JAGANNATH UNIVERSITY

Faculty of Engineering & Technology

B.Tech

(w.e.f. 2015-2016)

- ## Scheme of Examination

Electrical Engineering

- ## Detailed Syllabus

University Campus

NH-12, Chaksu Bypass, Tonk Road, Jaipur-303901

Phone : 0141-3020500/555,Fax : 0141-3020538

Plot No.-IP-2 & 3, Phase-IV, Sitapura Industrial Area, Jaipur-202022

Phone : 0141-4071551/552, Fax : 0141-4071562

Faculty of Engineering & Technology

B.Tech (Electrical Engg.)

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** Approved by AC vide resolution no. …… dated ……..*

FACULTY OF ENGINEERING & TECHNOLOGY

LIST OF COURSES (ELECTRICAL ENGINEERING DEPARTMENT)

CORE COURSES:

- Engineering Physics I (BT101)
- Introduction to Computers Fundamental and IT* (BT102)
- Applied Mathematics I (BT103)
- Introduction to Electrical & Electronic Engineering (BT104)
- Engineering Chemistry (BT106)
- Engineering Physics II (BT201)
- Introduction to Computer Programming * (BT202)
- Engineering Mechanics (BT203)
- Digital Electronics (BT204)
- Applied Mathematics II (BT205)
- Mathematics III (BT EE301)
- Circuit Analysis-I (BT EE302)
- Electrical Machine-I (BTEE303)
- Electronic Measurements & Instrumentation (BTEE304)
- Generation of Electric Power (BTEE305)
- Object Oriented Programming (BTEE306)
- Analog Electronics (BTEE401)
- Circuit Analysis-II (BTEE402)
- Electric Machines-II (EE403)
- Non Conventional Energy Systems (BTEE404)
- Data Base Management System (BTEE405)
- Random Variable & Stochastic Processes (BTEE406)
- Industrial Electronics (BTEE501)
- Microprocessors & Interfaces (BTEE502)
- Control System (EE503)
- Transmission & Distribution of Electric Power (BTEE504)
- High Voltage Engineering (BTEE505)
- Advanced Power System (BTEE601)
- Switchgear & protection (BTEE602)
- Economic operation of power system (BTEE603)
- Signals & Systems (BTEE604)
- Modern Control Theory (BTEE605)
- Power System Analysis(BTEE701)
- Power System Engineering (BTEE702)
- Electrical Machine Design(BTEE703)
- Electric drives and control(BTEE704)
- Application of Power Electronics to Power Systems (BTEE 801)
- Power System Operation and Control (BTEE 802)
- Minor Project II (BTEE 711)
- Major Project (BTEE 807)

ELECTIVE COURSES (Discipline Centric)

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- Materials in Electrical Systems (BTEE506A)
- Switching Theory and Logic Design (BTEE506B)
- Digital Signal Processing (BTEE506C)
- Communication Systems (BTEE506D)
- Electromagnetic Field Theory (BTEE506E)
- Power Quality (BTEE606A)
- Power System Reliability (BTEE606B)
- Power system coordination and control (BTEE606C)
- Advanced Microprocessors (BTEE606D)
- Electric Drives & Their Control (EE705A)
- Intelligent and smart instrumentation (BTEE705B)
- PLC and SCADA Systems (BTEE705C)
- Power line Carrier Communication (BTEE705D)
- Utilization of Electric Power (BTEE706A)
- Artificial Intelligence (BTEE706B)
- Power Plant Instrumentation (BTEE706C)
- Power Distribution System (BTEE706D)
- Neuro and Fuzzy Systems (BTEE803A)
- Ecommerce and its applications (BTEE803B)
- Telemetry and data acquisition system (BTEE803C)
- Advance Control Systems (BTEE803D)
- VLSI Design (BTEE803E)

ELECTIVE COURSES (OPEN ELECTIVE)

- Advanced manufacturing methods (BTEE804A)
- Disaster Management (BTEE804B)
- sociology and elements of Indian history for engineers (BTEE804C)
- Value Education And Human Rights (BTEE804D)
- Community development (BTEE804E)

ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

- English & Communication Skills (BT105)
- Environmental Sciences (BT206)

SKILL ENHANCEMENT COURSES

- Communication Skill Lab
- GD & Soft Skill
- Project Manage

FIRST SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BT 101	Engineering Physics-I	3	1	-	30	70	100	4
BT 102	Introduction to Computers Fundamental and IT*	3	-	-	30	70	100	3
BT 103	Applied Mathematics-I	3	1	-	30	70	100	4
BT 104	Introduction to Electrical & Electronic Engineering	3	-	-	30	70	100	3
BT 105	English & Communication Skills	3	-	-	30	70	100	3
BT 106	Engineering Chemistry	3	-	-	30	70	100	3

PRACTICALS/VIVA-VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BT 107	Electrical & Electronics Lab-I	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab-I	-	-	2	30	20	50	1
BT 109	IT Fundamental Lab*	-	-	2	30	20	50	1
BT 110	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 111	Engineering Workshop	-	-	2	30	20	50	1
TOTAL		18	**2**	**10**	**330**	**520**	**850**	**25**

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
COMMON TO ALL BRANCHES
SECOND SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BT 201	Engineering Physics-II	3	1	-	30	70	100	4
BT 202	Introduction to Computer Programming *	3	-	-	30	70	100	3

BT 203	Engineering Mechanics*	3	1	-	30	70	100	4
BT 204	Digital Electronics	3	-	-	30	70	100	3
BT 205	Applied Mathematics-II	3	-	-	30	70	100	3
BT 206	Environmental Sciences	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 207	Electrical & Electronic Lab-II	-	-	2	30	20	50	1
BT 208	Engineering Physics-II	-	-	2	30	20	50	1
BT 209	Computer Programming Lab*	-	-	2	30	20	50	1
BT 210	Engineering Drawing	-	-	2	30	20	50	1
BT 211	Communication Skill Lab*	-	-	2	30	20	50	1
TOTAL		**18**	**2**	**10**	**330**	**520**	**850**	**25**

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
THIRD SEMESTER

THEORY PAPERS

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTEE301	Applied Mathematics-III	3	1	-	30	70	100	4
BTEE302	Circuit Analysis-I	3	1	-	30	70	100	4
BTEE303	Electrical Machine-I	3	-	-	30	70	100	3
BTEE304	Electronic Measurements & Instrumentation	3	-	-	30	70	100	3
BTEE305	Generation of Electric Power	3	-	-	30	70	100	3
BTEE306	Object Oriented Programming	3	-	-	30	70	100	3
PRACTICALS /VIVAVOCE								
		L	**T**	**P**	**Seasonal**	**Practical**	**Total**	**Credits**
BTEE307	Electrical Machine Lab - I	-	-	2	30	20	50	1
BTEE308	Electronic Measurement & Instrumentation Lab	-	-	2	30	20	50	1
BTEE309	Object Oriented Programming Lab	-	-	2	30	20	50	1
BTEE310	Electrical Circuit Lab	-	-	2	30	20	50	1
BTEE311	Humanities & Social Science	-	-	2	30	20	50	1
	Total	18	2	10	330	520	850	25

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
FOURTH SEMESTER

THEORY PAPERS

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTEE401	Analog Electronics	3	1	-	30	70	100	4
BTEE402	Circuit Analysis-II	3	1	-	30	70	100	4
BTEE403	Electric Machines-II	3	-	-	30	70	100	3
BTEE404	Non Conventional Energy Systems	3	-	-	30	70	100	3
BTEE405	Data Base Management System	3	-	-	30	70	100	3
BTEE406	Random Variable & Stochastic Processes	3	-	-	30	70	100	3

PRACTICALS/ VIVA VOCE

		L	T	P	Seasonal	Practical	Total	Credits
BTEE407	Analog Electronics Lab	-	-	2	30	20	50	1
BTEE408	Electric Machine Lab-II	-	-	2	30	20	50	1
BTEE409	Technical Seminar	-	-	2	30	20	50	1
BTEE410	Data Base Management System Lab	-	-	2	30	20	50	1
BTEE411	GD & Soft Skill	-	-	2	30	20	50	1
	Total	18	2	10	330	520	850	25

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
FIFTH SEMESTER

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTEE501	Industrial Electronics	3	1	-	30	70	100	4
BTEE502	Microprocessors & Interfaces	3	-	-	30	70	100	4
BTEE503	Control System	3	1	-	30	70	100	4
BTEE504	Transmission & Distribution of Electric Power	3	-	-	30	70	100	3
BTEE505	High Voltage Engineering	3	-	-	30	70	100	3
	Elective (any one)							
BTEE506A	Materials in Electrical Systems	3	-	-	30	70	100	3

BTEE566B	Switching Theory and Logic Design	3	-	-	30	70	100	3
BTEE506C	Digital Signal Processing	3	-	-	30	70	100	3
BTEE506D	Communication Systems	3	-	-	30	70	100	3
BTEE506E	Electromagnetic Field Theory	3	-	-	30	70	100	3
PRACTICALS /VIVA VOCE								
		L	**T**	**P**	**Seasonal**	**Practical**	**Total**	**Credits**
BTEE507	Industrial Electronics Lab	-	-	2	30	20	50	1
BTEE508	Microprocessor Lab	-	-	2	30	20	50	1
BTEE509	MATLAB Programming Lab	-	-	2	30	20	50	1
BTEE510	Control System Lab	-	-	2	30	20	50	1
BTEE 511	Digital Signal Processing	-	-	2	30	20	50	1
BTEE 512	Training Viva	-	-	0	30	20	50	2
	Total	18	2	10	360	540	900	27

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
SIXTH SEMESTER

THEORY PAPERS

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTEE601	Advanced Power System	3	1	-	30	70	100	4
BTEE602	Switchgear & Protection	3	-	-	30	70	100	3
BTEE603	Economic Operation of Power System	3	-	-	30	70	100	3
BTEE604	Signals & Systems	3	1	-	30	70	100	4
BTEE605	Modern Control Theory	3	-	-	30	70	100	3
	Elective (any one)							
BTEE606A	Power Quality	3	-	-	30	70	100	3
BTEE606B	Power System Reliability	3	-	-	30	70	100	3
BTEE606C	Power System Coordination and Control	3	-	-	30	70	100	3
BTEE606D	Advanced Microprocessors	3	-	-	30	70	100	3

PRACTICALS / VIVA VOCE

		L	T	P	Seasonal	Practical	Total	Credits
BTEE607	Power System Lab	-	-	2	30	20	50	1
BTEE608	Advanced Power Electronics Lab	-	-	2	30	20	50	1
BTEE609	Power System Design Lab	-	-	2	30	20	50	1
BTEE610	Signal and Systems Lab	-	-	2	30	20	50	1
BTEE611	In House Workshop	-	-	0	30	20	50	1
BTEE612	Minior Project-I	-	-	1	30	20	50	2
	Total	18	2	9	360	540	900	28

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
SEVENTH SEMESTER

THEORY PAPERS

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
Code	**Subject/Paper**	L	T	P	IA	EA	Total	Credits
BTEE 701	Training & Seminar				540	360	900	**28**

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
EIGHTH SEMESTER

THEORY PAPERS

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTEE801	Power System Analysis	3	1	-	30	70	100	4
BTEE802	Power System Engineering	3	1	-	30	70	100	4
BTEE803	Electrical Machine Design	3	1	-	30	70	100	4
BTEE804	Electric Drives & Their Control	3	1	-	30	70	100	4
	ELECTIVE(any one)							
BTEE805A	EHV AC/DC Transmission	3	-	-	30	70	100	3
BTEE805B	Intelligent and Smart Instrumentation	3	-	-	30	70	100	3
BTEE805C	PLC and SCADA Systems	3	-	-	30	70	100	3
BTEE805D	Power Line Carrier Communication	3	-	-	30	70	100	3
	ELECTIVE(any one)							
BTEE806A	Utilization of Electric Power	3	-	-	30	70	100	3
BTEE806B	Artificial Intelligence	3	-	-	30	70	100	3
BTEE806C	Power Plant Instrumentation	3	-	-	30	70	100	3
BTEE806D	Power Distribution System	3	-	-	30	70	100	3
PRACTICALS /VIVA VOCE								
		L	**T**	**P**	**Seasonal**	**Practical**	**Total**	**Credits**
BTEE807	Electric Machine Design Lab	-	-	2	30	20	50	1
BTEE808	Electric Drives & Control Lab	-	-	2	30	20	50	1
BTEE809	MAT Lab for Electrical Engineers	-	-	2	30	20	50	1
BTEE810	Seminar	-	-	4	90	60	150	2
	Total	18		12	360	540	900	27
Grand Total of credits		138	17	73	2820	4180	7000	210
L- Lecture,T-Tutorial,P-Practical,IA-Internal Assessment,EA-External Assessment								

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to the project should be delivered one after starting of semester .The progress will be monitored through seminars and progress reports.

Note;--

1. The total number of the credits of (Electrical) Program are = 210.

2. Each student shall be required to appear for examinations in all courses. However, for the award of the degree a student shall be required to earn minimum of 200 credits.

For lateral entry students in Third SEMESTER ::--

1.The total number of credits of the B. Tech (Electrical)Program = 160

2.Each student shall be required to appear for examination for all courses third semester onwards .However, for the award of the degree a student shall be required to earn the minimum of 150 credits .

BACHELOR OF TECHNOLOGY

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
COMMON TO ALL BRANCHES
FIRST SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BT 101	Engineering Physics-I	3	1	-	30	70	100	4
BT 102	Introduction to Computers Fundamental and IT*	3	-	-	30	70	100	3
BT 103	Applied Mathematics-I	3	1	-	30	70	100	4
BT 104	Introduction to Electrical & Electronic Engineering	3	-	-	30	70	100	3
BT 105	English & Communication Skills	3	-	-	30	70	100	3
BT 106	Engineering Chemistry	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BT 107	Electrical & Electronics Lab-I	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab-I	-	-	2	30	20	50	1
BT 109	IT Fundamental Lab*	-	-	2	30	20	50	1
BT 110	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 111	Engineering Workshop	-	-	2	30	20	50	1
TOTAL		18	**2**	**10**	**330**	**520**	**850**	**25**

Note:

1. Semester I and II common for all Branches of Engineering.
2. Half the students will study Environmental Science in 1st Semester and rest will study Engineering Chemistry and Chemistry Lab. The students shall interchange the subjects and vice-versa In 2nd Semester.

BT101: Engineering Physics I

UNIT-I

Atomic Structure and Solid State: Atomic energy levels and electronic configuration, Intermolecular forces and binding, phases of matter, crystal structure simple cubic , body centered cubic and face centered cubic structures, energy bands in solids , band structure of metals, semiconductors and insulators.

UNIT-II

Semiconductor Physics: Extrinsic and intrinsic semiconductors, Fermi levels of undoped and doped semiconductors, p-n junction, depletion region, forward and reverse biased p-n junction, volt-Ampere characteristics of a diode , effect of temperature on diode characteristics, Zener diode , tunnel diode, photodiode and LEDs , their structure and characteristics.

UNIT-III

Theory of Relativity : Absolute and relative frames of reference, Galilean transformations, importance of Michelson-Morley experiment, postulates of special theory of relativity, Lorentz transformations, time dilation and length contraction, velocity addition , mass-energy relationship, elementary ideas about general theory of relativity.

UNIT-IV

Elementary Quantum Mechanics: Wave particle duality, deBroglie waves, experimental evidence of wave nature of matter, Schrodinger wave equation in One dimension, eigen values and eigen functions, physical interpretation of wave function, Heisenberg uncertainty principle, tunneling phenomenon.

UNIT5-V

Oscillation & Waves : Simple harmonic oscillator with example, energy of oscillator, Damping oscillator,viscous & solid friction damping,Qualityfactor,Resonance standing waves,elastic

waves,

Recommended reference books:

1.Conceptual Physics, P. Hewitt, Pearson, India

2. Physics for Scientists and Engineers, R. Serway

3. Fundamental University Physics, Alonso & Finn.

4. Physics Vol I and II, Resnick and Halliday

5. Berkley Physics Course Vol 1 & Vol. 3

6. Modern Physics , A . Beiser

BT102 - INTRODUCTION TO COMPUTER FUNDAMENTAL AND IT

UNIT-I

Computer System: Basics of computer systems, history, types and Generation of computer, capability and limitations of computer systems. Hardware organization: Anatomy of a digital computer, CPU.Internal architecture of CPU.Memory Units: Memory Hierarchy, Primary Memory, Secondary Memory, cache memory. Storage Devices, Input and Output Devices.

UNIT-II

Operating Systems: DOS Internal, External commands, Windows (2000 and NT) , Overview of architecture of Windows, tools and system utilities including registry , partitioning of hard disk , Overview of Linux architecture , File system , file and permissions , concept of user and group , installation of rpm and deb based packages.

UNIT-III

Number system & Conversions: decimal, binary, octal and hexadecimal number systems and their inter conversions, 1's and 2's complement representation, negative numbers and their representation, BCD, EBCDIC , ASCII and Unicode. Binary Arithmetic operations: addition, subtraction, multiplication, division.

UNIT-IV

Networking Basics - Uses of a Network and Common types of Networks, Network topologies and protocols, Network media and hardware, Overview of Database Management System.

UNIT-IV

Data Processing: Introduction to MS office, MS-Power Point and MS-Excel, Introduction to Electronic Spreadsheets, Applications of Electronic Spreadsheets, Types of Spreadsheets, Features of MS-Excel, Starting MS-Excel, Contents of the MS-Excel window, Cell Referencing,

Ranges and Functions, Formatting Worksheets and Creating Charts, Data Forms and Printing

Introduction to MS-PowerPoint : Introduction to MS-PowerPoint, What is a Presentations?, Slides, Working with Slides, Slides Show and Printing Presentation

Text/Reference Books:

1. Peter Norton, Introduction to computers, Sixth Edition Tata McGraw Hill (2007).
2. Pradeep K. Sinha, PritiSinha, Computer Fundamentals, BPB Publications.
3. Andrews Jean, A+Guide to Managing & Maintaining Your PC, Cengage Publication 6/e
4. Anita Goel, Computer Fundamentals, Pearson Education.

BT103- Applied Mathematics I

UNIT-I

Functions of variables: Geometric representation, limit, continuity and differentiability of functions of several variables , partial and full derivatives, derivatives of composite functions, Euler's theorem on homogeneous functions, harmonic functions, directional derivatives, Taylor's formula, maxima and minima of functions, Lagrange's multipliers.

