SARDAR PATEL UNIVERSITY , BALAGHAT
School of Engineering & Technology
Academic Session 2023-24 & Onwards

Four Year B.Tech in Electrical Engineering (EE)

BEE 301

Energy, Environment, Ecology & Society

Unit –I

Energy- Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

Unit –II

Ecosystem – Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation,

Unit –III

Air Pollution & Sound Pollution -

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

Unit –IV

Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. **Soil Pollution** – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

Unit –V

Society, Ethics & Human values– Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

References Books:

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3.Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
6 BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
7. Bala Krishnamoorthy; "Environmental management"; PHI 8. Gerard Kiely, "Environmental Engineering" ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunninghan WP and MA; principles of Environment Sc; TMH
11. Pandey, S.N. & Mishra, S.P. Environment & Ecology, 2011, Ane Books , Pvt. Ltd, New Delhi
12. Joseph, B. Environmental Studies, 2009 Tata Mcgraw Hill, Edu India Ltd. New Delhi.
13. Gour R.R, Sangal, R &Bagaria, G.P. , Excel Books, A-45, Naraina Phase-I New Delhi.-110028

Four Year B.Tech in Electrical Engineering (EE)
BOT302
Engineering Mathematics II

Course Objectives: To learn
• Methods of solving the differential equations of first and higher order.

• Evaluation of Partial Differential Equations

• The physical quantities involved in engineering field related to vector valued functions

• The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes:
          After learning the contents of this paper the student must be able to
• Identify whether the given differential equation of first order is exact or not

• Solve higher differential equation and apply the concept of differential equation to real world problems

• Evaluate the Application in Solution of Wave and Heat Conduction Equations.

• Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE

Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type , sin , cos , method of variation of parameters; Equations reducible to linear ODE with constant coefficients:
Legendre's equation, Cauchy-Euler equation.

UNIT-III: Partial Differential Equations

Partial Differential Equations of First Oder, Partial Differential Equations with Constant Coefficients, Separation of Variable Method with Application in Solution of Wave and Heat Conduction Equations.

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCES:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

Four Year B.Tech in Electrical Engineering (EE)
BEE 303
Network Analysis

Unit –I

Introduction to circuit elements R,L,C voltage & current sources KCL and KVL , Nodal & Mesh analysis, Network Topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices,

Unit –II

Network Theorems for DC circuits- Thevenins & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

Unit –III

Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem,

Unit –IV

Network Theorems for AC circuits- Thevenins & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

Unit –V

Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters,

List of Experiment

1. To Verify Thevenin Theorem.

2. To Verify Superposition Theorem.

3. To Verify Reciprocity Theorem.

4. To Verify Maximum Power Transfer Theorem.

5. To Verify Millman's Theorem.

6. To Determine Open Circuit parameters of a Two Port Network and to Determine Short Circui parameters of a Two Port Network.

7. To Determine A,B, C, D parameters of a Two Port Network

8. To Determine h parameters of a Two Port Network

9. To Find Frequency Response of RLC Series Circuit.

10. To Find Frequency Response of RLC parallel Circuit.

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Refrence books:-

1. M.E. Van Valkenburg, Network Analysis,Pearson

2. William H Hayt. & Jack E. Kemmerly, Steven M Durbin; Engineering Circuit Analysis;McGrawHill

3. Richard C Dorf, James A Svoboda, Introduction to Electric Circuits, Wiley India, 2015

4. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits; McGrawHill

5. J David Irwin, Robert M Nelms, Engineering Circuit Analysis, Wiley India,2015

6. Robert L Boylestad, introductory circuit analysis, Pearson,2016

7. M S Sukhija, T K Nagsarkar; Circuits and Networks, Oxford University Press, 2015

8. Samarajit Ghosh, Network Theory Analysis and Synthesis

Four Year B.Tech in Electrical Engineering (EE)

BEE 304
Analog Electronics

Unit –I

Semiconductor Diodes: Theory of P-N junction, temperature dependence and break down characteristics, junction capacitances, Zener diode, Varactor diode, Tunnel diode, PIN diode, LED, Photo diode, Schottky diode, Diode applications: series –parallel configurations, full wave and half wave rectification, voltage multiplier circuits, diode testing

Unit –II

Transistors: BJT, types& configuration, working principal, characteristics, and region of operation, load line, biasing methods, Small signal analysis of transistor (low frequency) using h-parameters, thermal runaway and thermal stability.FET, MOSFET, Transistor as an amplifier, gain,bandwidth, frequency response,

Unit –III

Feedback amplifierand Oscillators: Feedback amplifier, negative feedback, voltage-series, voltage shunt,current series and current shunt feedback, Sinusoidal oscillators, L-C (Hartley-Colpitts) oscillators, RC phase shift, Wien bridge, and Crystal oscillators. Power amplifiers, class A, class B, class A B, C amplifiers, their efficiency and power Dissipation, Push-pull and complimentary symmetry push-pull amplifier.

Unit –IV

Wave Shaping circuits: Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibrators. Clipper and clamper circuit, Differential amplifier, calculation of differential, common mode gain and CMRR using h- parameters, Darlington pair, Boot strapping technique. Cascade and cascade amplifier.

