JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2015-16)

I YEAR - I SEMESTER

S.No.	Course Code	Subject	L	P	C
1	**15A55101**	English	4	-	4
2	**15A51101**	Mathematics- I	4	-	4
3	**15A52101**	Applied Physics	4	-	4
4	**15A01101**	Environmental Studies	4	-	4
5	**15A03102**	Engineering Graphics	4	-	4
6	**15A52102**	Applied Physics Lab	-	4	2
7	**15A35101**	Engineering Workshop & IT Workshop	-	4	2
8	**15A55102**	English Language Communication Skills Lab	-	4	2
		Total	**20**	**12**	**26**

I YEAR - II SEMESTER

S.No.	Course Code	Subject	L	P	C
1	**15A55201**	Technical Communication and Presentation Skills	4	-	4
2	**15A51201**	Mathematics – II	4	-	4
3	**15A53201**	Applied Chemistry	4	-	4
4	**15A05201**	Problem Solving and Computer Programming	4	-	4
5	**15A02201**	Electrical Circuits – I	4	-	4
6	**15A04203**	Electronic Devices & Circuits	4	-	4
7	**15A05202**	Computer Programming Lab	-	4	2
8	**15A53202**	Applied Chemistry Lab	-	4	2
		Total	**24**	**8**	**28**

II B. Tech (EEE) – I Sem

S.No	Course Code	Subject	L	P	C
1	**15A51301**	Mathematical Methods	**4**	-	4
2	**15A02301**	Electrical Circuits - II	4	-	4
3	**15A02302**	Electrical Machines - I	4	-	4
4	**15A02303**	Control Systems Engineering	4	-	4
5	**15A54301**	Managerial Economics and Financial Analysis	4	-	4
6	**15A13301**	Applied Engineering	4	-	4
7	**15A02304**	Electric Circuits and Simulation Lab	-	4	2
8	**15A04305**	Electronic Devices & Circuits Lab	-	4	2
		Total	**24**	**8**	**28**

II B. Tech (EEE) – II Sem

S.No.	Course Code	Subject	L	P	C
1	**15A51402**	Complex Variables and Special Functions	4	-	4
2	**15A02401**	Electrical Machines - II	4	-	4
3	**15A02402**	Electric Power Generating Systems	4	-	4
4	**15A02403**	Electromagnetic Fields	4	-	4
5	**15A04401**	Switching Theory and Logic Design	4	-	4
6	**15A04408**	Analog Electronic Circuits	4	-	4
7	**15A54402**	Human Values and Professional Ethics (Audit Course)	2	-	-
8	**15A02404**	Electrical Machines Lab – I	-	4	2
9	**15A02405**	Control Systems & Simulation Lab	-	4	2
		Total	**26**	**8**	**28**

III B. Tech (EEE) – I Sem

S.No	Course Code	Subject	L	P	C
1	**15A02501**	Transmission of Electric Power	4	-	4
2	**15A02502**	Electrical Machines – III	4	-	4
3	**15A02503**	Power Electronics	4	-	4
4	**15A02504**	Electrical and Electronic Measurements	4	-	4
5	**15A02505**	Linear & Digital Integrated Circuits	4	-	4
6	**15A54501**	Management Science	4	-	4
7	**15A02506**	Electrical Machines Lab – II	-	4	2
8	**15A02507**	Electrical and Electronic Measurements Lab	-	4	2
		Total	**24**	**8**	**28**

III B. Tech (EEE) – II Sem

S.No	Course Code	Subject	L	P	C
1	**15A02601**	Switch Gear & Protection	4	-	4
2	**15A02602**	Digital Signal Processing	4	-	4
3	**15A02603**	Computer Aided Power System Analysis	4	-	4
4	**15A02604**	Microprocessors & Microcontrollers	4	-	4
5	**15A02605**	Power Semiconductor Controlled Drives	4	-	4
6	**Open Elective**		4	-	4
	15A02606a	1) PLC & Its Applications			
	15A02606b	2) Renewable Energy Sources			
	15A02606c	3) Linear & Nonlinear Optimization Techniques			
	15A02606d	4) Reliability and Safety Engineering			
7	**15A02607**	Microprocessors & Microcontrollers Lab	-	4	2
8	**15A02608**	Power Electronics & Simulation Lab	-	4	2
9	**15A55601**	Advanced Communication Skills Lab (Audit Course)	-	4	-
		Total	**24**	**12**	**28**

IV B. Tech (EEE) – I Sem

S.No	Course Code	Subject	L	P	C
1	**15A02701**	Electric Power Distribution Systems	4	-	4
2	**15A02702**	Instrumentation	4	-	4
3	**15A02703**	Introduction to HVDC Transmission & FACTS	4	-	4
4	**15A02704**	Power System Operation and Control	4	-	4
5	**15A02705**	Neural Networks & Fuzzy Logic Applications	4	-	4
6	**15A02706**	**MOOC (Elective-I)**	4	-	4
7	**15A02707**	Digital Signal Processing Lab	-	4	2
8	**15A02708**	Power Systems & Simulation Lab	-	4	2
9	**15A02709**	Project Work Part-A	-	2	-
		Total	**26**	**10**	**28**

IV B. Tech (EEE)– II Sem

S.No	Course Code	Subject	L	P	C
1	**Elective-II**		4	-	4
	15A02801a	1)Introduction to Power Quality			
	15A02801b	2) Power System Deregulation			
	15A02801c	3) Switched Mode Power Converters			
2	**Elective-III**		4	-	4
	15A02802a	1)Utilization of Electrical Energy			
	15A02802b	2) Introduction to Distributed Generation & Smart Grid			
	15A02802c	3) Energy Auditing & Demand Side Management			
3	**Elective-IV**		4	-	4
	15A02803a	1) Modern Control Theory			
	15A02803b	2) Reliability Engineering and its Application to Power Systems			
	15A02803c	**3)** Special Electrical Machines			

4	**Elective-V**		4	-	4
	15A02804a	1) Electricity Act and Costing of Electrical Systems			
	15A02804b	2) High Voltage Engineering			
	15A02804c	3) Process Control			
5		Seminar	-	4	2
6		Project Work Part-B	-	20	10
		Total	**16**	**24**	**28**

*BS – Basic Sciences
*ES – Engineering Science
*HS – Humanities and Social Science
*PC – Professional Subject -Core
*PE – Professional Subject –Elective
*MC- Mandatory Course
*OE- Open Elective

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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A55101	**ENGLISH**	4	0	0	4

Course Objectives:

1	To enable the students to communicate in English for academic and social purpose
2	To enable the students to acquire structure and written expressions required for their profession.
3	To develop the listening skills of the students and To inculcate the habit of reading for pleasure
4	To enhance the study skills of the students with emphasis on LSRW skills

Course Outcomes:

CO	The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												

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).