UNIT-II

Asymptotes and curvature: Rolle's Theorem, Cauchy's mean value theorem, Taylor and Maclaurin theorems, concavity and convexity of a curve, points of inflexion, asymptotes and curvature.

UNIT-III

Analytical functions: Limit, continuity and differentiability of analytic functions, Cauchy-Reimann equations, complex functions, line integrals, Cauchy's integral theorem, Cauchy's integral formula, power series, zeroes and singularity, residue theorem.

UNIT-IV

Integral calculus: Definite integral as limit of sum, properties of definite integrals, mean value theorem, fundamental theorem, evaluation of definite integrals, reduction formula.

UNIT-V

Differential equations: Order and degree of a differential equation, general and particular solutions, solution of differential equations by separation of variables method, integrating factor method, homogeneous differential equations of first order and their solutions, solution of linear differential equation $dy/dx+f(x)y=Q(x)$ and their application in electrical, nuclear and mechanical systems.

Recommended reference books:

1. Kreszig, Advanced Engineering Mathematics, Wiley Eastern Ltd
2. Grewal B. S., Higher Engineering mathematics, Khanna Publishers
3. Sastri S S., Engineering Mathematics, Vol. 1 & 2, PHI
4. Gangadharan A, Engineering Mathematics Vol 1 & 2, PHI
5. Dass H.K., Advanced Engineering Mathematics, S. Chand, Delhi

BT104 : Introduction to Electrical and Electronic Engineering

UNIT-I

Basic Electrical Quantities: Electromotive force, Electric Power ,Charge, current, voltage, Energy,Electric potential and field, magnetic flux,resistance, capacitance and inductance. Ohm's law, Voltage and current sources.

UNIT-II

Network analysis: Circuit principles, Kirchoff's Laws, Node Voltage and Mesh Current Analysis;Delta-Star and Star-Delta Transformation, Source Conversion. Classification of Network Elements, Superposition Theorem, Thevenin's Theorem.Norton Theorem.,MaximumPower Transfer Theorems.

UNIT-III

AC circuits: Alternating Quanitities,Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3-Phase AC System.Power in a circuit, reactive power, power factor, impedance in ac circuit, series and parallel resonance, Q factor, Introduction to 3-Phase AC System.

UNIT-IV

Transformers: Faraday's Law of Electromagnetic Induction Basic principle of operation of transformer, construction, working, voltage and current relations, Phasor Diagram of Ideal Transformer.open circuit and short circuit test, transformer losses and efficiency, ferrite core transformers.**Electrical DC Machine:** Principle of DC Machines, Types, Different Parts ofDC Machines

UNIT-V

Power Supplies: Half wave, full wave and bridge rectifiers, ripple factor and reduction by use of inductor,capacitor, L and pie section filters, voltage regulation using Zener diode.

Recommended reference books:

1. Millman and Halkias; Integrated Electronics, Tata-McGraw Hill , New Delhi
2. E. Hughes; Electrical and Electronic Technology, Pearson Limited.
3. R.P. Punagin, Basic Electronics, Tata McGraw Hill.
4. J.Millman and C. Halkias: Electronic Devices and Circuits, Tata McGraw Hill Publishing Company Ltd., 2000.
5 .Donald A. Neamen, Semiconductor Physics and Devices, McGraw Hill, 1997.
6. Vicent Del Toro, Electrical Engineering Fundamentals, Prentice Hall India.

BT105- English and Communication Skills

UNIT –I

Grammar and Vocabulary: Basic sentence pattern, use of tense, modals, active and passive voice, Direct and Indirect Speech, One word substitution, Synonyms and Antonyms and Common Erros in English.

UNIT-II

Phonetics: IPA symbols, Correct pronunciation of commonly used words, sounds (vowel and consonants)

UNIT-III

Literature : Poetry : where the mind is without fear – Rabindra Nath Tagore, Mending wall – Robert Frost, Night of Scorpion – Nissim Ezekiel

Essays: of studies: Francis Bascon, what is science? George Orwell.

UNIT-IV

Writing skills : Paragraph writing, Letter writing, covering letter and C.V., Writing E-mails.

UNIT-V

Fundamentals of Communication: (A) Communication: definition and meaning of communication, functions of communication, process of communication.

(B) Types of communication: Verbal and Non verbal communication, Formal and informal communication.

(C) Barriers to communication, qualities of good communication, the art of listening.

Recommended reference books:

1. English for competitive examinations, Prof. R. P. Bhatnagar, Macmillan Publications.

2. “Current English Grammar and usage with composition” by R. P. Sinha, Oxford University Press (New Delhi).

3. Effective Technical Communication by M. Ashraf Rizvi Tata Mcgraw-Hill Companies, New Delhi.

4. Communication skills by Sanjay Kumar & Pushp Lata. Oxford University Press (New Delhi)

BT106- Engineering Chemistry

UNIT -I

Water:

The sources of water, common Impurities, soft and hard water, Hardness of water, degrees of hardness and its effects, determination of hardness by various techniques, Municipal Water supply, requisites of drinking water, purification of water by sedimentation, filtration, reverse osmosis (RO), sterilization, chlorination. Water for boilers, corrosion, sludge and scale formation, caustic embitterment, treatment by preheating, lime-soda process, permutit de-ionizer or demineralization.

UNIT- II

Electrochemistry: Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

Analysis: Volumetric Analysis, Types of titrations, Theory of indicators.

Spectral Analysis: Electromagnetic radiation, Lambert-Beer's Law, UV-VIS, IR, NMR instrumentation & applications.

Thermal Methods of Analysis: principle, working and applications of Thermogravimetry, Differential thermal analysis and Differential scanning calorimetry.

UNIT- III

Fuels: The need of fuel, origin and classification of fuels, Solid fuels, coal and its constituents, calorific value and its determination, coke: carbonization process, various types of coke ovens.

Liquid Fuels: advantages, petroleum and its refining, synthetic petrol, reforming of gasoline,

knocking, octane number and anti knocking agents, cracking. Gaseous Fuels advantages, composition and calorific value of coal gas and oil gas and its determination.

Lubricants: Need of Classification, types of lubricants, their properties and uses, lubricants, viscosity and viscosity index and flash points, cloud and pour point, emulsification

UNIT- IV

Phase Rule: Statement, definition of terms involved, application to one component system (water-sulphur system), two component systems (Ag-Pbsystems).

Polymers: Plastics, preparation, properties and uses of polyethylene, bakelite, terylene and nylon, Rubber; natural rubber, synthetic rubber such as butyl and neoprene rubbers, vulcanization process
and its advantages.

Corrosion: its significance, theories of corrosion, Galvanic cell and concentration cell, pitting and stress corrosion, protection techniques.

UNIT-V

Explosives: Introduction, classification of explosives, preparation of commercially important explosives, blasting fuses, uses and abuses of explosives.

Cement: properties, Portland cement and its manufacture, chemistry of setting and hardening of cement, RCC structures.

Refractories: definition, classification, properties of silica and fireclay refractories, **Glass:** preparation, properties and uses.

Recommended reference books:

1. Morrison R.T & Boyn R. N ; Organic Chemistry; Prentice Hall of India 1999
2. Lee J. D. ; Inorganic Chemistry ;Blackwell Science
3. Gopalan R., Venkappayya D., Nagarajan S. "Engineering Chemistry" Vikas Publishing House Pvt Ltd 2000.
4. Jain & Jain " Engineering Chemistry" Dhanpat Rai publishing company
5. Dara S. S. , " A Text Book of Engineering Chemistry" S. Chand and Company Ltd, 2008
6. Keeler J and Wolhess P, Why Chemical Reaction Happen Oxford Press.

BT107- Electrical and Electronics Lab-I

List of Experiments

1. Identification, Study & Testing of various electronic components:

(a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR (l) Potentiometers.

2. Study of symbols for various Electrical & Electronic Components, Devices, Circuit functions etc.
3. Study of Analog & digital multi-meters.
4. Study of Function/ Signal generators.
5. Study of Regulated d. c. power supplies (constant voltage and constant current operations).
6. Study of analog CRO, measurement of time period, amplitude and frequency.
7. Perform half wave rectifier experiment and effect of filters on output.
8. Perform bridge rectifier experiment and measure the effect of filter output.
9. Application of diode as clipper and clamper.
10. Soldering & desoldering practice.

BT108- Engineering Physics Lab-I

List of Experiments

1. To study the charging of a condenser to plot a graph of voltage (V) across it against time (T) and to determine the time constant from this graph
2. To study the discharging of a condenser to plot a graph of voltage (V) across it against time (T) and to determine the time constant from this graph.

3. To determine the specific resistance of a material and difference between two small resistances using "Carey Foster's Bridge ".

4. To determine band gap of a semiconductor- diode.
5. To study the Zener diode as a constant voltage regular.
6. To verify Malus Law (Cosine square law) for plane polarized light with the help of a Photo voltaic cell.
7. To determine the transmission coefficient by using Lummer Brodhum Photometer.
8. To determine minimum deviation angle for different light using prism and spectrometer.
9. To determine the profile of He -Ne Laser beam.
10. To study the variation of thermo e.m.f. of iron copper thermo couple with temperature.
11. To determine the wavelength of sodium light using Michelson Interferometer.
12. To determine the curie temperature of Monel metal
13. The determination of viscosity.

BT109 – IT FUNDAMENTAL LAB

LIST OF EXPERIMENTS

1. Dismantling a PC Part -1.
2. Dismantling a PC Part -2.
3. Internal and External commands of DOS.
4. System utilities of windows.
5. Understanding and Working knowledge of Linux/Unix OS.
6. Understanding of File system of Linux.
7. Creating user and group.
8. Understanding and Working knowledge of MS Office, Power Point and Excel: Editing and Reviewing, Drawing, Tables, Graphs, Templates.

BT110- Engineering Chemistry Lab

List of Experiments

1. To determine the strength of a given unknown copper sulphate solution (Iodometrically) with titrate Hypo (sodium thio sulphate) solution.
2. To determine the strength of a given unknown FAS solution with titrate potassium dichromate solution using N-phenyl anthranilic acid (internal indicator).
3. To determine the strength of a given unknown potassium dichromate solution (Iodometrically) with titrate Hypo (sodium thio sulphate) solution.
4. Determine the percentage of available chlorine in a given sample of bleaching powder.
5. Determine the amount of free chlorine in a given water sample.
6. To determine the viscosity and viscosity index of a given sample of lubricating oil using Redwood viscometer No.1

7. To determine the flash and fire point of a given sample of lubricating oil using Pensky Marten's apparatus.
8. Determine the cloud and pour point of a given sample of lubricating oil.
9. Determination of hardness of water by complexometric method (using EDTA).
10. Determine the pH of an acid (strength of an acid) pH – metrically.
11. Determine the strength of a given unknown HCl solution by titrating it against NaOH solution (Conductometric analysis).
12. To estimation the amount of sodium hydroxide and sodium carbonate in the given alkali mixture solution (or in water sample) by titrating against an intermediate hydrochloric acid using phenolphthalein and methyl orange indicator.

BT111- (Engineering workshop)

FITTING AND SHEET METAL SHOP

1. Finishing of two sides of a square piece by filing and to cut a Square notch using hacksaw.
2. To drill three holes and Tapping on the given specimen.
3. Tin smithy for making mechanical joint and soldering of joint

WELDING SHOP

4. To prepare Lap Joint with the help of Arc welding
5. To prepare Butt Joint with the help of arc Welding
6. Gas welding practice by students on mild steel flat

MACHINE SHOP PRACTICE

7. Job on lathe M/C with centering and one step turning
8. Job on lathe M/C with grooving and chamfering operations

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
COMMON TO ALL BRANCHES
SECOND SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BT 201	Engineering Physics-II	3	1	-	30	70	100	4
BT 202	Introduction to Computer Programming *	3	-	-	30	70	100	3
BT 203	Engineering Mechanics*	3	1	-	30	70	100	4
BT 204	Digital Electronics	3	-	-	30	70	100	3
BT 205	Applied Mathematics-II	3	-	-	30	70	100	3
BT 206	Environmental Sciences	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BT 207	Electrical & Electronic Lab-II	-	-	2	30	20	50	1
BT 208	Engineering Physics-II	-	-	2	30	20	50	1
BT 209	Computer Programming Lab*	-	-	2	30	20	50	1
BT 210	Engineering Drawing	-	-	2	30	20	50	1
BT 211	Communication Skill Lab*	-	-	2	30	20	50	1
TOTAL		**18**	**2**	**10**	**330**	**520**	**850**	**25**

Note:

1. Semester I and II common for all Branches of Engineering.
2. Half the students will study Environmental Science in 1st Semester and rest will study Engineering Chemistry and Chemistry Lab. The students shall interchange the subjects and vice-versa In 2nd Semester.

BT201- Engineering Physics II

UNIT-I

Electric and Magnetic Fields :Coulomb's law, Gauss's law, electrostatic potential and field due to discrete and continuous charge distributions, dipole and quadrupole moments, dielectric polarization, electrostatic energy, conductors and capacitors, Biot-Savart law, Ampere's law, magnetic induction due to current carrying conductors, force on a charged particle in electric and magnetic field, Faraday's law of electromagnetic induction.

UNIT-II

Thermodynamics: Work- Thermodynamic definition of work, examples, displacement work, path dependence of displacement work, thermal equilibrium, Zeroth law , definition of temperature, heat/work interaction systems , First law and its consequences, isothermal and adiabatic processes, reversible, irreversible and quasi-static processes. Second law and entropy. Carnot engine and cycle. Absolute temperature scale.

UNIT-III

Optical phenomena : Principle of superposition, coherent and incoherent sources, temporal and spatial coherence, interference phenomena(Newton's ring and Michelson interferometer), diffraction of waves, diffraction from single and diffraction grating, polarization : types of polarization , Malus law, quarter and half wave plates, optical activity, specific rotation.

UNIT-IV

Lasers and Holography : Spontaneous and stimulated emission (Einstein A and B

coefficients), population inversion, basic principles of operation of He-Ne, Ruby and semiconductor lasers. **Optical Fibers** : Types of optical fibers and their characteristics, characteristics of step, graded , mono mode and multi mode fibers, numerical aperture and its measurement, fiber optical communication. Principles and applications of holography

UNIT-V

Magnetic Materials: Magnetization- origin of magnetic moment, classification of magnetic materials- die, Para and ferromagnetism, hysteresis curve, soft and hard magnetic materials. Superconductivity: General properties of superconductors, Meissonier effect, penetration depth, type I and Type II superconductors, flux quantization, magnetic levitation, high temperature superconductors, superconducting materials, Cooper pairs and postulates of BCS theory.

Recommended reference books:

1. Fundamental University Physics, Alonso & Finn.
2. Berkley Physics Course Vol 1 & Vol. 3
3. Thermodynamics and Statistical Physics by F. Reif.
4. Thermodynamics and Statistical Physics, S. Lokanathan and D.P. Khandelwal.
5. Optics by Ajoy Ghatak
6. Conceptual Physics, Paul Hewitt
7. Introduction to Electrodynamics, D.J.Griffiths
8. Modern Physics, A. Beiser
9. Physics for Scientists and Engineers, R. Serway

BT202- INTRODUCTION TO COMPUTER PROGRAMMING

UNIT I

Concept of algorithms, Flow Charts, Overview of the compiler (preferably GCC) , Assembler, linker and loader , Structure of a simple Hello World Program in C ,Overview of compilation and execution process in an IDE (preferably Code Block)

UNIT II

Programming using C: Preprocessor Directive, C primitive input output using get char and put char , simple I/O Function calls from library , data type in C including enumeration , arithmetic, relational and logical operations, conditional executing using if, else, switch and break .Concept of loops , for, while and do-while , Storage Classes: Auto, Register, Static and Extern

UNIT III

Arrays and Strings: Declaring an array, Initializing arrays, accessing the array elements, working with multidimensional arrays, declaring and initializing string variables, arithmetic operations on characters.

Pointers: Declaring and initializing pointers, pointer expressions, pointer increment and scale factor, pointers and arrays, pointers and strings.

UNIT IV

Functions: Defining functions, passing arguments to functions, returning values from functions, reference arguments, variables and storage classes, static functions, pointers and functions.

Structures: Declaring and initializing a structure, accessing the members of a structure, nested structures, array of structures, using structures in functions, pointers and structures.

UNIT V:

File Handling in C Using File Pointers, fopen( ), fclose( ), Input and Output using file pointers, Character Input and Output with Files , String Input / Output Functions , Formatted Input / Output

Functions, Block Input / Output Functions, Sequential Vs Random Access Files , Positioning the File Pointer.

Text/ Reference Books:

1. Kernighan & Ritchie, "C Programming Language", The (Ansi C version), PHI, 2/e
2. Yashwant Kanetkar " Test your C Skills " , BPB Publications
3. Programming in ANSI C, E. Balagurusamy; Mc Graw Hill, 6th Edition.
4. Herbert Schildt, "C: The Complete Reference", OsbourneMcgraw Hill, 4th Edition, 2002.
5. Forouzan Behrouz A. "Computer Science: A Structured Programming Approach Using C, Cengage Learning 2/e
6. K.R Venugopal, "Mastering C ", TMH
7. R.S. Salaria "Application Programming in C " Khanna Publishers4/e

BT203- ENGINEERING MECHANICS

Unit I

Force System: Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force, moment of force about a line. Varigon's theorem, couple, resolution of force into force and a couple, properties of couple and their application to engineering problems. Lami's theorem. Force body diagram.

Unit II

Centroid & Moment of Inertia: Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section, Polar Moment of inertia, Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of Pulleys, Wheel and differential axle, differential pulley Block,

Unit III

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.

Unit IV

Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular Acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion. Newton's laws, Equation of motion in rectangular Coordinate, radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

Unit V

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Nonconservative Force, Conservation of energy.

Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a

Particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular

Suggested Readings

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.
6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.
7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

BT204- Digital Electronics

UNIT I

BASIC LOGIC GATES & BOOLEAN ALGEBRA: Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vice-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.

UNIT II

DIGITAL LOGIC GATE CHARACTERISTICS: TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.

UNIT III

MINIMIZATION TECHNIQUES: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques.

UNIT IV

COMBINATIONAL SYSTEMS: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders

and demultiplexers.

UNIT V

SEQUENTIAL SYSTEMS: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous and synchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications, Registers: buffer register, shift register.

