JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
B. Tech (E.E.E) – R17 Regulation – w.e.f. 2017-18 Academic Year

COURSE STRUCTURE

I YEAR I Semester

Subject Code	Subject	L	T	P	C
17A15501	English	3	-	-	3
17A15101	Mathematics -I	2	2	-	3
17A15201	Applied Physics	3	-	-	3
15A10101	Environmental Studies	3	-	-	3
17A10301	Engineering Drawing	1	1	3	3
17A10501	Problem Solving & Computer Programming	3	0	-	3
17A15502	English Language Communication Skills Lab.	-	1	3	2
17A15202	Applied Physics Lab	-	1	3	2
17A10502	Computer Programming Lab	-	1	3	2
17A12451	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**6**	**12**	**25**

I YEAR II Semester

Subject Code	Subject	L	T	P	C
17A25501	Technical Communication and Presentation Skills	3	-	-	3
17A25101	Mathematics -II	2	2	-	3
17A20103	Engineering Mechanics	2	2	-	3
17A25301	Applied Chemistry	3	-	-	3
17A20201	Electric Circuits - I	2	2	-	3
17A20404	Electronic Devices and Circuits	3	-	-	3
17A25302	Applied Chemistry Lab	-	1	3	2
17A23501	Engineering Workshop & IT Workshop	-	1	3	2
17A20405	Electronic Devices and Circuits Lab	-	1	3	2
17A29901	Community Service (Audit)	-	-	2	-
17A20202	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**9**	**11**	**25**

II YEAR I SEMESTER

Code	Subject	L	T	P	C
17A35401	Managerial Economics and Financial Analysis	3	-	-	3
17A35102	Mathematics –III	2	2	-	3
17A35103	Complex Variables and Special Functions	2	2	-	3
17A30201	Electric Circuits - II	2	2	-	3
17A30202	Electrical Machines - I	2	2	-	3
17A30203	Linear Control Systems	2	2	-	3
17A35104	Exploratory Data Analysis Lab	-	1	3	2
17A30204	Electric Circuits & Simulation Lab	-	1	3	2
17A30205	Comprehensive Objective type Examination	-	-	-	1
	Total	**13**	**12**	**6**	**23**

II YEAR II SEMESTER

Code	Subject	L	T	P	C
17A40201	Electrical Machines - II	2	2	-	3
17A40202	Electric Power Generating Systems	2	2	-	3
17A40203	Electromagnetic Fields	2	2	-	3
17A40407	Analog Electronic Circuits	2	2	-	3
17A40408	Switching Theory & Logic Design	2	2	-	3
17A45101	Human Values & Professional Ethics(Audit)	2	-	-	-
17A40204	Control Systems & Simulation Lab	-	1	3	2
17A40206	Electrical Machines Lab-I	-	1	3	2
17A40207	Comprehensive Objective type Examination	-	-	-	1
	Total	**12**	**12**	**6**	**20**

III YEAR I SEMESTER

Code	Subject	L	T	P	C
17A55401	Management Science	3	-	-	3
17A50201	Transmission of Electric Power	2	2	-	3
17A50202	Electrical Machines - III	3	-	-	3
17A50203	Power Electronics	3	-	-	3
17A50204	Electrical & Electronic Measurements	3	-	-	3
17A50205	Linear & Digital Integrated Circuits	3	-	-	3
17A50206	Electrical Machines Lab – II	-	1	3	2
17A50207	Electrical and Electronic Measurements Lab	-	1	3	2
17A50208	Power Electronics & Simulation Lab	-	1	3	2
17A50209	Comprehensive Objective type Examination	-	-	-	1
	Total	**17**	**5**	**9**	**25**

III YEAR II SEMESTER

Code	Subject	L	T	P	C
17A60201	Switchgear & Protection	3	-	-	3
17A60202	Power Semiconductor Controlled Drives	2	2	-	3
17A60203	Computer Aided Power System Analysis	2	2	-	3
17A624501	Microprocessors & Microcontrollers	3	-	-	3
	Open Elective- I*	2	2	-	3
17A60204a	Instrumentation				
17A60204b	Wind Energy Conversion Systems				
17A60204c	Reliability and Safety Engineering				
17A69901	Foreign Language (Audit)	2	-	-	-
17A65501	Advanced Communication Skills Lab	-	1	3	2
17A624502	Microprocessors & Microcontrollers Lab	-	1	3	2
17A60205	Linear & Digital ICs Lab	-	1	3	2
17A60206	Comprehensive Objective type Examination	-	-	-	1
	Total	**14**	**9**	**9**	**22**

IV YEAR I SEMESTER

Code	Subject	L	T	P	C
17A70201	Electric Power Distribution Systems	2	2	-	3
17A70202	Digital Signal Processing	2	2	-	3
17A70203	Power System Operation and Control	2	2	-	3
	Open Elective-II*	2	2	-	3
17A70204a	a) PLC & Its Applications				
17A70204b	b) Solar Energy Conversion Systems				
17A70204c	c) Optimization Techniques				
	Elective – I	2	2	-	3
17A70205a	Special Electrical Machines				
17A70205b	HVDC Transmission				
17A70205c	FACTS Controllers				
17A79902	**MOOC-I (Audit)****	-	-	-	-
17A70206	Power Systems & Simulation Lab	-	1	3	2
17A70207	Digital Signal Processing Lab	-	1	3	2
17A70208	Comprehensive Objective type Examination	-	-	-	1
	Total	**10**	**12**	**6**	**20**

Note: Project Work shall initiate in IV-I Semester with a target of submission of Abstract and finalization of topic, and the evaluation of project work shall be done in IV-II Semester

*** The student should select the subject in the open elective which is not studied in previous semesters.**

**** The student can select the subject of any discipline for MOOC-I. However the agency will decide by the BoS Chair persons.**

IV YEAR II SEMESTER

Code	Subject	L	T	P	C
	Elective – II	2	2	-	3
17A80201a	Power Quality				
17A80201b	Modern Control Theory				
17A80201c	Switched Mode Power Converters				
	Elective – III	2	2	-	3
17A80202a	Utilization of Electrical Energy				
17A80202b	Costing of Electrical Systems				
17A80202c	High Voltage Engineering				
	Elective – IV	2	2	-	3
17A80203a	Neural Networks & Fuzzy Logic Applications				
17A80203b	Reliability Engineering and its Application to Power Systems				
17A80203c	Power System Deregulation				
	Elective – V	2	2	-	3
17A80204a	Electrical machine Design				
17A80204b	Grid Integration of Distributed Generation				
17A80204c	Energy Auditing & Demand Side Management				
17A89902	**MOOC-II(Audit)*** **	-	-	-	-
17A80205	Seminar	-	-	4	2
17A80206	Project Work	-	-	20	10
17A80207	Comprehensive Objective type Examination	-	-	-	1
	Total	**08**	**08**	**24**	**25**

***** The student should select the subject of discipline centric for MOOC-II. However the agency will decide by the BoS Chair persons.**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Theory P – Practical/Drawing C – Credits

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COURSE STRUCTURE

I YEAR I Semester

Subject Code	Subject	L	T	P	C
17A15501	English	3	-	-	3
17A15101	Mathematics -I	2	2	-	3
17A15201	Applied Physics	3	-	-	3
15A10101	Environmental Studies	3	-	-	3
17A10301	Engineering Drawing	1	1	3	3
17A10501	Problem Solving Using C	3	0	-	3
17A15502	English Language Communication Skills Lab.	-	1	3	2
17A15202	Applied Physics Lab	-	1	3	2
17A10502	Computer Programming Lab	-	1	3	2
17A12451	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**6**	**12**	**25**

I YEAR II Semester

Subject Code	Subject	L	T	P	C
17A25501	Technical Communication and Presentation Skills	3	-	-	3
17A25101	Mathematics -II	2	2	-	3
17A20103	Engineering Mechanics	2	2	-	3
17A25301	Applied Chemistry	3	-	-	3
17A20201	Electric Circuits - I	2	2	-	3
17A20404	Electronic Devices and Circuits	3	-	-	3
17A25302	Applied Chemistry Lab	-	1	3	2
17A23501	Engineering Workshop & IT Workshop	-	1	3	2
17A20405	Electronic Devices and Circuits Lab	-	1	3	2
17A29901	Community Service (Audit)	-	-	2	-
17A20202	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**9**	**11**	**25**

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Subject Code	Title of the Subject	L	T	P	C
17A15501	**English**	3	0	0	3

COURSE OBJECTIVES	
1	To enable the students to communicate in English for academic and social purpose
2	To enable the students to acquire structures and written expressions required for their profession.
3	To develop and practice critical and evaluative reading
4	To encourage investigating questions of the humanities through rhetorical study
5	To enhance the study skills of the students with emphasis on LSRW skills

COURSE OUTCOMES	
CO1	Develop facility in responding to a variety of situations and contexts calling for purposeful shifts in voice, tone, level of formality, design, medium, and/or structure
CO2	Become effective in the use of different modes of written communication in a professional environment
CO3	Develop capacity to apply different reading methods to evaluate a mass of data on the net and to glean the necessary information
CO4	Learn and use key rhetorical concepts through analyzing and composing a variety of texts
CO5	Well trained in LSRW skills and develop communicative competence

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT –I

Chapter entitled *Humour* from "Using English"
Chapter entitled "Jagadish Chandra Bose" from New Horizons

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)

R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II

Chapter entitled *Inspiration* from "Using English"
Chapter entitled "Dhyan Chand" from New Horizons

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

Chapter entitled *Sustainable Development* from "Using English"
Chapter entitled "After Twenty Years" from New Horizons

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter
G- Tenses – Present tense, Past tense and Future tense
V-Word formation and One-Word Substitutes

UNIT –IV

Chapter entitled *Relationships* from "Using English"
Chapter entitled "The Tiger in the Tunnel" from New Horizons

L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information
W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

UNIT –V

Chapter entitled Science and Humanism from "Using English"
Chapter entitled a. "Daffodils" b. "Where the mind is Without Fear" from New Horizons
L- Listening to speeches
S- Making Presentations and Group Discussions

R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately

Text Books:

1. **Using English (for detailed study)** published by Orient Black Swan, 2013
2. **New Horizons (for non detailes study) published by Pearson, 2013**

References:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **Every Day Dialogues in English- Robert J.Dixson, Prentice Hall of India**
3. **Communication Skills, Sanjay Kumar & Pushpalatha** Oxford University Press, 2012.
4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Current English grammar and usage**-S M Guptha, PHI, 2013.
6. **A Course in Listening and Speaking-Sasi Kumar.U, U.K.Cambridge**
7. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.
8. **Writing with a Purpose, Tickoo and Sasi Kumar, OUP, 2011**
9. **Oxford Advanced Learners Dictionary, 9th edition, Oxford, 2016**

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that 10 marks will be awarded for assignment.

Signature

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Subject Code	Title of the Subject	L	T	P	C
17A15101	**MATHEMATICS – I**	**2**	**2**	**0**	**3**

COURSE DESCRIPTION: First order differential equation, higher order linear differential equations; functions of several variables; applications of integration; multiple integrals, vector calculus.

COURSE OBJECTIVES:

CEO 1: To impart knowledge on the advanced concepts of linear differential equations, functions of several variables, applications of derivatives, multiple integrals and vectors calculus.

CEO 2: To develop skills in analyzing the problems, designing mathematical models, skills in differentiation, integration, and vectors calculus for the problems in engineering.

COURSE OUT COMES: After completion of the course a successful student is able to

CO 1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) Transforming integrals from three dimensional surfaces and volumes

on to plane surfaces

CO 2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO 3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Mechanical oscillations.
- (c) Deflection of Beams.
- (d) Heat transfer and Newton's laws of cooling
- (e) Engineering concepts involving lengths of curves and areas of planes Flux across surfaces

CO 4: Develop analytical skills in solving the problems involving
- (a) Newton's laws of cooling
- (b) non homogeneous linear differential equations

(c) maximum and minimum values for the functions
(d) lengths of curves, areas of surfaces and volumes of solids in engineering
(e) transformations of integrals from three dimensional surfaces and volumes on to plane surfaces

CO 5: Use relevant mathematical techniques for evaluating
(a) various types of particular integrals in differential equations
(b) stationary values for multi variable functions
(c) multiple integrals in change of variables
(d) Integrations of vector functions.

Course Outcome	Program Outcomes					Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	--	PSOz
CO1	H								
CO2	L	H							
CO3	M		H						
CO4	H	M		H					
CO5	M	L			H				

Correlation Levels: H - High M - Medium L - Low

UNIT-I:

FIRST ORDER DIFFERENTIAL EQUATIONS(6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II:

HIGHER ORDER LINEAR DIFFERENTIALEQUATIONS(12 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, Solution of Non homogeneous linear equations- Operator methods for finding particular integrals- for cases – e^{ax}, sinax, cos ax, x^n, $e^{ax}V(x)$, xV(x). Method of Variation of parameters. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – III

Power Series Expansions &Multi-variable Calculus (8 Lectures)

Taylor series, Maclaurin series. Functions of several variables, Continuity, Partial derivatives, Total derivative, Increment theorem, Chain rule, Tangent plane and Normal line, Mixed derivative theorem, Necessary and sufficient conditions for Maxima, Minima and Saddle point, The method of Lagrange multipliers.

UNIT – IV

Multiple Integrals (6 Lectures)

Double integral, Fubini's theorem, Volumes and Areas, Change of variable in a double integral, special case: Polar coordinates, Triple integral, Applications, Change of variables in a triple integral, Surface area, Line integrals, Surface integrals.

UNIT – V

Vector Calculus (12 Lectures)

Vector functions, Continuity and Differentiability of vector functions, Arc length for space curves, Unit tangent vector, Unit normal and Curvature to plane and space curves, Gradient, Directional derivatives, Vector fields, Divergence and Curl of a vector field, vector integrations, Green's Theorem (without Proof), Stokes' Theorem(without Proof), The divergence theorem(without Proof),verifications and applications.

TEXT BOOKS:

1. Engineering Mathematics-I, E. Rukmangadachari& E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

REFERENCES:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.
5. Advanced Engineering Mathematics 3rd Edition,by R.K.Jain&S.R.K.Iyengar, Narosa publishers.

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Subject Code	Title of the Subject	L	T	P	C
17A15201	**APPLIED PHYSICS**	3	-	-	3

COURSE OBJECTIVES	
1	To make a bridge between the physics in school and engineering courses.
2	To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light through transparent dielectric waveguides along with engineering applications.
3	To enlighten the concepts regarding the bulk response of materials to the EM fields and their analytical study in the back-drop of basic Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications
4	To get an insight into the microscopic meaning of conductivity, classical and quantum free electron models, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors.
5	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
6.	To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano and smart materials, their properties and applications in modern emerging technologies are to be elicited.

COURSE OUTCOMES	
CO1	The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fiber optics.
CO2	Basics of Electromagnetic fields are focused along with the understanding of quantum mechanical picture of subatomic world.

CO3	The discrepancies between the classical estimates and laboratory observations of electron transportation phenomena are successfully explained by free electron theory and band theory. The physical properties exhibited by materials would be lifted through the understanding of properties of semiconductors.
CO4	The dielectric and magnetic response of materials are focused.
CO5	The importance of superconducting materials, nanomaterials and smart materials along with their engineering applications are well elucidated.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

UNIT 1:PHYSICALOPTICS, LASERS AND FIBRE OPTICS

Physical Optics: Introduction to interference – Colours in thin films – Newton's Rings – Michelson interferometer – Fraunhofer diffraction due to single slit, double slit – Diffraction grating(Qualitative).

Lasers: Introduction – Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction–Principle of optical fiber –Numerical aperture and acceptance angle – V-Number - Types of optical fibers – Optical fiber communication system – Attenuation and losses in optical fibers – Applications of optical fibers.

UNIT 2:ELECTOMAGNETIC FIELDS AND QUANTUM MECHANICS

Electromagnetic Fields: Scalar and Vector Fields – Electric Potential – Gradient, Divergence of fields - Gauss and Stokes theorems - Derivations of Maxwell's equations.

QuantumMechanics: Black Body radiation – Dual nature of radiation – Schrodinger's time independent wave equation – Significance of wave function – Particle in a one dimensional infinite potential well.

UNIT 3: FREE ELECTRON THEORY AND SEMICONDUCTORS

Freeelectrontheory: Classical free electron theory – Sources of electrical resistance – Equation for electrical conductivity – Quantum free electron theory – Fermi-Dirac distribution – Kronig-Penny model (qualitative) – Origin of bands in solids – Effective mass.

Semiconductorphysics*:* Introduction –Direct and Indirect band gap semiconductors – Drift & diffusion currents – Einstein's equation – Continuity equation – Hall Effect.

UNIT 4: DIELECTRICSAND MAGNETIC MATERIALS

Dielectrics*:* Introduction – Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-Mosotti equation – Piezoelectricity – Ferro electricity – Dielectric strength, loss and breakdown.

Magneticmaterials*:* Introduction – Basic definitions – Origin of magnetic moment – Classification of magnetic materials – Hysteresis – Soft and hard magnetic materials – Applications of magnetic materials.

UNIT 5: ADVANCED MATERIALS

Superconductors*:* Introduction – Properties of superconductors – Meissner effect– Type I and type II superconductors – ac and dc Josephson effects – BCS theory (qualitative) – High T_c superconductors – Applications of superconductors.

Nanomaterials: Introduction – Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic – Applications of nanomaterials.

SmartMaterials: Shape Memory Alloys: Definition – Two phases – One way and two way memory effect – Pseudo elasticity – Applications of shape memory alloys.

Prescribed Text books:

1. Engineering physics – D.K. Battacharya and PoonamTandon, Oxford University press.

2. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co.

Reference Books:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Introduction to modern optics – Grant R Fowles
3. A text book on Optics – Brijlal&Subramanyam
4. Semiconductor physics and devices- Basic principle – Donald A, Neamen, McGraw Hill
5. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley

6. Shape Memory Alloys-Modeling and Engg. Applications – C Lagoudas, Springer
7. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers
8. Engineering Physics – S.O.Pillai, New Age Publications
9. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
10. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
11. Engineering Physics – M. Arumugam, Anuradha Publications

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Subject Code	Title of the Subject	L	T	P	C
15A10101	**Environmental Studies**	3	-	-	3

COURSE OBJECTIVES	
1	To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

COURSE OUTCOMES	
CO1	Critical Thinking: demonstrate critical thinking skills in relation to environmental affairs.
CO2	Communication: demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of contexts.
CO3	Interdisciplinary Synthesis: demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns
CO4	Ecological Literacy: demonstrate an awareness, knowledge, and appreciation of the intrinsic values of ecological processes and communities
CO5	Sustainability: demonstrate an integrative approach to environmental issues with a focus on sustainability

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓		✓			✓	✓
CO2	✓		✓		✓							✓
CO3	✓		✓		✓		✓		✓	✓		
CO4		✓		✓				✓			✓	
CO5	✓		✓			✓			✓			✓

UNIT – I

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

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern

agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

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

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

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-soports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

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

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

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

UNIT – IV

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

Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

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

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

TEXT BOOKS :

(1) Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
(2) Environmental Studies by Kaushik, New Age Pubilishers.
(3) Environmental Studies by Benny Joseph, TMHPubilishers

REFERENCES :

(1) Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company
(2) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, CengagePubilications.
(3) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(4) Comprehensive Environmental studies byJ.P.Sharma, Laxmi publications.
(5) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
(6) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

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B. Tech (E.E.E) I-Year I-sem – R17 Regulation – w.e.f. 2017-18 Academic Year

Subject Code	Title of the Subject	L	T	P	C
17A10301	**Engineering Drawing**	1	1	3	3

COURSE OBJECTIVES	
1	To draw and understand the practical importance of geometrical constructions.
2	To understand the representation of the regular planes and solids in first angle of projections

COURSE OUTCOMES	
CO1	Student will be familiar with the BIS conventions and dimensions
CO2	Student will be familiar with the positions of points and straight lines under different cases
CO3	Student will be able to represent regular planes and solids on the drawing sheet for various cases
CO4	Student can draw the development for regular solids
CO5	Student will familiarize with the 2D and 3D projections of various figure

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS
(Common to EEE, ECE and CSE).

Unit-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance Drawing Instruments and their Use – BIS Conventions in drawing and Lettering.
Curves used in practice:

a) Conic sections including the Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

Principles of orthographic projection, I and III angle projections –Conventions –Projections of points.

Unit –II

Projection of lines inclined to both planes –traces, Projection of plane figures inclined to both planes.

Unit –III

Projection of simple solids inclined to both planes.

Unit –IV

Sections and Developments: Sections and Sectional views of Regular solids –Prism, Cylinder, Pyramid, Cone – True shapes.

Unit –V

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines-Isometric projection of spherical parts.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

REFERENCES:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, John&john.

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation.

Internal mid examination for 30 marks and internal assessment for 10 marks shall be awarded for internal evaluation.

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Subject Code	Title of the Subject	L	T	P	C
17A10501	**Problem Solving Using C**	3	-	-	3

COURSE OBJECTIVES	
1	To understand the various steps in Program development.
2	To understand the basic concepts in C Programming Language.
3	To learn how to write modular and readable C Programs
4	To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
5	To understand the notations used to analyze the Performance of algorithms.

COURSE OUTCOMES	
CO1	Develop flowcharts, algorithms for given complex problems.
CO2	Analyze basic programming constructs.
CO3	Write C programs for real world problems.
CO4	Implement C programming by using various control structures.
CO5	Appreciate coding standards and best practices for program development.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓		✓			✓	✓
CO2	✓		✓		✓							✓
CO3	✓		✓		✓		✓		✓	✓		
CO4		✓		✓				✓			✓	
CO5	✓		✓			✓			✓			✓

UNIT - I

Introduction: Programs and Programming, Programming Languages, Compiler, Interpreter, Loader and Linker, Program Execution, Classification of Programming, Structured Programming Concept, Algorithms, Flowcharts, System Developments.

Fundamentals Algorithms: Exchange the Values between two variables, Counting, Summation of set of numbers, Factorial Computation, Generation of the Fibonacci sequence, Reversing the digits of a integer.

Basics Of C: Introduction**,** Developing Programs in C, A Simple C program, Parts of C Program Revisited.

UNIT – II

Structure of C: Structure of a C Program, Concept of a Variable, Data Types in C, Program Statements, Declaration, Tokens, Operators and Expressions, Type conversion in C.

Input and Output: Introduction, Basic Screen and Keyboard I/O in C, Non-Formatted Input and Output, Formatted Input and Output Function.

Control Statements: Introduction, Specifying Test Condition for Selection and Iteration, Writing Test Expression, Conditional Execution and Selection, Iteration and Repetitive Execution. Nested Loops.

UNIT – III

Arrays And Strings: Introduction, One-Dimensional Array, Strings, Multidimensional Arrays, Arrays of Strings.

Function: Introduction, Concept of Functions, Using Functions, Call by Value Mechanism, Working with Functions, Passing Arrays to Functions, Scope and Extent, Inline Function, Recursion.

UNIT - IV

Factoring Methods: Finding Square root of a Number, The Smallest Deviser of an Interger, The GCD of Two Integers, Generating Prime Numbers.

Pointers – Introduction, Understanding Memory, Address Operator, Pointer, Void Pointer, Null Pointer, Use of pointer, Arrays and Pointers, Pointers and string, Pointers and string, Pointers to pointers, Array of pointers, Pointers to Function, Dynamic Memory Allocation.

Introduction to Data Structures, Single Linked List.

UNIT – V

User-Defined Data Types and Variables: Introduction, User-defined Data Types, Structures, Union, Enumeration Types.

Files in C: Introduction, Using Files in C, Working with text Files, Working with Binary Fields, Direct File Input and Output, Files of Records, Random Access to Files of Records.

TEXT BOOKS:

1. Programming in C, PradipDey, Manas Ghosh, Second Edition, OXFORD,
2. How to Solve it by Computer by R.G. Dromey, Pearson.

REFERENCES:

1. Programming in C and Data Structures, Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.Ananda Rao, Pearson Education.
2. Value Range analysis of C programs by simon, Axel by New Age International Publishers.
3. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
4. Programming in C – Stephen G. Kochan, III Edition, PearsonEductaion.
5. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition Education / PHI
6. C Programming & Data Structures,E.Balagurusamy,TMH.
7. Complete Reference – C, Herbert Schildt,TMH.

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Subject Code	Title of the Lab	L	T	P	C
17A15502	**English Language Communication Skills Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2	To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
3	To provide opportunities for practice in using English in day to day situations
4	To improve the fluency in spoken English and neutralize mother tongue influence
5	To train students to use language appropriately for debate, group discussion and public speaking

COURSE OUTCOMES	
CO1	Better Understanding of nuances of language through audio- visual experience and be independent learners
CO2	The significance of paralinguistic features will be understood by the students and they will try to be intelligible.
CO3	Become good at Inter-personal skills
CO4	Achieve neutral accent and be free from mother tongue influence
CO5	Being an active participant in debates and group discussion, showing ability to express agreement, argument to summarize ideas to elicit the views of others and present own ideas;

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

UNIT- I

Phonetics – Introduction to Sounds of Speech – Vowels – Consonants – Phonetic Transcription & Orthographic Transcription

UNIT – II

Syllabification – Word Stress – Rules of word stress – Intonation – Falling tone and Rising tone

UNIT – III

Situational Dialogues – Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Giving directions -Social and Professional etiquettes – Telephone Etiquettes

UNIT – IV

JAM – Describing Pictures, Photographs, Products, and Process – Talking about Wishes-Information Transfer.

UNIT – V

Debates - Group Discussions-1

MINIMUM REQUIREMENT FOR ELCS LAB:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:
   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB

ii) Headphones of High quality

SUGGESTED SOFTWARE:

1. Walden Infotech English Language Communication Skills.
2. Clarity Pronunciation Power – Part I (Sky Pronunciation)
3. Clarity Pronunciation Power – part II
4. LES by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian), 2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
5. **English Pronunciation in Use. Intermediate & Advanced**, Hancock, M. 2009. CUP
6. **Basics of Communication in English**, Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
7. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
8. **English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011.

