

Faculty of Engineering & Technology
 KAKATIYA UNIVERSITY, WARANGAL-506 009
 Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER

Sl. No.	Category	Course code	Course title	Period/Week			Credits
				L	T	P	C
1	BSC	BSC105	Mathematics III	3	0	0	3
2	PCC	EE211	Electrical Circuits - I	3	1	0	4
3	PCC	EE212	Electrical Machines-I	3	1	0	4
4	PCC	EE213	Power Systems - I	3	1	0	4
5	PCC	EE214	Electromagnetic fields	3	1	0	4
6	PCC	EE215	Analog Electronics	3	0	0	3
7	PCC	EE216L	Analog Electronics Laboratory	0	0	2	1
8	PCC	EE217L	Computer Aided Electrical Drawing Laboratory	0	0	2	1
9	MC	MC210	Environmental Sciences	2	0	0	0
TOTAL CREDITS				20	5	4	24

[L= Lectures, T= Tutorials, P= Practical, C= Credits]

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B. Tech. (EEE) III SEMESTER
BSC-105
Mathematics - III
STATISTICS, PROBABILITY, AND NUMERICAL TECHNIQUES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Module1: Statistical Methods

Introduction, Collection of Data, Graphical Representation, Measures of Dispersion, Moments, Skewness, Kurtosis, Correlation, Coefficient of Correlation, Lines of Regression.

(Sections 25.1, 25.2, 25.3, 25.6, 25.9, 25.10, 25.11, 25.12, 25.13, 25.14 of Text Book)

Module2: Probability & Distributions

Probability, Addition Law of Probability, Independent Events, Baye's Theorem, Random Variable, Continuous Probability Distribution, Expectation, Moment Generating Function, Binomial Distribution, Poisson Distribution, Normal Distribution, Exponential Distribution.

(Sections 26.1, 26.4, 26.5, 26.6, 26.7, 26.9, 26.10, 26.11, 26.14, 26.15, 26.16, 26.19(6) of Text Book)

Module3: Numerical Techniques-I

Solution of Algebraic and Transcendental Equations, Principle of Least Squares, Method of Least Squares, Fitting of Other Curves, Finite Differences, Forward Differences, Backward Differences. (Sections 28.2, 24.4, 24.5, 24.6, 30.2, 30.2(1), 30.2(2) Of Text Book)

Module4: Numerical Techniques-II

Central Differences, Other Difference Operators, Newton's Interpolation Formulae, Gauss's Forward Interpolation Formula, Interpolation with Unequal Intervals, Numerical Differentiation. Sections 29.7, 29.4, 29.6, 29.7(1), 29.9, 30.1. of Text Book)

Module5: Numerical Techniques-III

Numerical Integration, Trapezoidal Rule, Simpson's one-third Rule, Simpson's three-eight Rule, Weddle's Rule, Solution of Simultaneous Linear Equations (Iterative Methods)

(Sections 30.4, 30.6, 30.7, 30.8, 30.10, 28.5 of Text Book)

Text Book:

B.S Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publications.

References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons
2. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Pvt. Ltd.

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B. Tech. (EEE) III SEMESTER
MC-210
ENVIRONMENTAL SCIENCES

Teaching Scheme				Examination Scheme	
L	T	P	C	CIE	ESE
0	0	2	0	30 Marks	70 Marks

UNIT-I (8)

Introduction to Environmental Science: Environment and society, major environmental issues: Ozone layer depletion, Acid rains, global climate change etc, sustainable development, Environmental impact assessment, environmental management

Natural Resources Utilization and its Impacts: Energy, minerals, water and land resources, Resource consumption, population dynamics, urbanization..

UNIT-II (8)

Ecology and Biodiversity: Energy flow in ecosystem, food chain, nutrient cycles, eutrofication value of biodiversity, biodiversity at global, national and local levels, threats for biodiversity, conservation of biodiversity.

UNIT-III (8)

Water Pollution: Sources, types of pollutants and their effects, water quality issues, contaminant transport, self-purification capacity of streams and water bodies, water quality standards, principles of water and wastewater treatment.

UNIT-IV (8)

Air Pollution: Sources, classification and their effects, Air quality standards, dispersion of pollutants, control of air pollution, automobile pollution and its control.

UNIT-V (8)

Solid Waste Management: Sources and characteristics of solid waste, effects, Collection and transfer system, disposal methods.

Text Books:

1. M. Chandrasekhar, Environmental science, Hi Tech Publishers, 2009.
2. P.N. Modi (2006), Water supply Engineering – Environmental Engineering (Vol. I) – Standard Book House.
3. Gerard Kiely, Environmental Engineering, McGraw Hill Education Pvt Ltd, Special Indian Edition, 2007.

References:

1. W P Cunningham, M A Cunningham, Principles of Environmental Science, Inquiry and Applications, Tata McGraw Hill, Eighth Edition, 2016.

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B. Tech. (EEE) III SEMESTER
EE-211
ELECTRICAL CIRCUITS - I

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT – I

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff’s laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis.

UNIT – II

Single-Phase Circuits: RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series- parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Band-width and Q-factor.