Recommended Reference Books:

1. M. Morris Mano: Digital Logic and Computer Design, PHI, India
1. Malvino and Leach: Digital Principles
2. Tocci R.J., Digital Systems- Principles & Applications, PHI 1997
3. loyd, Digital Fundamentals, PHI, 1997
4. Salivahanan A, Digital Circuit and Design, TMH

BT205- Applied Mathematics II

UNIT I

Vector spaces, linear dependence of vectors, basis and linear transformations, scalar and vector fields, level surfaces, directional derivatives, gradient, divergence and curl of fields, Green, Gauss and Stokes theorems.

UNIT II

Matrix algebra, rank of a matrix, adjoint and inverse of a matrix, Solution of algebraic equations using matrix algebra , consistency conditions, eigenvalues and eigenvectors , Hermitian matrices.

UNIT III

Numerical solution of matrix equations using Gauss, Gauss-Seidel, LU decomposition and other iterative methods.

UNIT IV

Convergence of improper integrals, tests of convergence, elementary properties of beta and gamma functions, differentiation under integral sign, Leibnitz rule, integrals dependent on a parameter, trapezoidal and Simpson's integration rules, applications in engineering.

UNIT V

Numerical methods; round off and truncation errors, approximations, order of convergence, Newton's forward and backward interpolation formula, central difference interpolation, solutions of polynomial equations using bisection, Newton-Raphson and Regula-falsi

methods.

Recommended Books:

1. H. K. Dass: Advanced Engineering Mathematics; S. Chand, Delhi
2. P. C. Bishwal: Numerical Analysis; PHI, India

BT206- Environmental Sciences

UNIT I

Ecosystem and Biodiversity: Components and types of ecosystem, Structure and functions of Ecosystem, Values, Type and levels of Biodiversity, Causes of extension, and Conservation methods of biodiversity.

UNIT II

Air Pollution: Definition, different types of Sources, effects on biotic and abiotic components and Control methods of air pollution.

UNIT III

Water pollution: Definition, different types of Sources, effects on biotic and abiotic components and treatment technologies of water pollution.

UNIT IV

Noise Pollution: Introduction of noise pollution, different Sources, effects on abiotic and biotic environment and Control measures.

UNIT V

Non Conventional energy sources: Introduction, Renewable Sources of Energy: Solar energy, wind energy, Energy from ocean, energy from biomass, geothermal energy and Nuclear Energy.

Recommended Reference Books:

1. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.

2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

3. Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. , Environmental Encycolopedia, Jaico Publishing House, Mubmbi, 2001.

4. De. A.K., Environmental Chemistry, Wiley Eastern Ltd.

5. Down to Earth, Centre for Science and Environment (R)

6. Gleick, H.P. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press.

7. Gilpin, Alan. Environmental Impact Assessment (EIA), cutting egde for the 21th century. Cambridge university Press.

BT207- Electrical and Electronics Lab-II

List of Experiment:

1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR.
2. To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3. To realize an SOP and POS expression.
4. To realize adder and Subtractor using universal gates.
5. To verify the truth table of Encoder and decoder.
6. To verify the truth table of multiplexer and demultiplexer.
7. To study and perform Various types of Flip-Flops.
8. To study and perform various types of counters.
9. To study and perform various types of shift registers.
10. To study and perform various types of Multivibrators.
11. To study and perform Schmitt Trigger.

BT208- Engineering Physics Lab-II

List of Experiments:

1. Conversion of a Galvanometer in to an ammeter and calibrate it.
2. Conversion of a Galvanometer in to voltmeter and calibrate it.
3. To determine the value of "g" by using compound pendulum.
4. To determine Plank's constant using LED.
5. To measure the Numerical Aperture (NA) of an optical fiber.

6. To determine the profile of He-Ne Laser beam.
7. To determine the wavelength of different lights using diffraction grating and spectrometer.
8. To determine the wavelength of sodium light by Newton's ring method.
9. To determine the specific rotation of glucose using Polarimeter.
10. To determine minimum deviation angle for different light using prism and spectrometer.
11. To study of detergent on surface tension of water by observing capillary rise
12. To determine the speed of sound in air at room temperature using a resonance tube by two resonance position.

BT209- COMPUTER PROGRAMMING LAB

LIST OF EXPERIMENTS

1 Write a program to calculate the area & perimeter of rectangle.

2 Write a program to calculate the area and circumference of a circle for a given radius.

3 Write a program to calculate simple interest for a given principal/amount.

4 Write a program to convert temperature given in ◦C to temperature in ◦F.

5 Write a program to find profit and loss (in percentage) of a given cost price and selling price.

6 Write a program to find out the maximum among the three given numbers.

7 Write a program to calculate the factorial of a given number.

8 Write a program to print the list of first 100 odd number.

9 Write a program to calculate the sum of the digits of a number and display it in reverse order.

10 Write a program to generate a Fibonacci series.

11 Write a program to generate the following series:

1 2

1 2 3

1 2 3 4

1 2 3 4 5

12 Write a program to generate the following series:

0 1

0 1 0

0 1 0 1

0 1 0 1 0

13 Write a program using a function to check whether the given number is prime or not.

14 Write a program to check whether the given string is a palindrome or not.

15 Write a program to find the length of a string, reverse the string and copy one string to another by using library function.

16 Write a program to swap two variables a & b using pointers.

17 Write a program to enter a line of text from keyboard and store it in the file. User should enter file name.
18 Write a recursive program for tower of Hanoi problem
19 Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices

- Addition of two matrices
- Subtraction of two matrices
- Finding upper and lower triangular matrices
- Transpose of a matrix
- Product of two matrices.

20 Write a program to copy one file to other, use command line arguments.
21 Write a program to perform the following operators an Strings without using String functions

- To find the Length of String.
- To concatenate two string.
- To find Reverse of a string.
- To Copy one sting to another string.

22 Write a Program to store records of an student in student file. The data must be stored using Binary File.Read the record stored in "Student.txt" file in Binary code.Edit the record stored in Binary File.Append a record in the Student file.
23 Write a programmed to count the no of Lowercase, Uppercase numbers and special Characters presents in the contents of File.

BT210- Engineering Drawing

Engineering Drawing

Sheet 1 Orthographic Projections (3 Problems)

Sheet 2 Riveted joints: Lap joints, butt joints, chain riveting, zig-zag riveting

Sheet 3 Screw fasteners, different threads, Nuts & bolts locking devices, set screws,

Sheet 4 Scale, plain scales, diagonal scales, scale of chords

Sheet 5 Conic Sections: Construction of ellipse, parabola and hyperbola

Sheet 6 Engineering Curves: Cycloid, Epicycloids, Hypo-cycloid, Involutes, Archemedian and logarithmic spirals

Sheet 7 Projection of points and lines, True inclinations and true length of straight lines, Traces of straight lines

Sheet 8 Projection of planes and solids: Projection of planes, Projection of polyhedra, Pyramids.

BT211- Communication Skills Lab

1. Introducing yourself.
2. Role Plays.
3. Word Formation.
4. Listening and Speaking Skills.
5. Words often mis-spelt and Mis- Pronounced.
6. One word for many.
7. Synonyms and Antonyms.
8. Seminar Presentation.
9. Group Discussion.
10. Job Interview.

THIRD SEMESTER								
THEORY PAPERS								
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTEE301	Applied Mathematics III	3	1	-	30	70	100	4
BTEE302	Circuit Analysis-I	3	1	-	30	70	100	4
BTEE303	Electrical Machine-I	3	-	-	30	70	100	3
BTEE304	Electronic Measurements & Instrumentation	3	1	-	30	70	100	4
BTEE305	Generation of Electric Power	3	-	-	30	70	100	3
BTEE306	Object Oriented Programming	3	-	-	30	70	100	3
PRACTICALS /VIVAVOCE								
		L	**T**	**P**	**Seasonal**	**Practical**	**Total**	**Credits**

BTEE307	Electrical Machine Lab – I	-	-	2	30	20	50	1
BTEE308	Electronic Measurement & Instrumentation Lab	-	-	2	30	20	50	1
BTEE309	Object Oriented Programming Lab	-	-	2	30	20	50	1
BTEE310	Electrical Circuit Lab	-	-	2	30	20	50	1
BTEE311	Humanities & social science	-	-	2	30	20	50	1
	Total	18	3	8	330	520	850	25

BTEE 301 Applied Mathematics-III

UNIT1

Differential Equations - linear differential equations of higher order with constant coefficients.

Second Order ODE with Variable Coefficients, Homogeneous form, Exact Equations, Change of Dependent variable, Change of Independent Variable, Normal form, Variation of Parameters.

UNIT 2

Series Solutions - Solution in series of second order LDE with variable coefficients (CF only). **PARTIAL DIFFERENTIAL EQUATION-** Partial differential equation of first order, Lagrange's form, standard forms, Charpit's method

UNIT 3

Laplace Transform - Laplace transform with its simple properties, Laplace transform of unit step function and periodic function, Convolution Theorem, inverse Laplace transform, applications to the solution of ordinary and partial differential equations having constant coefficient with special reference to heat equation and wave equation.

UNIT 4

Statistics- Standard deviation, moments, skewness, kurtosis, Curve fitting methods-method of least squares, fitting of a straight line, parabola. Correlation and regression, line of regression.

Fourier Series - Expansion of simple functions in Fourier series. Half range series, Change of intervals, Harmonic analysis.

UNIT 5

Fourier Transform - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.

Books Recommended:

(1) "Advanced Engineering Mathematics" by H.K.Dass

BTEE 302 Circuit Analysis-I

Unit I

Coupled Circuit:- Conductively coupled circuit, mutual impedance, magnetic coupling, mutual inductance, coefficient of magnetic coupling, transferred impedance, transformer equivalent inductively and conductively coupled circuits.

Unit II

Network theorem :- Thevenin's theorem, Norton's theorem, superposition, reciprocity, compensation, millman's, tellegen's, maximum power transfer and miller's theorem.

Unit III

Graph Theory:- Introduction, concept of graph of the networks, trees and their properties, incidence matrix, fundamental tie set matrix, fundamental cut set matrix, equilibrium equation on loop and node bases and their solutions.

Unit IV

Poly phase Circuit:- Star and delta combination, four wire star connection, balanced three phase voltages and unbalanced impedances, power and reactive volt-amperes in 3phase system, power relation in 3phase circuits. Power factor, resonance, resonance between parallel R-C and R-L circuit, selectivity and bandwidth, physical interpretation of selectivity.

Unit V

Time Domain and Frequency Domain Analysis:- response of networks to step, ramp, impulse, pulse and sinusoidal inputs, time domain and frequency domain analysis of circuits, sifting theorem, initial and final value theorem, special signal waveforms with lapalace transform & application to circuit operation.

Recommended Reference Books:

1. Network and Systems by D.Roy Chowdhury, "Wiley Estern".
2. Engineering Circuit Analysis by W.H. Haytand J.E. Kemmelrly,"McGraw Hill".
3. A course in Electrical Circuit Analysis by Soni and Gupta, 'Dhanpat rai & Sons".
4. Modern Network synthesis by M.E. Van Vallkenburg, "Willey estern.
5. Electronics devises and Circuit theory R.L. boylestad and L. Nashelesky, "PHI".
6. Electric Circuit by A Chkrabarty; Dhanpat rai Company

BTEE303 Electric Machine-I

Unit I

Energy conversion : Principal of Electromechanical energy conversion, Energy stored in a magnetic field system , Singly and Doubly excited system .

Unit II

DC generators: Construction ,Type of dc generators , Emf equation , lap& wave windinas , Armature reaction , Commutations , Methods of improving commutations demagnetizing and cross magnetizing mmf , Inter poles characteristics , Parallel operation,.

Unit III

DC motor: Principal ,Back emf , Types , Production of torque , Armature reaction & inter poles characteristics of shunt, Series & compound motor ,DC motor starting , Speed control of dc motor , Armature voltage and Field Current.Control method, ward Leonard method , Breaking, losses and Efficiency, Direct & Indirect test ,Swin burne test , Hopkinsim Test, Field & Retardation Test,

Unit IV

Transformer : Construction , Theory and operation , Emf equation , Phasor diagram , Equivalent circuit , Open and Short Circuit test , Back to Back test , Voltage regulation and Efficiency ,Autotransformers, Three winding Transformers, Parallel Operation Of Single Phase and Three Phase Transformer, Three Phase Transformer Connections, Phasor groups , Three phase to Two Phase and Six Phase Conversion , Harmonics and Excitation Phenomenon , Inrush Corrent Phenomena .

Unit V

Cross Field Machines: Principal of Operation of Rosenberg generators, Amplidyne and Metadyne .

Recommended Reference Books:

1. Electrical Machinery by P.S.Bhimbra; Khanna Publisher
2. Electrical Machine by Najrath khothari; TMH
3. Electrical Machine by S. B.Gupta S. K Kataria & Sons
4. Electrical Machine S. K. Bhattacharya ; TMH

BTEE304-Electronics Measurement and Instrumentation:

UNIT 1

MEASUREMENTS AND ERRORS - Measurements - significance of measurements - methods of measurement – instruments and measurement systems - classification of instruments – elements of measurement system. Accuracy and precision - significant figures - types of errors - probability of errors - limiting errors. Repeatability, Systematic & random errors, modeling of errors, standard deviation, Gaussian error analysis, Combination of errors.

UNIT 2

ELECTRONIC INSTRUMENTS FOR MEASUREMENTS - DC Voltmeter, DC Ammeter, Ohm meter, Multimeter, AC meters,Electrodynamometer , Watt hour meter ,digital voltmeter , component measuring system Q meter , vector impedance meter, frequency meters.RF Power & Voltage Measurements. D'Arsonaval, Vibration and Ballistic galvanometers.Introduction to shielding & grounding

UNIT 3

BRIDGE MEASUREMENT - Introduction, Wheatstone Bridge, Kelvin Bridge, AC Bridges, Maxwell's inductance and capacitance bridges, Hay Bridge, Schering Bridge, unbalanced conditions - Wein Bridge, Wagner ground connection. Sources and Detectors. Anderson bridge, Heaviside bridge, DeSauty bridge Sources of errors in bridge measurements and their minimization.

UNIT 4

TRANSDUCERS - Classification of transducers , Selection Criteria, Characteristics, Construction, Working Principles, selecting transducers , strain gauges , displacement transducers , capacitive and inductive transducers, LVDT , oscillation transducer - piezoelectric, potentiometer, velocity transducers temperature transducers , optical transducers, RTD, Thermocouples, Thermistors, RVDT, Bourdon Tubes, Bellows. Diaphragms, Load Cell, Ultrasonic Flow Meters.

UNIT 5

SIGNAL GENERATION AND DISPLAY INSTRUMENTS - Sine wave generators, Frequency synthesized signal generators, Sweep frequency

generators,Frequency - selective wave analyser,harmonic distortion analyzer, spectrum analyzer, logic analyzer, dual trace oscilloscope, digital storage oscillator , XY plotter. CRT Construction, Basic CRO circuits, CRO Probes, Oscilloscope Techniques of Measurement of frequency, Phase Angle and Time Delay, Multi beam, multi trace, sampling Oscilloscopes.

Recommended Reference Books:

1. K. Sawhney,"A course in Electrical and Electronic Measurement and Instrumentation"
2. Kalsi G.C. , "Electronic Instrumentation"-TMH
3. Albert D. Helfrick , William d. Cooper " Modern Electronics Instrumentation and Measurement"-TMH
4. Jones L.D. and Foster Chin. A. ," Electronic Instrumentation and Measurement" ,John Wiley & Sons,Newyork

BTEE 305 Generation Of Electrical Power

Unit-1

Conventional Energy Generation Methods: **(i) Thermal Power plants:** Basic schemes and working principle. **(ii) Gas Power Plants:** open cycle and closed cycle gas turbine plants, combined gas & steam plants – basic schemes. **(iii) Hydro Power Plants:** Classification ofhydroelectric plants. Basic schemes of hydroelectric and pumped storage plants. **(iv) NuclearPower Plants:** Nuclear fission and Nuclear fusion. Fissile and fertile materials. Basic plantschemes with boiling water reactor, heavy water reactor and fast breeder reactor. Efficienciesof various power plants.

Unit-2

New Energy Sources: Impact of thermal, gas, hydro and nuclear power stations onenvironment. Green House Effect (Global Warming). Renewable and non-renewable energysources. Conservation of natural resources and sustainable energy systems. Indian energy scene. Introduction to electric energy generation by wind, solar and tidal.

Unit-3

(i) Loads and Load curves: Types of load, chronological load curve, load duration curve, energy load curve and mass curve. Maximum demand, demand factor, load factor, diversity factor, capacity factor and utilization. **(ii) Power factor improvement**: Causes and effects of low power factor and advantages of power factor improvement. Power factor improvement using shunt capacitors and synchronous condensers.

Unit-4

Power Plant Economics: (i) Capital cost of plants, annual fixed and operating costs of plants, generation cost and depreciation. Effect of load factor on unit energy cost. Role of load diversity in power system economics. **(ii)** Calculation of most economic power factor when (a) kW demand is constant and (b) kVA demand is constant. **(iii) Energy cost reduction:** off peak energy utilization, co-generation, and energy conservation.

Unit-5

(i) Tariffs: Objectives of tariffs. General tariff form. Flat demand rate, straight meter rate, block meter rate. Two part tariff, power factor dependent tariffs, three-

part tariff. Spot (time differentiated) pricing. **(ii) Selection of Power Plants:** Comparative study of thermal, hydro, nuclear and gas power plants. Base load and peak load plants. Size and types of generation units, types of reserve and size of plant. Selection and location of power plants.

Recommended Reference Books:

1. Generation of Electric power by B. R. Gupta: S. Chand Publisher
2. Power plant Engineering by G. R.Nagpal ; Khanna Publisher
3. Power System Analysis by Nagrath Khothari ; TMH
4. Generation , distruption and utilasation of electric power by C. L. wadhawa: New Age international publisher

1. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
2. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
3. K Loudon, "Mastering Algorithms With C", Shroff Publisher & Distributors Pvt. Ltd.

BTEE 306 Object Oriented Programming

Unit I:

Evolution of Programming Paradigms; Structured versus Object-Oriented Development; Elements of Object Oriented Programming – encapsulation, data hiding, data abstraction, inheritance, polymorphism, message communication; Popular OOP Languages, Merits and Demerits of Object Oriented Methodology.