1. INTRODUCTION:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and technology. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.

The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

SYLLABUS:

UNIT –I

Chapter entitled *Humour* from "Using English"
Chapter entitled '*Homi Jehangir Bhabha'* 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 'My Struggle for an Education' 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 'The Autobiography of Abraham Lincoln' 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 ' T*he Happy Prince* 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 'If'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

Prescribed Books:

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

SUGGESTED READING:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **English Conversation Practice –**Grant Taylor, Tata McGraw Hill, 2009.
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. **Modern English Grammar-**Krishna SWAMI .McMillan, 2009.
7. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.
8. **Writing with a Purpose, Tickoo and Sasi Kumar, OUP, 2011**
9. **Strengthen Your Writing, Orient Blackswan**

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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A51101	**MATHEMATICS – I**	4	0	0	4

Course Objectives:

1	To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
2	To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
3	To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information.

Course Outcomes:

CO1	The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.
CO2	The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.

Mapping of Course outcomes with Program outcomes:

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

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

Exact, linear and Bernoulli equations, Applications to first order equations.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), method of variation of parameters, linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – II

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involutes, evolutes and envelopes..

UNIT – III

Curve tracing – Cartesian, polar and parametric curves. Length of curves, surface area of solid of revolution (single integrals)

UNIT – IV

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes in Cartesian and polar coordinates using double and triple integral.

UNIT – V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's, Stoke's and Gauss's Theorems.

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, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

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

Subject Code	Title of the Subject	L	T	P	C
15A52101	**APPLIED PHYSICS**	4	0	0	4

Course Objectives:

1	To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
2	To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications.
3	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.
4	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
5	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	
CO2	
CO3	
CO4	

Mapping of Course outcomes with Program outcomes:

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

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UNIT 1: PHYSICAL OPTICS, 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.

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

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

UNIT 2: CRYSTALLOGRAPHY AND QUANTUM MECHANICS

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction – Bragg's law –Laue method.

Quantum Mechanics: Introduction to matter waves – de'Broglie hypothesis – 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

Free electron theory: 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 – Classification of solids into conductors, semiconductors and insulators.

Semiconductor physics: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents – Einstein's equation – Continuity equation – Hall Effect.

UNIT 4: DIELECTRICS AND MAGNETIC MATERIALS

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

Magnetic materials: Introduction – Basic definitions – Origin of magnetic moment – Classification of magnetic materials into dia, para, ferro, antiferro and ferri 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 – Significance of nanoscale – Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic – Carbon nanotubes & its properties – Applications of nanomateials.

Smart Materials: 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 – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co.

2. Engineering physics – S. ManiNaidu, Pearson Education

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, Mc Graw 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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I B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A01101	**ENVIRONMENTAL STUDIES**	4	0	0	4

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	
CO2	
CO3	
CO4	

Mapping of Course outcomes with Program outcomes:

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

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Syllabus:

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 Erach Bharucha for University Grants Commission, Universities Press.
(2) Environmental Studies by Kaushik, New Age Pubilishers.
(3) Environmental Studies by Benny Joseph, TMH Pubilishers

REFERENCES :

(1) Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company
(2) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
(3) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(4) Comprehensive Environmental studies by J.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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I B. Tech -I Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A03102	**Engineering Graphics**	4	0	0	4

Course Objectives:

Course Outcomes:

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 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

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.

Suggestions:

Student is expected to buy a book mentioned under 'Text books' for better understanding.
Student should prepare rough sketches for all the problems given at the end of each chapter to improve his / her imaginations.
Student should also practice Auto CAD or any other drawing software to help understanding better.

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

Subject Code	Title of the Subject	L	T	P	C
15A52102	**APPLIED PHYSICS LAB**	0	0	4	2

Course Objectives:

1	
2	
3	
4	

Course Outcomes:

CO1	
CO2	
CO3	
CO4	

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

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

1. Determination of wavelengths of various colours 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.

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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A35101	**ENGINEERING WORKSHOP & IT WORKSHOP**	0	0	4	2

Course Objectives:

1	The objective of this subject is to provide the basic concepts about different manufacturing processes and use of various workshop tools the exposer to the Power tools used in the inclusion.
2	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
3	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
4	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,Prepare the Documents using Word processors.
CO2	Prepare Slide presentations using the presentation tool and Interconnect two or more computers for information sharing
CO3	Access the Internet and Browse it to obtain the required information and Install single or dual operating systems on computer
CO4	Prepare spread sheets for calculations using excel.

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

Engineering Workshop Lab

Syllabus:

1. TRADES FOR EXERCISES :

At least 2 exercises In each :

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.

Codes / Tables : Nil

Question Paper pattern : Test in any two out of 6 trades.

IT Workshop

PART – B (IT Workshop)

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, 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, Mc Graw 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

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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A55102	**ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**	0	0	4	2

Course Objectives:

1	To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills.
2	To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.
3	To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4	To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence and to train students to use language appropriately for interviews, group discussion and public speaking

Course Outcomes:

CO1	Becoming active participants in the learning process and acquiring proficiency in spoken English of the students.
CO2	Speaking with clarity and confidence thereby enhancing employability skills of the students

Mapping of Course outcomes with Program outcomes:

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

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:

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

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 – Social and Professional etiquettes – Telephone Etiquettes

UNIT – IV
JAM – Describing object/person/place/situation – Giving directions

UNIT – V
Debates and Group Discussions

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. K-Van Advanced Communication Skills
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.

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

Subject Code	Title of the Subject	L	T	P	C
15A55201	**TECHNICAL COMMUNICATION AND PRESENTATION SKILLS**	4	0	0	4

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 provide students with interactive practice sessions to make them internalize these skills.

Course Outcomes:

CO	Turning out the students with a clear concept of communication and presentation skills, getting them ready for placements and equipping them with readiness to implement them at work place.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												

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).