Method of Evaluation:

English Language Laboratory Practical Examination:

1. The Practical Examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core Engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for 40 sessional marks and 60 year-end Examination marks. Of the 40 marks, 20 marks shall be awarded for day-to-day work and 20 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

Signature

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Subject Code	Title of the Lab	L	T	P	C
17A15202	**Applied Physics Laboratory**	-	1	3	2

COURSE OBJECTIVES	
1	The Objective of this course is to make the students gain practical knowledge to correlate with the theoretical studies.
2	To develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.
3	To train engineering students on basis of measurements and the instruments
4	To equip the students with practical knowledge in electronic, optics, and heat experiments

COURSE OUTCOMES	
CO1	On Completion of this course, students are able to – Develop skills to impart practical knowledge in real time solution.
CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
CO3	Understand measurement technology, usage of new instruments and real time applications in engineering studies.
CO4	The student will be able to analyze the physical principle involved in the various instruments, also relate the principle to new application.
CO5	The various experiments in the areas of optics, mechanics and thermal physics will nurture the students in all branches of Engineering.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓		✓			✓	✓
CO2	✓		✓		✓							✓
CO3			✓		✓		✓		✓	✓		
CO4		✓		✓							✓	
CO5	✓		✓			✓			✓			✓

LIST OF EXPERIMENTS

Any TEN of the following experiments have to be performed during the SEMESTER

1. Determination of wavelengths of variouscolours of mercury spectrum using diffraction grating in normal incidence method.
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method.
4. Determination of radius of curvature of lens by Newton's rings.
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber.
9. Meldes experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Hall effect : Determination of mobility of charge carriers in semiconductor
14. B-H curve
15. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
16. Determination of dielectric constant and Curie temperature of a ferroelectric material.

Note: Out of 10 experiments, two experiments will be performed using virtual laboratory

Data Books Required: Nil

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Subject Code	Title of the Lab	L	T	P	C
17A10502	**Computer Programming Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To work with the compound data types
2	To explore dynamic memory allocation concepts
3	Able to design the flowchart and algorithm for real world problems
4	Able to write C programs for real world problems using simple and compound data types
5	Employee good programming style, standards and practices during program development

COURSE OUTCOMES	
CO1	Translate algorithms in to programs
CO2	Code and debug programs in C program language using various constructs.
CO3	Formulate problems and implement algorithms in C.
CO4	Able to use different data types in a computer program

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓		✓			✓	✓
CO2	✓		✓		✓							✓
CO3			✓		✓		✓		✓	✓		
CO4		✓		✓							✓	

LIST OF EXPERIMENTS

Week-1
1) Write a C program to make the following exchange between the variables a-> b -> c->d - > a
2) Write a C program to carry out the arithmetic operations addition, subtraction, multiplication, and division between two variables
3) Write a C program for printing prime numbers between 1 and n.

Week-2
1) Write a C program to construct a multiplication table for a given number.
2) Write a program to reverse the digit of a given integer.
3) Write a C program to find the sum of individual digits of a positive integer.
4) Write a C program to calculate the factorial of a given number

Week-3
1) Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the

sequence. Write a C program to generate the first n terms of the sequence.

2) Write a program to calculate tax, given the following conditions:
   a) If income is less than 1,50,000 then no tax.
   b) If taxable income is in the range 1,50,001 – 300,000 then charge 10% tax
   c) If taxable income is in the range 3,00,001 – 500,000 then charge 20% tax
   d) If taxable income is above 5,00,001 then charge 30% tax

Week-4 1) Write a program to print the calendar for a month given the first Week- day of the month.

Input the first day of the month (Sun=0,Mon=1,Tue=2,Wed=3,.....) :: 3

Total number of days in the month : 31

Expected output

Sun	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*
-	-	-	*1*	*2*	*3*	*4*
5	*6*	*7*	*8*	*9*	*10*	*11*
12	*13*	*14*	*15*	*16*	*17*	*18*
19	*20*	*21*	*22*	*23*	*24*	*25*
25	*26*	*27*	*28*	*29*	*30*	*31*

2) Write a C program to find the roots of a quadratic equation

Week-5 1) Write a program to print the Pascal triangle for a given number
2) Write a C program to find the GCD (greatest common divisor) of two given integers
3) Write a C program to construct a pyramid of numbers.
4) Write C code to define a function cash_dispense, which takes an amount as its input, and returns the number of 1000, 500, 100, 50, 20, 10, 5, 2, 1 rupee denomination that make up the given amount

Week-6 1) Write C code to reverse the contents of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1]
2) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices

   ii) Multiplication of Two Matrices

3) Write a program that will search and find out the position where the given key element exist in a user chosen array and print it as output.

Week-7 1) Write C code to compute the frequency table of survey responses given by 20 users. The survey responses range from 1 to 5 and are stored in an array. For example, 10 responses are stored in the array [1,1,5,2,3,3,5,5,2,2]. The frequency table will be as shown below:
   a. 1 = 2
   b. 2 = 3

c. 3 = 2
d. 4 = 0
e. 5 = 3

2) Write a program to define a function to sort an array of integers in ascending order by using exchange sort.

Week-8
1) Write a C program to check whether a given string is a palindrome or not, without using any built-in functions.
2) Write a C program to determine if the given string is a palindrome or not by using string functions.
3) Write a function that accepts a string and delete the first character.
4) Write a function that accepts a string and delete all the leading spaces.

Week-9 Write a program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given string.

Week-10
1) Write a C program to define a union and structure both having exactly the same numbers using the sizeof operators print the sizeof structure variables as well as union variable
2) Declare a structure *time* that has three fields *hr, min, secs.* Create two variables,*start_time*and*end_time.* Input there values from the user. Then while *start_time* is not equal to *end_time* display GOOD DAY on screen.

Week-11
1) Write a program to read in an array of names and to sort them in alphabetical order. Use sort function that receives pointers to the functions strcmp, and swap, sort in turn should call these functions via the pointers.
2) Write a program to read and display values of an integer array. Allocate space dynamically for the array using the *malloc().*
3) Write a program to calculate area of a triangle using function that has the input parameters as pointers as sides of the triangle.

Week-12
1) Two text files are given with the names text1 and text2. These files have several lines of text. Write a program to merge (first line of text1 followed by first line of text2 and so on until both the files reach the end of the file) the lines of text1 and text2 and write the merged text to a new file text3.
2) Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part<**n**> where n is the sequence number of the part file.

Reference Books:

1. Computer Science, A Structured Programming Approach Using C by Behrouz A. Forouzan& Richard F. Gilberg, Third Edition, Cengage Learning
2. C Programming A Problem-Solving Approach, Behrouz A. Forouzan& E.V. Prasad, F. Gilberg, Third Edition, Cengage Learning
3. Programming with C RemaTheraja, Oxford
4. "C Test Your Skills", Kamthane, Pearson Education
5. Programming in C: A Practical Approach, Ajay Mittal, Pearson
6. Problem solving with C, M.T.Somasekhara, PHI
7. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press
8. Programming withc, Byron S Gottfried, Jitender Kumar Chhabra, TMH, 2011

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Subject Code	Title of the Subject	L	T	P	C
17A25501	**Technical Communication and Presentation Skills**	3	0	0	3

COURSE OBJECTIVES	
1	To develop awareness in students of the relevance and importance of technical communication and presentation skills.
2	To prepare the students for placements
3	To sensitize the students to the appropriate use of non-verbal communication
4	To train students to use language appropriately for presentations and interviews
5	To enhance the documentation skills of the students with emphasis on formal and informal writing

COURSE OUTCOMES	
CO1	Become effective technical communicators
CO2	Be job-ready and able to face interviews confidently
CO3	Sensitive use of non-verbal language suitable to different situations in professional life
CO4	Learn and use keys words, phrases and sentence structures making a mark in interviews and presentation skills
CO5	Effective writing skills with the ability to use different styles for different situations

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT 1:

Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

UNIT II

Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

UNIT III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

UNIT IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

UNIT V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Text Books:

1. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma,3rd Edition, O U Press 2015

References:

1.Communication Skills by Pushpalatha & Sanjay Kumar, Oxford Univsesity Press

2.Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press.2012.

3. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.

4. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.

5. **Successful Presentations** by John Hughes & Andrew Mallett, Oxford.

6. **Winning at Interviews** by Edgar Thorpe and Showick Thorpe, Pearson

7. Winning Resumes and Successful Interviews by Munish Bhargava, Mc Graw Hill

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that 10 marks will be awarded for assignment.

Signature

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Subject Code	Title of the Subject	L	T	P	C
17A25101	**MATHEMATICS – II**	2	2	-	3

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms;partial differential equations.

COURSE OBJECTIVES:

CEO 1: To impart basic knowledge on Fourier series, Fourier transforms, Laplace Transforms, z-transforms and partial differential equations.

CEO 2: To develop skills in analyzing the problems, designing mathematical models, Fourier series, Fourier transforms, Laplace transforms, z-transforms and partial differential equations for the problems in engineering.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO 1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) Solving partial differential equations
- (f) Heat transfer and wave motion

CO 2: Develop skills in Analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO 3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO 4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms

(b) Laplace transforms
(c) Z-transforms and difference equations
(d) Heat transfer and wave motion

CO 5: Use relevant transformation techniques for
(a) Obtaining Fourier transforms for different types of functions
(b) Laplace transforms
(c) Z- transforms
(d) Partial differential equations

Course Outcome	Program Outcomes					Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	--	PSOz
CO1	H								
CO2	L	H							
CO3	M		H						
CO4	H	M		H					
CO5	M	L			H				

Correlation Levels: H - High M - Medium L – Low

UNIT- I :

FOURIER SERIES (7 periods)

Fourier series: Determination of Fourier coefficients (Euler's formulae),Fourier series of even and odd functions, convergence of Fourier series (Dirichlet conditions), Half-range Fourier sine and cosine expansions, Parseval's formula, Complex form of Fourier series.

UNIT- II:

FOURIER INTEGRALS AND FOURIER TRANSFORMS(8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III:

LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transform. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem, inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Step and Impulse functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV :

Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem, Solution of difference equations by Z– transforms.

UNIT – V :

PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions ,Method of separation of variables , Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

REFERENCES:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
4. Advanced Engineering Mathematics 3rd Edition,by R.K.Jain&S.R.K.Iyengar, Narosa publishers

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B. Tech (E.E.E) I-Year II-sem – R17 Regulation – w.e.f. 2017-18 Academic Year

Subject Code	Title of the Subject	L	T	P	C
17A20103	**ENGINEERING MECHANICS**	2	2	0	3

COURSE OBJECTIVES:

This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.

COURSE OUTCOMES:

After completing the course, the student should be able to do the following:

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

UNIT – I

INTRODUCTION OF ENGINEERING MECHANICS – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II

FRICTION : Types of friction– laws of Friction – Limiting friction- Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw jack.

UNIT – III

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures.

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids – Moment of Inertia of composite masses.(Simple problems only)

UNIT – IV

KINEMATICS: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

KINETICS : Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion.

UNIT – V

ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

MECHANICAL VIBRATIONS: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple Compound and Torsional pendulum- Numerical problems

TEXT BOOKS:

(1) Engineering Mechanics by Dr.R.K.Bansal, Lakshmi Publications.
(2) Engineering Mechanics by Shames & Rao – Pearson Education.
(3) Engineering Mechanics by Bhavakatti, New age pubilishers

REFERENCES:

(1) Engineering Mechanics by Seshigiri Rao, Universities Press, Hyderabad.
(2) Engineering Mechanics – B. Bhattacharyya, Oxford University Publications.
(3) Engineering Mechanics by FedrinandL.Singer – Harper Collings Publishers.
(4) Engineering Mechanics (Statics and Dynamics) by Hibller and Gupta; Pearson Education
(5) Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao, Tata McGraw-Hill Company
(6) Engineering Mechanics by Chandramouli, PHI publications.
(7) Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning

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Subject Code	Title of the Subject	L	T	P	C
17A25301	**Applied Chemistry**	3	-	-	3

COURSE OBJECTIVES	
1	The Applied Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
2	The main aim of the course is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
3	The lucid explanation of the topics will help students to understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
4	The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.

COURSE OUTCOMES	
CO1	After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers, nanomaterials with their applications and engineering materials.
CO2	Understand the electrochemical sources of energy
CO3	Understand industrially based polymers, various engineering materials.
CO4	Differentiation and uses of different kinds of photochemical reactions.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT 1 :ELECTROCHEMISTRY

i) Review of electrochemical cells, Numerical calculations.

Batteries: Rechargeable batteries: Lead acid, Ni-Cd, Lithium Ion Batteries, Super capacitors Fuels cells: Fuel cell working principle, classification of fuel cells-Hydrogen-Oxygen and Methanol-Oxygen.

ii) Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii) Corrosion: Definition, types of corrosion, Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and catholic protection and electro and electroless plating. (10h)

UNIT 2: POLYMERS

i) Introduction to polymers, Polymerization process, mechanism: cationic, anionic, free radical and coordination covalent.

Elastomers: Natural Rubber, process of natural rubber, vulcanization, Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, Buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications, PVC, Bakelite, nylons. Polydispersive index

ii)Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii) Liquid Crystals: Introduction, classification and applications

iii)Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications.(12h)

UNIT 3: FUEL TECHNOLOGY

i) Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Beehive oven and Otto Hoffmann's by product ovenprocesses.

ii) Liquid Fuels:Petroleum: Refining of Petroleum, Gasoline: Octane and cetane number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

iii) Gaseous Fuels:Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus.

Combustion: reaction of combustion and related problems.

iv)Nuclear Fuels: Controlled and uncontrolled reactions. Breeder reactor and Power reactors. (12h)

UNIT 4: CHEMISTRY OF ENGINEERING MATERIALS

i) Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators. Applications of electrical insulating materials (Gaseous, liquid and solid insulators)

ii) Semiconducting and Super Conducting materials-Principles and some examples

iii) Magnetic materials – Principles and types of magnetic materials-examples (9h)

UNIT5 :NANOCHEMISTRY& COMPOSITE MATERIALS

i) Nanochemistry Introduction, nanomaterials, nanoparticles,
nanostructure, supramolecular systems, nanotechnology applications, future perspective.
ii) Composite Materials: Classification of Composites materials, Constituents of Composite materials. Disperse Phase composite materials.

Glass fibre reinforced polymer composite and Carbon fibre reinforced polymer composite materials. Advantages and applications of Composites.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi.
2. A Text Book of Enigneering Chemistry, Jain and Jain, DhanapathiRai Publications, New Delhi

References:

1. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi
2. Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3.Concepts of Engineering Chemistry- AshimaSrivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

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Subject Code	Title of the Subject	L	T	P	C
17A20201	ELECTRIC CIRCUITS - I	2	2	0	3

COURSE OBJECTIVES:

To make the student learn about:

1.	Basic characteristics of R,L,C parameters, their Voltage and Current Relations and Various combinations of these parameters.
2.	The Single Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference.
3.	Series and parallel resonances, bandwidth, current locus diagrams.
4.	Network theorems and their applications.
5.	Network Topology and concepts like Tree, Cut-set , Tie-set, Loop, Co-Tree.

COURSE OUTCOMES:

After completing the course, the student should be able to do the following:

CO1	Given a network, find the equivalent impedance by using network reduction techniques and determine the current through any element and voltage across any element.
CO2	Given a circuit and the excitation, determine the real power, reactive power, power factor etc,.
CO3	Apply the network theorems suitably.
CO4	Determine the Dual of the Network, Calculate the Cut Set and Tie-set Matrices for a given Circuit. Also understand various basic definitions and concepts.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2			2						
CO2	2	2	2			1						
CO3	1	2	2			1						
CO4	2	2	1			1						

The course outcomes of the course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

SYLLABUS:

UNIT- 1 INTRODUCTION TO ELECTRICAL & MAGNETIC CIRCUITS

Electrical Circuits: Circuit Concept – Types of elements - Source Transformation-Voltage - Current Relationship for Passive Elements (For Different Input Signals-Square, Ramp, Saw Tooth, Triangular). Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations.

UNIT- II SINGLE PHASE A.C CIRCUITS

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, J-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) With Sinusoidal Excitation- Phasor diagrams - Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Apparent Power, Active and Reactive Power, Examples.

UNIT- III LOCUS DIAGRAMS & RESONANCE

Series R-L, R-C, R-L-C and Parallel Combination with Variation of Various Parameters - Resonance-Series, Parallel Circuits, Frequency Response, Concept of Bandwidth and Q Factor.

UNIT- IV NETWORK THEOREMS

Superposition and Reciprocity Theorems, Thevenin's, Norton's, Maximum Power Transfer, Millman's Theorems, Tellegen's, and Compensation Theorems for D.C and Sinusoidal Excitations.

UNIT- V NETWORK TOPOLOGY

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks. Nodal Analysis, Mesh Analysis, Super Node and Super Mesh for D.C Excitations.

TEXT BOOKS:

1. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company.
2. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill.
3. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons

REFERENCE BOOKS:

1. Network Analysis by M.E Van Valkenberg, Prentice Hall (India), 3rd Edition.
2. Electrical Engineering Fundamentals by V. Del Toro, Prentice – Hall International.
3. Electric Circuits by N.Sreenivasulu, REEM Publications
4. Electric Circuits- Schuam Series
5. Electrical Circuit Theory and Technology by John Bird, Routledge, Taylor & Fransis
6. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill

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Subject Code	Title of the Subject	L	T	P	C
17A20404	**Electronic Devices and Circuits**	3	0	0	3

COURSE OBJECTIVES	
1	Understand basic electronic devices
3	Be familiar with the theory, construction, and operation of Basic electronic devices
4	Learn biasing of BJTs & FETs
5	Understand single stage and multi stage amplifiers

COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1	Explain the theory, construction, and operation of basic electronic devices
CO2	Use the basic electronic devices
CO3	Design and analyze small signal amplifier circuits applying the biasing techniques.
CO4	Design and analyze multistage amplifiers for various applications.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

The course outcomes of the course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

SYLLABUS

UNIT- I

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.

Special Purpose Diodes: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode.

UNIT II

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters

UNIT- III

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations.

Transistor Biasing And Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors.

UNIT IV

BJT Amplifiers: Classification of Amplifiers – Distortion in amplifiers, Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier Different coupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, Frequency response of BJT amplifier – Analysis at low and high frequencies.

UNIT- V

Field Effect Transistor: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.FET Biasing. FET Amplifiers - Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOS Amplifiers, MOSFET Characteristics in Enhancement and Depletion mode – MOS Small signal model, Common source amplifier with resistive, load, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

TEXT BOOKS:

1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J.Millman and C.C.Halkias, Satyabratajit, TMH, 2/e, 1998.

REFERENCES:

1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
2. Electronic Devices and Circuits – Anil K. Maini, VarshaAgarwal –Wiley India Pvt. Ltd. 1/e 2009.
3. Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2nd edition by Raymond A. DeCarlo and Pen-Min-Lin, Oxford University Press-2004.
4. Network Theory by N.C.Jagan&C.Lakshminarayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
6. Electronic Devices and Circuits – 2nd Edition by Muhammad H.Rashid, Cengage Learning.

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Subject Code	Title of the Lab	L	T	P	C
17A25302	**Applied Chemistry lab**	-	1	3	2

COURSE OBJECTIVES	
1	Will learn practical understanding of the redox reaction
2	Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
3	Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus toengineer these to suit diverse applications
4	Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

COURSE OUTCOMES	
CO1	Would be confident in handling energy storage systems and would be able combat chemical corrosion
CO2	Would have acquired the practical skill to handle the analytical methods with confidence.
CO3	Would feel comfortable to think of design materials with the requisite properties
CO4	Would be in a postion to technically address the water related problems.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Copper by Iodometry
5. Estimation of Iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Acidity and Alkalinity of Water
7. Determination of pH of various water samples.

8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromite indicator (Mohrs method)

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – SM Enterprises Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera.

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Subject Code	Title of the Lab	L	T	P	C
17A23501	**Engineering Workshop & IT Workshop Lab**	-	1	3	2

Part – A: Engineering Workshop

COURSE OBJECTIVES	
1	The objective of this subject is to provide the basic concepts about the engineering workshop trades like Carpentry, Fitting etc.
2	Gain knowledge of the use of various workshop tools and make models in the respective trades.
3	Exposure to power tools

COURSE OUTCOMES	
CO1	Student will be aware of the safety aspects in using the tools
CO2	Student will be able to use the tools for the preparation of models in respective trades of engineering workshop.
CO3	Precautions in making the models will be known by the student.
CO4	Student will be aware of the usage of the power tools for various purposes.
CO5	Knowledge about the measuring instruments will be achieved.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓		✓		✓		✓		✓	
CO2	✓		✓		✓		✓		✓		✓	
CO3	✓		✓		✓		✓		✓		✓	✓
CO4					✓		✓				✓	
CO5		✓		✓		✓						✓

1. TRADES FOR EXERCISES:

At least 2 Exercises in each of the following trades :

1. Carpentry
2. Fitting
3. House-wiring
4. Black Smithy
5. Tin smithy
6. Power Tools Demonstration

TEXT BOOK:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

Part – B: IT Workshop

COURSE OBJECTIVES	
1	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
2	To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
3	To learn about Networking of computers and use Internet facility for Browsing and Searching

COURSE OUTCOMES	
CO1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use
CO2	Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel
CO3	Prepare Slide presentations using the presentation tool
CO4	Interconnect two or more computers for information sharing
CO5	Access the Internet and Browse it to obtain the required information

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓		✓		✓		✓		✓	
CO2	✓		✓		✓		✓		✓		✓	
CO3	✓		✓		✓		✓		✓		✓	✓
CO4					✓		✓				✓	
CO5		✓		✓		✓						✓

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives,

print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill

2. MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

2017-2018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
B. Tech (E.E.E) I-Year II-sem – R17 Regulation – w.e.f. 2017-18 Academic Year

Subject Code	Title of the Lab	L	T	P	C
17A20405	**Electronic Devices and Circuits Lab**	0	1	3	2

COURSE OBJECTIVES	
1	Learn testing of components
2	Be exposed to the characteristics of basic electronic devices
3	Study the performance of Half wave and Full wave rectifiers with and without filters
4	Understand the characteristics of BJT & FET configurations
5	Study the frequency response of BJT & FET Amplifiers

COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1	Learn the characteristics of basic electronic devices.
CO2	Design half and full wave rectifiers circuits with without filters and analyze the performance.
CO3	Design and analyze biasing circuits of BJT
CO4	Design amplifier circuits using BJT & FET and analyze it's performance.

LIST OF EXPERIMENTS

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B:

(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics

Part A: Germanium Diode (Forward bias&Reverse bias)

Part B: Silicon Diode (Forward bias only)

2. Zener Diode Characteristics

Part A: V-I Characteristics

Part B: Zener Diode act as a Voltage Regulator

3. Rectifiers (without and with c-filter)

Part A: Half-wave Rectifier

Part B: Full-wave Rectifier

4. BJT Characteristics(CE Configuration)

Part A: Input Characteristics

Part B: Output Characteristics

5. FET Characteristics(CS Configuration)

Part A: Drain (Output) Characteristics

Part B: Transfer Characteristics

6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

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ELECTRICAL AND ELECTRONICS ENGINEERING

II B. Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A35401	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**	3	0	0	3

COURSE OBJECTIVES	
1	The objective of this course is to inculcate the basic knowledge to the students with the concepts of Economics & Demand to make them effective business decision makers.
2	To understand fundamentals of Production & Cost Concepts which is an important subject helps to the Technocrats to take certain business decisions in the processes of optimum utilization of resources.
3	To know the various types of Market Structures & pricing methods and its strategies & Trade Blocks.
4	To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5	To provide fundamental skills about accounting and to explain the process of preparing accounting statements & analysis for effective business decisions.

COURSE OUTCOMES	
CO1	Capable of analyzing fundamentals of Economics such as Demand, Elasticity & Forecasting methods
CO2	To apply production, pricing & supply concepts for effective business administration
CO3	Students can able to identify the influence of various markets, the forms of business organization and its International Economic Environment.
CO4	Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity.
CO5	Prepare and analyze accounting statements like income & expenditure statement, balance sheet apart from the fundamental knowledge, to understand financial performance of the business and to initiate the appropriate decisions to run the business profitably.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT I: **INTRODUCTION TO MANAGERIAL ECONOMICS&DEMAND**

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting- Factors governing Demand Forecasting- Methods of Demand Forecasting -Relationship of Managerial Economics with Financial Accounting and Management.

UNIT II: **THEORY OF PRODUCTION AND COST ANALYSIS**

Production Function- Least cost combination- Short-run and Long- run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of returns - Internal and External Economies of scale – **Cost& Break Even Analysis**: Cost concepts and Cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Analysis.

UNIT III: **INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT**

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization- Trade Blocks (SAARC,EU,NAFTA,BRICS)-EXIM Policy-International Economic Environment.

UNIT IV: **CAPITAL AND CAPITAL BUDGETING**

Concept of Capital - Significance, Types of Capital- Components of Working Capital -Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Cash Budget- **Capital Budgeting** – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT V: **INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS**

Accounting Concepts and Conventions-Introduction Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). ***Financial Analysis*:** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios-Du Pont Chart.

Text Books:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Ahuja H.L Managerial economics. S.Chand, 3/e, 2013

References:

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that 10 marks will be awarded for assignment.

Data Books Required:

Present Value Factors table.

Signature

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ELECTRICAL AND ELECTRONICS ENGINEERING
II B. Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A35102	MATHEMATICS - III	2	2	0	3

COURSE DESCRIPTION:

Fundamentals of matrix theory; numerical solutions of equations curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OBJECTIVES:

CEO 1: To impart basic knowledge on ranks of matrices, systems of linear equations, numerical methods to solve algebraic and transcendental equations, differential equations, numerical differentiation and integration.

CEO 2: To develop skills in analyzing various numerical techniques, designing mathematical models, numerical techniques for engineering problems and
fitting of curves to experimental data.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO 1 :Acquire basic knowledge in

(a) Finding the rank of matrices and analyzing them.
(b) Solving algebraic and transcendental equations by various numerical methods.
(c) Fitting of various types of curves to the experimental data.
(d) Estimating the missing data through interpolation methods.
(e) Identification of errors in the experimental data
(f) Finding the values of derivatives and integrals through various numerical methods.
(g) Solving differential equations numerically when analytical methods fail to hold.

CO 2 :Develop skills in analyzing the

(a) Methods of interpolating a given data
(b) Properties of interpolating polynomials and derive conclusions
(c) Properties of curves of best fit to the given data
(d) Algebraic and transcendental equations through their solutions
(e) Properties of functions through numerical differentiation and integration
(f) Properties of numerical solutions of differential equations

CO 3 :Develop skills in designing mathematical models for

(a) Fitting geometrical curves to the given data
(b) Solving differential equations

(c) Constructing polynomials to the given data and drawing inferences.