Unit II:

Overview of C++; Class specification, class objects; Inline functions; Nesting of member functions, function overloading; Arrays within a class, arrays of objects, returning objects; Static data members, static member functions; Friend functions and friend classes; Constructors and Destructors – order of construction and destruction, parameterized constructors, constructor overloading, constructors with default arguments, copy constructor, dynamic initialization of objects

Unit III:

Operator Overloading – rules for overloading, overloading unary & binary operators, overloading binary operators using friends; Type Conversions – basic to class type, class to basic type, class to class type; Inheritance – forms of inheritance, inheritance and member accessibility, constructors and destructors in derived classes, constructor invocation and data members initialization, virtual base classes, nested and inner classes.

Unit IV:

Concept of dynamic binding; Pointers to objects; this pointer; Pointers to derived classes; Virtual functions, pure virtual functions; Object Slicing; Abstract classes, Smart pointers; Managing Console I/O Operations – C++ stream classes, unformatted I/O operations, formatted console I/O operations, managing output with manipulators; File handling – classes for file stream operations, file modes, file pointers and their manipulations, sequential and random access to a file, saving and retrieving of objects.

Unit V:

Generic programming with templates - function templates, class templates; Exception handling model and constructs; Standard Template Library(STL) overview, container classes; Namespace; Runtime typecasting.

Recommended Reference Books :

1. E. Balagurusamy, Object Oriented programming, Tata McGraw Hill.
2. K R Venugopal, Rajkumar, T Ravishankar, Mastering C++, Tata McGraw Hill.
3. C. Thomas Wu, An Introduction to OOP with Java, McGraw Hill.
4. Timothy Wood, An Introduction to Object Oriented Programming, Addison Wesley.
5. John R. Hubbard, Programming with C++, McGraw Hill International.

BTEE 307 Electrical machine Lab

1. Speed control of D.C. shunt motor by (a) field current control method& plot the curve for speed vs field current(b) armature voltage control method.
2. Speed control of D.C. motor by ward leonard method and to plot curve for speed vs applied armature voltage.
3. To determine the efficiency of D.C. shunt motor by loss swenmarion method.
4. To determine the efficiency of two identical D.C. machine by hopkinos's regenerative test.
5. To perform O.C. & S.C. a one phase transformer & determine the parameter of its equivalent ckt its voltage regulation &efficiency.
6. To perform back to back test on two identical I phase transformer & find their efficiency process of equivalent circuit.
7. To perform parallel operation of two 1 phase transformer & determine their load sharing.
8. To determine the efficiency & voltage regulation of single phase transformer by direct loading.
9. To perform OC & SC test on a 3 phase transformer find its efficiency & parameter of its equivalent circuit.

To study and perform of 3 phase transformer for its varios connection i.e. star/star, star/delta, delta delta , delta/delta & find magnitude of 3^{rd} harmonic current.

BTEE 308 Electronic Measurement and Instrumentation Lab

List of Experiments

1. Measurement of strain/ force with the help of strain gauge load cell
2. Measurement of displacement with the help of LVDT
3. Plot V-I characteristics & measure open circuit voltage & short circuit current of a solar panel.
4. Measure unknown inductance capacitance resistance using following bridges

   (a) Anderson Bridge (b) Maxwell Bridge
5. To measure unknown frequency & capacitance using Wein's bridge.
6. Measurement of the distance with the help of ultrasonic transmitter & receiver.
7. Draw the characteristics of the following temperature transducers:

   (a) RTD (Pt-100) (b) Thermistors (c) Thermocouple
8. Study the working of Q-meter and measure Q of coils
9. Measure the speed of a Table Fan using stroboscope.
10. Study the working of DIGITAL STORAGE CRO
11. Study of Phase shift Oscillator.

BTEE 309 Oriented Programming Lab

List of Experiments

1) Define a class to represent a bank account. Include the following members:
   Data members : Name of the depositor, Account number, Type of account, Balance amount in the account.
   Member functions : To assign initial values, To deposit an amount, To withdraw an amount after checking the balance, To display name and balance.
   Write a main program to check the working.
2) Create two classes **DM** and **DB** which store the values of distances. **DM** stores distances in metres and centimetres and **DB** in feet and inches. Write a program that can read values for the class objects and add one object of **DM** with another object of **DB**.
   Use a friend function to carry out the addition operation. The object that stores the results may be a **DM** object or **DB** object, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and centimetres depending on the object of display.
3) Write a function power() to raise a number m to a power n. The function takes a **int** value for m and **int** value for n, and returns the result correctly. Use a default value of 2 for n to make the function to calculate squares when this argument is omitted. Write a main() the gets the values of m and n from the user to test the function. Write another function that takes a **double** value for m. Both the functions should have the same name. Use the concept of function overloading.
4) Define a class String that could work as a user-defined string type. Include constructors that will enable to create an uninitialized string
   String s1; // string with length 0
   And also to initialize an object with a string constant at the time of creation like
   String s2("Well done!");
   Include a function that adds two strings to make a third string. Note that the statement
   s2 = s1;
   will be perfectly reasonable expression to copy one string to another.
5) Write a program to implement stack operations using OOP concepts.
6) Create a class Float Obj that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of Float Obj.
7) Write a program to implement operator overloading for complex number operations.
8) Write a program for matrix multiplication using the concept of friend operator overloading.
9) Write a program to implement the inheritance property by using the example of bank, where **Bank** is a base class and **Saving** and **Current** are two classes derived from bank. Member functions like deposit( ), withdraw( ), and display( ) should be implemented.
10) Create a base class called **shape**. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called **triangle** and **rectangle** from the base **shape**. Add to the base class, a member function **get_data( )** to initialize base class data members and another member function **display_area( )** to compute and display the area of figures. Make **display_area( )** as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes design a program that will accept dimensions of a triangle or rectangle interactively and display the area.
11) Write a program to demonstrate how to read and write class object.

BTEE310 Electric Circuit lab

1. Verification of Tellegens Theorem.
2. Verification of Thevenin's and Norton's Theorem.
3. Verification of compensation Theorem.
4. Verification of Maximum Power Transfer theorem.
5. Verification of Reciprocity theorem.
6. Measurement of self inductance of a coil.
7. Verification of Miller's Theorem.
8. Transient response of RL and RC circuits for DC input.
9. Frequency response of series and parallel resonance circuits.
10. Frequency response of single tuned coupled circuits.
11. Verification of Millman's Theorem

BTEE311 HUMANITIES & SOCIAL SCIENCE

Unit I

India: Brief history of Indian Constitution, farming features, fundamental rights, duties, directive principles of state. History of Indian National Movement, socio economic growth after independence.

Unit II

Society: Social groups- concept and types, socialization- concept and theory, social control: concept, social problem in contemporary India, status and role.

Unit III

The Fundamentals of Economics: meaning, definition and importance of economics, Logic of choice, central economic problems, positive and normative approaches, economic systems- socialism and capitalism.

Unit IV

Microeconomics: Law of demand supply, utility approach, indifference curves, elasticity of demand and supply and applications, consumer surplus, Law of returns to factors and returns to scale.

Unit V

Macroeconomics: concepts relating to National product–National income and its measurement, Simple Keynesian theory, simple multiplier, money and banking. Meaning, concept of international trade, determination of exchange rate, Balance of payments.

FOURTH SEMESTER								
THEORY PAPERS								
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTEE401	Analog Electronics	3	1	-	30	70	100	4
BTEE402	Circuit Analysis-II	3	1	-	30	70	100	4
BTEE403	Electric Machines-II	3	-	-	30	70	100	3
BTEE404	Non Conventional Energy Systems	3	-	-	30	70	100	3
BTEE405	Data Base Management System	3	-	-	30	70	100	3
BTEE406	Random Variable & Stochastic Processes	3	-	-	30	70	100	3
PRACTICALS/ VIVA VOCE								
		L	**T**	**P**	**Seasonal**	**Practical**	**Total**	**Credits**
BTEE407	Analog Electronics Lab	-	-	2	30	20	50	1
BTEE408	Electric Machine Lab-II	-	-	2	30	20	50	1
BTEE409	Technical Seminar	-	-	2	30	20	50	1
BTEE410	DBMS Lab	-	-	2	30	20	50	1
BTEE411	GD & Soft Skill	-	-	2	30	20	50	1
	Total	18	2	10	330	520	850	25

BTEE 401 Analog Electronics

UNIT 1

Field Effect Transistors & UJT: FET Construction & characteristics of JFET -parameters of JFET The Pinch-off voltage, The FET Small-Signal model, MOSFET-depletion & enhancement modes, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency Common Source and Common Drain, Common Gate JFET amplifiers. FET as a voltage variable resistor. Construction, theory of operation & characteristics of PUT (Programmable UJT).

UNIT 2

FEEDBACK AMPLIFIERS: Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Effect of feedback on noise, distortion, gain, input and output impedance of the amplifiers, Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier. Stability criterion.

UNIT 3

Small Signal Amplifiers At Low & High Frequency:

At Low Frequency: Analysis of FET, Temperature compensation methods, Analysis of Direct Coupled amplifiers and differential amplifiers frequency response and midband gain, gains at low and high frequency. Miller's Theorem. Cascading Transistor amplifiers, Darlington pair. Source follower.

At High frequency equivalent circuits for BJT and FET amplifiers, Calculation of Lower and Higher cutoff frequencies, Hybrid Pi model, conductances and capacitances of hybrid Pi model, high frequency analysis of CE amplifier, gain-bandwidth product. Emitter follower at high frequencies.

UNIT 4

Power Amplifiers: Power amplifier circuits, Class A output stage, class B output stage and class AB output stages, class C amplifiers, push pull amplifiers with and without transformers. Complementary symmetry & quasi complimentary symmetry amplifiers MOSFET Power amplifiers, Thermal stability of Power amplifiers, heat sink design.

UNIT 5

Tuned Amplifier - Band Pass Amplifier, Parallel resonant Circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary & Secondary Tuned Amplifier with BJT & FET. Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier. Shunt Peaked Circuits for Increased Bandwidth. Instability of tuned amplifiers, stabilization techniques, neutralization, Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier.

Recommended Reference Books:

1. Millman J. and Halkais C.C.," Integrated Electronics", McGraw Hill
2. David A.Bell, "**Electronics Devices And Circuits**",Prentice Hall of India,1998.
3. Robert boylestad "**Electronics Devices And Circuit Theory",**Prentice Hall of India

BTEE 402 CIRCUIT ANALYSES –II

Unit I

Attenuators:- Introduction , lattice attenuator, T- type and ∏ type attenuator , L- type attenuator ,ladder type and balanced attenuator.

Unit II

Two Port Networks :- Introduction , two port parameters (impedance, admittance, hybrid ,ABCD, inverse transmission parameters, inverse hybrid parameters) , interrelationship between the parameters, interconnections of two port networks, the ladder network, image impedance , image transfer fuction.

Unit III

Network Functions And Fourier Series:-Necessary condition for driving point function, & transfer fuction , pole &zeros,, time domain behavior from pole and zero plot , procedure for finding network fuctoins for general two terminal pair network, trigonometric furrier series, evaluation of fourier coefficients, wave form symmetry, exponential form of foyrier series.

Unit IV

Network Synthesis:- Hurwitz polynomial, positive real fuction, reactive network, foster I and II form & cauer I and II form

Unit V

Filters:- Constant k filters , the m-derived filters, image impedance of m- derieved half(or L) sections, composite filters, band pass& band elimination filters, lattice filters , barless's bisections theorem

Recommended Reference Books:

1. Network and Sysstems by D.Roy Chowdhury, "Wiley Estern".
2. Engineering Circuit Analysis by W.H. Haytand J.E. Kemmelrly,"McGraw Hill".
3. A course in Electrical Circuit Analysis by Soni and Gupta, 'Dhanpat rai & Sons".
4. Modern Network synthesis by M.E. Van Vallkenburg, "Willey estern.
5. Electronics devises and Circuit theory R.L. boylestad and L. Nashelesky, "PHI".
6. Elecric Circuit by A. Chakrabati :L Dhanpat Rai and Company

BTEE403 ELECTRIC MACHINE- II

Unit I

Polyphase Induction Mechines: Construction, principle of operation , slip, phasor diagram, equivalent circuits, expression for torque, and output power ,slip torque characteristics, effect of variation of supply voltage and rotor resistance on the characteristics , Circle digram. Predetermination of characteristics from the circuit diagram,Drawing circle diagram from design parameters and no load and blocked rotor test data. Starting of Induction motors, Direct on line starter, Star-Delta starter and autotransformer starter for cage induction motor by varying supply voltage, supply frequency and pole changing, speed control of slip ring induction motor by varying rotor resistance.

Unit II

Special Machines : High torque induction motor, double cage and deep bar rotor construction. Mains operated and self excited induction generators. Hysteresis motor,Reluctance motor and stepper motor, brushless motors.

Unit III

Single Phase Induction Motors: Principle of operation, double revolving field theory, Equivalent circuit, performance calculations and characteristics, Starting methods, Maximuma starting torque conditions in single- phase induction motors.

Unit IV

Synchronous Machine: types of Exciters for synchronous machines, MMF and short circuit characteristics, Leakage reactances, Synchronous reactance, Phasor digram under loaded conditions, Load characteristics, Predetermination of regultation by EMF and Portier triangle methods for non-salient pole aternators. Steady state power flow equations, Power angle characteristics, Constant excitation and constant power output, Circle diagram for synchronous machines. Two reation theory for sailent pole alternators and pre-determination for regulation, slip test, V cures, inverted V cures, compounding curves for synchronous motor.Synchronizing motor, Synchronous condenser.

Unit V

Parallel Operation of Alternators : Synchronizing, Synchroscope, Parallel operation of alternators, Alternator on infinite bus bar, Effect of change of excitation and prime mover input, Expressions for power developed as a function of torque angle, maximum power.

Recommended Reference Books:

1. Electrical Machinery by P.S.Bhimbra; Khanna Publisher
2. Electrical Machine by Najrath khothari; TMH
3. Electrical Machine by S. B.Gupta S. K Kataria & Sons
4. Electrical Machine S. K. Bhattacharya ; TMH

BTEE404 Non-Conventional Energy Resources

UNIT-1

Energy resources and their utilization : Indian and global energy sources, Energy exploited, Energy planning, Energy parameters (energy intensity, energy-GDP elasticity), Introduction to various sources of energy, Solar thermal, Photovoltaic, Water power, Wind energy, Biomass, Ocean thermal, Tidal and wave energy, Geothermal energy, Hydrogen energy systems, Fuel cells, Decentralized and dispersed generation. 3

UNIT-2

Solar energy: Solar thermal power and it's conversion, Solar collectors, Flat plate, Performance analysis of flat plate collector, Solar concentrating collectors, Types of concentrating collectors, Thermodynamic limits to concentration, Cylindrical collectors, Thermal analysis of solar collectors, Solar thermal energy storage, Applications, Water heating, Space heating & cooling, Solar distillation, solar pumping, solar cooking, Greenhouses, Solar power plants.

Solar photovoltaic system: Photovoltaic effect, Efficiency of solar cells, Semiconductor materials for solar cells, Solar photovoltaic system, Standards of solar photovoltaic system, Applications of PV system, PV hybrid system. 2

UNIT-3

Biogas Photosynthesis, Bio gas production Aerobic and anaerobic bio-conversion process, Raw materials, Properties of bio gas, Producer gas, Transportation of bio gas, bio gas plant technology & status, Community biogas plants, Problems involved in bio gas production, Bio gas applications, Biomass conversion techniques, Biomass gasification, Energy recovery from urban waste, Power generation from liquid waste, Biomass cogeneration, Energy plantation, Fuel properties, Biomass resource development in ndia.

UNIT-4

Wind energy Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals, Types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Selection of a wind mill, Wind energy farms, Economic issues, Recent development. 3

UNIT-5

Geothermal energy Structure of earth's interior, Geothermal sites, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Site selection for geothermal power plants. Advanced concepts, Problems associated with geothermal conversion. 2

Recommended Reference Books:

1. Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
2. Kothari D.P., "Renewable energy resources and emerging technologies", Prentice Hall of India Pvt. Ltd.
3. Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
4. Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.

BTEE 405 Data Base Management System

UNIT 1

INTRODUCTION TO DBMS: Overview and History of DBMS. File System vs. DBMS .Advantage of DBMS Describing and Storing Data in a DBMS. Queries in DBMS. Transaction management and Structure of a DBMS.

UNIT 2

ENTITY RELATIONSHIP MODEL: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model-Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, and Design with ER Model-Entity vs Attribute, Entity vs Relationship Binary vs. Ternary Relationship and Aggregation vs ternary Relationship Conceptual Design for a Large Enterprise.

UNIT 3

RELATIONAL MODEL: Relationship Algebra Selection and Projection, Set Operations, Renaming, Joints, Division, Relation Calculus, Expressive Power of Algebra and Calculus.

UNIT 4

SQL AND TRIGGERS: The Forms of a Basic SQL Query, Union, Intersection and Except, Nested Queries, Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values, Triggers and Active Databases.

UNIT 5

NORMAL FORMS AND CONCURRENCY CONTROL: Normalization using Functional Dependency, Multivalued dependency and Join dependency. Concurrency Control: Lock Based Protocols; Time Stamped Based Protocols, Deadlock Handling,.

Recommended Reference Books:

1 Date C J, “An Introduction To Database System”, Addision Wesley

2 Korth, Silbertz, Sudarshan, “Database Concepts”, McGraw Hill

3 Elmasri, Navathe, “Fundamentals Of Database Systems”, Addision Wesley

4 Leon & Leon, “Database Management System”, Vikas Publishing House.

5 Bipin C. Desai, “An introduction to Database Systems”, Galgotia Publication

6 Ramakrishnan, Gehrke, “Database Management System”, McGraw Hill

7 Kroenke, “Database Processing: Fundamentals, Design and Implementation”, Pearson

BTEE406 -Random Variables & Stochastic Processes:-

UNIT 1

PROBABILITY: Introduction to theory of probability, Definitions, sample, space & events, Self, joint & conditional probabilities, Statistically dependent & independent events.

UNIT 2

RANDOM VARIABLES: Introduction, distribution & density functions, discrete & continuous random variables, special distributions: binominal, Poisson, uniform, exponential, normal, Rayleighs. conditional distribution & density functions.

UNIT 3

MULTIPLE RANDOM VARIABLES :Vector random variable, joint distribution functions, joint probability density function(PDF), Statistical independence, distribution & density function of sum of random variable, one function of one random variable ,one function of two random variable, two function of two random variable.