UNIT – III

Network theorems: Superposition theorem, Thevinin’s theorem, Norton’s theorems, Maximum power transfer theorem, Tellegen’s theorem, Compensation theorem, Milliman’s theorem and Reciprocity theorem.(AC & DC).

UNIT – IV

Poly-phase Circuits: Analysis of balanced and unbalanced 3 - phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

UNIT – V

Transient analysis: Transient response of RLC circuits, Formulation of integral differential equations, Initial conditions, Response of RL, RC and RLC networks subjected to internal energy, Response to impulse, step, ramp, exponential and sinusoidal excitations.

Suggested Reading:

1. Van Valkenburg M.E., *Network Analysis*, Prentice Hall of India, 3rd Edition, 2000.
2. William Hayt H, Kimmerly Jack E, Steven Durbin M, *Engineering Circuit Analysis*, McGraw Hill, 6th Edition, 2002.
3. Jagan N.C, Lakshrninarayana C., *Network Analysis*, B.S. Publications, 3rd Edition, 2014.

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B. Tech. (EEE) III SEMESTER
EE-212
ELECTRICAL MACHINES – I

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT-I

Electromechanical energy conversion: Principle of energy conversion, Flow of energy in electro mechanical devices, Coupling-field reaction, Singly excited magnetic system – Electric energy input, Magnetic field energy stored, Mechanical work done – with slow, instantaneous and transient movement of armature, Calculation of mechanical force, Doubly excited magnetic systems, electromagnetic and reluctance torques.

UNIT-II

DC Machines: Simple loop generator, Essential parts of DC machine, Details of Lap winding &

Wave winding, EMF equation, Armature reaction — Remedies, Ampere turns, Commutation — reactance voltage, Methods of improving commutation — High resistance brushes, shifting of brushes, Interpoles, Compensating winding.

UNIT- III

DC Generators; Classification & types of DC generators, Open circuit, Internal & External characteristics — Critical resistance & critical speed, Voltage regulation, Conditions for self excitation, Causes of failure of voltage buildup, Parallel operation Series, Shunt and Compound generators, Applications.

UNIT- IV

DC Motors: Classification & Types of DC motors, Back emf, Speed regulation, Armature torque, Armature reaction, Operating characteristics, Performance curves, Basic speed control methods Shunt and Series motors, Three & four-point starters, Calculation of step resistances, Applications.

UNIT - V

Testing, Losses and Efficiency: Power losses — Copper losses and Rotational losses, Power flow, Efficiency, Testing - Brake Test and Swinburne’s test, Hopkinson’s test, Field’s test, Retardation test, Heat run test.

Suggested Reading

1. D.P. Kothari, I.J. Nagrath, *Electric Machines*, Tata McGraw Hill, 4th Edition, 2010
2. Bhimbra P.S., *Electrical Machinery*, Khanna Publications, 2000
3. Gupta J.B., *Theory and Performance of Electrical Machines*, S.K. Kataria & Sons, Delhi, 2005.
4. A.E. Clayton and N.N. Hancock, *The Performance and Design of Direct Current Machines*, 3rd edition, 1959.

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B. Tech. (EEE) III SEMESTER
EE-213
POWER SYSTEMS – I

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT- I

Economics of Power Generation: Load Curve, Load Demand and Diversified factors, Base

Load and Peak load operation, Types of costs and depreciation fund calculations, Methods of power factor improvement, Economics of power factor improvement, Tariffs, Distribution: 2 wire and 3 wire distributors, Ring mains, AC distribution calculations.

UNIT- II

Steam Power Stations: Choice of site, Layout & various parts of station, Boilers, Turbines,

Super Heaters, Economizers, Air pre-heaters etc. and their Pulverized fuel, Coal handling. **Hydro-Electric Power plants:** Estimation Hydrograph, Flow duration curve, Mass curve, Storage and pondage, Types electric plants and layouts, Prime movers for hydro -electric plants.

UNIT- III

Nuclear Power Plants: Fissile materials, Working principle of nuclear plants and reactor control, Shielding, Types of reactors.

Non-Conventional Energy Sources – Basic principles of Wind, solar and gas turbines..

UNIT - IV

Over-Head Lines: Supports sag and tension calculations, Effect of wind and ice, Erection conditions, Insulators: Types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, Testing of insulators. Insulated Cables: Conductors for cables, Insulating materials, Mechanical protection, Low voltage cables, Grading of cables, Three phase high voltage cables and Super voltage cables, Capacitance of three-core cables.

UNIT - V

Inductance and Capacitance of Transmission Lines: Inductance and capacitance of overhead line conductors, Single phase and three phase with symmetrical composite conductors, GMR and GMD Spacing, Transposition, Bundled conductors, Effect of earth capacitance.

TEXT BOOKS

1. WadhwaC.L., *Electrical Power Systems*, New Age International (P)Ltd.,4th Edition,2007.
2. WadhwaC.L., *Generation, Distribution and Utilization of Electrical Energy*, New Age International (P) Ltd., 4thEdition, 2006

Suggested Reading.