PREAMBLE:

In the increasingly globalized world, technical communication and presentation skills are assuming great importance. Industries and employers constantly complain that young engineers have adequate technical knowledge, but no communication and presentation skills. Success is defined these days in terms of possessing these skills. The syllabus has been designed to develop communicative competencies of the students.

Syllabus:

UNIT I

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

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

Prescribed Books

1. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 2009

Reference Books

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. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.

6.**English for Technical Communication for Engineering Students, Aysha Vishwamohan,**

Tata Mc Graw-Hill 2009.

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

Subject Code	Title of the Subject	L	T	P	C
15A51201	**MATHEMATICS – II**	4	0	0	4

Course Objectives:

1	Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution of partial differential equations.

Course Outcomes:

CO	The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												

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

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula- Complex form of Fourier series.

UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – IV

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.s

UNIT – V

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

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, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

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

Subject Code	Title of the Subject	L	T	P	C
15A53201	**APPLIED CHEMISTRY**	4	0	0	4

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.
5	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, nanom aterials with their applications and engineering materials.

Course Outcomes:

CO1	Understand the electrochemical sources of energy.
CO2	Understand industrially based polymers, various engineering materials.
CO3	Differentiation and uses of different kinds of photochemical reactions.

Mapping of Course outcomes with Program outcomes:

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

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).

Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering depends on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical materials engineers are in search of proper conducting polymers, the mechanical engineers are on lookout

for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

Syllabus:

UNIT.1

ELECTROCHEMISTRY

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries),Fuels 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, Polymerisation process, mechanism: cationic, anionic, free radical and coordination covalent.

Elastomers (rubbers)

Natural Rubber; 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.

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 Otto Hoffmann’s by product oven processes.

ii).Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane 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.

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)

iii).Semiconducting and Super Conducting materials-Principles and some examples

iii).Magnetic materials – Principles and some examples (9h)

UNIT.5

NANOCHEMISTRY & COMPOSITE MATERIALS

i). Nanochemistry Introduction, nanotechnology applications, nanomaterials, nanoparticles, nanostructure, supramolecular systems, future perspective.

ii). Composite Materials: Classification of Composites materials, Constituents of Composite materials. Disperse Phase composite materials Ex. a) Glass fibre reinforced polymer composite and b) 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 Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

REFERENCES:

1. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi
2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf 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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A05201	**PROBLEM SOLVING AND COMPUTER PROGRAMMING**	4	0	0	4

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	✓		✓			✓			✓			✓

Syllabus:

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,.

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, Pradip Dey, Manas Ghosh, Second Edition, OXFORD,
2. How to Slove 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. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
3. Programming In C, Remma Teraja, Second Edition OXFORD.
3 Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
3. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
4. Education / PHI
5. C Programming & Data Structures,E.Balagurusamy,TMH.

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I B. Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A02201	**ELECTRICAL CIRCUITS - I**	4	0	0	4

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–R-L-C Parameters-Voltage and Current Sources- Independent and Dependent Sources-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- Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex 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, Concept of Bandwidth and Q Factor.

UNIT- IV 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.

UNIT- V NETWORK THEOREMS

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

TEXT BOOKS:

1. Network Analysis by M.E Van Valkenberg, Prentice Hall (India), 3rd Edition.
2. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons
3. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill

REFERENCE BOOKS:

1. Electric Circuits by N.Sreenivasulu, REEM Publications
2. Electric Circuits- Schuam Series
3. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
4. Electrical Circuit Theory and Technology by John Bird, Routledge, Taylor & Fransis

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

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

Subject Code	Title of the Subject	L	T	P	C
15A04203	**ELECTRONIC DEVICES AND CIRCUITS**	4	0	0	4

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 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

Junction Diode Characteristics : Open circuited p-njunction, Biased p-n junction,p-n junction diode, current components in PN junction Diode, diode equation,V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.

UNIT- II

Rectifiers and Filters: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and Multiple Π section filter ,comparison of various filter circuits in terms of ripple factors.

UNIT- III

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collectorconfigurations,Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FETtypes, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- IV

Transistor Biasing and Thermal Stabilization : Need for biasing,operating point, load line analysis, BJT biasing- methods,basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE},Ic, and β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability. FET Biasing- methods and stabilization.

UNIT- V

BJT: Two port network, Transistor hybrid model, determination of h-parameters,conversion of h-parameters,generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:

1. J. Millman, C. Halkias, "Electronic Devices and Circuits", TataMc-Graw Hill, Second Edition,2010.
2. David A.Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2009.
3. Salivahanan, Kumar, Vallavaraj, "Electronic Devices and Circuits", Tata Mc-Graw Hill, Second Edition

REFERENCES:

1. Jacob Millman, C. Halkies, C.D.Parikh, "Integrated Electronics", Tata Mc-Graw Hill, 2009.
2. R.L. Boylestad and Louis Nashelsky,"Electronic Devices and Circuits",Pearson Publications,,9thEdition,2006.
3. BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, "Electronic Devices and Circuits", Pearson, 2nd edition.

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ELECTRICAL AND ELECTRONICS ENGINEERING

I B. Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A05202	**COMPUTER PROGRAMMING LAB**	0	0	4	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		✓		✓							✓	

Syllabus:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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ELECTRICAL AND ELECTRONICS ENGINEERING

I B. Tech - II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A53202	**APPLIED CHEMISTRY LAB**	0	0	4	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 to engineer 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 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 emphasisbeing either strongly correlated (2) and moderately correlated (1).

Syllabus:

The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have felt good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.

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 Alkalinity of Water
7. Determination of acidity of Water
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)

(Any 10 experiments from the above list)

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 Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A51301	**MATHEMATICAL METHODS**	4	0	0	4

Course Objectives:

1	This course aims at providing the student with the concepts of Matrices, Numerical Techniques and Curve fitting.

Course Outcomes:

CO1	The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

Mapping of Course outcomes with Program outcomes:

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

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

Elementary row transformations-Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations. Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix and inverse of a matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

UNIT – III

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT – IV

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods. Numerical solutions of Laplace equation using finite difference approximation.

TEXT BOOKS:

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

REFERENCES:

2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
3. 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.