UNIT 4

OPERATION ON SINGLE & MULTIPLE RANDOM VARIABLES : Mean & variance, moments, chebyshev's inequality, Central limit theorem, characteristic functions &moment generating function, covariance & correlation coefficient of multiple random variables.

UNIT 5

STOCHASTIC PROCESSES: Introduction, random process concept, stationary & independence, ergodicity, correlation, functions.Gaussion Random Process, Transmission of Random process through linear systems. Power spectral Density (PSD), Cross Spectral density, white Gaussion Random process.

Recommended Reference Books:

1. B.P. Lathi- Modern Digital & Analog Communication system.
2. A.B. Carlson- Communication systems.
3. A. populis- Random Variables & Stochastic processes.
4. Peebles, P. Probability, random variables and random signal principles. Mc Graw Hill, 2001.
5. Papoulis, A. Probability, random variables and stochastic processes. Mc Graw Hill (international Students' edition), Singapore.
6. Childers, D. G. Probability and random processes using MATLAB.Mc Graw Hill 1997.

BTEE407 Analog Electronics lab

List of Experiments

1. Plot and study the characteristics of small signal amplifier using FET.
2. To study and perform experiment of Astable Multivibrator and the frequency variation with different parameters.
3. To study and perform experiment of Bistable Multivibrator and the frequency variation with different parameters.
4. To study and perform experiment of Monostable Multivibrator and the frequency variation with different parameters.
5. To study and perform experiment of Schmitt trigger binary circuit.
6. To study and perform experiment of RC phase shift oscillator.
7. To study and perform experiment of Hartley oscillator.
8. To study and perform experiment of Colpitt oscillator.
9. Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.

BTEE408 ELECTRIC MACHINE LAB II

1. No-load & Blocked rotor tests on three phase Induction motor.
2. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods.
3. V and Inverted V curves of a three—phase synchronous motor.
4. Determination of Xd and Xq of a salient pole synchronous machine.
5. Sumpner's test on a pair of three phase transformers.
6. Brake test on three phase Induction Motor.
7. Regulation of three-phase alternator by Z.P.F. and A.S.A methods.
8. Efficiency of a three-phase alternator.
9. Measurement of sequence impedance of a three-phase alternator.

   To perform the heat run test on a delta/delta connected threephase transformer and determine the parameter for its determine the parameter for its equivalent circuit.

BTEE410 Data Base Management Systems Lab

List of Experiments

1. **Write a program to show two methods of retrieving SQL**
2. **Write a program show use of cursor type to retrieve multiple record sets**
3. **Write a SQL statement to read data out of a table**
4. **Write programs to use "join" and "primary key"**
5. **Write a program to show a "functional dependency" in database table design**
6. Write a program to show difference between group by and order by
7. Write a program to show use of the WHERE clause
8. Write a program to show difference between "join" and "union".
9. **Write a program to use the elements of the SELECT query syntax**
10. Write a program using the syntax for a CREATE TABLE statement
11. Write a program to use **dynamic SQL**
12. **Write a program to show the difference between delete and truncate commands**
13. **Write a program to show the difference between a local and a global temporary table**

FIFTH SEMESTER								
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTEE501	Industrial Electronics	3	1	-	30	70	100	4
BTEE502	Microprocessors & Interfaces	3	-	-	30	70	100	4
BTEE503	Control System	3	1	-	30	70	100	4
BTEE504	Transmission & Distribution of Electric Power	3	-	-	30	70	100	3
BTEE505	High Voltage Engineering	3	-	-	30	70	100	3
	Elective (any one)							
BTEE506A	Materials in Electrical Systems	3	-	-	30	70	100	3
BTEE566B	Switching Theory and Logic Design	3	-	-	30	70	100	3
BTEE506C	Digital Signal Processing	3	-	-	30	70	100	3
BTEE506D	Communication Systems	3	-	-	30	70	100	3
BTEE506E	Electromagnetic Field Theory	3	-	-	30	70	100	3
PRACTICALS /VIVA VOCE								
		L	**T**	**P**	**Seasonal**	**Practical**	**Total**	**Credits**
BTEE507	Industrial Electronics Lab	-	-	2	30	20	50	1
BTEE508	Microprocessor Lab	-	-	2	30	20	50	1
BTEE509	MATLAB Programming Lab	-	-	2	30	20	50	1
BTEE510	Control System Lab	-	-	2	30	20	50	1
BTEE 511	Digital Signal Processing	-	-	2	30	20	50	1
BTEE 512	Training viva	-	-	0	30	20	50	2
	Total	18	2	10	360	540	900	27

BTEE501 Industrial Electronics

UNIT 1

CHARACTERISTICS OF POWER DEVICES: Power diodes, power transistor, IGBTS, TRIAC, DIAC, SUS, SBS, and SCS.SCR:- Construction and its characteristics. Methods of turning on and turning off.

UNIT 2

CONTROLLED RECTIFIERS: Single and Three phase half wave and full wave controlled rectifiers, three phase bridge rectifier circuits. Double –Y type rectifier with interphase transformer. Effect of flywheel diode

UNIT 3

CONVERTERS AND INVERTER: One two and four quadrant converters, Fly back converter, forward/buck converter, Boost converter and buck-boost converter Inverters: - Single phase Tapped and Bridge inverter circuits, 3 phase bridge inverter. Voltage sourced and current sourced inverters.

UNIT 4

CHOPPERS AND CYCLOCONVERTERS: Basic chopper circuits, 2 and 4 quadrant choppers. Principle of operation of cycloconverter. Single phase to single phase, three phase to single phase and three phase to three phase cycloconverter circuits.

UNIT 5

MOTOR CONTROL: Introduction to speed control of DC motors using phase controlled converters and choppers, Basic idea of speed control of three phase induction motors using voltage and frequency control methods.

References books Recommended:

1. Power Electronics – By P.C. Sen
2. Power Electronics- By Dubey
3. Power Electronics- Ramamurthy
4. Industrial Electronics-By G.K. Mittal
5. Power Electronics Systems- By Agarwal (Pearson Education India)
6. Power Electronics - P.C. Sen, Tata McGraw Hill Publishing Co., Ltd., 1987.
7. Power Electronics and Control - S.K. Dutta, Prentice Hall of India Pvt. Ltd., 1986.
8. Power Elecronics By P. S. Bimbira :Khanna Publisher

BTEE 502 Microprocessors & Interfaces

UNIT 1

INTRODUCTION: Overview of Microprocessor Structure and its operation.CPU, address bus, data bus and control bus. Input/ Output devices, buffers,encoders, latches and memories. Demultiplexing of address/data bus and memory/IO read/write control signals

UNIT 2

8085 MICROPROCESSOR ARCHITECTURE: Internal data operations and registers, pins and signals, peripheral devices and memory organization, interrupts. CISC and RISC architecture overview. Memory Interfacing, Memory mapped I/O and peripheral mapped I/O 8085 Microprocessor Programming model. Intrduction to 8085 instructions,programming techniques, counters and time delays, stack and subroutines, interrupts of 8085.

UNIT 3

8085 MICROPROCESSOR INSTRUCTIONS: Classification, format and timing. Instruction set.Programming and debugging, 8 bit and 16 bit instructions.

UNIT 4

8085 MICROPROCESSOR INTERFACING: 8259, 8257, 8255, 8253, 8155 chips and their applications. A/D conversion, memory, keyboard and display interface (8279).

UNIT 5

INTRODUCTION TO 8051 MICROCONTROLLER: General features & architecture of 8051. Memory, timers and interrupts. Pin details. Interfacing and applications.

References Books Recommended:

1. Ramesh.S.Gaonkar "Microprocessor architecture, programming & applications with 8085/8080A"Penram International -1997.
2. Yu.Cheng Liu & Glenn A Gibson, "Microcomputer system, 8086/8088 family"-2nd Edition - PHI-1986.
3.Kenneth J.Ayala "The 8051 Microcontroller Architecture, Programming & Applications"-Penram International publishing- 1996.
4.D.V.Hall "Microprocessor and Digital system"-McGraw Hill Publishing Company-1990.
5.Ajit Pal "Microprocessor Principles and Applications"-Tata McGraw Hill-1990.
6.Kenneth "Microprocessor and programmed logic" PHI,1987.
7.Avatar singh and Walter A.Tribel "16 bit microprocessor, Architecture, software and interface techniques", PHI 1985.
8 Ghose Sridhar , "Microprocessors for Engineers and Scientists"
9 Lance A Leventhal, "Introduction to Microprocessors" Prentice Hall
10 Hamacher C V, "Computer Organization - 3rd Edition" , McGraw Hill., New York

BTEE 503 Control Systems

UNIT 1

CONCEPTS OF OPEN AND CLOSED LOOP SYSTEMS: Example and application of open loop and close loop systems. Brief idea of multivariable control system, Brief idea of Z-transform and digital control systems. Representation of physical systems (Electro-mechanical) by differential equations, Determination of transfer function by block diagram, Reduction technique and signal flow graphs techniques.

UNIT 2

TIME RESPONSE ANALYSIS OF FIRST ORDER & SECOND ORDER SYSTEMS: Time response analysis of first and second order systems. Transient response analysis steady state error and error constants.

UNIT 3

FREQUENCY DOMAIN METHODS: Bode plot, Design specification in frequency domain and their co-relation with time domain.

UNIT 4

STABILITY OF THE SYSTEM: Absolute and relative stability. Routh's stability criterion. Root locus method of analysis. Polar plots Nyquist stability criterion. M and sN locii, Nichol's chart.

UNIT 5

STATE VARIABLE ANALYSIS: Concept of state, state variables and state model. State models for linear continuous time systems.Diagonalization transfer functions. Solutions of state equations. Concept of controllability and observability

References books Recommended:

1 J Nagrath and M Gopal: Control Systems Engineering, New Age Publication.

2. K Atsuhiko Ogata: Modern Control Engineering, Prentice Hall of India.

3. M. gopal: Control Systems, Tata Mc-Graw Hill.

4. B.C.Kuo: Automatic Control Systems, Prentice Hall of India.

5. Linear Control System -By B.S. Manke (Khanna Publisher)

BTEE504 TRANSMISSION AND DISTRIBUTION OF ELECTRICAL POWER

UNIT 1

(i) **SUPPLY SYSTEM**

Basic network of power system transmission and distribution voltage , effect of system voltage on the size of conductor and losses .comparison of dc 2 wire , dc 3 wire , 1 – phase ac and 3 –phase ac (3-wire and 4-wire) system.

(ii) Distribution system:-

Primary and secondary distribution system, feeder, distribution and service main .radial and ring main distribution system , Kelvin's law for conductor size .

Unit 2

Parameter of Transmission lines:- Parameter of single and three phase transmission lines with single and double circuit s, resistance, inductance and capacitance of overhead lines .effect of earth/ lines transposition ,geometric mean radius and distance .inductance and capacitance of lines with symmetrical and unsymmetrical spacing inductance and capacitance of double circuit lines skin and proximity effect .equivalent –circuit and performance of shot and and medium transmission lines .

Unit 3

(i)Generalized ABCD lies constant, equivalent circuit and perform ace of long transmission communication circuit ,power flow thought a transmission line.

(ii) corona :- factor affecting corona , corona power loss and effect of corona .

Unit 4

Insulators and cables,

Insulators: - Types, voltage distribution in insulator string and grading , improvement of string efficiency .

Underground cable: - Types of cables single core , grading of cable thermal rating of cable .

Unit 5

Mechanical design of lines and ground Mechanical designs of transmission of lines – sag and tension calculation for different weather condition –Method of grounding –Peterson coil – substation layout

References books Recommended:

1. Power system Analysis by Nagrath Kothari: TMH
2. A course in Electric power by soni Gupta Bhatnagar : Dhanpat Rai and Company
3. Utilization of electric power by J. B. Gupta: S. K Kataria and Sons

BTEE505 HIGH VOLTAGE ENGINEERING

UNIT I

OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS

Causes of over voltages and its effect on power system – Lightning, switching surges and temporary over voltages - protection against over voltages.

UNIT II

ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS

Gaseous breakdown in uniform and non-uniform fields – corona discharges – Vacuum breakdown - conduction and breakdown in pure and commercial liquids – breakdown mechanisms in solid and composite dielectrics

UNIT III

GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS

Generation of High DC, AC, impulse voltages and currents. Tripping and control of impulse generators.

UNIT IV

MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS

Measurement of High voltages and High currents – digital techniques in high voltage measurement

UNIT V

HIGH VOLTAGE TESTING & INSULATION COORDINATION

High voltage testing of electrical power apparatus – power frequency, impulse voltage and DC testing – International and Indian standards – Insulation Coordination.

Recommend Reference Books:

1. M.S. Naidu and V. Kamaraju, ‘High Voltage Engineering’, Tata McGraw Hill, 3rd Edition,2004.
2. E. Kuffel and W.S. Zaengl, ‘High Voltage Engineering Fundamentals’, Pergamon press, Oxford, London, 1986.
3. E. Kuffel and M. Abdullah, ‘High Voltage Engineering’, Pergamon press, Oxford, 1970.

BTEE 506A Materials in Electrical Systems

UNIT I

Conducting Materials: Energy band diagram of conductors, semiconductors and insulators. Conductivity and Resistivity, factors affecting the resistivity, classification of conducting materials, electrical, mechanical and thermal properties and applications of low resistance materials like copper, aluminium, steel, silver, gold, platinum, brass and bronze. Electrical, mechanical and thermal properties and applications of high resistance materials like manganin, constantan, nichrome, mercury, tungsten and carbon. Introduction of super conductors.

UNIT II

Insulating Materials: Classification of insulating materials, electrical, physical, thermal, chemical, mechanical properties of insulating materials. Thermoplastic and natural insulating materials, Gaseous and liquid insulating materials, properties and applications of ceramics and synthetic insulating materials.

UNIT III

Magnetic Materials:

Introduction and classification of magnetic materials, permeability, B-H curve, magnetic saturation, hysteresis loop, coercive force and residual magnetism, concept of eddy current and hysteresis loss

UNIT IV

curie temperature, magnetostriction effect. Soft and hard magnetic materials, ferro and ferri magnetic materials, special purpose magnetic materials.

UNIT V:

Special Materials and components:

Properties and applications of different materials used in electrical systems like – thermocouples, bimetallic, fusing, and soldering. Introduction to different types of materials used in electromagnetic and electromechanical systems, resistors, capacitors, inductors, special semiconductors used in electrical engineering.

Text Books:

[T1] Electrical properties of materials by L. Solymer, Oxford University Press, 2014

[T2] An Introduction to Electrical Engineering Materials, C.S. Indulkar,

S.Thiruvengadam, S. Chand

Publishing, 4th edition, 2004

Reference Books:

[R1] Electronic Engineering Materials and Devices,J. Allison, Tata McGraw Hill Education,1973

[R2] Electrical Materials, Rob Zachariason, Delmar Cengage Learning, 2nd Revised edition 2011

[R3] Electrical Engineering Materials, Dekker Adrianu., PHI,1st edition, 2011

[R4] A Course In Electrical Engineering Materials, Seth S P, Dhanpat Rai, 3rd edition, 2011

[R5] Electrical and Electronic Engineering Materials by S.K. Bhattacharya, Khanna Publishers New Delhi.

BTEE 506B Switching Theory and Logic Design

UNIT- I

Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

Switching Theory: - Boolean Algebra- Postulates and Theorems, De' Morgan's Theorem, Switching Functions- Canonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine Mc-Clusky Methods.

Combinational Logic Circuits:- Review of basic gates- Universal gates, Adder, Subtractor ,Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Look-ahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and De-multiplexer, ALU, PLA and PAL.

UNIT- II

Integrated circuits: - TTL and CMOS logic families and their characteristics. Brief introduction to RAM and ROM.

Sequential Logic Circuits: - Latches and Flip Flops- SR, , D, T and MS-JK Flip Flops, Asynchronous Inputs.

Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD,Decade and Up/Down Counters , Shift Registers, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.

UNIT- III

Synchronous Sequential Circuits:- State Tables State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and merger chart methodsconcept of minimal cover table.

UNIT- IV

Algorithmic State Machine: Representation of sequential circuits using ASM charts synthesis of output and next state functions, Data path control path partition-based design.

UNIT- V

Fault Detection and Location: Fault models for combinational and sequential circuits, Fault detection in combinational circuits; Homing experiments, distinguishing experiments, machine identification and fault detection experiments in sequential circuits.

Text Book:

Zyi Kohavi, "Switching & Finite Automata Theory", TMH, 2nd Edition

Morris Mano, Digital Logic and Computer Design", Pearson

R.P. Jain, "Modern Digital Electronics", TMH, 2nd Ed,

Reference Books:

A Anand Kumar, "Fundamentals of Digital Logic Circuits", PHI

Taub ,Helbert and Schilling, "Digital Integrated Electronics", TMH

BTEE 506C Digital Signal Processing

UNIT 1

TRANSFORM ANALYSIS OF LTI SYSTEMS: Linear Time Invariant Systems(both discrete & continuous), Properties of LTI systems, Response of continuous time LTI system using convolution integral, Response of discrete time LTI system using convolution sum, The frequency response of LTI systems, System functions for systems characterized by Linear Constant Coefficient Difference equations, All-pass system, Minimum-Phase systems, Linear systems with linear phase.

UNIT 2

TYPES OF TRANSFORM: The Discrete Fourier transforms (DFT), Properties of the DFT, and Linear Convolution using DFT. Efficient computation of the DFT: Decimation–in-Time and Decimation-in frequency FFT Algorithms. Discrete cosine transform, Processing of speech signals: Vocoders, linear predictive coders.

UNIT 3

FILTER DESIGN TECHNIQUES: Introduction, Filter Design: Magnitude and phase response of digital filters-Linear phase response, IIR filter design by impulse invariance & bilinear transformation. Design of FIR filters by Windowing: Rectangular, Hanning, Hamming & Kaiser. Butterworth & Chebyshev filters.

UNIT 4

STRUCTURES FOR DISCRETE-TIME SYSTEMS: Block diagram and signal flow graph representation of Linear Constant Coefficient Difference equations, Basic structures for IIR and FIR systems, Transposed forms. Circular and sectioned convolutions, Matrix representation of digital networks.

Digital Filter Structure: Basic IIR and FIR digital filter structure, analysis of finite word length effects, effect of coefficient quantization, round-off errors, and limit cycle in IIR digital filters.