CO 4 :Develop numerical skills in solving the problems involving

(a) Systems of linear equations
(b) Fitting of polynomials and different types of equations to the experimental data
(c) Derivatives and integrals
(d) Ordinary differential equations

CO 5 : Use relevant numerical techniques for

(a) Diagonalising the matrices of quadratic forms
(b) Interpolation of data and fitting interpolation polynomials
(c) Fitting of different types of curves to experimental data
(d) Obtaining derivatives of required order for given experimental data

Course Outcome	Program Outcomes					Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	--	PSOz
CO1	H								
CO2	L	H							
CO3	M		H						
CO4	H	M		H					
CO5	M	L			H				

Correlation Levels: H - High M - Medium L - Low

UNIT–I :

MATRIX THEORY (11 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties,Diagonalization.Quadratic form, reductions to canonical form using orthogonal transformation method and nature of Quadratic forms.

UNIT-II

NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (9 periods)

Solutions of Algebraic and Transcendental equations by Regula falsi method, Newton – Raphson's method. Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III

INTERPOLATION (7 periods)
Interpolation, difference operators and their relationships, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT-IV

NUMERICAL DIFFERENTIATION AND INTEGRATION(7 periods)
Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpsons $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V

NUMERICAL SOLUTIONS OF DIFFERENTIAL EQUATIONS(11 periods)
Numerical solutions of first order Initial value problems using Taylor series method, Euler's, modified Euler's, Runge – Kutta method (4^{th}order only) and Milne's predictor – corrector method. Numerical solutions of Laplace equation using finite difference approximation.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

REFERENCES:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
5. Advanced Engineering Mathematics 3^{rd} Edition, by R.K.Jain & S.R.K.Iyengar, Naros a publishers

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ELECTRICAL AND ELECTRONICS ENGINEERING

II B. Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A35103	COMPLEX VARIABLES AND SPECIAL FUNCTIONS	2	2	0	3

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.

COURSE OBJECTIVES:

CEO 1: To impart basic knowledge on Beta and Gamma functions, Bessel function, Analytic functions, complex integration and power series, residue theorem, Mappings of functions of complex variables.

CEO 2: To develop skills in analyzing problems, designing mathematical models, Skills in Beta and Gamma functions, analytic functions, integral formulae, Residue theorem, conformal mappings for engineering problems.

COURSE OUTCOMES: After the completion of the course, a successful student is able to

CO 1: Acquire knowledge in

(a) Beta and Gamma functions
(b) Expressing complex functions in power series
(c) Differentiation and integration of complex functions
(d) Conformal mappings and bilinear transformations
(e) Expressing complex functions in terms of graphs and power series

CO 2: Develop skills in Analyzing the

(a) The properties exhibited by complex functions in Argand plane
(b) Properties of real integrals through complex variable techniques
(c) The properties of improper integrals through residue theory
(d) Conformal transformations of complex valued functions for inferences
(e) The properties of complex functions by expressing them in power series and graphs

CO 3: Develop skills in designing mathematical models involving

(a) Integrals of complex variable functions
(b) Improper integrals using beta and gamma functions
(c) Residue theory of complex functions
(d) Power series expansions of complex variable functions
(e) Transformations of complex variable functions
(f) Fluid flow patterns and flux functions.

CO 4: Develop analytical skills in providing solutions for problems involving
(a) Fluid, Electrical and Magnetic Potential functions
(b) Integration of complex functions
(c) Improper real integrals

CO 5 : Use relevant Complex variable techniques for
(a) Residues and integrals of complex functions.
(b) Improper real integrals through complex functions
(c) Techniques of Beta and Gamma functions to improper integrals

Course Outcome	Program Outcomes					Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	--	PSOz
CO1	H								
CO2	L	H							
CO3	M		H						
CO4	H	M		H					
CO5	M	L			H				

Correlation Levels: H - High M - Medium L - Low

UNIT-I:

SPECIAL FUNCTIONS (9 periods)

Beta and Gamma functions - Properties - Relationship between Beta and Gamma functions- Evaluation of improper integrals. Series Solutions of ordinary differential equations (Power series and Frobenius Method). Bessel & Legendre function-Orthogonality -Generating function (without proof) - Recurrence relations, Rodrigue's formula.

UNIT-II:

ANALYTIC FUNCTIONS (9 periods)

Function of a Complex Variable - Limits and Continuity of functions, uniform continuity, Differentiability and Analyticity – Cauchy Riemann equations (both Cartesian and polar) - Conjugate and harmonic conjugate functions - Milne Thompson method-Potential functions.

UNIT-III:

COMPLEX INTEGRATION AND POWER SERIES (9 periods)

Line integral - Evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem (without proof) - Cauchy's integral formula - Derivatives of analytic function - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT-IV:

RESIDUE THEOREM (9 periods)

Zeros and Singularities – Types of singularities - Residues – Evaluation of Residues at poles- Pole of order m - Residue theorem - Evaluation of integrals using residue theorem – Evaluation of improper and real integrals of the type:

i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ ii) $\int_{-\infty}^{\infty} f(x)dx$ iii) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT-V:

CONFORMAL MAPPING (9 periods)

Definitions and examples, Translation, Rotation, Inversion. Mappings defined by $w = e^z, \log z, z^2, \sin z, \cos z.$ Bilinear transformation - Properties - Fixed points - Cross ratio - Invariance of circles under bilinear transformation - Determination of bilinear transformation using three given points.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher

REFERENCES:

1. Mathematics III by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Advanced Engineering Mathematics, Peter V.O'Neil, CENGAGE publisher.
3. Advanced Engineering Mathematics by M.C. Potter, J.L. Goldberg, Edward F.Aboufadel, Oxford.
4. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers

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ELECTRICAL AND ELECTRONICS ENGINEERING

II B. Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A30201	**ELECTRIC CIRCUITS- II**	2	2	0	3

Course Objectives:

1	To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits
2	How to determine the transient response of R-L, R-C, R-L-C series circuits for d.c and a.c excitations
3	To know the applications of Fourier transforms to electrical circuits excited by non-sinusoidal sources
4	Study of Different types of filters, equalizers and PSPICE for Circuit Analysis

Course Outcomes:

CO1	Understand the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits
CO2	To get knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for d.c and a.c excitations
CO3	Applications of Fourier transforms to electrical circuits excited by non-sinusoidal sources are known
CO4	Design of filters, equalizers and PSPICE programs for Circuit Analysis

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2			2						
CO2	2	2	2			1						
CO3	1	2	2			1						
CO4	2	2	2			1						

Syllabus:

Unit-1: TRANSIENT ANALYSIS

D.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation - Initial Conditions in network - Initial Conditions in elements - Solution Method Using Differential Equation and Laplace Transforms - Response of R-L & R-C Networks to Pulse Excitation.

A.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for Sinusoidal Excitations - Solution Method Using Differential Equations and Laplace Transforms.

Unit-2: THREE PHASE A.C. CIRCUITS

Introduction - Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems. Analysis of Three Phase Unbalanced Circuits - Loop Method - Application of Millman's Theorem - Star Delta Transformation Technique – for balanced and unbalanced circuits - Measurement of Active and reactive Power – Advantages of Three Phase System.

Unit-3: FOURIER TRANSFORMS

Fourier Theorem - Trigonometric Form and Exponential Form of Fourier series – Conditions of Symmetry - Line Spectra and Phase Angle Spectra - Analysis of Electrical Circuits to Non Sinusoidal Periodic Waveforms. Fourier Integrals and Fourier Transforms – Properties of Fourier Transforms and Application to Electrical Circuits.

Unit-4: TWO PORT NETWORKS

Two Port Network Parameters – Impedance – Admittance - Transmission and Hybrid Parameters and their Relations. Concept of Transformed Network - Two Port Network Parameters Using Transformed Variables.

Unit-5: FILTERS & PSPICE FOR CIRCUITS

Filters – Low Pass – High Pass and Band Pass – RC, RL filters– derived filters and composite filters design – Attenuators – Principle of Equalizers – Series and Shunt Equalizers – L Type - T type and Bridged – T and Lattice Equalizers.

PSPICE for Circuit Analysis – Description of Circuit elements - nodes and sources - Input and Output variables – Modeling of the above elements – Types of DC analysis.

TEXT BOOKS:

4. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company.
5. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill.
6. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons

REFERENCE BOOKS:

7. Network Analysis by M.E Van Valkenberg, Prentice Hall (India), 3rd Edition.
8. Electrical Engineering Fundamentals by V. Del Toro, Prentice – Hall International.
9. Electric Circuits by N.Sreenivasulu, REEM Publications
10. Electric Circuits- Schuam Series
11. Electrical Circuit Theory and Technology by John Bird, Routledge, Taylor & Fransis
12. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill

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II B.Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A30202	**ELECTRICAL MACHINES – I**	2	2	0	3

Course Objectives: To make the students learn about:

1	The course will impart the concepts and principle of electromechanical energy conversions in rotating DC machines
2	The constructional features of DC machines and different types of winding employed in DC machines and the phenomena of armature reaction and commutation
3	Characteristics of generators and parallel operation of generators
4	Methods for speed control of DC motors and applications of DC motors
5	Various types of losses that occur in DC machines , how to calculate efficiency and Testing of DC motors

Course Outcomes:

After completing the course, the student should be able to do the following:

CO1	Able to calculate the e.m.f. generated on open circuit and find terminal voltage on load
CO2	Able to compute the load shared by each generator when several generators operate in parallel
CO3	Identify suitable method and conditions for obtaining the required speed of DC motor
CO4	Able to calculate the losses and efficiency of DC generators and motors

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		2		1						
CO2	2	2		2		1						
CO3	2	2		2		1						
CO4	2				1	1						

UNIT – I BASIC CONCEPTS OF ROTATING MACHINES

Principle of Electromechanical Energy Conversion – Forces and Torque In Magnetic Field Systems – Energy Balance – Energy and Force in A Singly Excited Magnetic Field System, Determination of Magnetic Force - Co-Energy – Multi Excited Magnetic Field Systems.

UNIT – II D.C. GENERATORS -I

D.C. Generators – Principle of Operation – Constructional Features – Armature Windings – Lap and Wave Windings – Simplex and Multiplex Windings – Use of Laminated Armature – E. M.F Equation– Numerical Problems – Parallel Paths-Armature Reaction – Cross Magnetizing and De-Magnetizing AT/Pole – Compensating Winding – Commutation – Reactance Voltage – Methods of Improving Commutation.

UNIT–III D.C GENERATORS – II

Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Causes for Failure to Self Excite and Remedial Measures-Load Characteristics of Shunt, Series and Compound Generators – Parallel Operation of D.C Series Generators – Use of Equalizer Bar and Cross Connection of Field Windings – Load Sharing.

UNIT – IV D.C. MOTORS

D.C Motors – Principle of Operation – Back E.M.F. – Circuit Model – Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors – Armature Reaction and Commutation.

Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Ward-Leonard System–Braking of D.C Motors – Permanent Magnet D.C Motor (PMDC).

Motor Starters (3 Point and 4 Point Starters) – Protective Devices-Calculation of Starters Steps for D.C Shunt Motors.

UNIT – V TESTING OF DC MACHINES

Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency.

Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test – Hopkinson's Test – Field's Test – Retardation Test in a D.C. Motor Test

TEXT BOOKS:

1. Electrical Machines – P.S. Bimbhra., Khanna Publishers, 2011.
2. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
3. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th Editon, 2003.

REFERENCE BOOKS:

1. Electrical Machinery Fundamentals by Stephen J Chapman, Mc Graw Hills, 2005.
2. Performance and Design of D.C Machines by Clayton & Hancock, BPB Publishers, 2004.
3. Electrical Machines by S.K. Battacharya, TMH Edn Pvt. Ltd., 3rd Edition, 2009.
4. Electrical Machines by M.V Deshpande, Wheeler Publishing, 2004.

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II B.Tech – I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A30203	**LINEAR CONTROL SYSTEMS**	2	2	0	3

Course Objectives:

To make the students learn about:

1	Merits and demerits of open loop and closed loop systems; the effect of feedback
2	The use of block diagram algebra and Mason's gain formula to find the effective transfer function
3	Transient and steady state response , time domain specifications and The concept of Root loci
4	Frequency domain specifications, Bode diagrams and Nyquist plots & The fundamental aspects of modern control

Course Outcomes:

After completing the course, the student should be able to do the following:

CO1	Evaluate the effective transfer function of a system from input to output using (i) block diagram reduction techniques (ii) Mason's gain formula
CO2	Compute the steady state errors and transient response characteristics for a given system and excitation
CO3	Determine the absolute stability and relative stability of a system
CO4	Derive state space model of a given physical system and solve the state equation

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	1	-	1	2	-	1	-	2
CO2	2	2	2	1	1	-	1	2	-	1	-	2
CO3	2	2	2	1	1	-	1	2	-	1	-	2
CO4	2	2	2	1	1	-	1	2	-	1	-	2

UNIT – I CONTROL SYSTEMS CONCEPTS

Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback Characteristics, Effects of positive and negative feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram reduction methods – Signal flow

graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver

UNIT-II TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants-Effects of Proportional, Integral and Derivative controllers.

UNIT – III STABILITY ANALYSIS IN FREQUENCY DOMAIN

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

UNIT – IV FREQUENCY RESPONSE ANALYSIS

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

Compensation techniques – Lag, Lead, Lag-Lead Compensator design in frequency Domain.

UNIT – V STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from differential equations. Transfer function models. Block diagrams. Diagonalization, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability.

TEXT BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.
3. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell, Pearson.

REFERENCE BOOKS:

1. Control Systems Principles & Design 4th Edition, M.Gopal, Mc Graw Hill Education, 2012.

2. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John wiley and son's, 8th edition, 2003.
3. Control Systems 3rd Edition, Joseph J Distefano III, Allen R Stubberud & Ivan J Williams, Schaum's Mc Graw Hill Education.
4. Control System Design by Goodwin

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ELECTRICAL AND ELECTRONICS ENGINEERING

II B.Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A35104	Exploratory Data Analysis Lab	-	1	3	2

COURSE DESCRIPTION: Statistical and Numerical Techniques – Measures of central tendency/dispersion, Curve fitting by method of least squares, linear regression and correlation, ANOVA; Data analysis using R, Numerical Solution of algebraic, transcendental and ordinary differential equations, Inverse and Eigen values of a matrix – Numerical method.

CEO 1: To impart knowledge on the application of Statistical and Numerical techniques – analysis of data, solution of algebraic, transcendental and differential equations, Matrices, transformation from time domain to frequency domain.

CEO 2: To develop skills in analyzing the data using appropriate statistical tools, solving algebraic and differential equations, matrices using appropriate numerical methods, obtaining amplitude and frequency of a time signal

COURSE OUTCOMES: After completion of the course, a successful student is able to

CO 1 : Develop skills in designing appropriate statistical method for
- (a) Determining the measures of central tendency/dispersion.
- (b) Box plot representation using Origin Software.
- (c) Finding a best fit curve to a given set of data.
- (d) Determining the coefficient of correlation and linear regression.

CO 2 : Develop skills in using suitable statistical technique for
- (a) Analyzing variance (ANOVA) for one variable.
- (b) Determination of R function for a given set of data and appropriate interpretation.
- (c) Representing three dimensional data in contour plot using MATLAB.

CO 3 : Transform a time signal/pulse to a frequency domain using concepts of Fourier series

CO 4 : Develop skills using suitable numerical technique for
- (a) Solving algebraic, transcendental and differential equations.
- (b) Determining Eigen Values and dominant Eigen value of a matrix.
- (c) Differentiation, integration and solution of differential equations.

Course Outcome	Mapping between Course Outcomes and Programme Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	H			M		H		
CO2	M	H		H				M	
CO3	M		H		H	H			M
CO4	H	M		H	H				H

Correlation Levels: H - High M - Medium L – Low

LIST OF EXPERIMENTS

Required softwares: ORIGIN, MATLAB, R-LAB.

I. Statistical and Fourier series Techniques:

To a given set of data:

1. Determine measures of central tendency/dispersion - Mean, Median, Mode, Range and Variance; Box plot representation using Origin Software.
2. Fit a straight line, parabola, exponential curve.
3. Determine the coefficient of correlation and regression.
4. Analysis of variance (ANOVA) for one variable.
5. Determine R function and give interpretation.
6. Transforming signal in time domain into frequency domain.
7. Represent in contour plot using matlab.

II. Numerical Techniques:

8. Solving algebraic and transcendental equations using Regula - Falsi and Newton - Raphson methods.
9. Determine the inverse of a matrix; solving system of algebraic equations using Gauss-Siedal method.
10. Determine the Eigen values of a matrix and dominant Eigen value by power method.
11. Numerical differentiation and integration.
12. Numerical solution of Ordinary differential equations - Modified Euler method & R-K fourth order method.

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II B.Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A30204	**ELECTRIC CIRCUITS & SIMULATION LAB**	-	1	3	2

Course Objectives:

To make the students learn about:

1	Experimental verification of theorems.
2	Experimental verification of Resonance phenomenon.
3	Drawing current locus diagrams and Practical implementation of active and reactive power measurement techniques.
4	Practical determination of two port network parameters and introduction to P-Spice.

Course Outcomes:

After completing the course, the student should be able to do the following:

CO1	Apply suitable theorems for circuit analysis and verify the results theoretically.
CO2	Experimental determination of two port network parameters and theoretical verification.
CO3	Measure active and reactive power experimentally and verify the theoretical values.
CO4	Experimentally determine self inductance, mutual inductance and coefficient of coupling Practically determine band width, Q-factor and verify with theoretical values.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	1	-	1	2	-	1	-	2
CO2	2	2	2	1	1	-	1	2	-	1	-	2
CO3	2	2	2	1	1	-	1	2	-	1	-	2
CO4	2	2	2	1	1	-	1	2	-	1	-	2

PART-A: ELECTRICAL CIRCUITS

1) Verification of Thevenin's and Norton's Theorems
2) Verification of Superposition Theorem and Maximum Power Transfer Theorem
3) Verification of Compensation Theorem
4) Verification of Reciprocity , Millmann's Theorems
5) Locus Diagrams of RL and RC Series Circuits
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of Coupling
8) Z and Y Parameters
9) Transmission and Hybrid Parameters
10) Measurement of Active Power for Star and Delta Connected Balanced Loads
11) Measurement of Reactive Power for Star and Delta Connected Balanced Loads
12) Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

PART-B: PSPICE SIMULATION

1) Simulation of DC Circuits
2) DC Transient Response
3) Mesh Analysis
4) Nodal Analysis

REFERENCES:

1. Simulation of Power Electronics Circuit, M B Patil, V Ramanarayan and V T Ranganat, Alpha Science International Ltd., 2009.

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II YEAR II SEM B. Tech EEE

Subject Code	Title of the Subject	L	T	P	C
17A40201	**ELECTRICAL MACHINES – II**	2	2	0	3

Objective : This subject facilitates to study

1.	The performance of different types of single phase Transformers.
2.	The performance of different types of three phase Transformers.
3.	The performance of different types of Induction motors and their characteristics.
4.	The Speed control of Induction motor.

Outcomes:

CO1	Able to draw the equivalent circuit of transformer.
CO2	Conduct O.C, S.C tests and predetermine the regulation and efficiency.
CO3	Able to draw the circle diagram of a three phase Induction motor and predetermine the performance characteristics of three phase induction motor.
CO4	Understand the similarities and differences between transformers and Induction motors.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	2	-	1	1	-	1	-	2
CO2	1	2	2	2	1	-	-	1	-	1	1	2
CO3	2	2	2	2	2	-	-	1	-	1	1	2
CO4	1	2	2	2	1	-	-	1	-	1	-	2

UNIT-I SINGLE PHASE TRANSFORMERS

Single Phase Transformers- Constructional Details- Hystersis and Eddy Current Losses-Emf Equation - Operation on No Load and on Load - Phasor Diagrams

Equivalent Circuit - Losses and Efficiency-Regulation. All Day Efficiency - Effect of Variations of Frequency & Supply Voltage on Iron Losses.

UNIT-II PERFORMANCE OF SINGLE PHASE TRANSFORMERS

OC and SC Tests - Sumpner's Test - Predetermination of Efficiency and Regulation-Separation of Losses Test-Parallel Operation with Equal and Unequal Voltage Ratios - Auto Transformers-Equivalent Circuit - Comparison with Two Winding Transformers.

UNIT-III THREE PHASE TRANSFORMERS AND INDUCTION MOTORS

Three Phase Transformers - Connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and Open Δ, Third Harmonics in Phase Voltages-Three Winding Transformers-Tertiary Windings- Scott Connection.

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines-Production of a Rotating Magnetic Field - Principle of Operation - Rotor Emf and Rotor Frequency - Rotor Reactance, Rotor Current and Pf at Standstill and During Operation.

UNIT-IV 3-PHASE INDUCTION MOTOR CHARACTERISTICS

Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and Their Inter Relation-Torque Equation-Deduction From Torque Equation - Expressions for Maximum Torque and Starting Torque - Torque Slip Characteristic –Generator Operation - Double Cage and Deep Bar Rotors - Equivalent Circuit - Phasor Diagram - Crawling and Cogging -Circle Diagram-No Load and Blocked Rotor Tests-Predetermination of Performance

UNIT-V STARTING AND SPEED CONTROL OF INDUCTION MOTORS

Starting Methods and Starting Current and Torque Calculations, Speed Control-Change of Frequency; Pole Changing and Methods of Consequent Poles; Cascade Connection. Injection of an Emf.

TEXT BOOKS:

4. Electrical Machines – P.S. Bimbhra., Khanna Publishers, 2011.
5. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
6. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th Editon, 2003.

REFERENCE BOOKS:

1. Performance and Design of AC Machines by MG.Say, BPB Publishers, 2002.
2. Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2nd edition, 2008.
3. Electrical Machinery Fundamentals by Stephen J Chapman, Mc Graw Hills, 2005.
4. Electrical Machines by S.K. Battacharya, TMH Edn Pvt. Ltd., 3rd Edition, 2009.

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II YEAR II SEM

Subject Code	Title of the Subject	L	T	P	C
17A40202	**ELECTRICAL POWER GENERATING SYSTEMS**	2	2	0	3

Course Objectives:

1.	To know about the principles of power generation. Investigate the line diagram and components in thermal power station.
2.	To accredit hydro and nuclear power stations.
3.	To enable the process involved in solar, wind,biogas, geothermal and ocean energy generation
4.	To analyze economic aspects in power generation and to investigate different tariff methods.

Course Outcomes:

CO1	Understand the principles of power generation. Analyze the construction, working and operating principle, and essential components of Thermal power generating station with their relative merits and demerits.
CO2	Analyze the construction, working and operating principle, and essential components of Hydro and Nuclear power generating stations.
CO3	Analyze the different methods and characteristics of solar, wind, biogas, geothermal and ocean power generating systems along with their economic and environmental aspects.
CO4	Carry out a detailed analysis on the economic aspects of power generation involving various tariff methods and costs of generation.

Mapping of Course outcomes with Program outcomes:

Courses Outcomes	Program Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	2	2			1	1	1					2
CO2	2	2					1			1		2
CO3	2	2	1				1			1		2
CO4	2	2	1				1			1		1

Syllabus:

UNIT-I THERMAL POWER GENERATING SYSTEMS

Block Diagram of Thermal Power Station (TPS) showing paths of Coal, Steam, Water, Air, Ash and Flue Gasses - Brief Description of TPS Components: Economizers, Boilers, Super Heaters, Turbines, Condensers, Chimney and Cooling Towers, Cogeneration.

UNIT-II HYDRO & NUCLEAR POWER GENERATING SYSTEMS
Hydro Power: Selection of Site, Classification, Layout, Description of Main Components.

Nuclear Power: Nuclear Fission and Chain Reaction- Nuclear Fuels.- Principle of Operation of Nuclear Reactor.-Reactor Components: Moderators, Control Rods, Reflectors and Coolants.- Radiation Hazards: Shielding and Safety Precautions.- Types of Nuclear Reactors and Brief Description of PWR, BWR and FBR.

UNIT -III SOLAR & WIND POWER GENERATING SYSTEMS

Solar Power Generation:Role and Potential of Solar Energy Options, Principles of Solar Radiation, Flat Plate and Concentrating Solar Energy Collectors, Different Methods of Energy Storage – PV Cell- V-I Characteristics.
Wind Power Generation:Role and potential of Wind Energy Option, Horizontal and Vertical Axis Wind Mills- Performance Characteristics- Power- Speed & Torque- Speed Characteristics- Pitch & Yaw Controls – Power Electronics Application – Economic Aspects.

UNIT-IV BIOGAS & GEOTHERMAL POWER GENERATING SYSTEMS

Biogas Power Generation: Principles of Bioconversion, Types of Biogas Digesters – Characteristics of Bio-Gas- Utilization- Economic and Environmental Aspects.
Geothermal and Ocean Power Generation:Principle of Geothermal Energy Methods of Harnessing-Principle of Ocean Energy-Tidal and Wave Energy- Mini Hydel Plants- Economic Aspects.

UNIT-V ECONOMIC ASPECTS OF POWER GENERATION

Load Curve, Load Duration and Integrated Load Duration Curves-Load Demand, Diversity, Capacity, Utilization and Plant Use Factors- Numerical Problems. Costs of Generation and their Division into Fixed, Semi-Fixed and Running Costs. Tariff Methods:Desirable Characteristics of a Tariff Method- Flat Rate, Block-Rate, Two-Part, Three –Part, and Power Factor Tariff Methods and Numerical Problems.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, DhanpatRai& Co. Pvt. Ltd., 1999.
2. Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.
3. Non Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.

REFERENCE BOOKS:

1. Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.
4. Wind Electrical Systems by S. N. Bhadra, D. Kastha& S. Banerjee – Oxford University Press, 2013.

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ELECTRICAL AND ELECTRONICS ENGINEERING
II B.Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A40203	**ELECTROMAGNETIC FIELDS**	2	2	0	3

Objectives:
To make the student learn about:

1.	The laws concerning static electric fields: Columb's law, Gauss's law; the laws concerning static magnetic fields: Biotsavart law, ampere circuital law.
2.	The Maxwell's equations concerned with static electric fields and static magnetic fields.
3.	The difference between the behaviors of conductors and dielectrics in electric fields, The energy stored and energy density in (i) static electric field (ii) magnetic field.
4.	Electromagnetic wave propagation and attenuation in various medium and propagation through boundaries between media and Significance of Poyinting theorem with it's Vector.