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

Subject Code	Title of the Subject	L	T	P	C
15A02301	**ELECTRICAL CIRCUITS- II**	4	0	0	4

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- I THREE PHASE A.C CIRCUITS

Phase Sequence- Star and Delta Connection-Relation Between Line and Phase Voltages and Currents in Balanced Systems-Analysis of Balanced Three Phase Circuits- 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.

UNIT- II 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- III TRANSIENT ANALYSIS

D.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation-Initial Conditions-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-Initial Conditions-Solution Method Using Differential Equations and Laplace Transforms

UNIT- IV 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 V: 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:

1. Network Analysis by M.E Van Valkenberg, Prentice Hall (India), 3rd Edition.
2. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons
3. Electric Circuits- Schuam Series

REFERENCE BOOKS:

1. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill
2. Electric Circuits by N.Sreenivasulu, REEM Publications
3. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
4. Electrical Circuit Theory and Technology by John Bird, Routledge, Taylor & Fransis

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

Subject Code	Title of the Subject	L	T	P	C
15A02302	**ELECTRICAL MACHINES – I**	4	0	0	4

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						

Syllabus:

UNIT – I PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION

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. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
2. Electrical Machinery Fundamentals by Stephen J Chapman, Mc Graw Hills, 2005.
3. Electrical Machines – P.S. Bimbhra., Khanna Publishers, 2011.

REFERENCE BOOKS:

1. Performance and Design of D.C Machines – by Clayton & Hancock, BPB Publishers, 2004.
2. Electrical Machines -S.K. Battacharya, TMH Edn Pvt. Ltd., 3rd Edition, 2009.
3. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th Editon, 2003.
4. Electrical Machines – M.V Deshpande, Wheeler Publishing, 2004.
5. Electromechanics – I - Kamakshaiah S., Overseas Publishers Pvt. Ltd, 3rd Edition, 2004.

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

Subject Code	Title of the Subject	L	T	P	C
15A02303	**CONTROL SYSTEMS ENGINEERING**	4	0	0	4

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

Syllabus:

UNIT – I INTRODUCTION

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

UNIT – III STABILITY

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

Concepts of state, state variables and state model, derivation of state models from differential equations. Transfer function models. Block diagrams. Diagonalization. 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.

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.

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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTAPURAMU
ELECTRICAL AND ELECTRONICS ENGINEERING
II B.Tech - I SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A54301	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**	4	0	0	4

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

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 Analysis**: Cost concepts and cost behavior- Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

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.

UNIT IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – 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

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

The students are required to submit any one of the following- two assignments/ a mini project/submission of any two case studies in the subject.

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.

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

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

Subject Code	Title of the Subject	L	T	P	C
15A13301	**APPLIED ENGINEERING**	4	0	0	4

Course Objectives:

1	
2	
3	
4	

Course Outcomes:

CO1	
CO2	
CO3	
CO4	

Mapping of Course outcomes with Program outcomes:

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

Syllabus:

PART – A

UNIT - I

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

FLUID KINEMATICS : stream line, path line and streak lines and steam tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

Fluid dynamics: surface and body forces – Euler's and Bernoulli's equations for flowing, momentum equation and its application on force on pipe bend.

UNIT – II

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

HYDROELECTRIC POWER STATIONS: Elements of hydro electric power station-types-concept of pumped storage plants.

UNIT – III

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

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

TEXT BOOKS :

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput S.Chand Pubilications.
3. Fluid Mechanics by Dr.R.K.Bansal, Lakshmi Publications Pvt.Ltd.

REFERENCE BOOKS :

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria &.
2. Fluid Mechanics and Machinery by D.Rama Durgaiah, New Age Internat.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

PART – B

UNIT-IV

Description and working of steam engines and steam turbines (Prime movers) – impulse and Reaction turbines. Description and working of I.C. Engines – 4 stroke and 2 stroke engines – comparison – Gas Turbines – Closed and open type gas turbines.

UNIT-V

Reciprocating Air compressors – description and working of single stage and multistage reciprocating air compressors – inter cooling. Transmission of power; Belt, Rope, Chain and gear drive-simple problems.

UNIT - VI

Block diagram of a vapour compression refrigeration system. Names of common refrigerates. Basic principles of air-conditioning. Room and General air conditioning systems Ducting – Different types of ventilation system. Earth moving machinery and Mechanical handling equipment – bull dozers – power showels – Excavators – concrete mixer – Belt and bucket conveyers.

TEXT BOOKS :

1. Mechanical Technology by Khurmi.
2. Mechanical Technology by Kodandaraman C.P.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02304	**ELECTRIC CIRCUITS AND SIMULATION LAB**	0	0	4	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

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:

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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A04305	**ELECTRONIC DEVICES AND CIRCUITS LAB**	0	0	4	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.

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:

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.

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PART B: List of Experiments

(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics
    a. Part A: Germanium Diode (Forward bias& Reverse bias)
    b. Part B: Silicon Diode (Forward bias only)
2. Zener Diode Characteristics
    a. Part A: V-I Characteristics
    b. Part B: Zener Diode act as a Voltage Regulator
3. Rectifiers (without and with c-filter)
    a. Part A: Half-wave Rectifier
    b. Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
    a. Part A: Input Characteristics
    b. Part B: Output Characteristics

5. FET Characteristics(CS Configuration)
    a. Part A: Drain (Output) Characteristics
    b. 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

PART C: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

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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
15A51402	**COMPLEX VARIABLES AND SPECIAL FUNCTIONS**	4	0	0	4

Course Objectives:

1	To enable the students to understand the mathematical concepts of special functions & complex variables and their applications in science and engineering.

Course Outcomes:

CO1	The student achieves the knowledge to analyze the problems using the methods of special functions and complex variables.

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: Special Functions: Gamma and Beta Functions – their properties – Evaluation of improper integrals. Series Solutions of ordinary differential equations (Power series and Frobenius Method).

UNIT – II: Bessel functions – Properties – Recurrence relations – Orthogonality. Legendre polynomials – Properties – Rodrigue's formula – Recurrence relations – Orthogonality.

UNIT – III

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thomson method.

Conformal mapping: Transformation of e^z, Inz, z^2, Sin z, cos z, Bilinear transformation - Translation, rotation, magnification and inversion – Fixed point – Cross ratio – Determination of bilinear transformation.

UNIT – IV

Complex integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point – Isolated singular point – Pole of order m – Essential singularity.

UNIT – V

Residue – Evaluation of residue by formula and by Laurent's series – Residue theorem.

Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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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
15A02401	**ELECTRICAL MACHINES – II**	4	0	0	4

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

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 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 TESTING OF TRANSFORMERS AND THREE 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.

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.

UNIT-III THREE-PHASE INDUCTION MOTORS

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines-Production of a Rotating Magnetic Field - Principle of Operation - Rotor Emf and Rotor Frequency - Rotor Reactance, Rotor Current and Pf at Standstill and During Operation- Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and Their Inter Relationship.

UNIT-IV 3-PHASE INDUCTION MOTOR CHARACTERISTICS

Torque Equation - Expressions for Maximum Torque and Starting Torque - Torque Slip Characteristic – 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:

1. Electrical Machinery & Transformers by Irving Kosow –Pearson Publishers, Second Edition, 2012
2. Electric Machines –by I.J.Nagrath & D.P.Kothari,Tata Mc Graw Hill, 7th Edition.,2005.
3. Theraja, B.L. and Theraja, A.K., "Electrical Technology", Nirja Construction &Development Company Pvt. LTD, New Delhi, Vol. II, 22nd Edition, 2005.

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. Electromechanics-II (transformers and induction motors) S. Kamakshaiah, Hitech publishers, 2005.
4. Electric Machinery - A.E. Fitzgerald, C.Kingsley and S.Humans, Mcgraw Hill Companies, 6th edition, 2003.

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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
15A02402	**ELECTRIC POWER GENERATING SYSTEMS**	4	0	0	4

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.

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, Dhanpat Rai & 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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COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTHAPURAMU
ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02403	**ELECTROMAGNETIC FIELDS**	4	0	0	4

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).

Syllabus:

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 Impedence 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. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A04401	**SWITCHING THEORY AND LOGIC DESIGN**	4	0	0	4

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.

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
C05	2	1	2	1			2			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).

Syllabus:

UNIT I

Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes.

Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

UNIT II

The map method, four variable & Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV

Sequential Circuits, Latches, Flips-Flops - RS, JK, Master-Slave JK, D& T flip flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, asynchronous counters.
Asynchronous sequential circuits - Introduction, Analysis Procedure, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards.

UNIT V

Memory organization,classification of semiconductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD memories, content addressable memory,
programmable logic devices, PROM as PLD, programmable logic array (PLA) programmable array logic (PAL), field programmable gate array (FPGA).

Text Books:

1. M.Morris Mano & Michel D. Ciletti,"Digital Design", 3rd Edition Pearson.
2. ZviKOhavi and NirahK.Jha, "Switching theory and Finite Automata Theory", 3rd Edition Cambridge.

References:

1. Fundamentals of Logic Design- Charles H.Routh, Thomson Publications, 5th Edition ,2004.
2. Comer, "Digital & State Machine Design", Third Indian edition, OXFORD

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Subject Code	Title of the Subject	L	T	P	C
15A04408	**ANALOG ELECTRONIC CIRCUITS**	4	0	0	4

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	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
C05	1	1	1	1			1	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).

Syllabus:

UNIT I

Multistage Amplifiers

BJT and FET RC Coupled Amplifiers – Frequency Response. Cascaded Amplifiers. Calculation of Band Width of Single and Multistage Amplifiers. Concept of Gain Bandwidth Product.

UNIT II

Feedback Amplifiers

Concept of Feedback Amplifiers – Effect of Negative feedback on the amplifier Characteristics. Four

Feedback Amplifier Topologies. Method of Analysis of Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback Amplifiers.

UNIT III

Sinusoidal Oscillators

Condition for oscillations –LC Oscillators – Hartley, Colpitts, Clapp and Tuned Collector Oscillators – Frequency and amplitude Stability of Oscillators – Crystal Oscillators – RC Oscillators -- RC Phase Shift and Weinbridge Oscillators.

UNIT IV

Large Signal Amplifiers

Class A power Amplifier, Maximum Value of Efficiency of Class A Amplifier, Transformer coupled amplifier – Push-Pull Amplifier – Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier) – Phase Inverters, Transistor Power Dissipation, Thermal Runaway, Heat Sinks.

UNIT V

Linear wave shaping: High pass, Low pass RC circuits-response for sinusoidal, Step, Pulse, Square and Ramp inputs, Clippers and Clampers

Multi-Vibrators: Analysis of Diode and transistor switching times, Analysis and Design of Bistable, Monosatable and Astable Multi-vibrators, Schmitt trigger Using Transistors.

Text Books :

1. Integrated Electronics – Millman and Halkias
2. Pulse, Digital & Switching Waveforms by Jacob Milliman, Harbert Taub and Mothiki S Prakash Rao, 2nd edition 2008, Tata McGraw Hill Companies

References:

1. K.Lal Kishore, “Electronic Circuit Analysis”, Second Edition, BSP
2. Electronic Devices and Circuits, G.S.N. Raju, IK International Publications, New Delhi, 2006
3. Electronic Devices and Circuits – Mottershead
4. A. Anand Kumar, “Pulse and Digital Circuits”, PHI, 2005.
5. David A. Bell, “Solid State Pulse Circuits”, 4th edition, 2002 PHI.

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

Subject Code	Title of the Subject	L	T	P	C
15A54402	**HUMAN VALUES AND PROFESSIONAL ETHICS (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												

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.

Unit II: ENGINEERING ETHICS

Senses of 'Engineering Ethics- Variety of moral issued – 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 – Valuing time –Co operation – Commitment.

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 persons.

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 – Analyzing Ethical Problems in research - Intellectual property Rights(IPR).

Text Books:

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

2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill– 2003.

4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.

5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications.

6. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

7. "Professional Ethics and Human Values" by Prof.D.R.Kiran-

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Subject Code	Title of the Subject	L	T	P	C
15A02404	**ELECTRICAL MACHINES LAB - I**	0	0	4	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 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:

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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Subject Code	Title of the Subject	L	T	P	C
15A02405	**CONTROL SYSTEMS AND SIMULATION LAB**	0	0	4	2

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

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:

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

Subject Code	Title of the Subject	L	T	P	C
15A02501	**TRANSMISSION OF ELECTRIC POWER**	4	0	0	4

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.

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Subject Code	Title of the Subject	L	T	P	C
15A02502	**ELECTRICAL MACHINES - III**	4	0	0	4

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:

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:

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.