UNIT 5

MULTI RATE DIGITAL SIGNAL PROCESSING: Design of practical sampling rate converters, decimator and interpolators, poly-phase decomposition, digital processing of analog signals.

References books Recommended:

1. Sanjit K Mitra, Digital Signal Processing - Tata McGraw Hill 1998.

2. Allan V.Oppenheim & Donald W.Schafer, Digital Signal Processing- Prentice Hall of India 1989.

3. Ludeman "Fundamentals of Digital signal processing" Harper and Row Publications 1986.

4. Signals and Systems- Oppenheim A.V., Willsky A.S. and Young I.J. PHE.

5. Digital Signal Processing- Oppenheim A.V. & Schafer R.W. PHI.

6**.** Oppenheim, Schafer, Buck**:** Discrete Time signal processing, Pearson Education

7. Proakis, Manolakis: Digital signal processing, Pearson Education

BTEE 506D Communication Systems

UNIT- I

Introduction: Overview of Communication system, Communication channels, Mathematical Models for Communication Channels

Introduction of random Variables: Definition of random variables, PDF, CDF and its properties, joint PDF,CDF, Marginalized PDF, CDF, WSS wide stationery, strict sense stationery, non stationery signals, UDF, GDF,RDF, Binomial distribution, White process, Poisson process, Wiener process.

UNIT - II

Analog Modulation: Modulation- Need for Modulation, Amplitude Modulation theory: DSB-SC, SSB, And VSB. Modulators and Demodulators. Angle Modulation, Relation between FM and PM Wave. Generation of FM wave- Direct and Indirect Methods. Bandwidth of FM (NBFM, WBFM)

Pulse Analog Modulation: Sampling-Natural and Flat top. reconstruction, TDM-Pulse Amplitude Modulation (TDM-PAM), Pulse Width Modulation (PWM), Pulse Position Modulation(PPM), Generation and Recovery.

Pulse Digital Modulation: Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), ADPCM.

UNIT - III

Digital Modulation and Transmission: Advantages of digital communication. Modulation schemes: ASK, PSK, FSK. Spectral Analysis. Comparison. Digital Signaling Formats-Line coding.

Information and Coding Theory: Entropy, Information, Channel Capacity. Source Coding Theorem:Shannon Fano Coding, Huffman Coding.

UNIT - IV

Fiber Optical System: Basic Optical Communication System. Optical fibers versus metallic cables, Light propagation through optical fibers. Acceptance angle and acceptance cone, Fiber configurations. Losses in optical fibers. Introduction to Lasers and light detectors. Applications: Military, Civil and Industrial applications.

UNIT - V

Advanced Communication Systems: Introduction to cellular radio telephones. Introduction to satellite Communication.

Text Books:

George Kennedy, "Electronics Communication System", TMH 1993

B.P. Lathi, "Analog& Digital Communication", Oxford University Press 1999.

Reference Books:

Simon Haykin, "Introduction to Analog & Digital Communication", Wiley, 2000

Tannenbaum, "Computer networks", PHI, 2003

K. Sam Shanmugam, "Digital & Analog Communication system", John Wiley & Sons 1998.

BTEE 506E- Electromagnetic Field Theory

UNIT 1

Introduction: Vector Relation in rectangular, cylindrical and spherical coordinate system. Concept and physical interpretation of gradient, Divergence and curl. Green's and stock's theorems.

UNIT 2

Electrostatics: Electric field due to various charge configurations.The potential functions and displacement vector. Gauss's law.Poisson's and Laplace's equation and their solution. Uniqueness theorem. Continuity equation. Capacitance and electrostatics energy.Boundary conditions.

UNIT 3

Magnetostatics: Magnetic field intensity, flux density & magnetization, Faraday's law. Bio Savart's Law. Ampere's law.Magnetic scalar and vector potentials. Energy Stored in magnetic field. Boundary conditions. Analog between electric and magnetic field.

UNIT 4

Time Varying Fields: Displacement currents and equation of continuity, Maxwell's equations, Uniform plane wave in free space, dielectrics and conductors, skin effect sinusoidal time variations, reflection of Uniform Plane Wave (UPW), standing wave ratio. Potentials vector and power onsiderations.

UNIT 5

Radiation, Emi And Emc: Radiation: Retarded potentials and concept of radiation. Alternating current element and power radiated. Radiation resistance**:** Introduction to Electromagnetic Interference and Electromagnetic compatibility, EMI coupling modes, methods of eliminating interference; shielding, grounding, conducted EMI, EMI Testing: emission testing, susceptibility testing.

References Books Recommended:

1. David K. Cheng, Fundamentals of Engineering Electromagnetics, Addison-Wesley Pub. Co.,

2. Electromagnetic waves and Radiating systems - E.C. Jordan and K.G. Balmain, PHI.

3. Sadiku- Elements of Electromagnetics, Oxford Press

4. Ulabi, Applied Electromagnetics

5. Schaum's Electromagnetics, MGH

6. Electro-Magnetics: Krauss J.D. F, Mc Graw Hill

7. Electromagnetics - Hayt, Tata Mc Graw Hill

8. B.B. Laud, Electromagnetics, New Age International (P) Ltd.

9. V.V. Sarvate, Electromagnetic fields and waves, New Age International (P) Ltd.

BTEE507 Industrial Electronics Lab

List of Experiment:

1 Study the characteristics of SCR.
- Observe the terminal configuration.
- Measure the breakdown voltage.
- Measure the latching & holding current.
- V-I characteristics.

2 Perform experiment on triggering circuits for SCR.
R-triggering circuit
R-C triggering circuit
UJT triggering circuit.
Study & obtain the waveforms of single phase half wave controlled converter.

3 Study & obtain the waveforms of single phase half controlled symmetrical and asymmetrical bridge converters.

4 Study & obtain the waveforms of single phase fully controlled bridge converter.

5 Study & obtain the waveforms for voltage- commutated- chopper.

6 Study & obtain the waveforms for current- commutated- chopper.

7 Perform experiment on single phase PWM inverter.

8 Perform experiment buck, boost & buck-boost regulator.

9 Perform experiment on Motor control - open loop & closed loop.

10 Study & obtain the characteristics of DIAC.

BTEE 508 Microprocessors Lab

List of Experiments

1. Study the hardware, functions, memory structure and operation of 8085-Microprocessor kit.
2. Program to perform integer division: (1) 8-bit by 8-bit (2) 16 bit by 8 bit.
3. Program to add two 8–bit numbers
4. Program to Find 2's compliment of a number.
5. Transfer of a block of data in memory to another place in memory
6. Transfer of black to another location in reverse order.
7. Searching a number in an array.
8. Sorting of array in: (1) Ascending order (2) Descending order.
9. Finding party of a 32-bit number.
10. Program to multiply two 8–bit numbers
11. Program to generate and sum 15 Fibonacci numbers.
12. Reversing bits of an 8-bit number.

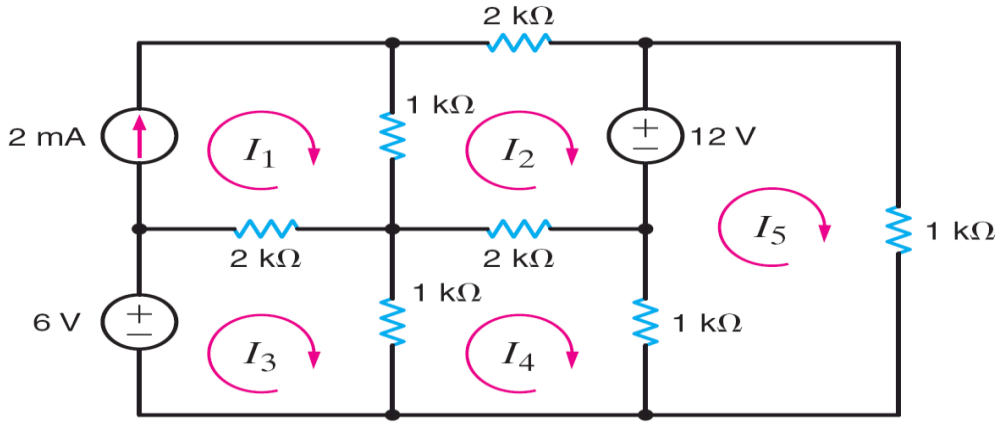
BTEE509 MATLAB Programming Lab

List Of experiments :-

1. Introduction to Matlab

2 Basic operation in Matlab using Matrix and array input type

3. Find mesh current in given ckt using Mat lab



4. plotting simple graphs .

5. script and function files.

6. curve fitting and interpolation

7. Application of simulink in Matlab

BTEE 510 CONTROL SYSTEMS LAB

List of Experiments-

1. Perform an experiment to find out the DC motor & generator constants .
2. Study of torque speed characteristics of DC motor.
3. Perform an experiment to find out the transfer function and inertia of DC motor..
4. Perform and experiment to find out the value of RLC by using second order time response analysis.
5. Perform and experiment to find out the parameters of AC servomotor KM, KG and effective friction.
6. Perform and experiment to find out the inertia nad tansfer function of AC servomotor.
7. Perform and experiment on compensation design kit to design the lag network .
8. Study of stability analysis (nyquist criterial) of linear time invariant system.

BTEE 511 DIGITAL SIGNAL PROCESSING LAB

List of Experiment

Modelling and simulation using MAT LAB

1. Realising a given block diagram having multiplier, adder/ subtractor and system (Discrete/Continuous) with given Impulse response. Calculating output for given input.

2. To simulate the transmitter and receiver for BPSK

3. To design and simulate FIR digital filter (LP/HP).

4. To design and simulate IIR digital filter (LP/HP).

5. To design and simulate DFT/FFT .

DSP Lab using TMS320C6XXX DSP Kits

6. To study the architecture of TMS320C6XXX DSP kits using Bloom with DSP.

7. To generate wave form (SINE, COSINE, SQUARE & TRIANGULAR).

8. Verification of Sampling Theorem.

9. Verification of linear/circular convolution.

10. To design FIR and FIR digital filter (LP/HP).

SIXTH SEMESTER

THEORY PAPERS

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTEE601	Advanced Power System	3	1	-	30	70	100	4
BTEE602	Switchgear & protection	3	-	-	30	70	100	3
BTEE603	Economic operation of power system	3	-	-	30	70	100	3
BTEE604	Signals & Systems	3	1	-	30	70	100	4
BTEE605	Modern Control Theory	3	-	-	30	70	100	3
	Elective (any one)							
BTEE606A	Power Quality	3	-	-	30	70	100	3
BTEE606B	Power System Reliability	3	-	-	30	70	100	3
BTEE606C	Power system coordination and control	3	-	-	30	70	100	3
BTEE606D	Advanced Microprocessors	3	-	-	30	70	100	3

PRACTICALS / VIVA VOCE

		L	T	P	Seasonal	Practical	Total	Credits
BTEE607	Power System Lab	-	-	2	30	20	50	1
BTEE608	Advanced Power Electronics Lab	-	-	2	30	20	50	1
BTEE609	Power System Design Lab	-	-	2	30	20	50	1
BTEE610	Signal and Systems Lab	-	-	2	30	20	50	1
BTEE611	Industrial tour/ In house workshop	-	-	0	30	20	50	1
BTEE612	Minior Project - I	-	-	1	30	20	50	2
	Total	18	2	9	360	540	900	28

BTEE601 ADVANCED POWER SYSTEM

Unit-1

Wave terminology, Development of wave quotations, Terminal problems, Lattice diagrams, Origin and Nature of power system transients and surges, Surge parameters of plants, Equivalent Circuit representations. Lumped and distributed circuit transients.

Unit-2

Line energisation and de-energisation transients-Earth and earthwire effects. Current chopping in circuit breakers. Short line fault condition and its relation to circuit breaker duty. Trapped harge effects. Effect of source and source representation in short line fault studies.

Unit-3

Control of transients, Lightening phenomenon, influence of tower footing resistance and earth resistance, Traveling waves in distributed parameters multiconductor lines, parameters as a function of frequency.

Unit-4

Mechanism of Lightning Discharge Types of Lightning strokes, Harmful effects of lighting, protections against lightning, overhead Ground wires.

Unit-5

Lightening Arresters, Types of lightening arresters, Surge Absorber simulation of surge diverters in trarient analysis. Fourier integral and z transform methods in power system trarient.

References Books Recommended:

1. Electrical trainsient in power system by Allen Green Wood: Wiely interscience , Newyork.
2. High Voltage Engineering by M. S. naidu and V. Kamraju : TMH

BTEE 602 SWITCH GEAR AND PROTECTION

UNIT –I

Circuit Breakers Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications : Types and Numerical Problems. – Auto reclosures.

Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT –II

Electromagnetic and Static Relays

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types. Application of relays: Over current/ Under voltage relays, Directionrelays, Differential Relays and Percentage Differential Relays.Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison. Static Relays: Static Relays verses Electromagnetic Relays.

UNIT –III

Generator and Transformer Protection

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

UNIT –IV

Feeder and Bus-Bar Protection

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars – Differential protection.

UNIT –V

Protection against over voltages

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

REFERENCE *TEXT BOOKS:*

1. Switchgear and Protection – by Sunil S Rao, Khanna Publlishers
2. Power System Protection and Switchgear by Badari Ram , D.N Viswakarma, TMH Publications
3. Fundamentals of Power System Protection by Paithankar and S.R.Bhide.,PHI, 2003.
4. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.
5. Electrical Power Systems – by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3nd editon
6. A Text book on Power System Engineering by B.L.Soni, Gupta, Bhatnagar, Chakrabarthy, Dhanpat Rai & Co.

BTEE603 Economic Operation of Power Systems

Unit-1

Economics of Power Generation: Introduction, cost of electrical energy, expression for cost of electrical energy, depreciation, power plant cost analysis, economics in plant selection, selection of types of generation and types of equipments, factors effecting economic generations and distributions, generating cost, economics of different types of generating plants.

Unit-2

Economical Operations of thermal power plants: Methods of loading turbo generators, input, output and heat rate characteristics, incremental cost, two generations units, large no of units, sequence of adding units, effects of transmission losses, economic scheduling considering transmission losses, coordination equations, penalty factors

Unit-3

Hydro Thermal coordination: Advantages of combined operation, base load peak load operation requirement, combined working of run-off river and steam plant, reservoirs hydroplants and thermal plants (long term operational aspects), short term hydro thermal coordination, coordination equations, scheduling methods and applications.

Unit-4

Parallel Operations of Generators: Conditions, synchronizing current and power, two alternators in parallel (effect of change in excitation, load sharing, sharing of load currents), Infinite bus bars, active and reactive power control, synchronizing power, torque, operating limits of alternators, operating characteristics of cylindrical alternator rotor.

Unit-5

Economics for Electrical Engineers: Concepts of physical and financial efficiencies of electrical goods and services, supply and demand, break even and minimum cost analysis, linear and nonlinear break even, min cist analysis

References Books Recommended:

1. Morden power system analysis by I. J Nagrath and Kothari: TMH
2. Power system Analysis by Graingar and Steventions: TMH
3. power System Analysis by Headi Saadat; TMH Edition

BTEE 604 Signals and Systems

UNIT1

CLASSIFICATION OF SIGNALS AND SYSTEMS: Basic concepts & definitions, continuous & discrete time signals, systems & their classification, LT1 systems, convolution, system modeling using Differential & Difference Equations.

UNIT 2

ANALYSIS OF C.T. SINGALS: Fourier series analysis, Spectrum of C.T. signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT 3

ANALYSIS OF D.T. SIGNALS: Discrete time Fourier series, Spectrum of D.T. signals, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Properties of Z-transform in signal analysis.

UNIT 4

Z-TRANSFORM & LAPLACE TRANSFORM: Introduction. The region of convergence for the Z-transform. The Inverse Z-transform. Two dimensional Z-transform. Properties of Z transform. Laplace transform, Properties of Laplace Transform, Application of Laplace transform to system analysis.

UNIT 5

SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Real sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals.

References books Recommended:

1. Signals & systems- By AV Oppenheim, A.S. willsky and I.T.Young Prentice Hall, 2nd edition.
2. “Methods of Signal & System Analysis- by G.R. Copper and GD Mc Gillon
3. Douglas K. Lindner, “Signals and Systems ", McGraw Hill International, 1999.
4. Simon Haykin and Barry Van Veen, “Signals and Systems ", John Wiley & Sons Inc., 1999.
5. Robert A. Gabel and Richard A. Roberts, “SIGNALS AND LINEAR SYSTEMS", John Wiley, 3rd Edition, 1987.
6. Roger E. Zeimer et al, " SIGNALS AND SYSTEMS: Continuous and Discrete", McMillan, 2nd Edition, 1990.

BTEE605 MODERN CONTROL THEORY

Unit-1

Introduction: Concept of Linear vector space Linear Independence, Bases & Representation domain and range. Concept of Linearity, relaxedness, time invariance, causality.

Unit-2

State Space Approach of Control System Analysis: Modern Vs conventional control theory,concept of state, state variable state vector, state space, state space equations, Writing statespace equations of mechanical, Electrical systems, Analogous systems.

Unit-3

State Space Representation using physical and phase variables, comparison form of system epresentation. Block diagram representation of state model. Signal flow graph representation.State space representation using canonical variables. Diagonal matrix. Jordan canonical form ,Derivation of transfer function from state-model.

Unit-4

Solution of State Equations: Diagonalization, Eigenvalues and eigen vectors. Matrix exponential, State transition matrix, Properties of state transition matrix. Computation of Statetransition matrix concepts of controllability & observability. Pole placement by statefeedback, Ackerman's formula

Unit-5

Digital Control Systems: Introduction, sampled data control systems, signal reconstruction,difference equations. The z-transform, Z-Transfer Function. Block diagram analysis ofsampled data systems, z and s domain relationship, digital PID controller

References Books Recommended:

1. Morden Control system theory by M. Gopal ; New Age International
2. Morden Control system theory by U. A. Bakshi, M. V. Bakhsi ; Technical publication
3. Morden Control system theory by William L. Brogan ; quantam publisher

BTEE606A Power Quality

UNIT I

Introduction: Power Quality (PQ), PQ problems , Sags, Swells, Transients, Harmonics, Interruptions, Flicker,Voltage fluctuations, Notch. PQ Issues, Assessing PQ: Remedies Customer side of meter, Utility side of themeter. Power quality monitoring – Monitoring considerations, Historical Perspective of PQ Measuring Instruments, PQ measurement equipment, Assessment of PQ measurement data, Application of intelligent systems, PQ monitoring standards.