Outcomes: After the end of this course student will

CO1	Gets knowledge on basic principles, concepts and use of fundamental laws like Gauss's Law, Coulomb's law, Biot-Savart law, ampere circuital law and Poisson's Equation to find fields and potentials for a variety of situations including charge distributions and capacitors.
CO2	Able to understand vector algebra, 3-dimensional co-ordinate systems, electrostatics, magneto statics, time-varying fields and interaction between electricity and magnetism.
CO3	Understand the behavior of magnetic and electric fields in the presence of dielectric and magnetic materials; appreciate how to simply modify expressions for capacitance and inductance from free space expressions.
CO4	Can be Derive and solve basic 1-D electromagnetic wave equations. Analyze electromagnetic wave propagation and attenuation in various medium and propagation through boundaries between media.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1		2	1	2		1	1		2
CO2	2	2	2	2	2	1	2			1		1
CO3	2	1	2	1			2					1
CO4	2	2	1	2	2	1	2			1		1

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT-I ELECTROSTATICS

Electrostatic Fields - Coulomb's Law - Electric Field Intensity(EFI) due to Line, Surface and Volume charges- Work Done in Moving a Point Charge in Electrostatic Field-Electric Potential due to point charges, line charges and Volume Charges - Potential Gradient - Gauss's Law-Application of Gauss's Law-Maxwell's First Law – Numerical Problems.

Laplace's Equation and Poisson's Equations - Solution of Laplace's Equation in one Variable. Electric Dipole - Dipole Moment - Potential and EFI due to Electric Dipole - Torque on an Electric Dipole in an Electric Field – Numerical Problems.

UNIT- II CONDUCTORS AND DIELECTRICS

Behavior of Conductors in an Electric Field-Conductors and Insulators – Electric Field Inside a Dielectric Material – Polarization – Dielectric Conductors and Dielectric Boundary Conditions – Capacitance-Capacitance of Parallel Plate, Spherical & Co-axial capacitors – Energy Stored and Energy Density in a Static Electric Field – Current Density – Conduction and Convection Current Densities – Ohm's Law in Point Form – Equation of Continuity – Numerical Problems.

UNIT-III MAGNETO STATICS

Static Magnetic Fields – Biot-Savart Law – Oerstead's experiment – Magnetic Field Intensity(MFI) due to a Straight, Circular &Solenoid Current Carrying Wire – Maxwell's Second Equation. Ampere's Circuital Law and its Applications Viz., MFI Due to an Infinite Sheet of Current and a Long Current Carrying Filament – Point Form of Ampere's Circuital Law – Maxwell's Third Equation – Numerical Problems.

Magnetic Force — Lorentz Force Equation – Force on Current Element in a Magnetic Field - Force on a Straight and Long Current Carrying Conductor in a Magnetic Field - Force Between two Straight and Parallel Current Carrying Conductors – Magnetic Dipole and Dipole moment – A Differential Current Loop as a Magnetic Dipole – Torque on a Current Loop Placed in a Magnetic Field – Numerical Problems.

UNIT – IV MAGNETIC POTENTIAL

Scalar Magnetic Potential and Vector Magnetic Potential and its Properties - Vector Magnetic Potential due to Simple Configuration – Vector Poisson's Equations.

Self and Mutual Inductances – Neumann's Formulae – Determination of Self Inductance of a Solenoid and Toroid and Mutual Inductance Between a Straight, Long Wire and a Square Loop Wire in the Same Plane – Energy Stored and Intensity in a Magnetic Field – Numerical Problems.

UNIT-V TIME VARYING FIELDS

Faraday's Law of Electromagnetic Induction – It's Integral and Point Forms – Maxwell's Fourth Equation. Statically and Dynamically Induced E.M.F's – Simple Problems – Modified Maxwell's Equations for Time Varying Fields – Displacement Current.

Wave Equations – Uniform Plane Wave Motion in Free Space, Conductors and Dielectrics – Velocity, Wave Length, Intrinsic Impedance and Skin Depth – Poynting Theorem – Poynting Vector and its Significance**.**

TEXT BOOKS:

1. Engineering Electromagnetics by William.H.Hayt, Mc.Graw – Hill, 2010.

2. Electromagnetic Fields by Sadiku – Oxford University Press, 5th Edition, 2010.

3. Field Theory – K.A.Gangadhar, Khanna Publications, 2003.

REFERENCE BOOKS:

1. Electrodynamics by Griffith, PHI, 3rd Edition, 1999.

2. Electromagnetics by J.D.Kraus,Mc.Graw – Hill Inc,5th edition,1999.

3. Electromagnetics by Joseph Edminister, Tata Mc Graw Hill, 2006.

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II B.Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A40407	Analog Electronic Circuits	2	2	0	3

COURSE OBJECTIVES	
1	To give understanding of various types of amplifier circuits such as large signal and tuned amplifiers.
2	To familiarize the concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
3	To explain clippers, clampers, switching characteristics of transistors.
4	To construct various multivibrators using transistors.

COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1	Design and realize different classes of power amplifiers and tuned amplifiers useable for audio and radio applications.
CO2	Utilize the concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.
CO3	Understand the applications of diode as integrator, differentiator, clippers, clampler circuits..
CO4	Understand switching characteristics of diodes and transistors.
CO5	Design mutivibrator circuits for various applications.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1		2	1	2		1	1		2
CO2	2	2	2	2	2	1	2			1		1
CO3	2	1	2	1			2					1
CO4	2	2	1	2	2	1	2			1		1

SYLLABUS

UNIT –I: POSITIVE & NEGATIVE FEEDBACK IN AMPLIFIERS

Classification of amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

Condition for oscillations. RC and LC type Oscillators – Frequency and amplitude stability of oscillators – Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators – RC-phase shift and Wien-bridge oscillators.

UNIT – II:

LARGE SIGNAL AMPLIFIERS

Class A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Push Pull and Complimentary Symmetry Class B and Class AB Power Amplifiers – Principle of operation of class –C Amplifier, Transistor Power Dissipation, Heat Sinks.

UNIT – III:
TUNED AMPLIFIERS
Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading single Tuned amplifiers on Bandwidth, Effect of Cascading Double Tuned amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned amplifiers.

UNIT – IV
Linear Wave Shaping: High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator.
Non-Linear Wave Shaping: Diode clippers, Transistor clippers, Clipping at two independent levels. Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits.

UNIT- V:
Switching Characteristics of Devices: Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Break down voltages, Transistor in Saturation, Temperature variation of Saturation Parameters, Transistor-switching times.
Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

TEXT BOOKS:
1. Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. PrakashRao, 2 Ed., 2008, TMH.

REFERENCES:
1. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
2. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
3. Microelectronic Circuits – Sedra / Smith – 5th Edition – Oxford, 2009
4. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson Education.

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II B.Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A40408	Switching Theory & Logic Design	2	2	0	3

COURSE OBJECTIVES	
1	To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2	To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3	To implement simple logical operations using combinational logic circuits
4	To design combinational logic circuits, sequential logic circuits.
5	To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

COURSE OUTCOMES	
Upon completion of the course, students should be able to:	
CO1	Understand numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray and BCD.
CO2	Analyze different methods used for simplification of Boolean expressions.
CO3	Design and implement Combinational circuits.
CO4	Design and implement synchronous and asynchronous sequential circuits and to use them as building blocks to build complex circuits.
CO5	Understand logic families and Implement logic gates.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1		2	1	2		1	1		2
CO2	2	2	2	2	2	1	2			1		1
CO3	2	1	2	1			2					1
CO4	2	2	1	2	2	1	2			1		1

SYLLABUS

UNIT-I:

Number Systems and Switching Functions: Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT-II:

Minimization methods:

Introduction, The Minimization of switching function using theorem, The Karnaaugh Map Method-Up to Five Variable Maps, Don't Care Map Entries, Tabular Method,

Combinational Circuits: Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Decoders, Encoders and Code converters, Basic PLD's-ROM, PROM,

PLA, PAL Realizations. Hazards and Hazard Free Relations.

UNIT-III:

Introduction to Sequential Circuits: Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, Latches, Flip Flops: SR, JK, Race Around Condition in JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip-Flop , Timing and Triggering Consideration, Clock Skew, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers, Data Transmission in Shift Registers, Operation of Shift Registers, Shift Register Configuration, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation Of Asynchronous And Synchronous Counters.

UNIT-IV:

Sequential Circuits: Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity-bit Generator, Design of Asynchronous Counters, Design of Synchronous Modulo N –Counters.

UNIT-V:

Finite State Machines: Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CMOS Logic Families and its Comparison.

TEXT BOOKS:

1. Switching and Finite Automata Theory- ZviKohavi&Niraj K. Jha, 3rdEdition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3rd Edition.
3. Digital Systems Principles and Applications (8th Edition) - Ronald J. Tocci Neal S. Widmer, 8th edition

REFERENCE BOOKS:

1. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. PrakashRao, 2 Ed., 2008, TMH.
2. Switching Theory and Logic Design – A Anand Kumar, PHI,2013.
3. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
4. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
5. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier
6. Fundamentals of Logic Design- Charles H. Roth, CengageLEanring, 5th, Edition, 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTAPURAMU
ELECTRICAL AND ELECTRONICS ENGINEERING

II B.Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A45101	HUMAN VALUES AND PROFESSIONAL ETHI**CS** **(Audit Course)**	2	0	0	0

COURSE OBJECTIVES	
1	To bring awareness among engineering graduates on ethics, human values & obligations.
2	To understand the ethical theories and their application to work ethics.
3	To understand the risk and safety measurements to be taken in various engineering areas.
4	To know various codes of ethics used by professional bodies & to learn about professional responsibility as an engineer.
5	To identify the global issues & measures to control adversity.

COURSE OUTCOMES	
CO1	Develop awareness on ethics, human values & obligations related to Self, Family, Society and State.
CO2	Become morally and socially responsible.
CO3	As a social experimentalist they can ensure less hazards & can find out engineering solutions from the ethical platform.
CO4	Students Can know how to ensure safety by minimizing risk through detailed analysis & can plan to get Intellectual property Rights(IPR).
CO5	Can identify various global issues, moral & social responsibilities.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

HUMAN VALUES AND PROFESSIONAL ETHICS (Audit course)

SYLLABUS

Unit I: HUMAN VALUES

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co-operation& Commitment – Empathy – Self Confidence Character – Spirituality- Obligations to Self, Family, Society and the State.

Unit II: ENGINEERING ETHICS

Senses of 'Engineering Ethics- Variety of Moral Issues – Types of Inquiry – Moral dilemmas – Moral Autonomy –Kohlberg's Theory- Gilligan's Theory- Consensus and Controversy – Models of Professional Roles- Theories about Right Action- Self interest - Customs and Religion –Uses of Ethical Theories.

Unit III: **ENGINEERING AS SOCIAL EXPERIMENTATION**

Engineering As Social Experimentation – Framing the Problem – Determining the Facts – Codes of Ethics – Clarifying Concepts – Application Issues – Common Ground - General Principles – Utilitarian Thinking -Respect for Human beings.

UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk- Safety and the Engineer- Designing for the Safety- Intellectual Property rights (IPR).

UINIT V: GLOBAL ISSUES

Globalization – Cross Culture Issues- Environmental Ethics – Computer Ethics – Computers as The Instrument of Unethical Behavior – Computers as the Object of Unethical Acts – Autonomous Computers- Computer Codes of Ethics – Weapons Development - Ethics and Research- Moral & Social Responsibility- Code of Conduct.

Text Books:

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.Senthil Kumar-PHI Learning Pvt. Ltd-2009,Rs.129.

References:

1. "Human Values & Ethics", SK Chakraborty & D.Chakraborty, Himalaya Publishing House, Mumbai,2014,Rs.398.
2. "2006Human Values & Professional Ethics ", B.S.Raghava and Jayashree Suresh, S.Chand &co., New Delhi, 2012.Rs.175
3. "Human Values & Ethics in the Workplace", Glenn Martin, GP Martin Publishing, Australia, 2007.

Method of Evaluation:

Internal assessment for 40 marks.

Data Books Required: No.

Signature

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ELECTRICAL AND ELECTRONICS ENGINEERING

II B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A40204	**CONTROL SYSTEMS & SIMULATION LAB**	0	1	3	2

Objectives: This course introduces

COURSE OBJECTIVES	
1	Determination of transfer functions of various systems and control of it by different methodologies.
2	To provide knowledge in the analysis and design of controllers and compensators.
3	The characteristics of servo mechanisms which are helpful in automatic control systems.
4	To know the stability analysis using matlab.

COURSE OUTCOMES	
CO1	Get the knowledge of feedback control.
CO2	Model the systems and able to design the controllers and compensators.
CO3	Get the knowledge about the effect of poles and zeros location on transient and steady state behaviour of second order systems and can implement them to practical systems.
CO4	Determine the performance and time domain specifications of first and second order systems.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	-	-	-	-	-	-	-	2
CO2	1	2	2	2	-	-	-	-	-	-	-	2
CO3	1	2	2	2	-	-	-	-	-	-	-	2
CO4	1	2	2	2	-	-	-	-	-	-	-	2

Any Eight of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine

6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:-

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB – Verification.

REFERENCE BOOKS:

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.

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ELECTRICAL AND ELECTRONICS ENGINEERING

II B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A40206	**ELECTRICAL MACHINES LAB - I**	0	1	3	2

Objectives:

COURSE OBJECTIVES	
1	Learn about DC motors and DC Generators
2	Various characteristics and performance analysis of DC machines
3	Various test conditions of DC machines
4	Understand the speed control techniques of DC machines.

COURSE OUTCOMES	
CO1	Learn about DC motors and DC Generators
CO2	Various characteristics and performance analysis of DC machines
CO3	Various test conditions of DC machines
CO4	Understand the speed control techniques of DC machines

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	2	1	-	1	-	-	-	-	1
CO2	1	2	2	2	1	-	1	-	-	-	-	1
CO3	1	2	2	2	1	-	1	-	-	-	-	1
CO4	1	1	2	2	1	-	1	-	-	-	-	1

The following experiments are required to be conducted compulsory experiments:

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

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

9. Load test on DC series generator. Determination of characteristics.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separation of losses in DC shunt motor.

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A55401	**MANAGEMENT SCIENCE**	3	0	0	3

COURSE OBJECTIVES	
1	To provide fundamental knowledge on Management, Administration, Organization & its concepts.
2	To understand the role of management in Production
3	To study Materials/Purchases/Stores/Inventory/Marketing Management and Quality control
4	To study HRM in order to have an idea on Recruitment, Selection, Training &Development, job evaluation and Merit rating concepts.
5	To identify Strategic Management areas & to Study the PERT/CPM for better Project Management.

COURSE OUTCOMES	
CO1	1. To apply the concepts & principles of management & designs of organization in a practical world.
CO2	To design good plant layout and apply Work-study principles, Quality Control techniques, in real life industry & To maintain & control the Inventory & students can able to identify the importance of marketing in emerging world.
CO3	To apply the concepts of HRM in Recruitment, Selection, Training & Development.
CO4	To develop PERT/CPM Charts for projects of an enterprise and estimate time & cost of project & to analyse the business through SWOT .
CO5	They can aware of the latest and contemporary issues of management science.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

MANAGEMENT SCIENCE

SYLLABUS

UNIT I: INTRODUCTION TO MANAGEMENT:
Management-Concept and meaning-Nature-Functions-Management as a Science and Art and both. Schools of Management Thought-Taylor's Scientific Theory-Henry Fayol's principles- Eltan Mayo's Human relations-Systems Theory- **Organizational Structure and Design**: Features of Organizational Structure-Work Specialization-Departmentation-Span of Control-Centralization and Decentralization. **Organisational Designs**-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization-Social responsibilities of Management.

UNIT II: OPERATIONS MANAGEMENT:
Principles and Types of Plant Layout-Methods of Production (Job, batch and Mass Production), Work Study- Statistical Quality Control**:** *C* chart, *P* chart, (simple Problems) Deming's contribution to Quality. **Material Management:** Objectives-Inventory-Functions, Types, Inventory Techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management- Just-In-Time (JIT). **Marketing Management:** Concept- Meaning - Nature- Functions of Marketing- Marketing Mix- Channels of Distribution - Advertisement and Sales Promotion- Marketing Strategies based on Product Life Cycle.

UNIT III: HUMAN RESOURCES MANAGEMENT (HRM):
HRM- Definition and Meaning – Nature-Managerial and Operative functions-Evolution of HRM- Job Analysis -Human Resource Planning(HRP)-Employee Recruitment-Sources of Recruitment-Employee Selection- Process and Tests in Employee Selection- Employee Training and Development-On- the- job & Off- the- job training methods-Performance Appraisal Concept-Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary Administration-Objectives-Essentials of Wage and Salary Administration-Job Evaluation-Employee Grievances-Techniques of handling Grievances.

UNIT IV: STRATEGIC & PROJECT MANAGEMENT:
Definition& Meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis. **Project Management:**Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying Critical Path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT V: CONTEMPORARY ISSUES IN MANAGEMENT:
The concept of Management Information System(MIS)- Materials Requirement Planning (MRP)-Customer Relations Management(CRM)- Total Quality Management (TQM)- Six Sigma Concept-Supply Chain Management(SCM)- Enterprise Resource Planning (ERP)- Performance Management-Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

Text Books:
1. A.R Aryasri: Management Science, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.

References:

1. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich ManagementPrinciples and Guidelines,Biztantra.
3. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
4. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
5. Samuel C.Certo: Modern Management, 9/e, PHI, 2005
6. Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2002.
7. Parnell: Strategic Management, Biztantra, 2003.
8. Lawrence R Jauch, R.Gupta &William F.Glueck: Business Policy and Strategic Management, Frank Bros., 2005.

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that 10 marks will be awarded for assignment.

Data Books Required: No.

Signature

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50201	**TRANSMISSION OF ELECTRIC POWER**	2	2	0	3

Course Objectives:

1	About the various factors that affect the performance of Transmission lines
2	Understand the theory of transmission lines modeling
3	To comprehend the different issues related to overhead lines and underground cables.
4	To provide the knowledge about the system transients, sag and various issues related to cables and transmission lines.

Course Outcomes:

CO1	Ability to do calculation of resistance, Inductance and Capacitance of Transmission Lines.
CO2	Able to discuss various factors governing the performance of Transmission Line.
CO3	Ability to do calculation of sag for different types of Transmission systems.
CO4	Ability to discuss construction of Underground Cables

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1					2	1		1		2
CO2	1	2	2	1		1	2	2		1	1	2
CO3	2	2	2	1		1	2	2		1	1	2
CO4	1	1	1	1			2	1		1		2

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

Syllabus:

Unit-I: Transmission Line Parameters

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

Unit-II: Modeling of Transmission Lines

Classification of Transmission Lines - Short, medium and long line and their model - representations - Nominal-T, Nominal-Pie and A, B, C, D Constants. Mathematical Solutions to estimate regulation and efficiency of all types of lines- Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations – Representation of Long lines – Equivalent T and Equivalent – π, Numerical Problems. – Surge Impedance and surge Impedance loading - wavelengths and Velocity of propagation – Ferranti effect, Charging current, Need of Shunt Compensation.

Unit-III: Insulators, Corona and Mechanical Design of lines

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems – Voltage Distribution, Calculation of string efficiency, Capacitance grading and Static shielding. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference. Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

Unit-IV: Power System Transients

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

Unit-V: Power Cables

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

Text Books:

1. Power System Analysis by W.D.Stevenson, J.J. Grainger McGrawhill

2. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.

3. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.

Reference Books:

1. Power System Analysis Hadi Saadat, TMH
2. Power System Analysis and Design Duncan Glover Cengage Learning
3. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50202	**ELECTRICAL MACHINES - III**	3	0	0	3

Course Objectives:

1	To study the working principles of Synchronous Generator and Synchronous Motor, study of their performance characteristics.
2	To familiarize the constructional details and to predetermining the regulation of alternators.
3	To Understand the concepts of load sharing among alternators.
4	To Study single phase & special motors which have significant applications in house hold appliances.

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

CO1	To Explain the working principles of Synchronous Generator and Synchronous Motor, study of their performance characteristics.
CO2	Analyze the constructional details and able to Estimate the regulation of synchronous generator using different methods.
CO3	Determine the load sharing among alternators.
CO4	Justify the Construction, principle of operation of Single Phase & Special Machines.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	2	1	-	1	-	-	-	2	-
CO2	1	2	1	2	2	-	1	-	-	-	1	-
CO3	1	2	2	2	1	-	1	-	-	-	2	-
CO4	1	2	2	1	1	1	1	1	-	-	2	-

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT – I SYNCHRONOUS MACHINES & CHARACTERISTICS OF SYNCHRONOUS GENERATORS

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation - Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage

reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT – II REGULATION OF ALTERNATORS

Predetermination of Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods –two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation.

UNIT – III PARALLEL OPERATION OF ALTERNATORS

Synchronization of alternators with infinite bus bar – synchronizing power, synchronizing torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

UNIT – IV SYNCHRONOUS MOTORS

Principle of operation – phasor diagram – Variation of current and power factor with excitation – V and Inverted V Curves - Power developed – Synchronous Condensers - Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT – V SINGLE PHASE MOTORS AND SPECIAL MOTORS

Single Phase Motors: Single phase induction motor – Constructional features - Double revolving field theory – Elementary idea of cross-field theory – split-phase motors – shaded pole motor.
Special Motors: Construction, working principle, performance of- Stepper Motors, Reluctance motors, A.C. Series motors, Universal motors, BLDC motor.

TEXT BOOKS:

7. Electrical Machines – P.S. Bimbhra., Khanna Publishers, 2011.
8. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
9. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th Editon, 2003.

REFERENCE BOOKS:

5. Performance and Design of AC Machines by MG.Say, BPB Publishers, 2002.
6. Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2nd edition, 2008.
7. Electrical Machinery Fundamentals by Stephen J Chapman, Mc Graw Hills, 2005.
8. Electrical Machines by S.K. Battacharya, TMH Edn Pvt. Ltd., 3rd Edition, 2009.
9. Electric Machines - by M. S. Sarma and M. K. Pathak, CENGAGE Learning.
10. Special Electrical Machines by K. Venkataratnam, Universities Press, 2013.

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50203	**POWER ELECTRONICS**	3	0	0	3

Course objectives:

1	The objective of this course is to study the high efficient and high reliable Power conversion systems.
2	To study the basic power semiconductor switching devices and their principles of operation
3	To study the various power conversion methods, controlling and designing of power converters.
4	To study the applications of Power electronic conversion to domestic, industrial, aerospace, commercial and utility systems etc.

Course Outcomes:

CO1	Acquire knowledge about basic operating principles of various power semiconductor switching devices.
CO2	Understand high efficient and high reliable power conversion methods.
CO3	Understand the operation of various power electronic converters and their control
CO4	Able to apply principles and methods to practical applications.

CO/PO mappings

Course Outcomes	Program Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO 1	1	2		2	-	-	-	-	-	-	-	-
CO 2	1	-	2	1	2	-	-	--	-	-	--	-
CO 3	1	-	2	1	2	-	--	-	-	-	-	-
CO 4	1	-	2	2	1	-	-	-	-	-	-	-

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT – I POWER SEMI CONDUCTOR DEVICES AND COMMUTATION CIRCUITS

Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT, SiC, GaN and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn-on and Turn-off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points –– Series and parallel connections of SCR's – Snubber circuit design – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems - Two transistor analogy – SCR – R and RC Triggering - UJT firing circuit – Line Commutation and Forced Commutation circuits.

UNIT – II PHASE CONTROLLED RECTIFIERS

Phase control technique – Single phase Line commutated converters – Midpoint and Bridge connections – Half controlled converters with Resistive, RL and Fully controlled converters with

Resistive, RL, Parallel RC and RLE load– Derivation of average load voltage & current -Active & Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance –Numerical problems

Three phase converters – Three pulse and six pulse converters – Midpoint and bridge connections average load voltage with R, RL and RLE loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –Numerical Problems.

UNIT – III CHOPPERS AND DC-DC CONVERTERS

Principle of chopper operation– Time ratio and Current limit control strategies – Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper; Buck, Boost & Buck-Boost, Types of chopper circuits (A, B, C, D & E) – Basic principle operation – waveforms, Morgan's chopper – Jones chopper and Oscillation chopper (Principle of operation only) Waveforms — AC Chopper – Numerical Problems.

UNIT – IV INVERTERS

Single phase Voltage Source inverters – operating principle - steady state analysis, Simple forced commutation circuits for bridge inverters – Mc Murray and Mc Murray Bedford inverters, Voltage control techniques for inverters and Pulse width modulation techniques, single phase current source inverter with ideal switches, basic series inverter, single phase parallel inverter – basic principle of operation only, Three phase bridge inverters (VSI) – 180 degree mode – 120 degree mode of operation - Numerical problems.

UNIT – V AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

AC voltage controllers – Principle of phase control – Principle of integral cycle control - Single phase two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor - wave forms – Numerical problems.

Cyclo converters - Midpoint and Bridge connections - Single phase to single phase step-up and step-down cyclo converters with Resistive and inductive load, Principle of operation, Waveforms, output voltage equation.

TEXT BOOKS:

1. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing Company, 1998.
3. Power Electronics – by Dr P.S.Bimbhra, Khanna Publishers, Fourth Edition, 2010.

REFERENCE BOOKS:

1. Power Electronics A first Course - Ned Mohan, Wiley
2. Fundamentals of Power Electronics – Robert W. Erickson, Kluwer publisher.
3. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
4. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
5. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50204	**ELECTRICAL & ELECTRONIC MEASUREMENTS**	3	0	0	3

Course Objectives:

1	*This course introduces the basic principles of different types of electrical instruments for the Measurement of voltage, current, power factor, power and energy.*
2	*It also explains the measurements of RLC parameters using bridge principles.*
3	*The principles of magnetic measurements are also explained.*
4	*The principle of working of CRO and its applications are explained.*

Course Outcomes:

CO1	Usage of wattmeters, pf meters, and energy meters in a given circuit.
CO2	Extend the range of ammeters and voltmeters
CO3	Measure active power, reactive power, power factor, and energy in both 1-phase and 3-phase circuits
CO4	Determine the resistance values of various ranges, L and C values using appropriate A.C bridges, Measure the different characteristics of periodic and aperiodic signals using CRO

Mapping of Course outcomes with Program outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1									
CO2	2	1	1		1		1					
CO3	2	2	1									
CO4	2	1	1									

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT- I MEASURING INSTRUMENTS

Classification – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Types – Expression for the Deflecting Torque and Control Torque – Errors and their Compensation, Extension of range.