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

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

Subject Code	Title of the Subject	L	T	P	C
15A02503	**POWER ELECTRONICS**	4	0	0	4

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.

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
15A02504	**ELECTRICAL & ELECTRONIC MEASUREMENTS**	4	0	0	4

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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02505	**LINEAR & DIGITAL IC APPLICATIONS**	4	0	0	4

Course Objectives:
The main objectives of the course are:
1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce linear and non - linear applications of operational amplifiers.
3. To introduce the theory and applications of 555 and PLL.
4. To understand and implement the working of basic digital circuits

Course Outcomes:
On completion of the course, the students will have:
1. A thorough understanding of linear integrated circuits and Opamps.
2. Analyze the linear, non-linear and specialized applications of operational amplifiers.
3. Understanding of the different families of digital integrated circuits and their characteristics.
4. Able to design circuits using operational amplifiers for various applications.

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

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

REFERENCE BOOKS:

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

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ELECTRICAL AND ELECTRONICS ENGINEERING

Subject Code	Title of the Subject	L	T	P	C
15A54501	**MANAGEMENT SCIENCE**	4	0	0	4

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												

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.

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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
15A02506	**ELECTRICAL MACHINES LAB - II**	-	-	4	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
15A02507	**ELECTRICAL AND ELECTRONIC MEASUREMENT LAB**	-	-	4	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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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

III Year B.Tech II-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A02601	**SWITCHGEAR AND PROTECTION**	4	0	0	4

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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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

III Year B.Tech II-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A02602	**DIGITAL SIGNAL PROCESSING**	4	0	0	4

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

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

III Year B.Tech II-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A02603	**COMPUTER AIDED POWER SYSTEM ANALYSIS**	4	0	0	4

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.

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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
15A02604	**MICROPROCESSORS AND MICROCONTROLLERS**	4	0	0	4

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

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
15A02605	**POWER SEMICONDUCTOR CONTROLLED DRIVES**	4	0	0	4

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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02606a	**PLC & ITS APPLICATIONS (OPEN ELECTIVE)**	4	0	0	4

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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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem.

Subject Code	Title of the Subject	L	T	P	C
15A02606b	**RENEWABLE ENERGY SOURCES (OPEN ELECTIVE)**	4	0	0	4

Course Objectives: The student will be able to learn about:

1	Basic renewable energy sources.
2	The development of solar energy by solar radiation.
3	The development of wind energy.
4	The applications of solar & wind energy systems.
5	The study of bio-mass, geothermal and ocean energy technology.

Course Outcomes:
The student gets thorough knowledge on:

CO1	Understands the principles of wind power and solar photovoltaic power generation, fuel cells.
CO2	Evaluate the cost of generation for conventional and renewable energy plants.
CO3	Design suitable power controllers for wind and solar applications.
CO4	Study of Ocean & Geo-thermal power plants.
CO5	Micro Hydel electric plants, Hydrogen Energy Concepts.

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

Syllabus:

UNIT - I:
Introduction, problems associated with fossil fuel based energy options, need for alternate sources of energy, present energy scenario, Role and potential of new and renewable energy sources.

UNIT - II:
Basic characteristics of sunlight – Solar energy resource - Flat plate and concentrating collectors – advanced collectors - Photovoltaic cell - characteristics – Equivalent circuit – Photo voltaic for battery charging - Solar Applications- solar heating/cooling technique, solar distillation and drying.

UNIT - III:
Wind source – Wind statistics - Energy in the wind – Aerodynamics - Rotor types – Forces developed by blades - Aerodynamic models – Braking systems – Tower - Control and monitoring system – Power performance. Horizontal and vertical axis windmills, performance characteristics Wind driven induction generators - Power circle diagram - Steady state performance – Modeling - Integration issues – Impact on central generation - Transmission and distribution systems – Wind farm electrical design.

UNIT - IV:

Wind - Diesel systems - Fuel savings - Permanent magnet alternators – Modeling – Steady state equivalent circuit - Self-excited induction generators – Integrated wind - Solar systems.

UNIT - V:

Micro-hydel electric systems – Power potential – Scheme layout – Generation efficiency and turbine part flow - Isolated and parallel operation of generators – Geothermal - tidal and OTEC systems - Hydrogen energy concept, production and storage of hydrogen, utilization of hydrogen, safety measures - Introduction to sources of energy from nuclear power biomass, ocean and geothermal energy.

TEXT BOOKS:

1. Renewable Energy Technologies: Practical Guide for Beginneers, PHI Learning Pvt. Ltd. 2008.
2. S.P. Sukhatme, Solar Energy – Thermal Collection and Storage, Tata-Mc Graw Hill New Delhi, 1984.
3. G.D.Rai, Non-conventional Energy Sources, Khanna Publishers, New Delhi, 1999.
4. El Wakil, Power Plant Technology, Tata Mc Graw Hill, New York, 1999.

REFERENCE BOOKS:

1. Integration of Alternative Sources of Energy – Felix A. Farret, M. Godoy Simoes, John Wiley & Sons, 2006
2. Fundamentals of Renewable Energy Systems, New Age International Publishers, 2007.
3. Arora and S.Domkundwar, A Course in Power Plant Engineering, Dhanpat Rai and Sons, New Delhi 1998.
4. Ed Nejat Vezirog, Alternate Energy Sources, Mc Graw Hill, New York.
5. John F.Walker & Jenkins. N , Wind Energy Technology, John Wiley and sons, Chichester , U.K , 1997.
6. Freries LL , Wind Energy Conversion Systems, Prentice Hall, U.K., 1990.

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ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem.

Subject Code	Title of the Subject	L	T	P	C
15A02606c	**LINEAR & NONLINEAR OPTIMIZATION TECHNIQUES (OPEN ELECTIVE)**	4	0	0	4

Course 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

Course 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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COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTHAPURAMU
ELECTRICAL AND ELECTRONICS ENGINEERING

III B. Tech -II Sem.

Subject Code	Title of the Subject	L	T	P	C
15A02606d	**RELIABILITY AND SAFETY ENGINEERING (OPEN ELECTIVE)**	4	0	0	4

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.

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
15A55601	**ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (AUDIT COURSE)**	0	0	4	0

1. Introduction:

In the past engineering education has focused only on imparting "hard" or technical skills. With the entry of multinational companies in India there is a revolutionary change in the employment opportunities and recruitment process as well. Globalization demands universities to produce engineers who are equipped with effective interpersonal skills to meet global demands.