UNIT II

Voltage Sag Analysis: Voltage sag characteristics - Methodology for computation of voltage sag magnitude and occurrence Accuracy of sag analysis Duration & frequency of sags Faults behind transformers Effect of pre-fault voltage Simple examples Voltage dip problems, fast assessment methods for voltage sags in distribution systems.

UNIT III

PQ Consideration in Industrial Power Systems: Adjustable speed drive (ASD) systems and applications Sources of power system harmonics Mitigation of harmonics Characterization of voltage sags experienced by three-phase ASD systems Types of sags and phase angle jumps Effects of momentary voltage dips on the operation of induction and synchronous motors.

UNIT IV

Harmonics: Harmonic distortion, Voltage versus current distortion, Harmonics versus Transients, Harmonic Indices, Harmonic sources from commercial loads

UNIT V

Harmonic sources from industrial loads, Locating Harmonic sources, System response characteristics, Effects of Harmonic distortion, Inter harmonics, Devices for controlling harmonic distortion.

Text Books:

1. Math H.J. Bollen, Understanding Power Quality Problems, IEEE Press, 1999.
2. Roger C.Dugan, Mark F.McGranaghan, Surya Santoso, H.Wayne Beaty, Electrical Power Systems Quality, Second Edition, Tata McGraw-Hill Edition.
3. C.Sankaran, Power Quality, CRC Press, 2002.

References Books:

1. N. G. Hingonani, Gyugi, Understanding FACTS concepts, Technology of flexible AC Transmission systems, IEEE Press, 1999
2. T.J.E Milles – Reactive Power Control in electric systems, John Wiley & Sons 1982
3. J. Arrillaga, D.A Bradely and P.S. Bodger, Power System Harmonics. New York: Wiley,1985

BTEE606B Power System Reliability

Unit I

Load Forecasting:Introduction, Factors affecting Load Forecasting, Load Research, Load Growth Characteristics, Classification of Load and Its Characteristics, Load Forecasting Methods - (i) Extrapolation (ii) Co-Relation Techniques, Energy Forecasting, Peak Load Forecasting, Reactive Load Forecasting, Non-Weather sensitive load Forecasting, Weather sensitive load Forecasting, Annual Forecasting, Monthly Forecasting, Total Forecasting.

Unit II

System Planning : Introduction, Objectives & Factors affecting to System Planning , Short Term Planning, Medium Term Planning, Long Term Planning, Reactive Power Planning.

Unit III

Reliability : Reliability, Failure, Concepts of Probability, Evaluation Techniques (i) Markov Process (ii) Recursive Technique, Stochastic Predic

tion of Frequency and Duration of Long & Short Interruption, Adequacy of Reliability,

Reliability Cost.

Unit IV

Generation Planning and Reliability: Objectives & Factors affecting Generation Planning, Generation Sources, Integrated Resource Planning, Generation System Model, Loss of Load (Calculation and Approaches), Outage Rate, Capacity Expansion, Scheduled Outage, Loss of Energy, Evaluation Methods. Interconnected System, Factors Affecting Interconnection under Emergency Assistance.

Unit V

Transmission Planning and Reliability: Introduction, Objectives of Transmission Planning, Network Reconfiguration, System and Load Point Indices, Data required for Composite System Reliability. Parallel & Meshed Networks - Introduction, Basic Evaluation Techniques, Bus Bar Failure, Scheduled Maintenance, Temporary and Transient Failure, Weather Effects, Breaker Failure

BTEE606C Power system coordination and control

UNIT I

INTRODUCTION System load variation: System load characteristics, load curves daily, weekly and annual, load duration curve, load factor, diversity factor. Reserve requirements: Installed reserves, spinning reserves, cold reserves, hot reserves. Overview of system operation: Load forecasting, techniques of forecasting, basics of power system operation and control.

UNIT II

REAL POWER FREQUENCY CONTROL

Fundamentals of speed governing mechanism and modeling Speed load characteristics

Load sharing between two synchronous machines in parallel concept of control area, LFC control of a single area system: Static and dynamic analysis of uncontrolled and controlled cases, Economic Dispatch Control. Multi area systems: Two area system modeling; static analysis, uncontrolled case; tie line with frequency bias control of two area system derivation, state variable model.

UNIT III

HYDROTHERMAL SCHEDULING PROBLEM Hydrothermal scheduling problem: short term and long term mathematical model, algorithm. Dynamic programming solution methodology for hydrothermal scheduling with pumped hydro plant: Optimization with pumped hydro plant Scheduling of systems with pumped hydro plant during off peak seasons: algorithm. Selection of initial feasible trajectory for pumped hydro plant Pumped hydro plant as spinning reserve unit gene ration of outage induced constraint Pumped hydro plant as Load management plant.

UNIT IV

UNIT COMMITMENT AND ECONOMIC DISPATCH

Statement of Unit Commitment (UC) problem; constraints in UC: spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints; UC solution methods: Priority list methods, forward dynamic programming approach, numerical problems .Incremental cost curve, coordination equations without loss and with loss,solution by direct method and λ iteration method. Base point and participation factors. Economic dispatch controller added to LFC control.

UNIT V

COMPUTER CONTROL OF POWER SYSTEMS

Energy control centre: Functions Monitoring, data acquisition and control. System hardware configuration SCADA and EMS functions: Network topology determination, state estimation, security analysis and control. Various operating states: Normal, alert, emergency, in

extremis and restorativeState transition diagram showing various state transitions and control strategies

REFERENCES:

1.Olle. I. Elgerd, „Electric Energy Systems Theory –An Introduction", Tata McGraw Hill Publishing Company Ltd,New Delhi, Second Edition, 2003.

2. D.P. Kothari and I.J. Nagrath, Modern Power System Analysis, Third Edition, Tata McGraw Hill Publishing Company Limited,New Delhi, 2003.

3. L.L. Grigsby, „The Electric Power Engineering, Hand Book", CRC Press & IEEE Press, 2001

4. Allen.J.Wood and Bruce F.Wollenberg, „Power Generation, Operation and Control",John Wiley & Sons, Inc., 2003.

5. P. Kundur, „Power System Stability & Control", McGraw Hill Publications

BTEE606D ADVANCED MICROPROCESSORS

Unit-1

8086 Microprocessor: Hardware specifications, architecture, address spaces, clock generator, bus controller and arbiter, Minimum and maximum mode, System Bus Timing.

Unit-2

Software & Instruction Set: Assembly language programming: addressing mode and instructions of 8086, linking and execution of programs, MACRO programming, assembler directives and operators.

Unit-3

I/O Interfaces: Programmable peripheral interfacing **(**8255, 8155), Programmable Timer interfacing (8253,8254), Programmable interrupt controller (8259) Serial Communication interfaces.

Unit-4

Data & Memory Interfacing: A/D, D/A converter interfacing, Memory interfacing and Decoding, DMA controller.

Unit-5

Multiprocessor Configurations: 8086 based Multiprocessor systems. 8087 Numeric data processor.

References Books Recommended:

1. Design with Mcro Controller by John Peatman ; M. C. Grawhill Publication
2. the principle of microcontroller by Raj Kamal ; S. Chand publication

EE607 : POWER SYSTEM LAB

List of Experiments :

1. To study the operation of electro-mechanical type on inverse time over current relay by using VPL 102A.
2. To study the operation of electro-mechanical type under voltage relay by using VPST-103B.
3. To study the performance of directional over current relay using VPL-82.
4. To study the phase to earth fault relay by balance condition using VPL-04A.
5. To study the operational of micro-controller based biased single phase differential protection on transformer secondary relay using VPL-83.
6. To study the characteristics of normal fuse, HRC fuse and MCB, using fuse, HRC fuse and MCB characteristics trainer VPL-03.
7. To analyses the directional over current relay by DMT & IDMT method using VPL-81.
8. To study the gas actuated buchholz relay.

BTEE608 ADVANCED POWER ELECTRONICS LAB

1 .Study and test AC voltage regulators using triac, antiparallel thyristors and triac&diac.

2 .Study and test single phase PWM inverter.

3 .Study and test buck, boost and buck- boost regulators.

4. Study and test MOSFET chopper.

5 .Study and test Zero voltage switching.

6 .Study and test SCR DC circuit breaker.

7 .Control speed of a dc motor using a chopper and plot armature voltage versus speed characteristic.

8 .Control speed of a single-phase induction motor using single phase AC voltage regulator.

9 .(i) Study single-phase dual converter.

(ii) Study speed control of dc motor using single-phase dual converter.

10 .Study one, two and four quadrant choppers (DC-DC converters).

11 .Study speed control of dc motor using one, two and four quadrant choppers.

12 .Study single-phase cycloconverter.

BTEE609 POWER SYSTEM DESIGN LAB

List of Experiments

1. Generating station design: Design considerations and basic schemes of hydro, thermal, nuclear and gas power
plants. Electrical equipment for power stations.
2. Auxiliary power supply scheme for thermal power plant.
3. Distribution system Design: Design of feeders & distributors. Calculation of voltage drops in distributors.
Calculation of conductor size using Kelvin's law.
4. Methods of short term, medium term and long term load forecasting.
5. Sending end and receiving end power circle diagrams.
6. Instrument Transformers: Design considerations of CTs & PTs for measurement and protection.
7. Substations: Types of substations, various bus–bar arrangements**.** Electrical equipment for substations.

BTEE610 SIGNALS AND SYSTEMS LAB

List of Experiments

1. Introduction to MATLAB and its basic commands.
2. Plot unit step, unit impulse, unit ramp, exponential, parabolic functions and sinusoidal signals
3. Plot the linear convolution of two sequences.
4. Plot the correlation of two sequences.
5. Plot the magnitude and phase spectra of a signal using Fourier transforms.
6. Plot the magnitude and phase spectrum of signal using Fourier series.
7. Find out the Z transform of a signal and check the stability using pole zero location.
8. Plot the spectra of ideally sampled signal w.r.t. sampling of Discrete time signals.
9. Verification of few properties of Fourier transform.
10. Evaluate the DTFS coefficients of a signal and plot them.

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	T	P	IA	EA	Total	Credits
BTEE 701	Training & Seminar				540	360	900	**28**

THEORY PAPERS								
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTEE801	Power System Analysis	3	1	-	30	70	100	4
BTEE802	Power System Engineering	3	1	-	30	70	100	4
BTEE803	Electrical Machine Design	3	1	-	30	70	100	4
BTEE804	Electric Drives & Their Control	3	1	-	30	70	100	4
	ELECTIVE(any one)							
BTEE805A	EHV AC/DC Transmission	3	-	-	30	70	100	3
BTEE805B	Intelligent and Smart Instrumentation	3	-	-	30	70	100	3
BTEE805C	PLC and SCADA Systems	3	-	-	30	70	100	3
BTEE805D	Power Line Carrier Communication	3	-	-	30	70	100	3
	ELECTIVE(any one)							
BTEE806A	Utilization of Electric Power	3	-	-	30	70	100	3
BTEE806B	Artificial Intelligence	3	-	-	30	70	100	3
BTEE806C	Power Plant Instrumentation	3	-	-	30	70	100	3
BTEE806D	Power Distribution System	3	-	-	30	70	100	3
PRACTICALS /VIVA VOCE								
		L	**T**	**P**	**Seasonal**	**Practical**	**Total**	**Credits**
BTEE807	Electric Machine Design Lab	-	-	2	30	20	50	1
BTEE808	Electric Drives & Control Lab	-	-	2	30	20	50	1
BTEE809	MAT Lab for Electrical Engineers	-	-	2	30	20	50	1
BTEE810	Seminar	-	-	4	90	60	150	2
	Total	18		12	360	540	900	27
Grand Total of credits		138	17	73	2820	4180	7000	210
L- Lecture,T-Tutorial,P-Practical,IA-Internal Assessment,EA-External Assessment								

BTEE801 POWER SYSTEM ANALYSIS

UNIT -I

Power System Network Matrices-1 Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems. Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).- Modification of Z_{Bus} for the changes in network (Problems)

UNIT –II

Power flow Studies-1 Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.

Decoupled and Fast Decoupled Methods.- Comparison of Different Methods – DC load Flow

UNIT – III

Short Circuit Analysis Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems

Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT –IV

Power System Steady State Stability Analysis Elementary concepts of Steady State, Dynamic and Transient Stabilities.

Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT –V

Power System Transient State Stability Analysis Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation.- Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Recommended reference Books:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc.
3. Power System Analysis by Hadi Saadat – TMH Edition.
4. Power System Analysis by B.R.Gupta, Wheeler Publications. 1. Computer Techniques in Power System Analysis by M.A.Pai, TMH Publications.
5. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing company, 2nd edition.

BTEE 802 Power System Engineering

UNIT I

Different form energy sources: Fossils fuels, Nuclear energy and Hydro power,-

Renewable Energy Sources:

Introduction to Solar energy, geo-thermal energy, tidal energy, wind energy, bio-gas energy and M.H.D. Power generation. **Thermal Power Plant:** Location and Site selection, general layout and working of plant, boilers, economizers, super heaters, draft equipments, fuel and ash handling plants**.**

UNIT II

Gas Turbine Power Plant: Lay out, Working and components of gas turbine power plant, combined gas and steam turbine plant.

Hydro Electric Plant: Location and site selection, general layout and operation of plant, Types of Hydro Turbines and their characteristics – Impulse and reaction type (Pelton Wheel, Francis and Kaplan turbines,), speed governing system.

Diesel Power Plant: Layout and components of plant auxiliary equipments.

UNIT III

Nuclear Power Plant: Location and site selection, general layout and operation of plant, brief description of reactors, moderators and reflectors.

UNIT IV

Economic Operation Of Power System: Performance curves, Economic generation scheduling neglecting losses and generator limits, Economic generation scheduling Economic Dispatch including transmission losses – approximate penalty factor, iterative technique for solution of economic dispatch with losses; Derivation of transmission loss formula.

UNIT V

Substation Layout: Types of substations, typical layout and constructional details of pole mounted, Indoor, Outdoor sub-stations, hybrid gas insulated sub stations, bus bar arrangements, application of substation equipment like transformer , circuit breaker, isolator, metering equipments and protecting equipment , substation grounding.

[T1,T2][No. of Hrs.10]

Text Books:

[T1] M. V. Deshpande, "Elements of Electric Power Station Design", Wheeler Publishing Co.

[T2] B. G. A. Skrotzki & W. A. Vopat, "Power Station Engineering and Economy", Tata McGraw Hill. 5th edition 2013

[T3] Harish. C. Rai, "Power Plant Engineering", I.K. International Publishers.

Reference Books:

[R1] S. L. Uppal, "Electrical Power", Khanna Publishers. 13th edition 2003

[R2] M. L. Soni, P. V. Gupta and U. S. Bhatnagar, "A Course in Electrical Power", Dhanpat Rai & Sons, 1st edition 2005

[R3] B. R. Gupta, "Generation of Electrical Energy", Eurasa Publishing House

[R4] C.L. Wadhva, "Generation distribution and utilization Electrical Engg."

BTEE803 ELECTRICAL MACHINE DESIGN

UNIT I

MAGNETIC CIRCUITS AND COOLING OF ELECTICAL MACHINES Concept of magnetic circuit – MMF calculation for various types of electrical machines – Real and apparent flux density of rotating machines – Leakage reactance calculation for transformers, Induction and synchronous machine – Thermal ratings Continuous, Short time and Intermittent – Direct and Indirect cooling methods – Cooling of turbo alternators

UNIT II

D.C. MACHINES

Constructional details – Winding design – Output equation – Main dimensions – Choice of specific loadings – Choice of number of poles – Armature design – Design of field poles and field coil – Design of commutator and brushes – Losses and efficiency calculations

UNIT III

TRANSFORMERS

Constructional details of core and shell type transformers – Amorphous Cores – Output rating of single phase and three phase transformers – Optimum design of transformers – Design of core, Yoke and windings for core and shell type transformers – Equivalent circuit parameter from design data – Losses and efficiency calculations – Design of tank and cooling tubes

UNIT IV

THREE PHASE INDUCTION MOTORS Constructional details of squirrel cage and slip ring motors – Output equation – Main dimensions – Choice of specific loadings – Design of stator – Design of squirrel cage and slip ring rotor – Equivalent circuit parameters from design data – Losses and efficiency calculations

UNIT V

SYNCHRONOUS MACHINES

Constructional details of cylindrical pole and salient pole alternators – Winding design –Output equation – Choice of specific loadings – Main dimensions – Short circuit ratio –Design of stator and rotor of cylindrical pole and salient pole

machines – Design of fieldcoil – Performance calculation from design data – Introduction to computer aided design

TEXT BOOKS

1. A.K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and Sons, New Delhi, 6th Edition, 2006

2. S.K. Sen, "Principles of Electrical Machine Design with Computer Programmes", Oxford and IBH Publishing Co. Pvt Ltd., New Delhi, 1987

Recomaondad Reference Books:

1. R.K. Agarwal, "Principles of Electrical Machine Design", S.K.Kataria & Sons,Delhi, 2002
2. V.N. Mittle and A. Mittle, "Design of Electrical Machines", Standard Publications & Distributors, Delhi, 2002

BTEE804 ELECTRIC DRIVES AND THEIR CONTROL

Unit I

INTRODUCTION

Basic Elements – Types of Electric Drives – factors influencing the choice of electrical drives – heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors.

Unit II

DRIVE MOTOR CHARACTERISTICS

Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors – DC motors: Shunt, series and compound - single phase and three phase induction motors.

Unit III

STARTING METHODS

Types of D.C Motors starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors.

Unit IV

CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C. DRIVES

Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system - Using controlled rectifiers and DC choppers – applications.

Unit V

CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES

Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.

Recomaondad Reference Books:

1. PILLAI.S.K " A first course on Electric drives", Wiley Eastern Limited, 1998
2. M.D.SINGH, K.B.KHANCHANDANI, "Power Electronics", Tata McGraw-Hill, 1998

3. H.Partab, “Art and Science and Utilisation of electrical energy”, Dhanpat Rai and Sons, 1994
4. VEDAM SUBRAHMANIAM, “Electric Drives (concepts and applications)”, Tata
5. McGraw-Hill,2001 NAGRATH.I.J. & KOTHARI.D.P, “Electrical Machines”, Tata McGraw-Hill, 1998

BTEE805A EHV AC/DC TRANSMISSION

Unit-I

Constitution of EHV a.c. and d.c. links, Kind of d.c. links, Limitations and Advantages of a.c. and d.c. transmission, Principal application of a.c. and d.c. transmission, Trends in EHV a.c. and d.c. transmission, Power handling capacity. Converter analysis garetz circuit, Firing angle control, Overlapping.

