Chhattisgarh Swami Vivekananda Technical University, Bhilai

Semester: B.Tech – 3rd **Branch: All branches**
Subject: Mathematics- III **Course Code: B000312(014)**

Total Marks in End Semester Exam: 100 **L: 3 T: 1 P: 0 Credits 4**
Minimum number of Class Tests: 02

Course Objectives:

1. To provide knowledge of Laplace transform of elementary functions including its properties and applications to solve ordinary differential equations.
2. To have thorough knowledge of partial differential equations which arise in mathematical descriptions of situations in engineering.
3. To study about a quantity that may take any of a given range of values that can't be predicted as it is but can be described in terms of their probability.
4. To provide a thorough understanding of interpolation and methods to solve ordinary differential equation.

UNIT-I Laplace transform: Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by t^n, Division by t, Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT- II Partial differential equation: Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT- III Random variable: Discrete and continuous probability distributions, Mathematical expectation, Mean and Variance, Moments, Moment generating function, probability distribution, Binomial, Poisson and Normal distributions.

UNIT- IV Interpolation with equal and unequal intervals: Finite differences, Newton's Forward & Backward Difference Formulae, Central Difference Formula, Stirling's Formula, Bessel's Formula, Lagrange's Formula and Newton's Divided Difference Formula.

UNIT-V Numerical Solution of Ordinary Differential Equations: Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Runge-Kutta Methods, Predictor-corrector Methods- Milne's Method, Adams-Bashforth Method.

Text Books:

1. "Higher Engg. Mathematics", Dr. B.S. Grewal– Khanna Publishers.
2. "Advanced Engg. Mathematics" , Erwin Kreyszig – John Wiley & Sons.
3. "Numerical Methods in Engineering and Science" , Dr. B.S. Grewal, Khanna Publishers.
4. "Numerical Methods for Scientific and Engineering Computation" , M .K. Jain, S. R. K

Reference Books:

1. "Applied Mathematics", P. N. Wartikar& J. N. Wartikar. Vol-II Pune Vidyarthi Griha Prakashan, Pune.
2. "Applied Mathematics for Engineers & Physicists", Louis A. Pipes- TMH.
3. "Numerical Methods for Scientists and Engineers" K. Shankar Rao, Prentice Hall of India.
4. "Numerical Methods" P. Kandasamy, K. Thilagavathy and K. Gunavathi, S. Chand publication.

Course outcomes: After studying the contents of the syllabus in detail the students will be able to: Define (mathematically) unit step unit impulse, Laplace transform its properties, inverse and applications to solve ordinary differential equations and find Numerical solution of differential equations, which may be arising due to mathematical modelling based on engineering problems. Hands on these Mathematical topics will make them equipped to prepare for higher studies through competitive examinations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Technology**

Branch: **Electrical & Electronics** Semester: **III**

Subject: Electrical Circuit Analysis Code: **B000311(025)**

Total Theory Periods: **40** Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)** Assignments: **Two (Minimum)**

ESE Duration: **Three Hours** **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

1. To provide knowledge of Basic Electric Circuit Concepts.
2. To provide the concept of conversion of electrical circuits to graphs for determination of current and voltages.
3. To provide Knowledge of various theorems and its applications to circuits.
4. To give the knowledge of analysis of network reduction and calculation of various parameters.
5. To know the basic concepts of coupled circuits and network performance under resonance condition.
6. To provide knowledge of three phase balanced and unbalanced Poly phase Circuits and measurement of three phase power.
7. To provide the concept of non-sinusoidal waveforms and its impact on electrical circuits

UNIT- I

Development of Circuit Concepts: The relationship of field and circuit concept for parameters of circuit elements, active and passive elements: resistance, inductance and capacitance, voltage and current sources (independent & dependent sources), nodal analysis, mesh analysis, super node, super mesh, duality of simple circuit, normalizing factor. **Total Period 10**

UNIT-II

Network Solution And Reduction: Solution of network equation of determination method of network reductions, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem, Tellegen's theorem, Millman's theorem (independent & dependent sources), star-delta transformation, source transformation technique. **Total Period 12**

UNIT- III

Magnetic coupled circuits and Resonance: Electrostatic and electromagnetic coupling, self-inductance, mutual inductance, coupling coefficient, complete network solution with conductive and inductive coupling, Series and parallel resonance, quality factor, bandwidth, selectivity, half power frequencies, locus diagram of simple series and parallel circuits. **Total Period 10**

UNIT-IV

Poly Phase Circuits: Examples of two, three, four-loop circuits in poly phase circuit and their solutions, balanced star & delta load analysis and unbalanced star & delta load analysis for poly phase circuits. **Total Period 08**

UNIT-V

Non-sinusoidal Ideal Wave Forms: Common non-sinusoidal waveforms, Fourier series, analytical evaluation of Fourier coefficients, exponential form of Fourier series, frequency spectra of periodic waveforms, effective value and equivalent power factor, solution of circuits with non sinusoidal currents and voltages. **Total Period 10**

Text Books:

1. "Fundamentals of Electric Circuits" Alexander &Sadiku, TMH Publications.