UNIT – II MEASUREMENT OF POWER, POWER FACTOR AND ENERGY

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Elements, Expression for Deflecting and Control Torques; P.F. Meters: Dynamometer and Moving Iron Type – 1-ph and 3-ph Power factor Meters. Single Phase Induction Type Energy Meter – Driving and Braking Torques – Errors and their Compensation, Three Phase Energy Meter.

UNIT – III INSTRUMENT TRANSFORMERS, POTENTIOMETERS, AND MAGNETIC MEASUREMENTS

Current Transformers and Potential Transformers – Ratio and Phase Angle Errors – Methods for Reduction of Errors-Design Considerations. DC Potentiometers: Principle and Operation of D.C. Crompton's Potentiometer –Standardization – Measurement of unknown Resistance, Currents and Voltages. A.C. Potentiometers: Polar and Coordinate types- Standardization – Applications. Determination of B-H Loop Methods of Reversals - Six Point magnetic measurement Method – A.C. Testing – Iron Loss of Bar Samples.

UNIT – IV D.C & A.C BRIDGES

Method of Measuring Low, Medium and High Resistances – Sensitivity of Wheatstone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance – Loss of Charge Method. Measurement of Inductance - Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle – DeSauty Bridge. Wien's Bridge – Schering Bridge.

UNIT – V CRO AND DIGITAL METERS

Cathode Ray Oscilloscope- Cathode Ray Tube-Time Base Generator-Horizontal and Vertical Amplifiers – Applications of CRO – Measurement of Phase, Frequency, Current and Voltage-Lissajous Patterns.

Digital Voltmeters-Successive Approximation, Ramp, and Integrating Type-Digital Frequency Meter-Digital Multimeter-Digital Tachometer

TEXT BOOKS:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications, 2007.
2. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, 5th Edition, Reem Publications, 2011.

REFERENCE BOOKS:

1. Electronic Instrumentation by H. S. Kalsi, Tata Mcgrawhill, 3rd Edition, 2011.
2. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, 2010.
3. Electrical & Electronic Measurement & Instrumentation by R. K. Rajput, 2nd Edition, S. Chand & Co., 2nd Edition, 2013.

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III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50205	**LINEAR & DIGITAL IC APPLICATIONS**	3	0	0	3

COURSE OBJECTIVES	
The main objectives of the course are:	
1	To introduce the basic building blocks of linear & digital integrated circuits.
2	To learn the linear and non - linear applications of operational amplifiers.
3	To introduce the theory and applications of 555 and PLL.
4	To learn the theory of ADC and DAC
5	To understand different families of digital integrated circuits and their characteristics.

COURSE OUTCOMES	
On completion of the course, the students will be able to :	
CO1	Understand the basic concepts of Op -AMPs, characteristics and specifications.
CO2	Design circuits using operational amplifiers for various applications .
CO3	Develop, apply and analyze circuits for advanced applications using Opamps, PLL, VCO and Analog multipliers.
CO4	Understand different families of digital integrated circuits and their characteristics
CO5	Design various and sequential circuits using digital ICs.

Mapping of Course outcomes with Program outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1									
CO2	2	1	1		1		1					
CO3	2	2	1									
CO4	2	1	1									

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

SYLLABUS

UNIT -I:
Operational Amplifier
Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT -II:
Op-Amp, IC-555 & IC 565 Applications
Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square

Wave,IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

UNIT -III:

Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT -IV:

Digital Integrated Circuits

Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing- TTL Driving CMOS & CMOS Driving TTL, Combinational Logic ICs – Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT -V:

Sequential Logic IC's and Memories

Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore, Cengage Learning/ Jaico, 2009.
2. Operational Amplifiers with Linear Integrated Circuits by K.Lal Kishore – Pearson, 2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH.
4. Modern Digital Electronics – RP Jain – 4/e – TMH, 2010.
5. Digital Design Principles and Practices – John. F. Wakerly 3/e, 2005.

Operational Amplifiers with Linear Integrated Circuits, 4/e William D.Stanley, Pearson Education India, 2009

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50206	**ELECTRICAL MACHINES LAB - II**	0	1	3	2

Course Objectives: This laboratory deals with the practical exercises on

1	*Transformers and understand their performance characteristics.*
2	*Induction Motors and understand their performance characteristics.*
3	*Alternators and understand their performance characteristics.*
4	Synchronous motors are experimented in detail and their performance characteristics are evaluated.

OUTCOME:

CO1	After going through this laboratory course, the student acquires sufficiently good practical knowledge about the operation, testing, and characteristics of Transformers.
CO2	After going through this laboratory course, the student acquires sufficiently good practical knowledge about the operation, testing, and characteristics of Induction Motors.
CO3	After going through this laboratory course, the student acquires sufficiently good practical knowledge about the operation, testing, and characteristics of Alternators and synchronous motors.
CO4	The student should also have acquired the knowledge about the fixation of the rating of transformers, induction motors and synchronous machines.

CO-PO Mappings:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1	-	-	-	-	-	-	-	2
CO2	2	2	2	2	1	-	-	1	-	-	-	2
CO3	2	2	2	2	1	-	-	1	-	-	-	2
CO4	2	2	2	2	1	-	-	1	-	-	-	2

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

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

1. O.C. & S.C. Tests for predetermination of regulation and efficiency of single phase transformers.
2. Sumpner's test on a pair of single phase transformers.
3. Scott connection of transformers.
4. No-load & Blocked-rotor tests for construction of circle diagram and predetermination of performance characteristics of three-phase Induction motor.
5. Regulation of a three phase alternator by synchronous impedance & m.m.f methods.
6. V and inverted V curves of a 3-phase synchronous motor.
7. Determination of Equivalent circuit of a single phase induction motor.
8. Determination of X_d and X_q of a salient pole synchronous machine.

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

9. Parallel operation of single phase transformers.
10. Separation of core losses of a single phase transformer.
11. Load test on three phase Induction motor.
12. Regulation of three-phase alternator by Z.P.F. and A.S.A. methods.

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III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50207	**ELECTRICAL AND ELECTRONIC MEASUREMENT LAB**	0	1	3	2

Objective: This laboratory deals with the practical exercises for

1	Calibration of various electrical measuring instruments.
2	Accurate determination of inductance and capacitance using D.C and A.C Bridges.
3	Measurement of coefficient of coupling between two coupled coils.

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

CO1	Calibrate various electrical measuring instruments.
CO2	Accurately determine the values of inductance and capacitance using a.c bridges.
CO3	Compute the coefficient of coupling between two coupled coils.
CO4	Accurately determine the values of very low resistances.

CO-PO Mappings:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1	-	-	-	-	-	-	-	2
CO2	2	2	2	2	1	-	-	1	-	-	-	2
CO3	2	2	2	2	1	-	-	1	-	-	-	2
CO4	2	2	2	2	1	-	-	1	-	-	-	2

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

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

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of low resistance – Determination of Tolerance.
5. Determination of Coefficient of coupling between two mutually coupled coils.
6. Schering Bridge & Anderson bridge.
7. Measurement of 3-phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3-voltmeter and 3-ammeter methods.

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

9. Maxwell's bridge and DeSauty bridge.
10. Calibration of LPF wattmeter – by Phantom loading.
11. Measurement of 3-phase power with Two-watt meter method (Balanced & Un balanced).
12. Wheatstone bridge – measurement of medium resistances.
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurement and Calibration
15. Transformer turns ratio measurement using A.C Bridge.
16. A.C. Potentiometer – Calibration of AC Voltmeter, Parameters of Choke coil.

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III B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A50208	**POWER ELECTRONICS AND SIMULATION LAB**	0	1	3	2

Course Objectives: The student will understand about

1	Various characteristics of power electronic devices with gate firing circuits, Various forced commutation techniques.
2	The operation of single-phase half & fully-controlled converters, and inverters with different types of loads.
3	The operation of single-phase AC Voltage controllers with different loads.
4	Experimentation and also by the PSPICE/PSIM.

Course Outcomes:

The student should have learned about

CO1	The study of various power electronic devices and their commutation circuits.
CO2	The voltage and current characteristics of various converters and inverters at different firing angles.
CO3	The study of different types converters and inverters with different types of loads.
CO4	The PSPICE/PSIM programming for various power electronic devices.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	2	1	1	-	1	1	1	2
CO2	1	2	2	-	-	2	1	2	-	1	1	2
CO3	1	2	2	2	1	1	1	1	1	1	1	2
CO4	1	2	2	2	2	2	2	2	1	2	2	2

Any Eight of the Experiments in Power Electronics Lab

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

11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge converter with R and RL loads
13. Single Phase dual converter with RL loads

Any two simulation experiments with PSPICE/PSIM

PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.

PSPICE simulation of resonant pulse commutation circuit and Buck chopper.

PSPICE simulation of single phase Inverter with PWM control.

REFERENCE BOOKS:

1. Simulation of Electric and Electronic circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

III Year B.Tech II-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A60201	**SWITCHGEAR AND PROTECTION**	3	0	0	3

Course Objectives:

1	To discuss the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
2	The study of different Circuit Breakers and Relays
3	The protection of Generators and Transformers
4	The protection of various feeder bus bars from abnormal conditions and over voltages & importance on Neutral grounding for overall protection.

Course Outcomes:

CO1	Understand the operation of different circuit breakers.
CO2	Get thorough knowledge on different relays which are used in real time power system operation
CO3	Understand the protection of different power system components such as generators, transformers, lines and feeders against over voltages.
CO4	Understand the protection of different power system components such as generators, transformers, lines and feeders against over voltages

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1			1						1
CO2	2	2	1			1						2
CO3	2	2	1			1						2
CO4	2	2				1						2

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

Syllabus:

Unit-1: **Circuit Breakers**

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average, Max. RRRV, Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures. Description and Operation of- Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

Unit-2: **Electromagnetic, Static and Numerical Relays**

Basic Requirements of Relays – Primary and Backup protection - Construction details of – Attracted armature, balanced beam, inductor type and differential relays – Universal Torque equation – Characteristics of over current, Direction and distance relays. Static Relays – Advantages and Disadvantages – Definite time, Inverse and IDMT static relays – Comparators – Amplitude and Phase comparators. Microprocessor based relays – Advantages and Disadvantages – Block diagram for over current (Definite, Inverse and IDMT) and Distance Relays and their Flow Charts.

Unit-3: **Protection of Generators and Transformers**

Protection of generators: 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-4: **Protection of Feeders, Transmission Lines and Busbars,**

Protection of Feeders (Radial & Ring main) using over current Relays. Protection of Transmission lines – 3 Zone protection using Distance Relays. Carrier current protection. Protection of Bus bars -Differential protection.

Unit-5: **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. Neutral Grounding- Grounded and Ungrounded Neutral Systems. - Effects of Ungrounded Neutral onsystem performance. Methods of Neutral Grounding: Solid, Resistance, Reactance – Arcing Grounds and Grounding Practices.

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. Power System Protection- P. M. Anderson, Wiley Publishers

Reference Books:

1. Protective Relaying Principles and Applications – J Lewis Blackburn, CRC Press
2. Numerical Protective Relays, Final Report 2004 – 1009704 EPRI, USA
3. Protective Relaying Theory and Applications - Walter A Elmore, Marcel Dekker
4. Transmission network Protection by Y.G. Paithankar, Taylor and Francis,2009.

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III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A60202	**POWER SEMICONDUCTOR CONTROLLED DRIVES**	2	2	0	3

Course Objectives: The student should learn about

1	Operation of electric motor drives those are controlled from power electronic converters.
2	Analyze the stable steady-state operation and transient dynamics of a motor-load system.
3	Analyze the operation of the chopper fed DC drive.
4	Gives the differences between synchronous motor drives and induction motor drives.

Course Outcomes:

CO1	Understand single quadrant operation of electric drives.
CO2	Understand multi quadrant operation of electric drives.
CO3	Understand the speed control methods for AC-AC & DC-AC converters fed to Induction motors and synchronous motors with their closed loop, and open loop operations
CO4	Able to choose suitable electric drive system based on their applications

CO/PO mappings

Course Outcomes	Program Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO 1	1	2	-	2	-	-	-	-	-	-	-	-
CO 2	1	-	2	1	2	-	-	-	-	-	-	-
CO 3	1	-	2	1	2	-	-	-	-	-	-	-
CO 4	1	-	2	2	-	-	-	-	-	-	-	-

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT-I: Introduction

Electrical Drives, Parts of electrical Drives –Electrical motors, Power modulators, sources and control unit -dynamics of electrical drives -torque equation -equivalent values of drive parameters-components of load torques, types of load Torques–steady state stability –Load equalization.

UNIT-II: Control of Electrical Drives

Modes of operation- speed control and drive classifications- Closed loop control of Drives- current limit control, closed loop torque control, closed loop speed control, closed loop speed control of multi-motor drives- speed sensing-current sensing.

UNIT-III: DC motor drives

DC motors & their performance (shunt, series, compound, permanent magnet motor, universal motor, dc servomotor) –Braking –regenerative braking, dynamic braking, plugging –Transient analysis of separately excited motor –converter control of dc motors –analysis of separately excited & series motor with 1-phase and 3-phase converters –dual converter –analysis of chopper controlled dc drives –converter ratings and closed loop control.

UNIT-IV: Induction motor drives

Three-phase Induction Motors- Analysis and Performance- stator voltage control of induction motor –torque-slip characteristics –control by ac voltage controllers and soft start–stator frequency control –variable frequency operation –V/F control- Voltage Source Inverter Control- Current Source Inverter Control - Cycloconverter Control- rotor resistance control –slip torque characteristic- slip power recovery – Static scherbius drive- Static Kramer drive.

UNIT-V: Synchronous motor drives

Separate and self control of synchronous motors- operation of self controlled By VSI, CSI and Cycloconverters. Load commutated CSI fed synchronous motors- operation- waveforms- speed torque characteristics- Applications- Advantages and Numerical problems- Closed loop control operation of Synchronous motor drives.

Text Books:

1. Fundamentals of Electric Drives –by G K Dubey, Narosa Publishers 2007.
2. Power Electronics –MD Singh and K B K hanchandani, Tata –McGraw-Hill Publishing Company, 1998.
3. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

Reference Books:

1. Modern Power Electronics and AC Drives by B.K.Bose, PHI Publications. Prentice Hall PTR- 2002.
2. Thyristor Control of Electric drives –Vedam Subramanyam Tata McGraw Hill Publilcations-2008.
3. First Course on Power Electronics and Drives - Ned Mohan, Mnpere USA.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

III Year B.Tech II-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A60203	**COMPUTER AIDED POWER SYSTEM ANALYSIS**	2	2	0	3

Course Objective: The student will be able to

1	Represent of a power system elements including generators, transmission lines and transformers.
2	Analyze power system models based on nodal admittance and impedance matrices for the large networks.
3	Calculation of power flow in a power system network using various techniques.
4	It also deals with short circuit analysis and analysis of power system for steady state and transient stability

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

CO1	Understand the mathematical models of power system components.
CO2	Generate input data suitable for load flow. Pickup the best algorithm for load flow studies.
CO3	Understand the fault calculations for various types of faults and impact of different earthing.
CO4	Understand the power system stability concepts.

Mapping of Course outcomes with Program outcomes:

Courses outcomes	**Program Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO 1	1	2	2	1	2	1	-	-	-	-	-	-
CO 2	2	2	2	2	2	1	-	-	-	1	1	2
CO 3	2	2	2	2	2	2	-	2	-	1	1	1
CO 4	2	2		1	2	2	1	-	-	1	1	2

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT -I Power System Network Matrices-I

Per-Unit representation of Power system elements - Per-Unit equivalent reactance network of a three phase Power System. Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems.

UNIT -II Power System Network Matrices-II

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 - Modification of Z_{Bus} for the changes in network (Problems)

UNIT –III Power flow Studies

Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Algorithm and Flowchart. Acceleration Factor, Load flow Solution for Simple Power Systems (Max. 3-Buses): Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution- Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods. Comparison of Different Methods.

UNIT – IV Short Circuit Analysis

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Symmetrical Component Theory:, Positive, Negative and Zero sequence components: Positive, Negative and Zero sequence Networks. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT –V Power System Stability Analysis

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Derivation of Swing Equation, Power Angle Curve and Determination of Steady State Stability. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Numerical methods for solution of swing equation - Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Text Books:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Computer Techniques in Power System Analysis – M A Pai, McGraw Hill.
3. Computer aided power system analysis – George Kusic, CRC Press
4. Power System Analysis by Hadi Saadat – TMH Edition.

5. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.

Reference Books:

1. Computer Methods in Power Systems, Stagg El – Abiad & Stags.
2. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc.
3. Computer Analysis of Power Systems – J Arrillaga.
4. Power System Stability – Vol-1, Kimbark, IEEE Press.
5. Power System Analysis by B.R.Gupta, Wheeler Publications.
6. Analysis of Faulted Power Systems – P M Anderson, IEEE Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTHAPURAMU
ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A624501	**MICROPROCESSORS AND MICROCONTROLLERS**	3	0	0	3

Course Objectives:

1	Architecture and designing of 8085 & 8086 Microprocessor with Assembling language programming and interfacing with various modules
2	Understand the Interfacing of 8086 with various advanced communication devices
3	Designing of 8051 Microcontroller with Assembling language programming and interfacing with various modules
4	Write Assembly Language Programs for the Digital Signal Processors and use Interrupts for real-time control applications
5	Write Xilinx programming and understanding of Spartan FPGA board

Course Outcomes:

CO1	Understand the basic architecture & pin diagram of 8086 microprocessor.
CO2	Assembly language programming to perform a given task, Interrupt service routines for all interrupt types
CO3	Microcontroller and its applications and Microprocessor and Microcontroller designing in various applications.
CO4	Write Assembly Language Programs for the Digital Signal Processors and use Interrupts for real-time control applications
CO5	Write Xilinx programming and understanding of Spartan FPGA board

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	-	1	-	-	-	-	-	-
CO2	1	2	1	2	-	1	1	-	-	-	-	-
CO3	1	2	2	-	-	1	-	-	-	-	-	-
CO4	1	2	2	1	-	1	-	-	-	-	-	-
CO5	1	2	2	1	1	1	-	-	-	-	-	-

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT-I: INTRODUCTION TO MICROPROCESSORS

Historical background- Evolution of microprocessors up to 64-bit. Architecture of 8086 microprocessor, special function of general purpose registers. 8086 flag registers and functions of 8086 flags – Addressing modes of 8086 – Instruction set of 8086 – Assembler directives - Pin diagram 8086 – Minimum mode and maximum mode of operation. Timing diagrams.

UNIT II: ASSEMBLY LANGUAGE PROGRAMMING & I/O INTERFACE

Assembler directives – macros – simple programs involving logical – branch instructions – sorting – evaluating arithmetic expressions - string manipulations – 8255 PPI - various modes of operation - A/D - D/A converter interfacing, Memory interfacing to 8086 – interrupt structure of 8086 – vector interrupt table – interrupt service routine – interfacing interrupt controller 8259 - Need of DMA – serial communication standards – serial data transfer schemes.

UNIT III: 8051 MICRO CONTROLLER PROGRAMMING AND APPLICATIONS

Introduction to micro controllers, Functional block diagram, Instruction sets and addressing modes, interrupt structure – Timer – I/O ports – serial communication. Data transfer, manipulation, Control and I/O instructions – simple programming exercises key board and display interface – Closed loop control of servo motor – stepper motor control.

UNIT IV: Digital Signal Processor

Introduction to the TMS320LF2407 DSP Controller: Basic architectural features - Physical Memory - Software Tools. Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers. **C2xx DSP CPU and Instruction Set:** Introduction & code Generation - Components of the C2xx DSP core - Mapping External Devices to the C2xx core - peripheral interface - system configuration registers - Memory - Memory Addressing Modes - Assembly Programming Using the C2xx DSP Instruction set.

UNIT V: FPGA

Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA – Xilinx, XC3000 series - Configurable logic Blocks (CLB) – Input / Output Block (IOB) – Programmable Interconnect Point (PIP) – Xilinx 4000 series – HDL programming –overview of Spartan 3E and Virtex II pro FPGA boards- case study

TEXT BOOKS

1. Ramesh S. Gaonkar, 'Microprocessor Architecture Programming and Applications with 8085', Penram Intl.Publishing, 6th Edition, 2013
2. Ray A. K., Bhurchandi K. M., 'Advanced Microprocessor and Peripherals', Tata McGraw-Hill Publications, 3rd Edition, 2013.
3. Hamid A. Tolyat, "DSP Based Electro Mechanical Motion Control"-CRC press,2004.
4. Application Notes from the webpage of Texas Instruments.
5. XC 3000 series datasheets (version 3.1). Xilinx,Inc., USA, 1998
6. XC 4000 series datasheets (version 1.6). Xilinx,Inc., USA, 1999
7. Wayne Wolf, 'FPGA based system design', Prentice hall, 2004.

REFERENCE BOOKS

1. Microprocessor and Interfacing - Douglas V Hall 2nd Edition , Tata McGrawhill-1992
2. Microprocessor – NILESH B BAHADURE – PHI, 2010.
3. The 8051 Micro Controller Architecture, Programming and Applications – Kenneth J Ayala, Pearson International publishing (India).

4. Krishna Kant, ‘Microprocessors and Microcontrollers, Architecture, Programming and System Design-8085,8086, 8051, 8096’, Prentice Hall India Ltd Publications, 1st Edition, 2010
5. Kenneth Ayala, ‘The 8051 Microcontroller’, Cengage Learning Publications, 3rd Edition, 2007

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A60204a	**INSTRUMENTATION Open Elective- I***	2	2	0	3

Course Objectives:

1	Measuring system, Common errors, test signals and modulation phenomenon
2	Data acquisition system, various telemetry systems and various modulation systems
3	Measuring various meters and analyzers
4	Basic transducers and their usage in various measurements

Course Outcomes:

CO1	Measuring systems, error measurements, test signals, different types of data transmission and modulation techniques
CO2	Various telemetry systems and basic operation of Data acquisition systems
CO3	Various measuring meters and signal analyzers
CO4	Transducers and their measurement of electrical and non-electrical quantities

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1		1	1			1	1			2
CO2	2					2	1	2	2	1		
CO3	2	2			1		1	2			2	
CO4	1	2					1	2			2	

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT-I: INSTRUMENT ERRORS, SIGNALS AND THEIR REPRESENTATION

Measuring Systems, Performance Characteristics, - Static Characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signal and Their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II: DATA TRANSMISSION, TELEMETRY AND DAS

Methods of Data Transmission – General Telemetry System. Frequency Modulation System (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Acquisition Systems – Components of Analog DAS – Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing – Digital DAS – Block Diagram — Modern Digital DAS (Block Diagram)

UNIT-III: SIGNAL ANALYZERS

Wave Analyzers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers- Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, Q Meter. Peak Reading and RMS Voltmeters.

UNIT-IV: TRANSDUCERS

Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle Operation of Resistor, Inductor, LVDT and Capacitor Transducers; LVDT Applications, Strain Gauge and Its Principle of Operation, Guage Factor, Thermistors, Thermocouples, Synchros, Piezo Electric Transducers, Photovoltaic, Photo Conductive Cells, Photo Diodes.

UNIT-V: MEASUREMENT OF NON-ELECTRICAL QUANTITIES

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXT BOOKS:

1. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India, 2004.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co., 2012.

REFERENCE BOOKS:

1. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 3/e., 2010.
2. Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India., 1990.
3. Industrial Instrumentation – Principles and Design by T. R. Padmanabhan, Springer, 3rd re print, 2009.

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ELECTRICAL AND ELECTRONICS ENGINEERING

IV B. Tech -I Sem.

Subject Code	Title of the Subject	L	T	P	C
17A60204b	**WIND ENERGY CONVERSION SYSTEMS Open Elective- I***	2	2	0	3

Course Objectives: Able to know

1	Fundamentals of wind turbine and wind energy conversion devices and ratings.
2	Characteristics of wind turbine and control strategy.
3	Basic principles of Induction generators and synchronous generators and grid connected systems.
4	Variable speed applications and hybrid systems.

Course Outcomes:

After completion of the course the student will able to;

CO1	Design of wind turbine rotor.
CO2	Wind speed statistics and able to chose site for wind generation.
CO3	Decide which generator is suitable for wind power generation.
CO4	Connect two conventional sources for uninterrupted power supply.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	1	2	2	1	1	-	1	1	-	2
CO2	-	-	-	-	-	2	1	2	-	1	-	2
CO3	-	1	2	2	1	1	1	1	1	1	-	2
CO4	-	-	-	2	2	2	2	2	1	2	-	2

UNIT-I: FUNDAMENTALS OF WIND TURBINES

Historical background - basics of mechanical to electrical energy conversion in wind energy - types of wind energy conversion devices – definition - solidity, tip speed ratio, power coefficient, wind turbine ratings and specifications - aerodynamics of wind rotors - design of the wind turbine rotor

UNIT-II: WIND TURBINE CONTROL SYSTEMS & SITE ANALYSIS

Power speed characteristics - torque speed characteristics - Pitch angle control – stall control – power electronic control – Yaw control – Control strategy – wind speed measurements – wind speed statistics – site and turbine selection.

UNIT-III: BASICS OF INDUCTION AND SYNCHRONOUS MACHINES

The Induction Machine – constructional features - equivalent circuit model - performance characteristics - saturation characteristics – dynamic d-q model – the wound – field synchronous machine – the permanent magnet synchronous machine – power flow between two synchronous sources – induction generator versus synchronous generator

UNIT-IV: GRID CONNECTED AND SELF-EXCITED INDUCTION GENERATOR OPEARTION

Constant – voltage, constant – frequency- single output system –double output system with current converter & voltage source inverter – equivalent circuits – reactive power and harmonics – reactive power compensation – variable – voltage, variable – frequency generation – the self-excitation process – circuit model for the self – excited induction generator – analysis of steady state operation – the steady state characteristics – the excitation requirement – effect of a wind generator on the network .

UNIT-V: WIND GENERATION WITH VARIABLE-SPEED TURBINES AND APPLICATION

Classification of schemes – operating area – induction generators – doubly fed induction generator – wound field synchronous generator – the permanent magnet generator – Merits and limitations of wind energy conversion systems – application in hybrid energy systems – diesel generator and photovoltaic systems – wind photovoltaic systems.

TEXT BOOKS:

1. S.N.Bhadra,D.Kastha, S.Banerjee, " wind electrical systems" Oxford University Press.

REFERENCES:

1. S.Rao & B.B.Parulekar, "Energy Technology", 4th edition, Khanna publishers, 2005.
2. "Renewable Energy sources & Conversion Technology" by N.K.Bansal, Manfred Kleemann, Michael Meliss. Tata Mcgraw Hill Publishers.