In this scenario the **Advanced English Language Communication skills lab** introduced at the 3rd B. Tech. level plays a key role to learn the foreign language in a happy atmosphere and in a successful way. Breaking through the traditional method of teaching, this course motivates student's learning attitude by providing an interactive learning environment.

This course is developed on the methodology of LSRW skills along with soft skills. This course focuses on the practical aspects of listening, speaking, reading and writing that enable the students to expose to various activities like group discussions, Oral Presentations, Mock interview sessions etc., Personality development, etiquettes and to provide corporate knowledge to help the students in facing interviews in a formal organizational set up.

2. Objectives:

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

- To expose the students to a variety of self instructional, learner-friendly modes of language learning.
- To enable the students to learn better pronunciation and accent through listening and reading exercises.
- To train students to use language appropriately for interviews, group discussion and public speaking.
- To initiate them to greater use of the computer in resume preparation, format-making etc.
- To help the students to cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer based competitive exams such as GRE, TOFEL, and GMAT etc.
- To enable the students to acquire good communication skills as well as soft skills to meet global demands.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

Unit I:

Reading &Listening Comprehension: Skimming –scanning- Extensive and Intensive reading. Reading for making inferences. Active VS passive listening. Listening and Note taking, - Listening for making inferences.

. **Unit II:**

Writing Skills: Formal and informal writing- Resume Writing-E-Correspondence.

. **Unit III:**

Technical Presentations (Oral) : Planning-Preparation-Presentation . Art of Persuasion-Audience analysis- Handling questions.

.

Unit IV:

Interview Skills: Types of Interviews - pre-interview planning- answering strategies. Analysis of One to one –interviews – group interviews - Mock interviews.

Unit V:

Soft Skills: Inter Personal Skills- Goal setting – Etiquettes and good manners – Team Working – Work Ethics--Time management – Problem Solving.

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Minimum Requirements

The English Language Lab shall have two parts:

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.

The Communication Skills Lab with movable chairs and audio-visual aids with a PA System, a TV, a digital stereo-audio and video system, a Camcorder, etc

System Requirement (Hardware Component):

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

P-IV Processor
Speed-2.8 GHZ
RAM_512 MB minimum
Hard Disk-80 GB
Headphones

Prescribed Software:

10. K-Van Advanced Communication Skills

11. Walden Infotech Advanced Communication Skills.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. **Technical Writing and Professional Communication, Huckin and Olsen** Tata Mc Graw-Hil 2009.

2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

3. **Cambridge English for Job-Hunting** by Colm Downes, Cambridge University Press, 2008

4. **Resume's and Interviews** by M.Ashraf Rizvi, Tata Mc Graw-Hill, 2008

5.. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.

6. **Managing Soft Skills** by K R Lakshminarayan and T.Muruguvel, Sci-Tech Publications, 2010

7. **The ACE of Soft Skills** by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010

8. **Soft Skills** by Dr. K. Alex, S.Chand

9. **Study Skills for Professional Students in Higher Education** by Dr. M. Adithan, S.Chand.

10. **Personality Development and Soft Skills by Barun** K. Mitra, Oxford Higher Education.

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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
15A02607	**MICROPROCESSORS AND MICROCONTROLLERS LAB**	0	0	4	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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III B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A02608	**POWER ELECTRONICS AND SIMULATION LAB**	0	0	0	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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IV - B.Tech -I-Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A02701	**ELECTRIC POWER DISTRIBUTION SYSTEMS**	4	0	0	4

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

Subject Code	Title of the Subject	L	T	P	C
15A02702	**INSTRUMENTATION**	4	0	0	4

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. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A02703	**INTRODUCTION TO HVDC TRANSMISSION & FACTS**	4	0	0	4

Course Objectives:

1	The course aims to impart in-depth knowledge of HVDC converters
2	To bring out the importance of HVDC transmission systems and controllers
3	To explain the concept of harmonics.
4	Use the static compensation schemes

Course Outcomes:

CO1	**Understand the operation of HVDC converters**
CO2	**Understand about FACTS devices and their applications**
CO3	Able to understand AC and DC transmission systems
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-1: INTRODUCTION

Comparison of AC and DC Transmission systems, Application of D.C. Transmission, Types of DC links, Typical layout of a HVDC converter station. HVDC converters, pulse number, Analysis of 6 - pulse Bridge circuit with and without overlap, converter Bridge characteristics, equivalent circuits of Rectifier and inverter configurations 12- pulse converters, Principles of DC links control, converter control characteristics, system control Hierarchy, Firing angle control, current and extinction Angle control starting and stopping of DC link.

Unit-2: HARMONICS, FILTERS AND REACTIVE POWER CONTROL

Introduction, generation of Harmonics, AC and DC Filters, Reactive power requirements at steady state, sources of Reactive power, static Var systems.

Unit-3: TYPES OF FACT DEVICES

Objectives of shunt compensation, Methods of controllable VAR generation, Static VAR compensators, SVC and STATCOM, Comparison

Unit-4: STATIC SERIES COMPENSATORS

Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), switching converter type series compensators – static synchronous series compensator (SSSC) – power angle characteristics – Basic operating control Schemes.

Unit-5: COMBINED COMPENSATORS

Introduction, unified power flow controller (UPFC), Basic operating principle, Independent real and reactive power flow controller, control structure.

Text Books:

[1]. HVDC power Transmission systems by K.R. Padiyar, Wiley Eastern Limited

[2]. Understanding of FACTS by N.G. Hingorani & L. Gyugyi, IEEE Press.

Reference Books:

[1]. **EHVAC, HVDC Transmission & Distribution Engineering,** S.Rao,Khanna publishers, 3rd edition 2003.

[2]. **Power Electronic Control in Electrical Systems-** E Acha. VG Agelidis & O Anaya-Lara. THE Miller – Elsevier, 2009.

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

Subject Code	Title of the Subject	L	T	P	C
15A02704	**POWER SYSTEM OPERATION AND CONTROL**	4	0	0	4

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
15A02705	**NEURAL NETWORKS & FUZZY LOGIC APPLICATIONS**	4	0	0	4

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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02707	**DIGITAL SIGNAL PROCESSING LAB**	0	0	4	2

OBJECTIVES:

- To implement the processing techniques using the instructions of DSP Processor
- To implement various filters using MATLAB Programming.