2. "Electrical Circuits and networks", K. Sureshkumar, Pearson Education/, First Edition

Reference Books:

1. "Circuit Analysis Theory and Practice", Allan H. Robbins and Wilhelm C. Miller, Cengage Learning.

2. "Electric Circuit Analysis", Hayt, Kemmerly, Durbin, TMH Publications

3. "Engineering Network Analysis and Filter Design", Gopal G. Bhise, Prem R. Chandra, Durgesh C. Kulshreshtha, Umesh Publications.

4. "Network Analysis & Synthesis", D. Roy Choudhary, New Age International publications

Course outcomes:

1. Students will learn about the different types of electrical sources and networks
2. Students will have knowledge of converting a electrical circuit into graph and will be able to analyze the circuit graphically.
3. Student will analyse circuits with ideal, independent, and controlled voltage and current sources
4. Student will be able to find out current through or voltage across any branch of a given Electrical network using theorems.
5. Students will learn about series and parallel resonance conditions in series and parallel circuits and its impact on network voltage and current magnitudes.
6. Students will have knowledge of balanced and unbalanced poly phase circuits.
7. Students will be able to analyze the behavior of non-sinusoidal waveforms.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Technology**

Branch: **Electrical & Electronics** Semester: **III**

Subject: **Electrical Machines I** Code:

Total Theory Periods: **4 0** Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)** Assignments: **Two (Minimum)**

ESE Duration: **Three Hours** **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

The objective of this course is to expose the studentson basic knowledge of construction and working of various transformers their equivalent circuit, parameter determination and applications.

This course also provides the knowledge of direct current electrical machines, its operational constraints, starting mechanisms, conventional speed control methods, various tests and applications.

UNIT- I

Single Phase Transformer: Introduction, Constructional features of a transformer, core and shell type, working principle of a transformer, EMF equation, Ideal transformer, Actual transformer on no-load and on load, phasor diagram (no load, Unity, lagging and leading power factor), Equivalent circuit, per unit representation, Voltage regulation of a transformer, Losses in a transformer, separation of losses Open circuit and short circuit test, Efficiency, condition for maximum efficiency, All-day efficiency. **Total Period 08**

UNIT-II

Single Phase Transformer and Auto-transformer: Back-to-Back test, power and distribution transformer, , Polarity test, Parallel operation of single-phase transformer (equal and unequal voltage ratios), auto-transformer, its equivalent circuit and phasor diagram, its comparison with two winding transformer, conversion from auto- transformer to two winding transformer and vice versa,. **Total Period 10**

UNIT- III

Three Phase Transformer: Three-phase transformers, constructional details, Bank of three single phase units, three phase single unit transformer, different connections (star-star, star-delta, Delta-star, Delta-delta) and vector groups, Conditions for parallel operation of three phase transformers, calculation of efficiency and regulation, Scott connection, open delta connection, principle (only) of working of a three winding transformer and its applications. **Total Period 12**

UNIT-IV

DC Machine –I: BLV and BLI concept, constructional details, production of voltage and torque, classification of DC machine, armature reaction and its effect, methods to reduce armature reaction,

commutation, methods of improving commutation, effect of brush shift, Types of generators, condition of self excitation, critical speed and critical resistance of shunt generator. **Total Period 12**

UNIT-V

DC Machine –II: Electrical and mechanical characteristics of DC motor, starters for shunt motors- three point and four point starter, speed control of DC motors- armature and field control method, losses in DC machines, efficiency and condition for maximum efficiency, Testing of DC machines- Swinburne's test and Regenerative test(Study only). **Total Period 08**

Course outcomes:

1. Understand the fundamentals and working of transformers
2. Draw the equivalent circuit diagrams of various transformers
3. Analyse the load profile, voltage regulations and efficiency under various operating conditions
4. Understand the working principle and construction of direct current machines
5. Understand the needs and requirements of various types of d.c. machine operations like starting, speed control, tests etc.

Text Books:

1. Nagrath& Kothari, "Electric Machines", TMH Publications,
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers
3.P.K. Mukherjee & S. Chakravarti "Electric Machines", DhanpatRai Publication

Reference Books:

1. J. B. Gupta, "Theory & Performance of Electrical Machines", S. K. Kataria& Sons
2. Ashfaq Hussain, "Electric Machines", Dhanpat Rai Publication
3. Samarjeet Ghosh, "Electrical Machines", PHI Publications

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Technology**

Branch: **Electrical & Electronics** Semester: **III**

Subject: **Electronics Devices & Circuits** Code: **B000314(025)**

Total Theory Periods: **30** Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)** Assignments: **Two (Minimum)**

ESE Duration: **Three Hours** **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

1. To understand the basic concept electronics devices their property, behavior and application..
2. To understand the concept of waves shaping circuit and constant power supply.
3. To understand the concept of solid state rectifiers.
4. Application of transistor as an amplifier and switch.
5. To learn the concept of positive and negative feedback in amplifier.
6. Gain experience in the designing of an electronics circuit.