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ELECTRICAL AND ELECTRONICS ENGINEERING

IV B. Tech -I Sem.

Subject Code	Title of the Subject	L	T	P	C
17A60204c	**RELIABILITY AND SAFETY ENGINEERING Open Elective- I***	2	2	0	3

Course Objectives:

1	To introduce the concepts of system reliability and safety and to learn about reliability block diagram, markov models, fault tree analysis, monte carol simulation and dynamic reliability analysis.
2	To know about probabilistic safety assessment procedure, identification of hazards and initiating events.
3	To learn about event tree analysis, importance measures, common-cause failure analysis and human reliability analysis.
4	To learn about various applications of probabilistic safety analysis.
5	To learn about uncertainty management in reliability assessment.

Course Outcomes:

After completion of the course the student will able to;

CO1	Understand the concepts of system reliability and safety. Get knowledge on reliability block diagram, markov models, fault tree analysis, monte carlo simulation and dynamic reliability analysis.
CO2	Understand the probabilistic safety assessment procedure, identification of hazards and initiating events.
CO3	Familiar with event tree analysis, importance measures, common-cause failure analysis and human reliability analysis.
CO4	Get knowledge on various applications of probabilistic safety analysis.
CO5	Understand about uncertainty management in reliability assessment.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	2	2	1	1	-	1	1	1	2

CO2	-	-	-	-	-	2	1	2	-	1	1	2
CO3	1	2	2	2	1	1	1	1	1	1	1	2
CO4	-	-	-	2	2	2	2	2	1	2	2	2
CO5	-	2	2	2	1	-	1	-	-	-	1	2

UNIT I: BASIC RELIABILITY CONCEPTS

Introduction, Need for Reliability and Safety Engineering, Definitions and Terms, Basic Reliability Mathematics - Classical Set Theory and Boolean Algebra, Concepts of Probability Theory, Reliability and Hazard Functions, Distributions Used in Reliability and Safety Studies, Failure Data Analysis, Numerical Problems.

UNIT II: SYSTEM RELIABILITY MODELING

Reliability Block Diagram, Markov Models, Fault Tree Analysis, Monte Carlo Simulation, Dynamic Reliability Analysis, Numerical Problems.

UNIT III: PROBABILISTIC SAFETY ASSESSMENT

Introduction, Concept of Risk and Safety, Probabilistic Safety Assessment Procedure, Identification of Hazards and Initiating Events, Event Tree Analysis, Importance Measures, Common-cause Failure Analysis, Human Reliability Analysis.

UNIT IV: APPLICATIONS OF PROBABILISTIC SAFETY ASSESSMENT

Objectives of Probabilistic Safety Assessment, Probabilistic Safety Assessment of Nuclear Power Plants, Technical Specification Optimization, Risk Monitor, Risk-informed In-service Inspection.

UNIT V: UNCERTAINTY MANAGEMENT IN RELIABILITY/SAFETY ASSESSMENT

Mathematical Models and Uncertainties, Uncertainty Analysis: an Important Task of Probabilistic Risk/Safety Assessment, Methods of Characterizing Uncertainties, Uncertainty Propagation, Uncertainty Importance Measures, Treatment of Aleatory and Epistemic Uncertainties, Dempster – Shafer Theory, Probability Bounds Approach, Bayesian Approach, Expert Elicitation Methods, Case Study to Compare Uncertainty Analysis Methods, Numerical Problems.

TEXT BOOK:

1. Reliability and Safety Engineering – by Ajit Kumar Verma, Srividya Ajit, Durga Rao Karanki, Springer Publications, 2010.

REFERENCE BOOKS:

1. Roy Billinton and Ronald N. Allan, Reliability Evaluation of Engineering Systems, Pitman Advanced Publishing Program, 2nd Edition 1998.
2. Charles E. Ebeling , Reliability and Maintainability Engineering, Tata McGraw Hill, 2000
3. E. Balagurusamy, Reliability Engineering, Tata McGraw Hill, 2003.
4. A. K. Gupta, Reliability, Maintenance & Safety Engineering, University Science Press, 2013.

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A69901	**Foreign Language (Audit)**	2	0	0	0

COURSE OBJECTIVES	
1	to be able to understand frequently used phrases and expressions in French related to relevant areas of experience.
2	to be able to carry out simple, habitual daily tasks and exchanges in French.
3	to be able to describe in French, in simple terms, their past, their environment and issues related to their immediate needs.

COURSE OUTCOMES	
CO1	respond appropriately to simple statements and instructions in French in everyday situations, for example, questions and directions;
CO2	participate in conversations based on everyday topics and respond orally in everyday situations in a manner acceptable to native speakers;
CO3	equipped with sufficient vocabulary to operate in familiar and predictable situations.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT I: **Everyday activities-** Home life and school- Home life- School routine

Food, health and fitness- Eating and drinking- Health and fitness

UNIT II: **Personal and social life-** Self, family and personal relationships- Self, family, pets, personal- relationships- Holidays and special occasions- Festivals and special occasions- Holidays; getting around

UNIT III: **The world around us-** Home town and local area- Home town and geographical- surroundings- Natural and made environment- Natural environment- Weather- People, places and customs

UNIT IV: **The world of work-** Continuing education- Careers and employment- Language and communication in the work place

UNIT V: **The international world-** Tourism at home and abroad- Holiday travel and transport- Life in other countries and communities- Places and customs- World events and issues- Issues according to available resources and individual interest

Text Books:

References:

Method of Evaluation:
Please mention if it is apart from the regular practice

Signature

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Lab	L	T	P	C
17A65501	Advanced Communication Skills Lab	0	1	3	2

COURSE OBJECTIVES	
1	To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2	Further, they would be required to communicate their ideas relevantly and coherently in writing.
3	To prepare all the students for their placements.
4	To initiate them into greater use of the computer in resume preparation, report writing, format making etc.
5	To train them to use language effectively to face interviews, group discussions, public speaking.

COURSE OUTCOMES	
CO1	Accomplishment of sound vocabulary and its proper use contextually
CO2	Flair in Writing and felicity in written expression.
CO3	Effective Speaking Abilities for enhanced job prospects.
CO4	Able to use technology to enhance job oppurtunities
CO5	Develop language competency and become confident users of English in interviews, Group Discussions, and Public Speaking

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

UNIT-I: COMMUNICATIVE COMPETENCY

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary for competitive purpose
4. Spotting errors

UNIT-II: TECHNICAL WRITING

1. Report writing
2. Curriculum vitae
3. E-mail writing
4. Abstract & Synopsis Writing
5. Reviewing (Book/Film)

UNIT-III: PRESENTATIONAL SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation
4. Stage dynamics
5. Body Language

UNIT-IV: CORPORATE SKILLS

1. Telephonic skills
2. Net Etiquettes
3. SMART Goal setting
4. Time Management
5. Negotiation Skills

UNIT-V: GETTING READY FOR JOB

1. Group discussions-II
2. Interview skills
3. Answering Strategies
4. Mock Interviews

MINIMUM REQUIREMENT FOR ELCS LAB:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

SUGGESTED SOFTWARE:

10. Walden Infotech English Language Communication Skills.
11. Clarity Pronunciation Power – Part I (Sky Pronunciation)
12. Clarity Pronunciation Power – part II
13. LES(Learn English Select) by British council
14. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
15. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
16. Lingua TOEFL CBT Insider, by Dreamtech
17. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
18. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

The software consisting of the prescribed topics elaborated above should be procured and used.

- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **Train2success.com**

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
3. Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press.2012.
4. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
5. **Practice Psychometric Tests**: How to familiarize yourself with genuine recruitment tests, 2012.
6. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
7. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
8. **English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.**
9. **Word Power Made Handy,** Shalini Verma, S Chand Publications, 2011.
10. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011.

Method of Evaluation:

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for 40 sessional marks and 60 year-end Examination marks. Of the 40 marks, 20 marks shall be awarded for day-to-day work and 20 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

Signature

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A624502	**MICROPROCESSORS AND MICROCONTROLLERS LAB**	0	1	3	2

Course Objectives: The student will understand about

1	Assembly language programming on 8086 Microprocessors
2	Interfacing of various devices with 8086
3	MASAM Programming
4	Interfacing 8051 Microcontroller with its peripheral devices.

Course Outcomes: The student able to perform:

CO1	Assembly language programming on 8086 Microprocessors.
CO2	Interfacing of various devices with 8086.
CO3	MASAM Programming.
CO4	Interfacing 8051 Microcontroller with its peripheral devices.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	2	1	1	-	-	1	1	2
CO2	-	2	2	-	-	2	1	-	-	1	1	2
CO3	1	2	2	2	1	1	1	-	-	1	1	2
CO4	-	2	2	2	2	2	2	-	-	2	2	2

I . Microprocessor 8086:

Introduction to MASM/TASM.

Arithmetic operation – Multi byte addition and subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.

Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.

By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.

Modular Program: Procedure, Near and Far implementation, Recursion.

Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing

8259 – Interrrupt Controller.
8279 – Keyboard Disply.
8255 – PPI.
8251 – USART.

III. Mcrocontroller 8051:

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. Understanding three memory areas of 00 – FF (Programs using above areas).
5. Using external interrupts
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Programs based on short, page, absolute addressing.

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Lab	L	T	P	C
17A60205	Linear & Digital ICs Lab	0	1	3	2

COURSE OBJECTIVES	
The main objectives of the course are:	
1	To expose the students to linear and digital ICs data sheets and specifications
2	To understand characteristics of OPAMPs
3	To understand using OPAMPs for linear and nonlinear applications
4	To design combinational and sequential circuits using digital ICs.

COURSE OUTCOMES	
At the end of the course, the student should be able to:	
CO1	Design oscillators and amplifiers using operational amplifiers.
CO2	Design filters using Opamp and perform experiment on frequency response
CO3	Analyze the working of PLL and design DC power supply using ICs.
CO4	Design, Test and Evaluate various combinational circuits such as adders, subtractors, multipliers, multiplexers and de-Multiplexers
CO5	Construct flips-flops, counters and shift registers and verify its functionality

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

LIST OF EXPERIMENTS

PART- A: LINEAR IC LAB EXPERIMENTS:

1. Linear ICS, Specifications, Interpretation of the data sheets.
2. Inverting, Non inverting amplifiers using op-amp
3. Integrator and Differentiator using op-amp
4. Active low-pass, High-pass and band-pass filters using op-amp
5. Astable and Monostable Multivibrators using op-amp
6. Phase shift and Wien bridge oscillators using op-amp
7. Astable and Monostable Multivibrators using NE555 Timer.
8. PLL characteristics and its use as Frequency Multiplier.
9. DC power supply using LM723.

EQUIPMENT REQUIRED FOR LAB:
Cathode Ray Oscilloscopes (20MHz)

Signal Generator /Function Generators (2 MHz)
Regulated Power Supplies (0 – 30V)
Bread Boards
Digital Multimeters

PART- B: DIGITAL IC LAB EXPERIMENTS:

1. Digital ICs, Specifications, interpretation of the data sheets.
2. Verification of logic gates
3. Code converters
4. 4 bit binary Adder/ Subtractor
5. Multiplexer and De-multiplexer
6. Encoder and decoder
7. 4 bit ripple counter
8. 3-bit synchronous up/down counter
9. Universal shift registers

EQUIPMENTS FOR DIGITAL LAB:

1. Power Supplies
2. DIGITAL IC Trainer Kits
3. Bread Boards
4. Seven segment display
5. Multimeter
6. ICs -7400/ 7402 / 7404 / 7486 / 7408 / 7432 / 7483 / 74150 / 74151/74154 / 74147 / 7445 / 7476/7491/ 555 / 7494 / 7447 / 74180 / 7485 / 7473 / 74138 / 7411 / 7474

Note: *Any* ***SIX of*** *the above experiments from each part are to be conducted*

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ELECTRICAL AND ELECTRONICS ENGINEERING

IV - B.Tech -I-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A70201	**ELECTRIC POWER DISTRIBUTION SYSTEMS**	2	2	0	3

Course Objectives: The student acquires knowledge about:

1	*The Characteristics and classification of distribution systems.*
2	The technical aspects and design considerations in DC and AC distribution systems and their comparison.
3	Technical issues of substations such as, location, ratings and bus bar arrangements.
4	The causes of low power factor and methods to improve, methods of voltage control and co-ordination procedure for placing protective devices.

Course Outcomes:

CO1	Understand design aspects and computational procedures for DC and AC Distribution systems, load modeling and factors.
CO2	Acquire knowledge on important phenomena regarding substations such as ratings, optimal location, layout of equipment, various types of bus bar arrangements
CO3	Understand the dependence of voltage on reactive power flow and Power factor improvement.
CO4	Understand various methods of voltage control and Coordination of Protective Devices.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2								1	1	1	2
CO2		2	2	2	1		1	2		1	2	2
CO3		2	2	2	1		1	2		1	2	2
CO4			1		1		1	1		1	2	2

Syllabus:

UNIT – I GENERAL CONCEPTS

Introduction to distribution systems, Load modeling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT – II GENERAL ASPECTS OF D.C. DISTRIBUTION SYSTEMS

Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems.

Voltage Drop and power loss derivations in D.C Distributors for the following cases: Radial D.C Distributors fed at one end and at both ends (equal/unequal Voltages), Uniform loading and Ring Main Distributor, LVDC Distribution Network

A.C. DISTRIBUTION SYSTEMS

Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of secondary distribution systems.

Voltage Drop and power loss derivations in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT – III SUBSTATIONS

Location of Substations: Rating of distribution substations, service area within primary feeders. Benefits derived through optimal location of substations.

Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substation layout showing the location of all the substation equipment.

Bus bar arrangements in Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar, Double breaker – One and half breaker system with relevant diagrams, Lightening arrestors, Substation grounding.

UNIT – IV POWER FACTOR IMPROVEMENT and VOLTAGE CONTROL

Causes of low P.F -Methods of Improving P.F -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical P.F. for constant KW load and constant KVA type loads- Capacitive compensation for power-factor control - effect of shunt capacitors (Fixed and switched) and other compensating devices, Power factor correction- Economic justification - Procedure to determine the best capacitor location-Numerical Problems.

Dependence of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

UNIT – V PROTECTION AND COORDINATION OF DISTRIBUTION SYSTEMS

Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizer, and circuit breakers. Coordination of Protective Devices: General coordination procedure.

Text Books:

1. "Electric Power Distribution system, Engineering" – by Turan Gonen, Mc Graw-hill Book Company.
2. Electric Power Distribution – by A.S. Pabla, Tata Mc Graw-hill Publishing company, 4th edition, 1997.

Reference Books:

1. Distribution System Modeling and Analysis – William H Kersting, CRC Press.
2. Principles of Power Systems by V.K.Mehta, S Chand
3. Electrical Power Distribution and Automation by S.Sivanagaraju, V.Sankar, Dhanpat Rai & Co, 2006

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

IV Year B.Tech I-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
17A70202	**DIGITAL SIGNAL PROCESSING**	2	2	0	3

Course Objectives:

1	Understanding the fundamental characteristics of signals and systems.
2	Development of the mathematical skills to solve problems involving convolution, filtering, modulation and sampling
3	Knowledge of frequency-domain representation and analysis concepts using Fourier Analysis tools, Z-transform
4	Realization of FIR and IIR digital filters

Course Outcomes:

CO1	Compute the z-transform of a sequence, identify its region of convergence, and compute the inverse z-transform by partial fractions.
CO2	Compute the linear and circular convolutions of discrete-time sequences
CO3	Realize various filters and finding solution for various filter designs
CO4	Understanding of different transformation techniques

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2									
CO2		1		1	2	1		1	1	1		1
CO3				2	2	2	1	1	1	1		1
CO4	1			1		1		1	1	1		1

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

Syllabus:

Unit-1: INTRODUCTION TO DIGITAL SIGNAL PROCESSING

Discrete Time Signals and Sequences, Linear Shift Invariant Systems, Stability and Causality, Linear Constant Coefficient Difference Equations. Frequency Domain Representation of Discrete Time Signals and Systems.

Unit-2: DISCRETE FOURIER SERIES AND FAST FOURIER TRANSFORMS

Properties of Discrete Fourier Series, DFS Representation of Periodic Sequences, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences Using DFT, Computation of DFT. Relation between Z-Transform and DFS, Fast Fourier Transforms (FFT)-Radix2 Decimation in Time and Decimation in Frequency FFT Algorithms, Inverse FFT and FFT for Composite N.

Unit-3: REALIZATION OF DIGITAL FILTERS

Z-Transforms: Concept, Properties, Region of Convergence, and Applications; Solution of Difference Equations of Digital Filters, Block Diagram Representation of Linear Constant-Coefficient Difference Equations, Basic Structures of IIR Systems, Transposed Forms, Basic Structures of FIR Systems, System Function.

Unit-4: IIR AND FIR DIGITAL FILTERS

Analog Filter Approximations-Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Design Examples: Analog-Digital Transformations, Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Digital Filters Using Window Techniques, Frequency Sampling Technique, Comparison of IIR and FIR Filters, Illustrative Problems.

Unit-5: MULTIRATE DIGITAL SIGNAL PROCESSING

Basic Sample Rate Alteration Devices, Multirate Structures for Sampling Rate Converters, Multistage Design of Decimator and Interpolator, Polyphase Decomposition, Nyquist Filters. Spectral Analysis of Nonstationary Signals, Musical Sound Processing, Signal Compression, Transmultiplexers, Discrete Multitone Transmission of Digital Data.

Text Books:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 2007.
2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata McGraw Hill, 3rd edition, 2009.

Reference Books:

1. Signals - Discrete Time Signal Processing – Allan V Oppenheim and Systems, Pearson

2. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.
3. A Text book on Digital Signal processing – R S Kaler, M Kulkarni, Umesh Gupta, I K International Publishing House Pvt. Ltd., 2009

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IV B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A70203	**POWER SYSTEM OPERATION AND CONTROL**	2	2	0	3

Course Objectives:

1	To learn about load characteristics and economic operations of Power Systems
2	To know about hydrothermal scheduling and modeling of turbines, generators and automatic controllers
3	To know about single area and two area load frequency control and economic emission dispatch
4	To learn about reactive power control and computer control of power systems

Course Outcomes:

CO1	Understand the load characteristics and economic operations of Power Systems
CO2	Understand hydrothermal scheduling and modeling of turbines, generators and automatic controllers
CO3	Understand single area and two area load frequency control and economic emission dispatch
CO4	Understand reactive power control and computer control of Power Systems

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2						1			2
CO2	1	2						1				2
CO3	1										1	2
CO4	2											2

Syllabus:

Unit-1: Introduction & Economic Dispatch

An Overview of power system operation and control, System load variation, Load characteristics, Formulation of economic dispatch in Thermal Power Stations , Input-output cost characterization, Incremental cost curve, Incremental fuel and Production costs, Input-output characteristics, Coordination equation without and with line losses, Derivation of Loss Coefficients.

Unit-2: Hydrothermal Scheduling and Governing

Optimal scheduling of Hydrothermal System: Scheduling problems-Short term Hydrothermal scheduling problem, Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models. Modeling of Governor:

Mathematical Modeling of Speed Governing System, Derivation of small signal transfer function, Block Diagram.

Unit-3: Load Frequency Control and Economic emission dispatch

Definitions of Control area, Single area control: Block diagram representation of an isolated power system, Steady state analysis, Dynamic response, uncontrolled case. Two area control: uncontrolled case and controlled case, tie-line bias control, Proportional plus Integral control of single area and its block diagram representation, steady state response, Economic dispatch control, Economic emission dispatch, Combined Economic and Emission dispatch.

Unit-4: Reactive Power Control

Overview of Reactive Power control, Reactive Power compensation in transmission systems, Advantages and disadvantages of different types of compensating equipment for transmission systems, Load compensation, Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation.

Unit-5: Computer Control of Power Systems

Need for computer control of power systems, concept of energy control centre, System monitoring, Data acquisition and control, System hardware configuration, SCADA and EMS functions, Network topology, State estimation, Weighted Least Square Estimation (WLSE), Contingency analysis.

Text Books:

1. Power Generation Operation and Control - Wood and Wollenberg, Wiley Publishers.
2. Electric Energy System Theory : an Introduction O I Elgerd TMH Publishers.
3. Power Systems Operation and Control – Chakravarthi, Halder
4. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata M Graw – Hill Publishing Company Ltd, 2nd edition.

Reference Books:

1. Power System Analysis and Design - J.Duncan Glover and M.S.Sarma, THOMPSON, 3rd Edition.
2. Power System Stability and Control – Prabha Kundur, McGraw Hill Publishers.
3. Reactive Power Control in Electric Systems - T J E Miller, Wiley Publishers.
4. Power System SCADA and Smart Grids by Mini S. Thomas, John Douglas McDonald, CRC Press.
5. Reactive Power compensation, A practical guide by Wolfgang Hofmann, Jurgen Schlabbach and Wolfgang Just – Jhon Wiley Publications.
6. Power System State Estimation Theory and Implementation by Ali Abur, Antonio Gomez Exposito – Marcel Dekker, Inc.

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IV B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A70204a	**PLC & ITS APPLICATIONS Open Elective-II***	2	2	0	3

Course Objectives: The student will be able to learn about:

1	PLC and its basics, architecture, connecting devices and programming.
2	Implementation of Ladder logic for various Industrial applications.
3	Designing of control circuits for various applications.
4	PLC logical and arithmetic operations.

Course Outcomes: The student should have learnt about:

CO1	PLC and its basics, architecture, connecting devices and programming.
CO2	Implementation of Ladder logic for various Industrial applications.
CO3	Designing of control circuits for various applications.
CO4	PLC logical and arithmetic operations.

CO/PO mappings:

Course Outcomes	Program Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO 1	1	2	-	2	-	-	-	-	-	-	-	-
CO 2	1	-	2	1	2	-	-	-	-	-	-	-
CO 3	1	-	2	1	2	-	-	-	-	-	-	-
CO 4	1	-	2	2	-	-	-	-	-	-	-	-

Syllabus:

UNIT-I

PLC Basics: PLC System, I/O Modules and Interfacing, CPU Processor, Programming Equipment, Programming Formats, Construction of PLC Ladder Diagrams, Devices Connected To I/O Modules.

PLC Programming: Input Instructions, Outputs, Operational Procedures, Programming Examples Using Contacts and Coils. Drill Press Operation.

UNIT-II

Digital Logic Gates, Programming in the Boolean Algebra System, Conversion Examples. Ladder Diagrams for Process Control: Ladder Diagrams & Sequence Listings, Ladder Diagram Construction and Flowchart for Spray Process System.

UNIT-III

PLC Registers: Characteristics of Registers, Module Addressing, Holding Registers, Input Registers, Output Registers. PLC Functions: Timer Functions & Industrial Applications, Counter Function & Industrial Applications, Arithmetic Functions, Number Comparison Functions, Number Conversion Functions

UNIT-IV

Data Handling Functions: SKIP, Master Control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep Functions and Their Applications. Bit Pattern and Changing a Bit Shift Register, Sequence Functions and Applications, Controlling of Two-Axis & Three Axis Robots With PLC, Matrix Functions.

UNIT-V

Analog PLC Operation, Types of PLC Analog Modules and Systems, PLC Analog Signal Processing, BCD or Multibit data Processing, Analog output application examples, PID Modules, PID Tuning, Typical PID Functions, PLC Installation, Troubleshooting and Maintanance.

Text Books:

1. Programmable Logic Controllers- Principles and Applications by John W. Webb & Ronald A. Reiss, Fifth Edition, PHI, 2011.

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IV B. Tech -I Sem.

Subject Code	Title of the Subject	L	T	P	C
17A70204b	**SOLAR ENERGY CONVERSION SYSTEMS Open Elective-II***	2	2	0	3

Course Objectives: The student will be able to learn about:

1	Fundamentals of solar cells and know the importance of solar energy.
2	Design of solar cells and PV modules depends on ratings.
3	How to track maximum power from solar cell and how to main constant supply.
4	Different applications of solar PV systems.

Course Outcomes:
The student gets thorough knowledge on:

CO1	Solar cells and their ratings
CO2	Series parallel connection of PV modules for different current and voltage ratings.
CO3	Design of DC-Dc converters for getting maximum power.
CO4	How to connect solar electrical energy for different applications.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	2	-	1	1	1	-	1	2
CO2	1	2	2	1	2	-	2	1	1	1	-	1
CO3	1	2	2	1	2	-	1	-	-	-	-	2
CO4	1	1	1	1	1	-	2	-	-	-	1	2

Syllabus:

UNIT-I: SOLAR CELL FUNDAMENTALS
Place of PV in world energy scenario – need for sustainable energy sources – current status of Renewable energy sources – place of photovoltaic in Energy supply – solar radiation – the sun and earth movement – angle of sunrays on solar collectors – sun tracking – estimating solar radiation empirically – measurement of solar radiation - Fundamentals of semiconductors – charge carriers and their motion in semiconductor – P-N Junction Diode – an introduction to solar cells.

UNIT-II: DESIGN OF SOLAR CELLS
Upper limits of cell parameters – short circuit current, open circuit voltage, fill factor, efficiency – losses in solar cells – model of a solar cell, effect of series and shunt resistance on efficiency , effect of solar radiation on efficiency – solar cell design – design for high I_{SC} – Design for high V_{OC} – design for high FF – Analytical techniques.

UNIT-III: SOLAR PHOTOVOLTAIC MODULES

Solar PV Modules from solar cells – series and parallel connection of cells – mismatch in module – mismatch in series connection – hot spots in the module , bypass diode – mismatching in parallel diode – design and structure of PV modules – number of solar cells in a module, wattage of modules, fabrication of PV module – PV module power output.

UNIT-V: BALANCE OF SOLAR PV SYSTEMS

Basics of Electromechanical cell – factors affecting performance – batteries for PV systems – DC to DC converters – charge controllers – DC to AC converters(Inverters) – Maximum Power Point tracking (MPPT) – Algorithms for MPPT.

UNIT V: PV SYSTEM DESIGN AND APPLICATIONS

Introduction to solar PV systems – standalone PV system configuration – design methodology of PV systems – design of PV powered DC fan without battery, standalone system with DC load using MPPT, design of PV powered DC pump, design of standalone system with battery and AC/DC load – wire sizing in PV system – precise sizing of PV systems – Hybrid PV systems – grid connected PV systems.

