, 1984.
7. Electrical Systems Analysis and Design for Industrial Plants, McGraw-Hill Book Company.
8. IEEE Bronze Book, 'Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities, IEEE Press.

ELECTIVE-VI

EEC-066 : MICROWAVE & RADAR

UNIT –I

PROPAGATION THROUGH WAVEGUIDES:

Rectangular waveguide, solution of wave equation in rectangular co-ordintes derivation of field equations for TE & TM modes degenerate and dominate mode, Power Transmission and Power loss, Excitation of waveguides, nonexistence of TEM mode in wave guides, Introduction to circular of TEM mode in waveguides, Introduction to circular of TEM mode in waveguides, Introduction to circular Waveguides, Stripline and microstripline.

UNIT –II

MICROWAVE CAVITY RESONATORS:

Rectangular and cylindrical cavities, Quality factor, Excitation of cavities.

MICROWAVE COMPONENTS:

Wave guide couplings, bends and twists, Transitions, Directional couplers, hybrid couplers, Matched load, Attenuators and phase shifters, E-plane, H-plane and Hybrid Tees, Hybrid ring.

Waveguide discontinuities, Windows, Irises and Tuning screws, Detectors, wave meters; Isolators and Circulators, tunable detector, slotted line carriage, VSWR meter.

Scattering Matrix.

UNIT –III

MICROWAVE MEASUREMENTS:

Measurement of frequency, Wave length, VSWR, Impedance Attenuation, Low and high power. Radiation pattern.

UNIT –IV

Limitation of conventional active devices at Microwave frequency.

UNIT –V

MICROWAVE TUBES:

Klystron, Reflex Klystron, Magnetron, TWT, BWO: Their schematic, Principle of operation, performance characteristics and application.

UNIT –VI

MICROWAVE SEMICUNDOTOR DEVICES:

PIN diode, Tunnel diode, LSA diode, varactor diode, Gunn Devices, IMPATT and TRAPATT, their Principal of operation, characteristics and applications.

UNIT –VII

PRINCIPLES OF RADAR:

Radar Block diagram operation, Radar Range equation, Radar Frequencies Pulse and C.W. Radar, Introduction to Doppler and M.T. Radar, Applications.

UNIT –VIII

RADAR TRANSMITTERS & DEVICES:

Block diagram of radar receiver for C.W. and pulse radar, front end amplifier, Receiver noise figure, Duplexers Radar antennas, Radar Displays, Introduction to Radar clutter.

Text Books:

1. Liao, S.Y. / Microwave Devices & Circuits; PHI 3rd Ed.
2. 2 M.I. Skolnik, Introduction to Radar Engineering ; THM

Reference Books:

1. Collin, R.E. Foundations for Microwave Engineering; TMH 2nd Ed.
2. Rizzi, Microwave Engineering: Passive Circuits; PHI.
3. A Das and S.K. Das, Microwave Engineering; TMH.

EEC-067 : SPEECH PROCESSING

UNIT-I

1. Digital models for speech signals: Mechanism of speech production & acoustic phoenetics, the acoustic theory of speech production, lossless tube models, and digital models for speech signals.

UNIT-II

2. Time Domain methods of speech sampling: Time dependent processing of speech, short time energy and average magnitude, short time average zero crossing rate,discrimination between speech& silence, pitch period estimation using parallel processing, short time autocorrelation function & AMDF, pitch period estimation using autocorrelation function.

UNIT-III

3. Short time Fourier Analysis: Definition and properties, design of filter banks, implementation of filter bank summation method using FFT, spectrographic displays, pitch detection, analysis by synthesis phase, vocoder and channel vocoder .

UNIT-IV

4. Homomorphic speech processing: Homomorphic system for convolution, complex cepstrum of speech, pitch detection using Homomorphic processing, formant estimation, Homomorphic vocoder.