Unit –V

Operational Amplifier: Operational amplifier basics, practical Op-amp circuits & characteristics, slew rate , bandwidth, offset voltage ,basic current, application, inverting, non-inverting amplifier, summer, average, differentiator, integrator, differential amplifier, instrumentation amplifier, log and antilog amplifier, voltage to current and current to voltage converters, comparators Schmitt trigger , active filters, 555 timer and its application.

List of Experiment

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.

2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth.

3. Study the effect of voltage series, current series, voltage shunt and current shunt feedback on amplifier using discrete components.

4. Design & realize inverting, non-inverting and buffer amplifier using 741 op-amps.

5. Verify the operation of a differentiator circuit using op amp IC 741 and show that it acts as a high pass filter.

6. Verify the operation of a integrator circuit using op amp 741 and show that it acts as a low pass filter.

7. Design & Verify the operation of adder and subtractor circuit using op amp 741.

8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.

9. Study of IC 555 as astable and monostable multivibrator.

10. Design & realize using op amp 741, wein-bridge oscillator

Refrence Book:-

1. Robert L Boylestad, Louis Nashelsky; Electronic Devices and Circuits; Pearson
2. Jacob Millman, Cristos C Halkias, Satyabrata Jit; Electronic Devices and Circuits; McGraw-Hill
3. Anil K Maini, Electronic Devices and Circuits, Wiley
4. S Salivahanan, N Suresh Kumar; Electronic Devices and Circuits; McGraw- Hill

Four Year B.Tech in Electrical Engineering (EE)
BEE 305
Electrical Measurements and Measuring Instruments

Unit –1

Galvanometers – Theory, principle of operation and construction of ballistic galvanometer, D'arsonal galvanometer, Definition of analog & digital instruments, Classification of analog instruments, their operating principle, Operating force, Types of supports, Damping, Controlling.

Unit –1I

Different types of Ammeter & Voltmeter – PMMC, MI, Electrodynamometer, Induction, Expression for control & deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier.Digital Voltmeter, Ammeter, Multimeter and Wattmeter.

Unit –1II

Instrument transformers: Potential and current transformers, ratio and phase angle errors, testing of instrument transformers, Difference between CT and PT, errors and reduction of errors.
Measurement of power: Power in AC and DC Circuit, Electrodynamometer type of wattmeter, Construction, theory, operation & error, Low power factor & UPF wattmeter, Double element and three element dynamometer wattmeter, Measurement of power in three phase circuit, one, two & three wattmeter method, Measurement of reactive power by single wattmeter, Measurement of power using CTs & PTs.

Unit –1V

Measurement of Energy: Single phase and three phasedigital / Electronic energy meter – construction & operation – Energy flow and power calculations, errors – Testing by phantom loading, Tri-vector meter, Maximum demand meter, Ampere hour meter.

Unit –V

Power factor meter– Single phase and three phase Electro-dynamometer type & moving iron type.
Frequency meter – Vibrating reed, Resonance type & Weston type, Synchronoscope,
Ohmmeter –series & stunt type, Megger & Ratio meter.

List Of Experiment

1. Measurement of low resistance using Kelvin's Double bridge

2. Measurement of medium resistance using Wheatstone's bridge

3. Measurement of high resistance by loss of charge method

4. Measurement of Insulation resistance using Megger.

5. Measurement of earth resistance by fall of potential method and verification by using earth tester

6. Measurement of power in a single phase ac circuit by 3 voltmeter/ 3 Ammeter method

7. Calibration of a dynamometer type of wattmeter with respect to a standard/Sub Standard wattmeter

Reference books:-

1. G. K. Banerjee,' Electrical and Electronic Measurements'. PHI Learning Pvt.Ltd.
2. R. B. Northrop,' Introduction to Instrumentation and Measurement'; CRC press Taylor & Francis
3. Vijay Singh;' Fundamentals of Electrical & Electronic Measurements', New Age International Publishers.

4. A.K. Sawhney; 'A course in Electrical & Electronic Measurements & Instrumentation'; Dhanpat Rai & co(p) Ltd ,New Delhi

Four Year B.Tech in Electrical Engineering (EE)

BEE 306P
Electrical Workshop

(Suggested Exercise)

1.Study of different types of wires and determination of gauge of wire through SWG.

2. Study of different types of LT & HT cables

3. Study and practice of wire joints.

4. Study and practice of cable laying and joints of cable

5. Description of various insulators.

6. Study of various types of wirings.

7. Study of various types of LT and HT poles/Towers.

8. Study and practice of DC machine winding.

9. Development of tube light circuit using thermal/Bimetallic starter.

10. Development of series circuit band.

11. Development of circuit of two lamps operating with single switch.

12. Study of DC/AC machine starters.

BEE 307P
GD/Seminar/Spoken English

(Suggested Topics)

1. Different types of wires and determination of gauge of wire through SWG.

2. Different types of LT & HT cables

3. Wire joints.

4 Cable laying and joints of cable

5. Description of various insulators.

6. Various types of wirings.

7. Various types of LT and HT poles/Towers.

8. DC machine winding.

9. Development of tube light circuit using thermal/Bimetallic starter.

10. Development of series circuit band.

11. Development of circuit of two lamps operating with single switch.

12. DC/AC machine starters.

Students are Advised to present seminar individually with the help of PPT Presentation in above topics. Student can choose also their topics for Seminar/GD as per instruction of department faculties.