Unit-II

FACTS devices, basic types of controller, series controller, static synchronous series compensator(SSSC), thyristor-controlled series capacitor(TCSC), thyristor controlled seriesreactor(TCSR), shunt controller (STATCOM), static VAR compensator(SVC), series-series controller, combined series-shunt controller, unified power flow controller(UPFC), thyristor controlled phase shifting transformer(TCPST).

Unit-III

Components of EHV d.c. system, converter circuits, rectifier and inverter valves, Reactive power requirements, harmonics generation, Adverse effects, Classification, Remedial measures to suppress, filters, Ground return. Converter faults & protection harmonics misoperation, Commutation failure, Multi terminal D.C. lines.

Unit-IV

Control of EHV d.c. system desired features of control, control characteristics, Constant current control, Constant extinction angle control. Ignition Angle control. Parallel operation of HVAC & DC system. Problems & advantages.

Unit-V

Travelling waves on transmission systems, Their shape, Attenuation and distortion, effect of junction and termination on propagation of traveling waves. Over voltages in transmission system. Lightning, switching and temporary over voltages: Control of lighting and switching over voltages

Recommended Reference Books:

1. S. Rao,- “EHV AC & DC Transmission” Khanna pub.

2. Kimbark,-" HVDC Transmission" john willy & sons pub.
3. Arrillaga,- "HVDC Transmission"2nd Edition ,IEE londan pub.
4. Padiyar, -"HVDC Transmission" 1st Edition ,New age international pub.
5. T.K. Nagsarkar,M.S. Sukhiza, -"Power System Analysis", Oxford University
6. Narain.G. Hingorani, l. Gyugyi-"Undustanding of FACTS concept and technology", John Wiley & sons pub.
7. P.Kundur- "H.V.D.C. Transmission" McGraw Hill Pub.

BTEE805B Intelligent and smart instrumentation

UNIT-I

Recent Trends in Sensor Technologies: Introduction**;** Film sensors (Thick film sensors, Thin film sensors)**;**
Semiconductor IC technology – standard methods; Microelectro-mechanical systems (Micro-machining, some
application examples)**;** Nano-sensors**.** Bulk Micromachining. Micromachining Surface Micromachining. Other
Micromachining Techniques. (LIGA Process) Micromilling. Micromachined Materials, Digital transducers.

UNIT-II

Sensors:- Primary sensors**;** Excitation**;** Amplification; Filters**;** Converters; Compensation (Nonlinearty**:** look up
table method**,** polygon interpolation, polynomial interpolation**,** cubic spline interpolation, Approximation &
regression; Noise & interference**;** Response time**;** Drift; Cross-sensitivity)**;** Information Coding/ Processing**;**
Data Communication**;** Standards for smart sensor interface.

UNIT-III

VI and Data Acquisition: Introduction to virtual Instrumentation, VI programming using LabVIEW, Signal
Conditioning, DAQ Hardware Configuration, DAQ Hardware, DAQ Software Architecture, DAQ Assistant,
Channel and Task configuration, Selecting and Configuring a DAQ device, Serial interfacing - RS 232C, RS
422, RS 423, RS 485.

UNIT IV

Instrumentation Systems:- Types of Instrumentation systems, Intelligent Instrumentation, Component of
Intelligent Instrumentation System,

UNIT V

Concept of real time system and its industrial application, realization of real time system using microcontroller and typical applications.

Text Books:

[T1] Mathivanan, “PC Based Instrumentation”,1st Ed., PHI
[T2] D.Patranabis, “sensors and Transducers” 2nd Edition, PHI

Reference Books:-

[R1] J.Jerome, “Virtual Instrumentation using LabVIEW”, PHI
[R2] P.Rai Choudhury, MEMS and MOEMS Technology and Application,PHI
[R3] Barney, “ Intelligent Instrumentation, Microprocessor Applications in measurement and Control”, PHI
[R4] M.Bhuyan, “Intelligent Instrumentation: Principles and Applications”, CRC Press

BTEE805CPLC and SCADA Systems

UNIT-I

Programmable Logic Controller (PLC) Basics: Introduction, Parts of PLC, Principles of operation, PLC size
and applications, PLC Advantages and Disadvantages, PLC Manufacturers, PLC hardware components, I/O
section, Analog I/O modules, Digital I/O modules, CPU- Processor memory module, Programming devices,
Devices which can be connected to I/O modules, Relay, Contactor, SPST, Push Buttons, NO/NC Concept

UNIT-II

Programming of Programmable Logic Controller: General PLC Programming Procedures, Contacts and
Coils, Program SCAN, Programming Languages, Ladder Programming, Relay Instructions, Instruction
Addressing, Concept of Latching, Branch Instructions, Contact and Coil I/O Programming Examples, Relation of
Digital Gate Logic to Contact/Coil Logic.

UNIT-III

Programmable Logic controller Functions: Timer Instructions: ON DELAY Timer and OFF DELAY timer,
Counter Instructions: UP/DOWN Counters, Timer and Counter Applications, Program Control Instructions:
Master Control Reset, Jump and Subroutine,

UNIT-IV

Math Instructions- ADD, SUB. Data Handling: Data Move, Data Compare, Data Selection, Electro-pneumatic
Sequential Circuits and Applications.

UNIT-V

SCADA: Definition of SCADA, Applicable Processes, Elements of SCADA System, A Limited Two-Way
System. Real Time Systems: Communication Access and Master-Slave determining scan interval. Introduction to Remote Control, Communications-A/D Conversion, Long Distance Communication, Communication System
components in brief- Protocol, Modems, Synchronous/Asynchronous telephone cable/radio, Half Duplex, Full

Duplex System, Brief introduction to RTU and MTU, Applications-Automatic Control, Advisory Applications.

Text Books:

[T1] Frank D. Petruzella “Programmable Logic Controllers”, McGraw-Hill Book Company.

[T2] John w. Webb and Ronald A. Reis, “Programmable Logic Controllers”, PHI

Reference Books:

[R1] Stuart A.Boyer “Supervisors Control and Data Acquisition”, ISA

[R2] William I. Fletcher “An Engineering Approach to Digital Design”, PHI.

[R3] Simpson, Colin “Programmable Logic Controllers”, Englewood Cliffs NJ PHI.

[R4] Gray Dunning, “Introduction to Programmable Logic Controllers”, Delmar Thompson Learning

[R5] Stenerson, John “Fundamentals Logic Controllers Sensors, & Communications”, Englewood Cliffs, NJ,
1993. Prentice Hall.

[R6] Programmable Logic Controllers, W.Bolton, Elsevier

BTEE805DPower line Carrier Communication

UNIT- I

Channel Characterization: Introduction, channel modelling fundamentals, model for outdoor channel, models for indoor channels, noise and disturbances measuring techniques, PLC channel emulation tools. Coupling: Introduction, filtering basics, transformer and capacitor coupler design, impedance adaptation concepts.

UNIT- II

Digital Transmission Techniques: Introduction, Architecture of PLC system, Narrowband and broadband PLC systems, Modulation and coding for narrow band and broad band PLC systems, Error Handling.

UNIT- III

PLC Networks : Introduction, Organisation and structure of PLC networks, Media Access Control layer, Multiple Access Schemes, Protocols for PLC,

UNIT-IV

Traffic control, Supporting Energy Management Systems, Quality of service(QOS), International standards on PLC networking Technology .

UNIT-V

Systems and Implementations: PLC smart grid systems, PLC broadband Access systems, Multimedia PLC
systems, DC-PLC systems, PLC in emerging countries

Text:

[T1] Hendrik C. Ferreira,Lutz Lampe John Newbury,Theo G.Swart,"PLC: theory and Applications for narrow band and broad band communication over power lines".Wiley and Sons.

[T2] Halid Hrasnica, Abdelfatteh Haidine, Ralf Lehnert" Broad Band Power line Communications: Network Design" Wiley and sons.

References:

[R1] Gilbert Held,"Understanding Broadband over Power line",Auerbach Publications.

BTEE806A UTILIZATION OF ELECTRIC POWER

UNIT 1

Heating and welding:

Advanced and method of electric heating, resistance ovens, Induction heating, dielectric heating, the arc furnace, heating of building, electric welding, resistance and arc welding, control devices and welding equipment. 10 HOURS

UNIT 2

Electrolytic process:

Fundamental principles extraction refining of metals electroplating. Factors affering electrode position process 06 Hours

UNIT 3

Illumination:

Laws of illumination, distribution and control of light lighting calculation, factory lighting, flood lighting, street lighting, different types of lamps, incandescent, fluorescent, vapour and CFL and their working, Glare and its remedy

UNIT 4

Electrictraction:

System of traction, speed time curve, tractive effort, co-efficient of adhesions selection of traction motors, method of control, energy saving by series parallel control, AC traction equipment. AC series motor, characteristics, regenerative braking, linear induction motor and their use. AC traction, disel electric equipmepment, train lighting system.

UNIT 5

Power Factor consideration:

Cause & disadvantages of LPF, methods of improvements, economic aspect Electrical Tariffs: Types of domestic & non-domestic prevailing tariff structures. 06 HOURS

Recommended Reference Books:

1. Art and Science of utilization of electrical energy by Pratab; Dhanpat Rai and Company
2. Openshaw Taylor, Utilization of electric energy
3. Charaborthy, soni, guptha & bhatnager, a course in electrical power, dhanpat rai and sons.

BTEE806B Artificial Intelligence

Unit I

Introduction and Intelligent systems, What Is AI, The Foundations of Artificial Intelligence, The History of Artificial Intelligence, Applications of A.I. Intelligent Agents Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents, How the components of agent programs work.

Unit II

Solving Problems by Searching, Study and analysis of various searching algorithms. Implementation of Depth-first search Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bi-directional search Informed (Heuristic) Search Strategies: Greedy best-first search A* search: Minimizing the total estimated solution cost, Conditions for optimality: Admissibility and consistency, Optimality of A*, Memory-bounded heuristic search, Heuristic Functions, Generating admissible heuristics from sub problems: Pattern databases, Learning heuristics from experience Beyond Classical Search Local Search Algorithms and Optimization Problems: Hill-climbing search Simulated annealing, Local beam search, Genetic algorithms, Local Search in Continuous Spaces, Searching with Non-deterministic Actions: AND-OR search trees, Searching with Partial Observations

Unit III

Adversarial Search and Constraint Satisfaction Problems, Study of mini-max algorithm Adversarial Search: Games, Optimal Decisions in Games, The mini-max algorithm, Optimal decisions in multiplayer games, Alpha-Beta Pruning, Move ordering , Imperfect Real-Time Decisions, Evaluation functions, Cutting off search, Forward pruning, Search versus lookup, Stochastic Games, Evaluation functions for games of chance, Partially Observable Games Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Variations on the CSP formalism, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, Alpha-beta pruning and CSP, Implementation aspects of mini-max algorithm and CSP.

Unit IV

Logical agents and Classical Planning, Study and comparison of knowledge representation structures. Implementation aspects of Backtracking algorithm and forward and backward chaining Logical Agents: Knowledge representation structures: Frames, semantic net, Scripts, Logic: Prepositional Logic, Prepositional Theorem Proving, Inference and proofs, Proof by resolution, Conjunctive normal form, Horn clauses and definite clauses, Forward and backward chaining, A complete backtracking algorithm, Syntax and Semantics of First-Order Logic, Symbols and interpretations, Knowledge Engineering in First-Order Logic, Unification, Resolution, Introduction to logic programming (PROLOG) Classical Planning: Definition of Classical Planning, The complexity

of classical planning, Algorithms for Planning as State-Space Search, Forward (progression) state- space search, Backward (regression) relevant-states search, Heuristics for planning, Planning Graphs, Other Classical Planning Approaches, Hierarchical Planning

Unit V

Quantifying Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Bayes' Rule and Its Use, Representing Knowledge in an Uncertain Domain, Other Approaches to Uncertain Reasoning, Rule-based methods for uncertain reasoning, representing vagueness: Fuzzy sets and fuzzy logic, Study of fuzzy logic and Decision trees, Implementation aspects of Decision trees Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, The decision tree representation, Expressiveness of decision trees, Inducing decision trees from examples

Text Book:

1. Artificial Intelligence: A Modern Approach by Peter and Norvig ISBN-0-13-103805-2,

Reference Books:

1. Artificial Intelligence by Elaine Rich, Kevin Knight and Nair ISBN-978-0-07-008770-5, TMH
2. Prolog Programming for A.I. by Bratko, TMH
3. Artificial Intelligence by Saroj Kausik ISBN:-978-81-315-1099-5, Cengage Learning
4. Artificial Intelligence and Intelligent Systems by Padhy, Oxforfd University Press,

BTEE806C Power Plant Instrumentation

UNIT I

Power plant: Unit, overview, Types of boiler, Exhaust Gas Boilers and Incinerators, turbine generators, condensers, material handling systems. Comparison of thermal power plant, hydroelectric power plant, Nuclear power plant, solar power plant, Wind power plant.

UNIT II

Boiler Instrumentation: Control and optimization, Combustion control, air to fuel ratio control, 3-element drum level control, steam temperature and pressure control, oxygen/CO2 in flue gases, furnace draft, boiler interlocks, sequence event recorder, supervisor control, data acquisition controls, burner management systems and controllers. Start-up and shut-down procedures, Boiler safety standard, Boiler inspection procedures. Boiler load calculation, boiler efficiency calculation.

UNIT IIII

Turbine instrumentation and control, start-up and shut-down, thermal stress control, condition monitoring &
power distribution instrumentation. Synchronous, Induction generators.

UNIT IV

Hydroelectric power generation, regulation & monitoring of voltage & frequency of output power. Pollution & effluent monitoring & control. Energy Management, electrical sub-station controls

UNIT V

Power Generation using non-conventional energy sources viz. Wind Power, solar Power, Tidal Power, Plant safety & redundancies. Nuclear Power Generation & control Station. Diesel Generator Controls.

Text Books:

[T1] E. L. Wakil, M. M. Power Plant Technology, McGraw Hill

[T2] Krishnaswamy/Ponni Bala, Power Plant Instrumentation, PHI Learning

Reference Books:

[R1] An Introduction to Reliability and Maintainability Engineering. Sharles E. Ebeling, McGraw Hill

[R2] E. Balagurusamy, "Reliability Engineering", Tata McGraw Hill PC, 1984.

BTEE806D Power Distribution System

UNIT- I

Introduction to sub-transmission and distribution system; classification of loads – residential, commercial, agricultural, industrial and their characteristics; distribution system planning – short-term, mid-term, long-term, load modeling and characteristics; definition of demand factor, utilization factor, load factor, plant factor, diversity factor, loss factor; computer applications to distribution system automation; tariff.

UNIT- II

Distribution feeders, transformers and sub-stations; primary feeders – voltage level, radial and loop types, uniformly distributed and non-uniformly distributed load; design considerations for secondary system voltage level, location of substation, rating, service area with primary feeders, optimal location; existing system improvement.

UNIT- III

System analysis – voltage drop and power loss calculation; methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines; loss reduction, voltage regulation, voltage control and improvement, issues in quality of service – voltage sag, swell and flicker; application of capacitors to distribution system – effect of series and shunt capacitors, power factor correction, economic justification for capacitor with cost-benefit analysis aiming at most economic power factor, optimum location of capacitor.

UNIT-IV

Distribution sub-station bus schemes, description and comparison of switching schemes; types of common faults and procedure for system fault calculation; protection – objectives, over current protection devices – fuses,

UNIT-V

Automatic circuit re-closer, automatic line sectionalizing, coordination of protective devices fuse to fuse, fuse to circuit breaker, re-closer to circuit breaker.

Text:

[T1] Turan Gonen, "Electric Power Distribution System Engineering", McGraw Hill

[T2] Dale R. Patrick," Electrical Distribution System", 2nd Edition, CRC Press

References:

[R1] James A. Momoh, "Electric Power Distribution Automation, Protection and Control", CRC Press

[R2] A. S. Pabla, "Electric Power Distribution", Tata McGraw Hill

BTEE807ELECTRICAL MACHINES DESIGN LAB

To design the following parts of the electrical machines by using C++/MATLAB or any other related software.

1. Design of Armature
2. Design of Commutator
3. Design of Armature winding
4. Design of Magnetic Core of Transformer
5. Design of rotor bars and slots of squirrel cage induction motor
6. Design of rotor core of slip ring induction motor
7. Design of salient pole rotor of synchronous machine
8. Design of stator core and winding for synchronous machine
9. Design of rotor for turbo alternators
10. Design of damper winding

BTEE808ELECTRICAL DRIVES AND CONTROL LAB

1. Study and test the firing circuit of three phase half controlled bridge converter.
2. Study and obtain waveforms of 3 phase half controlled bridge converter with R and RL loads.
3. Study and test the firing circuit of 3-phase full controlled bridge converter.
4. Study and obtain waveforms of 3-phase full controlled bridge converter with R and RL loads.
5. Study and test 3-phase AC voltage regulator.
6. Control speed of dc motor using 3-phase half controlled bridge converter. Plot armature voltage versus speed characteristic.
7. Control speed of dc motor using 3-phase full controlled bridge converter. Plot armature voltage versus speed characteristic.
8. Control speed of a 3-phase induction motor in variable stator voltage mode using 3-phase AC voltage regulator.
9. Control speed of universal motor using AC voltage regulator.
10. Study 3-phase dual converter.
11. Study speed control of dc motor using 3-phase dual converter.

BTEE809Matlab for Electrical Engineers

1. Fault analysis (for 3 to 6 bus) and verify the results using MATLAB or any available software for
the cases: (i) LG Fault (ii) LLG Fault (iii) LL Fault and (iv) 3-Phase Fault
2. Load flow analysis for a given system (for 3 to 6 bus) using (i) Gauss Seidal (ii) Newton Raphson
(iii) Fast Decoupled Method and verify results using MATLAB or any available software
3. Study of voltage security analysis
4. Study of overload security analysis and obtain results for the given problem using MATLAB or
any software.
5. Study of economic load dispatch problem with different methods.
6. Study of transient stability analysis using MATLAB