UNIT-V

Linear Predictive Coding of Speech: Basic principles of linear predictive analysis, the autocorrelation method, computation of the gain for the model, solution of LPC equations for auto correlation method, prediction error and normalized mean square error, frequency domain interpretation of mean squared prediction error relation of linear predictive analysis to lossless tube models, relation between various speech parameters, synthesis of speech from linear predictive parameters, application of LPC parameters.

Text / Reference Books:

1. Digital Processing of speech signals by R.L. Rabiner & R.W. chafer, Pearson Education.
2. Voice processing by G.E. Pelton, McGraw –Hill.
3. Speech Analysis, synthesis and perception by J.L. Flanagan, Springer- Verlog. N. Y.
4. Diserete time speech signal Processing: Principles and Practices by Jhomas Quatieri, Pearson Education.

EEC -068 : IMAGE PROCESSING

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UNIT-I

Image:

Image formation, image geometry perspective and other transformation, sterio imaging elements of visual perception

Digital Image-sampling and quantization serial & parallel Image processing

UNIT-II

Signal Processing - Fourier, Walsh-Hadmard discrete cosine and Hotelling transforms and their properties, filters, correlators and convolvers

Image enhancement-Contrast modification,

Histogram specification, smoothing, sharpening, frequency domain enhancement, pseudo-colour enhancement

UNIT-III

Image Restoration-Constrained and unconstrained restoration Wiener filter , motion blur remover, geometric and radiometric correction

Image data compression-Huffman and other codes transform compression, predictive compression two tone Image compression, block coding, run length coding, and contour coding.

UNIT-IV

Segmentation Techniques-thresholding approaches, region growing, relaxation, line and edge detection approaches, edge linking, supervised and unsupervised classification techniques, remotely sensed image analysis and applications

UNIT-V

Shape Analysis – Gestalt principles, shape number, moment Fourier and other shape descriptors, skelton detection, Hough transform, topological and texture analysis, shape matching.

Practical Applications – Finger print classification, signature verification, text recognition, map understanding, bio-logical cell classificaton.

Text Books:

1.Ganzalez and Wood, “Digital Image Processing”, Addison Wesley, 1993.

2.Anil K.Jain, “Fundamental of Image Processing”, Prentice Hall of India

References:

1.Rosenfeld and Kak, “Digital Picture Processing” vol.I & vol.II, Academic,1982

2.Ballard and Brown, “Computer Vision”, Prentice Hall, 1982

3.Wayne Niblack, “An Introduction to Digital Image Processing”, Prentice Hall, 1986

4.Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing, Analysis and Machine Vision”,Vikas Publications.

EEC-069 : SATELLITE COMMUNICATION

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UNIT-I

Elements of Satellite Communication

Orbital mechanics, look angle and orbit determination, launches & launch vehicle, orbital effects, Geostationary Orbit.

UNIT-II

Satellite subsystems, attitude and orbit control systems, TTC&M, communication subsystem, satellite antennasatellite link design: basic transmission theory, system noise temperature and G/T ratio, downlink design, uplink design, satellite systems using small earth station, design for specified C/N.

UNIT-III

Modulation and multiplexing techniques for satellite links: FM, pre-emphasis and de-emphasis, S/N ratios for FM video transmission, digital transmission, digital modulation and demodulation, TDM.
Multiple access: FDMA, TDMA, DAMA and CDMA.

UNIT-IV

Error control for digital satellite links: error detection and correction, channel capacity, error control coding, convolutional codes, linear and cyclic block codes.
Propagation effects and their impact on satellite-earth links: attenuation and depolarization, atmospheric absorption, rain, cloud and ice effects etc.

UNIT-V

Introduction of various satellite systems: VSAT, low earth orbit and non-geostationary, direct broadcast satellite television and radio, satellite navigation and the global positioning systems.

Text Books:

1. Satellite Communications / Pratt, Bostian, Allnutt / John Wiley & Sons.
2. Satellite Communications / Dennis Roddy / McGraw-Hill
3. Digital Satellite Communications/ Tri T. Ha./ McGraw-Hill.