1. SinghS.N., *Electrical Power Generation, Transmission and Distribution*, Prentice Hall of India, Pvt. Ltd. New Delhi, 2003.
2. V.K.Mehta,*Principles of Power Systems*, S.Chand and Co., 2007.

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B. Tech. (EEE) III SEMESTER
EE-214
ELECTRO MAGNETIC FIELDS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT - I

Review of Vector Analysis: Coulomb’s Law, Electric field intensity, Electric field due to different charge distributions. Electric field due to line charge, Sheet charge, Volume charge distribution, Electric flux density, Gauss’s law, Divergence theorem,. Potential, Potential gradient, potential field of different charge distributions, Applications of above laws.

UNIT - II

Energy in electrostatic field, Poisson’s and Laplace equations, Uniqueness theorem, Solution of Laplace’s equation, Conductors, Dielectric capacitance, Conductor properties and Boundary conditions, Calculation of capacitance, Boundary conditions for conductors and perfect dielectric materials.

UNIT - III

Steady magnetic field, Biot-Savart’s law, Ampere’s law, Stoke’s theorem, Magnetic scalar vector potential Faraday’s law, Magnetic boundary conditions, Self and Mutual inductances, Force on moving charge, Force on differential elements, Magnetic circuits, Analogy with electrical circuits, Applications of above laws.

UNIT- IV

Maxwell’s equations in Integral form, Line and surface integrals, Application to static fields, Boundary conditions, Maxwell’s equations in differential forms, Continuity equation, Potential function for static fields, Field equations in vector forms, energy storage in electric and magnetic fields.

UNIT - V

EM waves in homogeneous medium solutions for free space conditions, Uniform plane wave propagation, Poisson’s and Laplace’s equations, Sinusoidally time varying uniform plane waves in free space, Uniform plane waves in dielectrics and conductors, Poynting vector, Power dissipation, Reflection of uniform plane waves, Introduction to method of moments, Method of images.

Suggested Reading

1. Matthew Sadiku N.O., *Elements of Electromagnetics*, Oxford University Press, 4th Edition, 2006.
2. William. Hayt H, Buck John A., *Engineering Electromagnetics*, Tata McGraw Hill, 7th Edition, 2003.
3. Nannapaneni Narayana Rao, *Elements of Engineering Electromagnetics*, PHI, New Delhi, 5th Edition, 2002.

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B. Tech. (EEE) III SEMESTER
EE-215
ANALOG ELECTRONICS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT I

Diode circuits (4 Hours)

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

UNIT-II

BJT circuits (8 Hours)

Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits.

UNIT-III

MOSFET circuits (8 Hours)

MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier :small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.

UNIT-IV

Differential, multi-stage and operational amplifiers (8 Hours)

Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product).

UNIT-V**Applications of op-amp (8 Hours)**

Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion: (Flash, Successive Approximation, Dual slope).

TEXT BOOKS

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.

Suggested Reading:

3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. D.Roy Chowdary and Shail B Jain, "*Linear Integrated Circuits*", 3rd Edition, New Age International (P) Limited, New Delhi, 2008.

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B. Tech. (EEE) III SEMESTER
EE-216L
ANALOG ELECTRONIC LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

List of Experiments:

1. Characteristics of Semiconductor Diodes (Si, Ge and Zener).
2. Characteristics of BJT (CB, CE).
3. CRO and its Applications.
4. Rectifiers: Half Wave Rectifier, Full Wave Rectifier with and without filters
5. Characteristics of FET.
6. Transistors as an Amplifier.
7. Inverting, Non-Inverting Amplifier using Op amp.
8. RC phase shift Oscillator
9. Wien Bridge Oscillator
10. Integration and Differentiation using Op-amp.

Suggested Readings:

1. David Bell A., *Operational Amplifiers and Linear ICS*, Prentice Hall of India, 2005.
2. Maheshwari and Anand, *Laboratory Experiments and PSPICE Simulations in Analog Electronics*, 1st edition, Prentice Hall of India, 2006.

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B. Tech. (EEE) III SEMESTER
EE-217L
COMPUTER AIDED ELECTRICAL DRAWING LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

Drawing of the following using Electrical CADD / Corel Draw / MS Word / PPT/Visio

1. Lines, Arcs, Curves, Shapes, Filling of objects, Object editing & Transformation.
2. Electrical, Electronic & Electro – mechanical symbols.
3. House – wiring diagrams and layout.
4. Simple power and control circuit diagrams.
5. Electrical machine winding diagrams. (A.C & D.C)
6. Transmission tower, Over head lines – ACSR conductors, Single circuit, double circuit, and Bundle conductor.
7. Constructional features of D.C motors, AC motors and Transformers.
8. D.C and A.C motor starter diagrams.
9. Lamps used in illumination
10. Single line diagram of Power System

Suggested Readings:

1. KB.Raina, S.K.Bhattacharya,*Electrical Design, Estimating and Costing*, Wiley Eastern Ltd., 1991.
2. Nagrath, Kothari, *Electrical Machines*, Tata McGraw Hill Publishing Company Ltd., 2000.
3. A.K.Sawhney, *A Course in Electrical Machines Design*, Dhanpat Rai and Sons, 1996.