TEXT BOOKS:

1. “Solar Photovoltaics Fundamentals, Technologies and Applications” by Chetan singh solanki, PHI publications.

REFERENCES:

1. Solar Energy Fundamentals and applications by H.P. Garg, J. Prakash “Tata McGraw- Hill publishers Ist edition”
2. S.Rao & B.B.Parulekar, “Energy Technology”, 4th edition, Khanna publishers, 2005.

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IV B. Tech -I Sem.

Subject Code	Title of the Subject	L	T	P	C
17A70204c	**OPTIMIZATION TECHNIQUES Open Elective-II***	2	2	0	3

Objectives:

The student will be able to learn:

1	The basic concepts of Optimization
2	The emphasis of this course is laid different classical Optimization techniques linear programming and simplex algorithms.
3	About optimality of balanced transportation Problems
4	About Constrained and unconstrained Nonlinear programming.
5	About principle of optimality and dynamic programing

OUTCOMES:

The student gets thorough knowledge on:

CO1	Basic theoretical principles in optimization
CO2	Formulation of optimization models, solution methods in optimization
CO3	Finding initial basic feasible solutions.
CO4	Methods of linear and non-linear (constrained and unconstrained) programming.
CO5	Applications to a wide range of engineering problems.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	2	-	-	-	-	-	-	-
CO2	1	2	2	2	1	-	2	-	-	-	-	1
CO3	1	2	2	2	2	-	1	-	-	-	-	2
CO4	1	2	2	2	1	-	2	-	-	-	1	2
CO5	-	1	2	2	1	-	1	-	-	1	1	2

Syllabus:

UNIT – I Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

UNIT – III Transportation Problem

Formulation, methods of solution: Finding initial basic feasible solution by north – west (NW) corner rule, least cost and Vogel's approximation methods – testing for optimality of balanced transportation problems.

UNIT – IV Unconstrained & Constrained Nonlinear Programming:

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Unconstrained Optimization Techniques: Univariate method, Powell's method and steepest descent method. Constrained optimization Technique: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method - Basic approaches of Interior and Exterior penalty function methods.

UNIT – V Constrained Nonlinear & Dynamic Programming:

Introduction to convex Programming Problem. Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

TEXT BOOKS:

1. "Engineering optimization: Theory and practice"-by S. S. Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .LTd.

REFERENCE BOOKS:

1. **Practical Methods of Optimization – R Fletcher, Wiley Publishers.**
2. **Numerical Optimization – Jorge Nocedal, Springer Publishers.**
3. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma.
3. "Operations Research: An Introduction" – by H.A. Taha, PHI Pvt. Ltd., 6th edition
4. Linear Programming – by G. Hadley

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IV B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A70205a	**SPECIAL ELECTRICAL MACHINES (ELECTIVE-I)**	2	2	0	3

Course Objectives:

1	To learn about the stepper motor characteristics, operation and speed control.
2	To learn about the Variable Reluctance (VR) Stepping Motors characteristics, operation and position control.
3	To learn about the Switched mode reluctance motor characteristics, operation and design.
4	To learn about the Brushless DC motor and Permanent magnet motor performance prediction and rotor position sensing and learn about double sided Linear induction motor.

Course Outcomes:

CO1	Understand the stepper motor characteristics, operation and able to do speed control.
CO2	Understand the Variable Reluctance (VR) Stepping Motors characteristics, operation and able to do position control.
CO3	Understand the Switched mode reluctance motor characteristics and able to design.
CO4	Get knowledge on Brushless DC motor and Permanent magnet motor performance prediction and rotor position sensing and learn about double sided Linear induction motor.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	-	-	1	-	-	-	-	-	2
CO2	1	2	-	-	-	-	-	-	-	-	-	2
CO3	1	-	2	-	1	1	-	-	-	-	-	2
CO4	-	-	2	-	-	1	-	-	-	-	-	1

Syllabus:

Syllabus:

UNIT -I Stepper Motors

Introduction – Synchronous Inductor, Hybrid Stepping Motor, Construction, Principle of Operation, Energisation with two phase at a time – Essential conditions for the satisfactory Operation of a 2 – Phase Hybrid Step Motor –Very Slow-Speed Synchronous Motor for Servo Control – Different Configurations for Switching the Phase Windings – Control Circuits for Stepping Motors – An Open – Loop Controller for a 2-Phase Stepping Motor.

UNIT –II Variable Reluctance (VR) Stepping Motors

Single – Stack VR step motors, Multiple stack VR motors – Open – Loop Control of 3-Phase VR Step Motor – Closed – Loop Control of Step Motor, Discriminator, Translator, Major loop – Characteristics of Step Motor in Open – Loop Drive – Comparison between Open-Loop Position Control with Step Motor and a Position Control Servo using a Conventional Servo Motor – Suitability and Areas of Application of Stepping Motors, 5–Phase Hybrid Stepping Motor, Single – Phase Stepping Motor - The Construction, Operating Principle, Torque developed in the Motor.

UNIT – III Switched Reluctance Motor (SRM)

Introduction – Improvements in the Design of Conventional reluctance Motors – Some Distinctive Differences between SR and Conventional Reluctance Motors – principle of Operation of SRM – Some Design Aspects of Stator and Rotor Pole Arcs, Design of stator and Rotor and pole Arcs in SR Motor, Determination of $L(\theta)$ – θ Profile – Power Converter for SR Motor – A Numerical Example - Rotor Sensing Mechanism and Logic Control, Drive and Power Circuits, Position Sensing of rotor with Hall Problems – Derivation of Torque Expression, General, Linear Case.

UNIT –IV Brushless DC Motor and Permanent Magnet Materials and Motors

Types of Construction – Principle of Operation of BLDM – Sensing and Switching Logic Scheme, Sensing, Logic Controller, Lockout Pulses – Drive and Power Circuits, Base Drive Circuit, Power Converter Circuit – Theoretical Analysis and Performance Prediction, Modeling and magnet circuit, d-q analysis of BLDM – Transient Analysis – Formulation in terms of Flux Linkages as State Variables – Approximate Solutions for Current and Torque under Steady State – Theory of BLDM as Variable Speed Synchronous Motor, Rotor position Sensing and Switching Logic for a BLDM for forward and reverse position.

UNIT –V Linear Induction Motor

Development of a Double sided LIM from Rotary type IM – A Schematic of LIM Drive for Electric Traction – Development of one sided LIM with back Iron – Field Analysis of a DSLIM: Fundamental Assumptions.

TEXT BOOKS:

1. K. Venkataratnam, Special Electrical Machines, University Press.
2. R. K. Rajput, Electrical machines, 5th Edition [For Chapters I and II refer Chapter VIII of this book]
3. V. V. Athani, Stepper Motors: Fundamentals, Applications and Design, New Age International Pub.
4. N. Mohan, Undeland & Robbins, Power Electronics Converters, Applications & Design.
5. Johan E. Gibson and F. B. Teuter, Control System Components.
6. M. G. Say & E. O. Taylor, D. C. Machines.

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ELECTRICAL AND ELECTRONICS ENGINEERING

IV B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A70205b	**HVDC TRANSMISSION (ELECTIVE-I)**	2	2	0	3

OBJECTIVES: The objectives of the course are to make the students learn about:

1	Technical and economic aspects of HVAC and HVDC transmission and their comparison.Static power converters
2	Control of HVDC converter systems
3	Origin, effects, classification and elimination of harmonics.
4	The occurrence of faults, and transients in HVDC system and their protection.

Course Outcomes:After completion of the course the student will able to;

CO1	Compare HVDC and HVAC transmission systems.
CO2	Understand the operation of various converters used in HVDC transmission systems.
CO3	Devise means to suppress / eliminate harmonics.
CO4	Design HVDC Filters.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	2	2	1	1	-	1	1	1	2
CO2	-	-	-	-	-	2	1	2	-	1	1	2
CO3	1	2	2	2	1	1	1	1	1	1	1	2
CO4	-	-	-	2	2	2	2	2	1	2	2	2
CO5	-	2	2	2	1	-	1	-	-	-	1	2

Syllabus:

UNIT-I: INTRODUCTION TO HVDC TRANSMISSION

HVDC Transmission: Technical And Economical Comparison of HVAC and HVDC Transmission, Types of DC Links, Power Handling Capabilities of HVDC Lines, static Conversion Principles, Static Converter Configuration.

UNIT-II: STATIC POWER CONVERTER ANALYSIS

Static Power Converters: 3-Pulse, 6-Pulse & 12-Pulse Converters, Converter Station and Terminal Equipment, Commutation Process, Rectifier and Inverter Operation, Equivalent Circuit for Rectifier, Inverter and HVDC Link- Special Features of Converters.

UNIT-III: CONTROL OF HVDC CONVERTER SYSTEMS

Control of HVDC Converter Systems: Principle of DC Link Control – Constant Current, Constant Extinction Angle and Constant Ignition Angle Control and Voltage Dependent Current Control. Individual Phase Control and Equidistant Firing Angle Control

UNIT-IV: HARMONICS AND FILTERS

Origin of Harmonics in HVDC Systems, Classification of Harmonics, Elimination of Harmonics, Suppression Methods, Harmonic Instability Problems, Design of HVDC AC & DC Filters.

UNIT-V: TRANSIENTS, FAULTS AND PROTECTION OF HVDC SYSTEMS

Origin of over Voltages in HVDC Systems, Over Voltages due to DC and AC Side Line Faults - Converter Faults, Over Current Protection- Valve Group and DC Line Protection. Over Voltage Protection of Converters, Surge Arresters etc.

TEXT BOOKS:

1. HVDC Power Transmission Systems, K.R.Padiyar, 3rd Edition, New Age International publishers, 2015.

2. HVDC Transmission, S.Kamakshaiah, V.Kamaraju, Mc Graw Hill Education (India) Pvt. Ltd., 2011.

REFERENCES:

1. Direct Current Transmission, Vol. 1, E. W. Kimbark, Wiley, 1971
2. High Voltage Direct Current Transmission, Jos Arrillaga, IEE Power and Energy series 29, 2nd Edition, 1998
3. EHV-AC, HVDC Transmission & Distribution Engineering, S Rao, Khanna Publishers, 4th Edition, 2008.

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ELECTRICAL AND ELECTRONICS ENGINEERING

IV B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A70205c	**FACTS CONTROLLERS (ELECTIVE-I)**	2	2	0	3

OBJECTIVES: The objectives of the course are to make the students learn about:

1	The basic concepts, different types, and applications of FACTS controllers in power transmission.
2	The basic concepts of static shunt and series converters.
3	The working principle, structure and control of UPFC.
4	The static compensation schemes.

Course Outcomes: After completing this course the student will be able to:

CO1	Understand various control issues, for the purpose of identifying the scope and for selection of specific FACTS controllers.
CO2	Apply the concepts in solving problems of simple power systems with FACTS controllers.
CO3	Design simple FACTS controllers and converters for better transmission of electric power.
CO4	Understand operation of different FACTS devices and their applications

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1			2							2
CO2	1		2	1	2							
CO3	1				1							2
CO4	1		1		2	1						

Syllabus:

UNIT-I: CONCEPTS OF FLEXIBLE AC TRANSMISSION SYSTEMS

Transmission line Interconnections, Power flow in parallel lines, Mesh systems, Stability considerations, Relative importance of controllable parameters, Basic types of FACTS controllers, Shunt controllers, Series controllers, Combined shunt and series controllers, Benefits of FACTS.

UNIT-II: VOLTAGE AND CURRENT SOURCED CONVERTERS

Concept of Voltage Sourced Converters, Single Phase Full Wave Bridge Converter, Three Phase Full Wave Bridge Converter, Transformer Connections for 12-Pulse Operation, 24 and 48-Pulse Operation, Three Level Voltage Sourced Converter, Pulse Width Modulation (PWM) Converter, Converter Rating, Concept of Current Sourced Converters, Thyristor based converters, Current Sourced Converter with Turn off Devices, Current Sourced –vs- Voltage Sourced Converters.

UNIT-III: STATIC SHUNT COMPENSATORS

Objectives of Shunt Compensation, Midpoint Voltage Regulation for Line Segmentation, End of Line Voltage Support to Prevent Voltage Instability, Improvement of Transient Stability, Power Oscillation Damping, Methods of Controllable VAR Generation, Variable Impedance Type Static VAR Generators, Switching Converter Type VAR Generators, Hybrid VAR Generators, SVC and STATCOM, Transient Stability Enhancement and Power Oscillation Damping, Comparison Between STATCOM and SVC, V-I, V-Q Characteristics, Response Time.

UNIT-IV: STATIC SERIES COMPENSATORS

Objectives of Series Compensation, Voltage Stability, Improvement of Transient Stability, Power Oscillation Damping, Subsynchronous Oscillation Damping, Variable Impedance Type Series Compensators, GTO Thyristor Controlled Type Series Capacitor (GCSC), Thyristor Switched Series Capacitor (TSSC), Thyristor-Controlled Series Capacitor(TCSC), Basic Operating Control Schemes for GCSC, TSSC, and TCSC, Switching Converter Type Series Compensators, The Static Synchronous Series Capacitor(SSSC), Transmitted Power Versus Transmission Angle Characteristic, Control Range and VA Rating, Capability to Provide Real Power Compensation.

UNIT-V: POWER FLOW CONTROLLERS

The Unified Power Flow Controller-Basic Operating Principles, Conventional Transmission Control Capabilities, Independent Real and Reactive Power Flow Control. Control Structure, Basic Control System for P and Q Control, Dynamic Performance, The Interline Power Flow Controller (IPFC), Basic Operating Principles and Characteristics, Generalized and Multifunctional FACTS Controllers.

TEXT BOOKS:

1. Thyristor Based Facts Controllers for Electrical Transmission Systems – Mohan Mathur, Wiley Publishers.

2. Understanding FACTS – Concepts and technology of Flexible AC Transmission systems, Narain G. Hingorani, Laszlo Gyugyi, IEEE Press, WILEY, 1st Edition, 2000, Reprint 2015.
3. FACTS Controllers in Power Transmission and Distribution, Padiyar K.R., New Age International Publishers, 1st Edition, 2007.

REFERENCE BOOKS:

1. Flexible AC Transmission Systems: Modelling and Control, Xiao – Ping Zhang, Christian Rehtanz, Bikash Pal, Springer, 2012, First Indian Reprint, 2015.
2. FACTS – Modelling and Simulation in Power Networks, Enrigue Acha, Claudio R. Fuerte – Esquival, Huge Ambriz – perez, Cesar Angeles – Camacho, WILEY India Private Ltd., 2004, Reprint 2012.

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Subject Code	Title of the Subject	L	T	P	C
17A70206	**POWER SYSTEMS & SIMULATION LAB**	0	1	3	2

OBJECTIVES: The objectives of this course include:

1	To do the experiments (in machines lab) on various power system concepts like determination of sequence impedance, fault analysis, finding of subtransient reactances.
2	To draw the equivalent circuit of three winding transformer by conducting a suitable experiment.
3	To develop the MATLAB program for formation of Y and Z buses. To develop the MATLAB programs for gauss-seidel and fast decouples load flow studies.
4	To develop the SIMULINK model for single area load frequency problem.

Course Outcomes: After completion of the course the student will able to;

CO1	Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's. Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.
CO2	Get the practical knowledge on development of MATLAB program for formation of Y and Z buses.
CO3	Get the practical knowledge on development of MATLAB programs for gauss-seidel and fast decouples load flow studies.
CO4	Get the practical knowledge on development of SIMULINK model for single area load frequency problem.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

Syllabus:

1. Determination of Sequence Impedances of Cylindrical Rotor Synchronous Machine.
2. Fault Analysis – I
   LG Fault
   LL Fault
3. Fault Analysis – II

LLG Fault
LLLG Fault

4. Determination of Sub transient reactances of salient pole synchronous machine.
5. Equivalent circuit of three winding transformer.
6. Y bus formation using MATLAB
7. Z Bus formation using MATLAB
8. Gauss-Seidel load flow analysis using MATLAB
9. Fast decoupled load flow analysis using MATLAB
10. Develop a Simulink model for a single area load frequency problem and Simulate the same.

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IV B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A70207	**DIGITAL SIGNAL PROCESSING LAB**	0	1	3	2

OBJECTIVES: The objectives of the course are to make the students learn about:

1	To implement the processing techniques using the instructions of DSP Processor.
2	To implement various filters using MATLAB Programming.

Course Outcomes: The student can be able to perform:

CO1	Programming concepts to implement various digital filters.
CO2	Generation of signals and their processing.
CO3	Interfacing of DSP processor with other peripherals.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												

SIMULATION IN MATLAB

1. Generation of Signals
2. Linear and circular convolution of two sequences
3. Sampling and effect of aliasing
4. Design of FIR filters
5. Design of IIR filters
6. Calculation of FFT of a signal
7. Decimation by polyphase decomposition.

USING PROCESSOR

8. Study of various addressing modes of DSP using simple programming examples.
9. Implementation of Linear and Circular Convolution.
10. Sampling of input signal and display.
11. Waveform generation.
12. Implementation of FIR filter

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Subject Code	Title of the Subject	L	T	P	C
17A80201a	**POWER QUALITY (ELECTIVE-II)**	2	2	0	3

Course Objectives:

1	To know about introduction on power quality issues.
2	To learn about voltage disturbances and power transients that is occurring in power systems.
3	To know the concept of harmonics in the system and their effect on different power system equipment.
4	To study about different power quality measuring and monitoring concepts.

Course Outcomes:

CO1	To get knowledge about introduction on power quality issues.
CO2	Analyze voltage disturbances and power transients that are occurring in power systems.
CO3	Understand the concept of harmonics in the system and their effect on different power system equipment.
CO4	To get knowledge about different power quality measuring and monitoring concepts.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2								
CO2	1	1					1	1				1
CO3	1	2		2							2	2
CO4	1	1				2					2	2

Syllabus:

Unit-1: INTRODUCTION

What is power quality? Power quality, voltage quality, why are we concerned about power quality, The power quality Evaluation procedure, Terms and Definitions, Transients, Long-duration voltage variations, short-voltage variations, voltage imbalance, wave form distortion, voltage fluctuation, power frequency variations, power quality terms CBEMA and ITI curves.

Unit-2: VOLTAGE SAGS AND TRANSIENT OVER VOLTAGES

Sources of sagas and interruptions, Estimating voltage sag performance, fundamental principles of protection, solutions at the end-use level, Motor-starting sags and utility system fault-clearing issues, sources of over voltages, principles of over voltage protection, devices for over voltage protection, utility capacitor-switching transients, utility system lightning protection.

Unit-3: FUNDAMENTALS OF HARMONICS

Harmonic sources from commercial and industrial loads, locating harmonic sources, Power system response characteristics, Harmonics Vs transients, Effect of harmonics, harmonic distortion, voltage and current distortion, harmonic indices, inter harmonics, resonance, harmonic distortion evaluation, devices for controlling harmonic distortion, passive and active filters, IEEE and IEC Standards.

Unit-4: LONG-DURATION VOLTAGE VARIATIONS

Principles of regulating the voltage, Devices for voltage regulation, utility voltage regulator Application, capacitors for voltage regulation flicker.

Unit-5: POWER QUALITY BENCH MARKING AND MONITORING

Benchmarking process, RMS Voltage variation Indices, Harmonics indices Power Quality Contracts, Monitoring considerations, power quality measurement equipment, Power quality Monitoring standards.

Text Books:

[1]. Electrical Power Systems Quality, Roger C. Dugan, Mark F.McGranaghan, Surya Santoso, H.Wayne Beaty, 2nd Edition, TMH Education Pvt. Ptd.

[2]. Power quality by C. Sankaran, CRC Press.

Reference Books:

[1]. Electrical systems quality Assessment by J. Arrillaga, N.R. Watson, S. Chen, John Wiley & Sons.

[2]. Understanding Power quality problems by Math H. J. Bollen IEEE Press.

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IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80201b	**MODERN CONTROL THEORY (ELECTIVE- II)**	2	2	0	3

Objective: This course introduces

1	To give an overview of system analysis and design based on state space.
2	Design of state feedback control and observer.
3	The properties of Nonlinearities.
4	Stability analysis for linear and nonlinear systems.
5	Design of adaptive control and optimal control problem.

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

CO1	Obtain the State Space Modeling for linear time-invariant systems.
CO2	Solve system state equations.
CO3	Analyze the system stability.
CO4	Apply optimal control to statement of the optimal control problems
CO5	Design an adaptive control

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	2	-	1	-	1	1	-	2
CO2	2	2	1	-	2	-	1	-	1	1	-	2
CO3	2	2	1	-	2	-	1	-	1	1	-	2
CO4	1	1	1	-	2	-	2	-	-	1	-	2
CO5	1	1	1	-	2	-	2	-	-	1	-	2

Syllabus:

UNIT – I STATE VARIABLE DISCRIPTION

State space representation of systems – State diagrams for continuous time state models – Solution of state equations – State transmission matrix. controllability and observability for continuous time systems, Principle of Duality, Controllability and observability of state models in Jordan canonical form and other canonical forms.

UNIT – II POLE PLACEMENT OBSERVER

Fundamental theorem of feedback control - - Pole assignment by state feedback using Ackermann's formula – Eigen structure assignment problem-Design of full order observer using Ackermann's formula. - Full order Observer based controller design. Reduced order observer design.

UNIT – III DESCRIBING FUNCTION AND PHASE-PLANE ANALYSIS

Introduction to nonlinear systems, Types of nonlinearities, Concepts of describing functions, Derivation of describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis - Jump Resonance. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase-plane analysis of nonlinear control systems.

UNIT-IV STABILITY ANALYSIS

Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.problems.

UNIT –V OPTIMAL AND ADAPTIVE CONTROL

Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Infinite time Regulator, Output regulator problem. Tracking problem, Parameter Optimization. Basic block diagram of adaptive system, Classification of adaptive control systems- MRAC systems- different configuration-classification-Mathematical description.

TEXT BOOKS:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
3. Control System Design – Goodwin, Pearson.

REFERENCE BOOKS:

1. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.
2. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell, Pearson.
3. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003
4. T. Kailath, T., Linear Systems, Perntice Hall, Englewood Cliffs, NJ, 1980.
5. N. K. Sinha , Control Systems, New Age International, 3rd edition, 2005.
6. K.J.Astrom and Bjorn Wittenmark, Adaptive control, Pearson Edu., 2nd Edn
7. Sankar Sastry, Adaptive control.

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IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80201c	***SWITCHED MODE POWER CONVERTERS*** **(ELECTIVE – II)**	2	2	0	3

Course Objectives:

1	To provide conceptual knowledge in modern power electronic converters and its applications in electric power utility.
2	To make the student to analyze and control the various power converter circuits.

Course Outcomes: After completion of the course the student will able to;

CO1	The student learns the fundamental concepts of DC - DC Converters.
CO2	The student can analyze and control the various power converter circuits.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2			1						2
CO2	1	2										2

UNIT I DC-DC CONVERTERS

Principles of stepdown and stepup converters – Analysis and state space modeling of Buck, Boost, Buck- Boost and Cuk converters.

UNIT II SWITCHING MODE POWER CONVERTERS

Analysis and state space modeling of flyback, Forward, Luo, Half bridge and full bridge converters- control circuits and PWM techniques.

UNIT III RESONANT CONVERTERS

Introduction- classification- basic concepts- Resonant switch- Load Resonant converters- ZVS, Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control .

UNIT IV DC-AC CONVERTERS

Single phase and three phase inverters, control using various (sine PWM, SVPWM and advanced modulation) techniques, various harmonic elimination techniques- Multilevel inverters- Concepts - Types: Diode clamped- Flying capacitor- Cascaded types- Applications.

UNIT V POWER CONDITIONERS, UPS & FILTERS

Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

Text Book:

1. Power Electronics Essentials and Applications L Umanand, Wiley
2. M.H. Rashid – Power Electronics handbook, Elsevier Publication, 2001.
3. Course material on Switched Mode Power Conversion – V Ramanarayanan, Dept. of Electrical Engg. IISc. Bangalore.

REFERENCES:

1. Philip T Krein, " Elements of Power Electronics", Oxford University Press
2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters, Applications and design- Third Edition- John Wiley and Sons- 2006
3. M.H. Rashid – Power Electronics circuits, devices and applications- third edition Prentice Hall of India New Delhi, 2007.

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Subject Code	Title of the Subject	L	T	P	C
17A80202a	**UILIZATION OF ELECTRICAL ENERGY (ELECTIVE – III)**	2	2	0	3

Course Objectives:

1	To make the students aware about the importance of maximizing the energy efficiency by optimum utilization of electrical energy.
2	To ensure that the knowledge acquired can be applied in various fields such as electric heating, illumination, chemical processes and electric traction.
3	To develop ability amongst the students to analyze the performance of arc furnaces, electric traction, different sources of light, illumination schemes, electric traction.
4	To provide knowledge about above processes and applications of these in practical world.

Course Outcomes:

CO1	Understand the importance of maximizing the energy efficiency by its optimum utilization and mould their practical work in professional world accordingly.
CO2	Understand the performance of simple resistance furnaces, modern welding techniques, Illumination schemes and electric traction.
CO3	Able to get technical knowledge of various control devices and their use in practical world.
CO4	Able to design various illumination systems and apply them to real world usage.

CO/PO mappings

Course Outcomes	Program Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO 1	1	2		2								
CO 2	1		2	1	2							
CO 3	1		2	1	2							
CO 4	1		2	2								

The course outcomes of each core course are mapped to the program outcomes with a level of emphasis being either strongly correlated (2) and moderately correlated (1).

UNIT – I ILLUMINATION

Definition – Laws of illumination – Polar curves – Calculation of MHCP and MSCP. Lamps: Incandescent lamp, Sodium Vapour lamp, Fluorescent lamp. Requirement of good lighting scheme – Types, Design and Calculation of illumination. Street lighting and Factory lighting – Numerical Problems.

UNIT – II ELECTRICAL HEATING & ELECTRIC WELDING

Advantages. Methods of Electric heating – Resistance, arc, Induction and dielectric heating. Types of electric welding – Resistance, Electric arc, gas welding and Ultrasonic welding, Welding electrodes of various metals, Defects in welding.

UNIT – III ELECTROLYTIC PROCESS

Basic principle of Electrolysis, Faradays laws of Electrolysis – Numerical problems, Applications of Electrolysis – Electro deposition-manufacturing of chemicals – anodizing – electro polishing – electro cleaning – electro parting – electro metallurgy, Power supply for Electrolysis.