OUTCOMES: The student can be able to perform:

- Programming concepts to implement various digital filters
- Generation of signals and their processing
- Interfacing of DSP processor with other peripherals

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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02708	**POWER SYSTEMS & SIMULATION LAB**	0	0	4	2

Objectives:

The objectives of this course include:

- To do the experiments (in machines lab) on various power system concepts like determination of sequence impedance, fault analysis, finding of subtransient reactances.
- To draw the equivalent circuit of three winding transformer by conducting a suitable experiment.
- 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.
- To develop the SIMULINK model for single area load frequency problem.

Outcomes:
After completion of the course the student will able to;

- Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactances.
- Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.
- Get the practical knowledge on development of MATLAB program for formation of Y and Z buses.
- Get the practical knowledge on development of MATLAB programs for gauss-seidel and fast decouples load flow studies.
- Get the practical knowledge on development of SIMULINK model for single area load frequency problem.

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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ELECTRICAL AND ELECTRONICS ENGINEERING
IV B. Tech -II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A02801a	**INTRODUCTION TO POWER QUALITY (ELECTIVE-II)**	4	0	0	4

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
15A02801b	**POWER SYSTEM DEREGULATION (ELECTIVE – II)**	4	0	0	4

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
15A02803c	**SWITCHED MODE POWER CONVERTERS (ELECTIVE – II)**	4	0	0	4

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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ELECTRICAL AND ELECTRONICS ENGINEERING

IV B. Tech –II Sem. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A02802a	**UTILIZATION OF ELECTRICAL ENERGY** **(ELECTIVE – III)**	4	0	0	4

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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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

IV - B. Tech II SEM (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A02802b	**INTRODUCTION TO DISTRIBUTED GENERATION AND SMART GRID (ELECTIVE – III)**	4	0	0	4

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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02802c	**ENERGY AUDITING & DEMAND SIDE MANAGEMENT (ELECTIVE – III)**	4	0	0	4

Course 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)**

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

Subject Code	Title of the Subject	L	T	P	C
15A02803a	**MODERN CONTROL THEORY (ELECTIVE- IV)**	4	0	0	4

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.

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

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

Subject Code	Title of the Subject	L	T	P	C
15A02803b	**RELIABILITY ENGINEERING AND IT'S APPLICATIONS TO POWER SYSTEMS (ELECTIVE-IV)**	4	0	0	4

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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ELECTRICAL AND ELECTRONICS ENGINEERING

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

Subject Code	Title of the Subject	L	T	P	C
15A02803c	**SPECIAL ELECTRICAL MACHINES (ELECTIVE-IV)**	4	0	0	4

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 $L(\theta) - \theta$ 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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IV B. Tech – II Sem (EEE)

Subject Code	Title of the Subject	L	T	P	C
15A02804a	**ELECTICITY ACT AND COSTING OF ELECTRICAL SYSTEMS (ELECTIVE – V)**	4	0	0	4

Course 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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IV B. TECH -II SEM. (E.E.E)

Subject Code	Title of the Subject	L	T	P	C
15A02804b	**HIGH VOLTAGE ENGINEERING (ELECTIVE – V)**	4	0	0	4

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 Impulse 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
15A02804c	**PROCESS CONTROL (ELECTIVE – V)**	4	0	0	4

Course Objective:

The student will be able to understand:

1	Dynamics of various processes
2	Effect of various control actions
3	Knowledge on the final control elements
4	Evaluation criteria and tuning techniques of controllers
5	Concept of multi loop control techniques

Course Outcomes:

The student acquires knowledge about:

1	Dynamics of various processes
2	Effect of various control actions
3	Knowledge on the final control elements
4	Evaluation criteria and tuning techniques of controllers
5	Concept of multi loop control techniques

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

UNIT I PROCESS DYNAMICS

Need for process control – Mathematical model of Flow, Level, Pressure and Thermal processes – Interacting and non – interacting systems –Degrees of freedom – Continuous and batch processes – Self regulation – Servo and regulatory operations – Lumped and Distributed parameter models – Heat exchanger – CSTR – Linearization of nonlinear systems.

UNIT II CONTROL ACTIONS

Characteristic of on -off, proportional, single speed floating, integral and Derivative controllers – P+I, P+D and P+I+D control modes – Electronic PID controller – Auto/manual transfer - Reset windup – Practical forms of PID Controller

UNIT III FINAL CONTROL ELEMENTS

I/P converter – Pneumatic and electric actuators –Valve Positioner – Control Valves – Characteristic of Control Valves:- Inherent and Installed characteristics –Modeling of pneumatic control valve – Valve body: - Commercial valve bodies – Control valve sizing – Cavitation and flashing – Selection criteria.

UNIT IV CONTROLLER TUNING

Evaluation criteria – IAE, ISE,ITAE and ¼ decay ratio -Tuning: - Process reaction curve method, Continuous cycling method and Damped oscillation method – Determination of optimum settings for Mathematically described processes using time response and frequency response approaches – Auto tuning.

UNIT V MULTILOOP CONTROL

Feed- forward control – Ratio control – Cascade control – Inferential Control – Split – range and introduction to multivariable control – Examples from distillation column and boiler systems – IMC – Model Predictive Control – Adaptive control – P&ID diagram.

TEXT BOOKS:

1. Bequette, B.W.,"Process Control Modeling, Design and Simulation", Prentice Hall of India, 2004.
2. Stephanopoulos, G., "Chemical Process Control - An Introduction to Theory and Practice", Prentice Hall of India, 2005.
3. Seborg, D.E., Edgar,T.F. and Mellichamp, D.A., "Process Dynamics and Control", Wiley John and Sons, 2nd Edition, 2003.

REFERENCES:

1. Coughanowr, D.R.,"Process Systems Analysis and Control", McGraw-Hill International Edition, 2004.
2. D. P. Eckman, "Automatic Process control", 7th Edition, John Wiley, New York,1990.
3. Considine, D.M., Process Instruments and Controls Handbook, Second Edition, McGraw, 1999.
4. Bela.G.Liptak., "Process Control and Optimization"., Instrument Engineers' Handbook., volume 2, CRC press and ISA, 2005.
5. Curtis D. Johnson Process Control Instrumentation Technology, 8th Edition, Pearson, 2006.