UNIT – IV ELECTRIC TRACTION

Introduction –Traction Systems, Systems of Electric Traction- Advantages of Electric Traction, Systems of Track Electrification, Desirable features of Traction Motors – Suitability of D.C. series motor, A.C. series motor, 3 phase induction motor and linear induction motor for traction. Electric Braking in traction– Plugging, Rheostatic and Regenarative types – Suitability of different motors for braking, Temperature Rise and Load Equalization.

UNIT – V TRACTION MECHANICS

Types of services – urban – sub-urban and main line services, Speed-time curves of different services – trapezoidal and quadrilateral speed-time curves – Numerical Problems, Tractive effort, Power, Specific Energy Consumption- factors affecting Specific Energy Consumption, Mechanics of train movement - Adhesive weight and coefficient of adhesion – Problems.

TEXT BOOKS:

1. Utilization of Electrical Energy' by E. O. Taylor – Revised in S.I. Units by V.V.L.Rao, Orient Longman
2. Generation, Distribution and Utilization of Electrical Energy' by C. L. Wadhwa, Eastern Wiley Ltd.
3. 'Utilization of Electric Power and Electric Traction' by J.B. Gupta, S.K. Kataria and sons,Delhi.

REFERENCE BOOKS:

1. Art & Science of Utilization of electrical Energy – by H. Partab, Dhanpat Rai & Sons.
2. A text book on Power System Engineering' by A. Chakraborti, M. L. Soni, P. V. Gupta, U.S.Bhatnagar, Dhanpat Rai and Co.(P) Ltd – Delhi

3. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited Publishers, 1996.
4. Utilization of Electrical Power – by R.K. Rajput, Laxmi publications.

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Subject Code	Title of the Subject	L	T	P	C
17A80202b	**COSTING OF ELECTRICAL SYSTEMS (ELECTIVE – III)**	2	2	0	3

Objective:

The student will be able to learn about:

1	Domestic and Industrial wiring estimation
2	Coasting and Contracting types
3	Estimate the Transmission line based on IE Rules.
4	Estimate the Overhead distribution and underground distribution systems materials and accessories based on IE Rules.

Course Outcomes:

After completion of the course the student will able to;

CO1	Prepare an estimate of quantity and cost of the material for a electrical project.
CO2	Prepare detail estimate and costing of Residential and commercial Electrical Installations.
CO3	Test Residential, commercial and Industrial Electrical Installation Prepare detail estimate and costing of a transmission line/Overhead and underground distribution project.
CO4	Prepare estimates for repairs and maintenance of electrical devices and equipment.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	2	2	2	2	-	1	1	2
CO2	1	2	2	2	-	2	2	1	-	1	2	2
CO3	1	2	2	2	1	1	2	2	-	1	-	2
CO4	1	1	2	2	2	1	2	1	-	-	-	1

Unit-I Electrical Wiring

Types of wires Different types of wiring system and wiring procedure Merits, demerits and comparison of different types of wiring, Different types and specifications of wiring materials, Accessories and wiring tools Domestic and industrial panel wiring I.E. rules for wiring, including Electricity supply act-1948 Different types of wiring circuits.

Unit– II Estimating, Costing and Contracting

Estimation and estimation tools. Electrical Schedule of rates, catalogues, Survey and source selection, Recording estimates, Quantity and cost of material required. Purchase system, Purchase enquiry and selection of appropriate purchase mode, Comparative statement, Purchase orders, Payment of bills, Types of contract system. Tendering procedure and preparation of simple tender, Earnest Money Deposit, Security Deposit Schedule of rates (S.O.R.)

Unit– III Estimating and Costing of Domestic and Industrial wiring

Layout for domestic Wiring, Load calculation , Cable selection Earthing Selection of switchgear. Overall Estimating and costing, Layout for industrial Wiring, Load calculation, Cable selection, Earthing Selection of switchgear. Overall Estimating and costing.

Unit-IV Estimation of Overhead Transmission line

Transmission lines, Line supports, Factors governing height of pole, Conductor materials, size of conductor for overhead, Transmission line: cross arms, pole brackets and clamps, guys and stays, conductors configuration spacing and clearances, span lengths, overhead line insulators, insulator materials lightning arrestors, erection of supports, setting of stays, Earthling of lines, Guarding of overhead lines, Clearances of conductor from ground, Spacing between supports conductors, I.E. rules pertaining to LV transmission line.

Unit- V Estimation of Distribution line Underground Distribution System

Describe Method of installation of service connection (1-phase and 3-phase), observing I.E. rules, Overhead distribution system. Materials and accessories required for the overhead distribution system. Estimate for 440 V, 3-phase, 4 wires or 3 wires overhead distribution system. Types of service connections, Method of installation of service connection(1-phase and 3-phase), I.E. rules pertaining to overhead lines and service connection. Underground distribution system. Materials and accessories required for underground distribution system. Estimate for 440 V, 3-phase, 4 wires or 3 wires underground distribution system. I.E. rules pertaining to underground system and service

TEXT BOOKS:

1. Electrical Design, estimating & Costing aina, K. B. and Bhattacharya,S.K New Age International (p) Limited, New Delhi
2. Electrical Estimating & costing Uppal, S L New Age International (p) New Delhi

REFERENCE BOOKS:

1. Electrical Installation Estimating & Costing Gupta, J.B. S. K. Kataria & Sons, New Delhi
2. Relevant IS Code for-service line connection, laying of cable, wiring installation NBC National Building Code- Vol-IV
3. E. rules for wiring, Electricity supply act-1948. Bureau of Indian Standards Electricity supply act-1948

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ELECTRICAL AND ELECTRONICS ENGINEERING

IV B. Tech –II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80202c	**HIGH VOLTAGE ENGINEERING (ELECTIVE – III)**	2	2	0	3

COURSE OBJECTIVES:

To make the student learn about:

1.	Various Dielectric Materials like solids, liquids and gases and their properties like breakdown strength, practices that causes breakdown etc.
2.	Generation and Measurement of high voltages and currents in both AC and DC.
3.	Generation and Measurement of Impluse Voltages.
4.	Various High Voltage testing techniques.

COURSE OUTCOMES:

After completing the course, the student should be able to do the following:

CO1	Understand the concept of breakdown of solid, liquid and gaseous dielectrics and analyze the breakdown in detail.
CO2	Understand the methods of generation of high voltage AC and DC.
CO3	Understand the measurement of high voltage AC and DC.
CO4	Understand about high voltage testing methods.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		1		2	1						2
CO2	2		1		2	1						2
CO3	1		1		2	1						2
CO4	1		1	2		1						

Syllabus:

UNIT-I BREAK DOWN IN GASEOUS, LIQUID & SOLID DIELECTRICS

Introduction to HV Technology, Need for Generating High Voltages in Laboratory. Industrial Applications of High Voltage, Electrostatic Precipitation, Separation. Gases As Insulating Media, Collision Process, Ionization Process, Townsend's Criteria Of Breakdown in Gases, Paschen's Law, Liquid As Insulator, Pure and Commercial Liquids, Breakdown in Pure and Commercial Liquids.

Intrinsic Breakdown, Electromechanical Breakdown, Thermal Breakdown, Breakdown of Solid Dielectrics in Practice, Breakdown in Composite Dielectrics, Solid Dielectrics Used in Practice.

UNIT–II GENERATION OF HV AC AND DC VOLTAGES

HV AC-HV Transformer: Need for Cascade Connection and Working of Transformers Units Connected in Cascade. Series Resonant Circuit- Principle of Operation and Advantages - Tesla Coil - HV DC-Voltage Doubler Circuit, Cockroft- Walton Type High Voltage DC Set - Calculation of High Voltage Regulation, Ripple and Optimum Number of Stages for Minimum Voltage Drop.

UNIT–III GENERATION OF IMPULSE VOLTAGES

Introduction to Standard Lightning and Switching Impulse Voltages - Analysis of Single Stage Impulse Generator-Expression for Output Impulse Voltage - Multistage Impulse Generator Working of Marx Impulse Generator, Rating of Impulse Generator - Components of Multistage Impulse Generator - Triggering of Impulse Generator By Three Electrode Gap Arrangement - Trigatron Gap and Oscillograph Time Sweep Circuits, Generation of Switching Impulse Voltage - Generation of High Impulse Current.

UNIT–IV MEASUREMENT OF HIGH VOLTAGES

Electrostatic Voltmeter-Principle, Construction and Limitation - Chubb and Fortescue Method for HV AC Measurement - Generating Voltmeter- Principle, Construction - Series Resistance Micro Ammeter for HV DC Measurements - Standard Sphere Gap Measurements of HVAC, HVDC And Impulse Voltages - Factors Affecting The Measurements - Potential Dividers-Resistance Dividers Capacitance Dividers Mixed RC Potential Dividers. Measurement of High Impulse Currents-Rogowsky Coil.

UNIT–V HIGH VOLTAGE TESTING TECHNIQUES

Dielectric Loss and Loss Angle Measurements Using Schering Bridge - Transformer Ratio Arms Bridge. Need for Discharge Detection and PD Measurements Aspects - Factors Affecting The Discharge Detection, Discharge Detection Methods-Straight and Balanced Methods. Tests on Isolators, Circuit Breakers, Cables, Insulators and Transformers.

TEXT BOOKS:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 4th Edition, 2004.
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition, 2000.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.
3. High Voltage Technology by L. L. Alston, OXFORD University Press, Second Edition, 2009.
4. High Voltage Engineering Problems & Solutions, R. D. Begamudre, New Age International Publishers, First Edt., 2010

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IV B. Tech –II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80203a	**NEURAL NETWORKS & FUZZY LOGIC APPLICATIONS (Elective – IV)**	2	2	0	3

Course Objective:

The student will be able to understand:

1	*Importance of AI techniques in engineering applications*
2	Artificial Neural network and Biological Neural Network concepts
3	ANN approach in various Electrical Engineering problems
4	Fuzzy Logic and Its use in various Electrical Engineering Applications

Course Outcomes:

The student acquires knowledge about:

CO1	Artificial Intelligence techniques
CO2	ANN Techniques and their concepts
CO3	Role of ANN in various Applications
CO4	Fuzzy Logic concepts and its role in various applications

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	1	2	2	2	1	1	-	2
CO2	1	2	2	1	1	2	2	2	1	1	-	2
CO3	1	2	2	1	1	2	2	2	1	1	-	2
CO4	1	2	2	1	1	2	2	2	1	1	-	2

Syllabus:

UNIT - I: INTRODUCTION TO ARTIFICIAL INTILLEGENCE

Introduction and motivation - Approaches to AI - Architectures of AI - Symbolic Reasoning System - Rule based Systems - Knowledge Representation - Expert Systems.

UNIT - II: ARTIFICIAL NEURAL NETWORKS

Basics of ANN - Comparison between Artificial and Biological Neural Networks - Basic Building Blocks of ANN - Artificial Neural Network Terminologies - McCulloch Pitts Neuron Model - Learning Rules - ADALINE and MADALINE Models - Perceptron Networks (Continuous and Discrete) – Perceptron Convergence Theorem - Back Propagation Neural Networks - Associative Memories – BAM and Hopfield networks.

UNIT - III: ANN APPLICATIONS

ANN approach to: Electrical Load Forecasting Problem - System Identification - Control Systems - Pattern Recognition.

UNIT - IV: FUZZY LOGIC

Classical Sets - Fuzzy Sets - Fuzzy Properties, Operations and relations - Fuzzy Logic System - Fuzzification - Defuzzification - Membership Functions - Fuzzy Rule base - Fuzzy Logic Controller Design.

UNIT - V: FUZZY LOGIC APPLICATIONS

Fuzzy Logic Implementation for Induction Motor Control - Switched Reluctance Motor Control - Automatic Voltage Regulation - Fuzzy Logic Controller in Level control.

Text Books:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Neural Networks using MATLAB", McGraw Hill Edition, 2006.

2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition, WILEY India Edition, 2012.

References:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer International Edition, 2013.

2. Yung C. Shin and Chengying Xu, "Intelligent System - Modeling, Optimization & Control, CRC Press, 2009.

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IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80203b	**RELIABILITY ENGINEERING AND IT'S APPLICATIONS TO POWER SYSTEMS (ELECTIVE-IV)**	2	2	0	3

Course Objectives:

1	To learn about the basic reliability concepts, density and distribution functions, random variables and networks
2	To know about different reliability functions and time dependent reliability evaluation of different networks
3	To know about Markov modelling and component repairable models for frequency and duration
4	To study about the reliability applications to generation, transmission and distribution systems

Course Outcomes:

CO1	Understand the basic reliability concepts, density and distribution functions and network modeling.
CO2	Know about different reliability functions and time dependent reliability evaluation of different networks
CO3	Understand concept of Markov modeling and component repairable models for frequency and duration
CO4	Get knowledge on the reliability applications to power systems

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	-	-	1	-	-	-	-	-	2
CO2	1	2	-	-	-	-	-	-	-	-	-	2
CO3	1	-	2	-	1	1	-	-	-	-	-	2
CO4	-	-	2	-	-	1	-	-	-	-	-	1

Syllabus:

Unit-1: BASICS OF PROBABILITY THEORY, DISTRIBUTION & NETWORK MODELLING

Basic Probability Theory – Rules for Combining Probabilities of Events – Bernoulli's Trials – Probability Density and Distribution Functions – Random variables – Binomial Distribution –

Expected Value and Standard Deviation of Binomial Distribution. Analysis of Series, Parallel, Series-Parallel Networks – Complex Networks – Decomposition Method.

Unit-2: RELIABILITY FUNCTIONS

Reliability Functions f(T), F(T), R(T), H(T) and Their Relationships – Exponential Distribution – Expected Value and Standard Deviation of Exponential Distribution – Bath Tub Curve – Reliability Analysis of Series Parallel Networks Using Exponential Distribution – Reliability Measures MTTF, MTTR, MTBF.

Unit-3: MARKOV MODELLING AND FREQUENCY & DURATION TECHNIQUES

Markov Chains – Concept of Stochastic Transitional Probability Matrix, Evaluation of Limiting State Probabilities – Markov Processes One Component Repairable System – Time Dependent Probability Evaluation Using Laplace Transform Approach – Evaluation of Limiting State Probabilities Using STPM– Two Component Repairable Models. Frequency and Duration Concept – Evaluation of Frequency of Encountering State, Mean Cycle time, For One, Two Component Repairable Models – Evaluation of Cumulative Probability and Cumulative Frequency of Encountering of Merged States.

Unit-4: APPLICATIONS TO GENERATING SYSTEMS

Generation System Reliability Analysis: Reliability Model of a Generation System– Recursive Relation for Unit Addition and Removal – Load Modeling - Merging of Generation Load Model – Evaluation of Transition Rates for Merged State Model – Cumulative Probability, Cumulative Frequency of Failure Evaluation – LOLP, LOLE, LOEE – Examples.

Unit-5: APPLICATIONS TO NETWORK

Transmission & Distribution System Reliability Analysis: System and Load Point Reliability Indices – Weather Effects on Transmission Lines, Weighted Average Rate and Markov Model. Basic Techniques - Radial Networks – Evaluation of Basic Reliability Indices, Performance Indices – Load Point and System Reliability Indices – Customer Oriented, Loss and Energy Oriented Indices -Examples.

Text Books:

[1]. System Reliability Concepts by V. Sankar, Himalaya Publishing House, 2015.

[2]. Reliability Evaluation of Engg. System – R. Billinton, R.N.Allan, Plenum Press, New York, reprinted in India by B.S.Publications, 2007.

[3]. Assessment of Power System Reliability: Methods and Applications by Marko Čepin, Springer Publications, 2011.

Reference Books:

[1]. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

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IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80203c	**POWER SYSTEM DEREGULATION (ELECTIVE – IV)**	2	2	0	3

Course Objectives:

The objectives of this course include:

1	To learn about key issues of restructured power systems and its financial matters.
2	To get knowledge on cost analysis, information on system operator and its duties.
3	To know about ATC, TTC and different ancillary services.
4	To learn about different cost allocation method in the power systems.

Course Outcomes:

After completion of the course the student will able to;

CO1	Understand the key issues of restructured power systems and its financial matters.
CO2	Know about cost analysis, information on system operator and its duties.
CO3	Know about ATC, TTC and different ancillary services.
CO4	Understand about different cost allocation method in the power systems.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	1	-	2	-	-	2	1	2
CO2	1	2	1	2	1	-	2	-	-	2	1	2
CO3	1	1	2	2	1	-	2	-	-	2	1	2
CO4	1	1	2	2	1	-	2	-	-	2	1	1

UNIT-I: KEY ISSUES IN ELECTRIC UTILITIES

Introduction – Restructuring models – Independent System Operator (ISO) – Power Exchange - Market operations – Market Power – Standard cost – Transmission Pricing – Management of Inter zonal/Intra zonal Congestion.

UNIT-II: OPEN ACCESS SAME-TIME INFORMATION SYSTEM (OASIS) & MARKET POWER

Structure of OASIS - Posting of Information – Transfer capability on OASIS. Market Power: Introduction - Different types of market Power – exercising of Market Power - Examples.

UNIT-III: AVAILABLE TRANSFER CAPABILITY (ATC) & ELECTRICITY PRICING

Transfer Capability Issues – ATC – TTC – TRM – CBM Calculations – Calculation of ATC based on power flow. Electricity Pricing: Introduction – Electricity Price Volatility Electricity Price Indexes – Challenges to Electricity Pricing – Construction of Forward Price Curves – Short-time Price Forecasting.

UNIT-IV: POWER SYSTEM OPERATION IN COMPETITIVE ENVIRONMENT

Introduction – Operational Planning Activities of ISO- The ISO in Pool Markets – The ISO in Bilateral Markets – Operational Planning Activities of a GENCO.

UNIT-V: TRANSMISSION COST ALLOCATION METHODS & ANCILLARY SERVICES MANAGEMENT

Introduction - Transmission Cost Allocation Methods : Postage Stamp Rate Method - Contract Path Method - MW-Mile Method – Unused Transmission Capacity Method - MVA-Mile method – Comparison of cost allocation methods. Ancillary Services Management: Introduction – Reactive Power as an Ancillary Service – a Review – Synchronous Generators as Ancillary Service Providers.

TEXT BOOKS :

1. Kankar Bhattacharya, Math H.J. Boller and Jaap E.Daalder, Operation of Restructured Power System, Kulwer Academic Publishers, 2001.
2. Mohammad Shahidehpour and Muwaffaq alomoush, Restructured Electrical Power Systems, Marcel Dekker, Inc., 2001.

REFERENCE BOOKS:

1. Loi Lei Lai, Power System Restructuring and Deregulation, John Wiley & Sons Ltd., England.
2. Regulations of CERC, www.cercind.gov.in

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IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
	ELECTRICAL MACHINE DESIGN (ELECTIVE – V)	2	2	0	3

Objectives: The objectives of this course include:

1	To study about various electrical engineering materials used for design of electrical machines.
2	How to design of DC machine.
3	How to design of Transformer.
4	How to design of Induction motor.
5	How to design of Synchronous machine.

Course Outcomes: After completion of the course the student will able to;

CO1	Select electrical engineering material for different electrical machines.
CO2	Design of DC machine.
CO3	Design of Transformer.
CO4	Design of Induction motor.
CO5	Design of Synchronous machine.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	-	2	1	-	1	1	-
CO2	-	1	2	2	2	-	2	2	-	-	1	-
CO3	-	1	2	2	1	-	-	-	-	-	1	-
CO4	-	1	2	2	2	-	1	1	-	-	1	-
CO5	-	1	2	2	2	-	1	1	-	-	1	-

Syllabus:

UNIT- I: INTRODUCTION

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings – Thermal considerations - Heat flow – Temperature rise and Insulating Materials - Rating of machines – Standard specifications.

UNIT-II: DCMACHINES

Output Equations – Main Dimensions – Choice of Specific Electric and Magnetic Loading - Magnetic Circuits Calculations - Carter's Coefficient - Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature – Design of commutator and brushes – performance prediction using design values.

UNIT-III: TRANSFORMERS

Output Equations – Main Dimensions - kVA output for single and three phase transformers – Window space factor – Design of core and winding – Overall dimensions – Operating characteristics – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers.

UNIT-IV: INDUCTION MOTORS

Output equation of Induction motor – Main dimensions – Choice of Average flux density – Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor – Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current - Short circuit current – Operating characteristics- Losses and Efficiency.

UNIT-V: SYNCHRONOUS MACHINES

Output equations – choice of Electrical and Magnetic Loading – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

Text book:

1.Electrical machine design by AK Sahaney

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IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80204b	**GRID INTEGRATION OF DISTRIBUTED GENERATION (ELECTIVE – V)**	2	2	0	3

Objectives: The objectives of this course include:

1	To study about various types of power generation resources to be connected in distributed generation system.
2	To know the architecture of smart grid with integrated distribution generation with various plants.
3	To get the knowledge on smart grid and how will gain the efficient power to the distributed end.
4	To get the knowledge of Smart grid to evolve a perfect power system

Course Outcomes: After completion of the course the student will able to;

CO1	Understand about the distribution generation system connected with various power generation plants.
CO2	Gain the knowledge on smart grid by various techniques for better efficiency in transmitting the power.
CO3	Know about the integration of distribution generation with various plants to the smart grid.
CO4	Overview of the perfect power system configurations.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	2	2	2	-	2	1	-	1	1	2
CO2	-	2	2	2	2	-	2	2	-	-	1	2
CO3	-	2	2	2	1	-	-	-	-	-	1	2
CO4	-	-	2	2	2	-	1	1	-	-	1	1

Syllabus:

UNIT-I Introduction to Distributed Generation

The development of the electrical power system - Value of distributed generation and network pricing – Reasons for distributed generation - The future development of distributed generation - Distributed generation and the distribution system - Technical impacts of generation on the distribution system - Economic impact of distributed generation on the distribution system - Impact of distributed generation on the transmission system - Impact of distributed generation on central generation.

UNIT-II Distributed generation plant

Combined heat and power plants - Renewable energy generation - Small-scale hydro generation - Wind power plants - Offshore wind energy - Solar photovoltaic generation

UNIT-III Distributed generators and their connection to the system

Distributed generators - Synchronous generators - Induction generators - Doubly fed induction generator - Full power converter (FPC) connected generators - System studies - Load flow studies in a simple radial system - Load flow studies in meshed systems - Symmetrical fault studies - Unbalanced (asymmetrical) fault studies - Case studies - Steady-state voltages under peak and minimum loading - Electromagnetic transient studies.

UNIT-IV DC DISTRIBUTION

AC vs DC sources-Benefits of and drives of DC power delivery systems-Powering equipment and appliances with DC-Data centers and information technology loads-Future neighborhood-Potential future work and research.

UNIT-V SMART GRID TO EVOLVE A PERFECT POWER SYSTEM ?

Electricity network-Local energy networks- Electric transportation- Low carbon central generation-Attributes of the smart grid- Alternate views of a smart grid.

Overview of the perfect power system configurations- Device level power system- Building integrated power systems- Distributed power systems- Fully integrated power system-Nodes of innovation.

TEXT BOOKS:

1. “Distributed Generation” by N.Jenkins, J.B. Ekanayake & G. Strbac
2. Clark W Gellings, “The Smart Grid, Enabling Energy Efficiency and Demand Side Response”- CRC Press, 2009.
3. Janaka Ekanayake, Kithsiri Liyanage,Jianzhong.Wu, Akihik Yokoyama, Nick Jenkins, “Smart Grid: Technology and Applications”- Wiley, 2012.

REFERENCES:

1. IEEE 1547. IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems; 2003.
2. James Momoh, “Smart Grid :Fundamentals of Design and Analysis”- Wiley, IEEE Press, 2012.
3. Horlock J.H. Cogeneration: Combined Heat and Power Thermodynamics and Economics. Oxford: Pergamon Press; 1987.

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IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
17A80204c	**ENERGY AUDITING & DEMAND SIDE MANAGEMENT (ELECTIVE – V)**	2	2	0	3

Objectives: The objectives of this course include:

1	To learn about energy consumption and situation in India
2	To learn about Energy Auditing.
3	To aware of Energy Measuring Instruments.
4	To understand the Demand Side Management.

Course Outcomes:

After completion of the course the student will able to;

CO1	Understand the concepts of energy auditing.
CO2	Analyze efficiency of motors and improvement of power factor.
CO3	Energy measuring Instruments.
CO4	Understand the Energy Economic analysis and Demand side management.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	2	1	1	-	1	1	-	-	1	2
CO2	1	2	2	2	1	-	2	2	1	1	1	2
CO3	1	2	2	2	1	1	1	1	-	-	1	2
CO4	1	2	2	2	1	-	1	1	1	1	1	1

UNIT - I INTRODUCTION TO ENERGY AUDITING

Energy situation – world and India, energy consumption, conservation, Codes, standards and Legislation. Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes. Measurements in energy audits, presentation of energy audit results.

UNIT - II ENERGY EFFICIENT MOTORS & POWER FACTOR IMPROVEMENT

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance - over motoring - motor energy audit. Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on p.f. , p.f motor controllers.

UNIT – III LIGHTING AND ENERGY MEASURING INSTRUMENTS

Good lighting system design and practice, lighting control ,lighting energy audit - Energy Measuring Instruments- watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC's

UNIT – IV *ENERGY ECONOMIC ANALYSIS*

The time value of money concept, developing cash flow models, payback analysis, depreciation, taxes and tax credit – numerical problems.

UNIT – V *DEMAND SIDE MANAGEMENT*

Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM – time of day pricing, multi-utility power exchange model, time of day models for planning. Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and Organization of Energy Conservation awareness Programs.

TEXT BOOK:

1. **Industrial Energy Management Systems,** Arry C. White, Philip S. Schmidt, David R. Brown, Hemisphere Publishing Corporation, New York.
2. **Fundamentals of Energy Engineering -** Albert Thumann, Prentice Hall Inc, Englewood Cliffs, New Jersey.
3. **Electrical Power distribution**, A S. Pabla, TMH, 5th edition, 2004
4. **Demand Side Management,** Jyothi Prakash, TMH Publishers.

REFERENCES:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998
3. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
4. Energy management hand book by W.C.Turner, John wiley and sons
5. Energy management and good lighting practice : fuel efficiency- booklet12-EEO
6. **Recent Advances in Control and Management of Energy Systems, D.P.Sen, K.R.Padiyar, Indrane Sen, M.A.Pai, Interline Publisher, Bangalore, 1993.**
7. **Energy Demand – Analysis, Management and Conservation, Ashok V. Desai, Wiley Eastern, 2005.**
8. **Hand book on energy auditing - TERI (Tata Energy Research Institute)**