UNIT- I

Diode applications: *Rectifiers:* Half wave, full wave, bridge. Filters*:* Capacitor filter, LC, CLC filters. Clipper and its types, clamper and its types, *Zener diode:* breakdown Mechanism, characteristic, Zener diode as voltage regulator.

Total Period 08

UNIT- II

Field Effect Transistor(FET): Introduction, Construction, Operation, V-I Characteristics, Transfer Characteristics, Drain Characteristics, FET as VVR. Low frequency FET model. Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Introduction, Construction, Operation and characteristics, Types of MOSFET. **Total Period 08**

UNIT- III

DC Analysis of Transistor and FET Amplifiers: Transistor Biasing and Thermal Stabilization:The operating point, Bias stability, Stability factor, Emitter Bias, Collector to base bias, Voltage divider bias with emitter bias, Emitter bypass capacitor, Bias compensation. FET Biasing: Field Effect Transistor (FET): biasing of FET and MOSFET. **Total Period 08**

UNIT- IV

AC Analysis of Transistor Amplifiers: Low frequency Transistor Amplifier: h-parameter Models for CB, CC, CE configurations. Linear analysis of transistor amplifier. Miller's Theorem and its Dual, Simplified CE Model. Linear analysis of Transistor Circuits. high frequency Transistor Amplifier: CE

hybrid- pi model and its parameters, short circuit current gain and Current Gain with Resistive load.

Total Period 08

UNIT- V

Feedback Amplifier & Oscillator: Feedback amplifier: Types of amplifier, feedback concept, characteristics of negative feedback, feedback topologies. Oscillator: Types of oscillators, Berkhausen criteria for oscillation, RC phase shift Oscillator, Wien Bridge Oscillator, LC Oscillator, Crystal Oscillator. **Total Period 08**

Course outcomes:

1. Student can predict and design rectifiers and filters as per circuit requirement.
2. Learn to design transistor biasing circuit and calculating its stability.
3. Student can apply the concept of feedback in amplifier circuit.
4. Learn to design oscillator of desired frequency.
5. Gain experience in the problem finding and trouble shooting in electronics circuits consisting of diodes and transistors.

Text Books:

1. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, TMH
2. Electronic devices and circuits- A.K. Maini & Varsha Agrawal, 1st Edition ,Wiley Publication.

Reference Books:

1. Microelectronics – Millman and Grabel, TMH Publications
2. Electronic Devices and Circuit Theory – Boylestad & Nashelsky, 8th Ed. PHI.
3. Electronic Devices & Circuits – David A. Bell, PHI

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Technology**

Branch: **Electrical & Electronics** Semester: **III**

Subject: **Renewable & Environment Engineering** Code: **B000315(025)**

Total Theory Periods: **30** Total Tutorial Periods: **00**

Class Tests: **Two (Minimum)** Assignments: **Two (Minimum)**

ESE Duration: **Three Hours** **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

1. To provide the students with a broad understanding of predictions of different load demands of the consumers.
2. Student will understand the application of solar PV system and different types of Solar Collectors.
3. To provide the students with a broad understanding different types of Green Energy Sources.
4. Students will understand the Environmental Pollution, prevention of pollution and Pollution case studies.
5. Students will have a basic understanding Social and the Environment Issues and Environment Protection Act

Unit I

Introduction: Criteria for choosing appropriate green energy technologies, life cycle cost; the emerging trends of green energy, Eco/green technologies for addressing the problems of Water,Energy, Health, Agriculture and Biodiversity- WEHAB eco-restoration/ phyto-remediation, ecological sanitation, renewable energy technologies, industrial ecology, agro ecology and other appropriate green technologies.

Prediction of Load: Definition of connected load, maximum load, maximum demand, demand factor, load factor, diversity

factor, plant capacity factor, plant utilization factor, load duration curve, mass curve. Calculation based on above factors. **Total Period 07**

Unit II

Solar Energy: Introduction to Solar Photovoltaics, Basics principles, operating principles, Types of solar cells, Features and Limitations of Solar Photovoltaic system, how solar cells work- introduction, Electronic structure of semiconductors-the solar cell-power losses, solar Cells-Temperature and irradiation effects, Application of solar PV system. Introduction to Solar Thermal, Solar Collectors-Flat-Plate Collectors, Flat-Plate Collector -Thermal Testing, Collector - Efficiency Curve, Evacuated-Tube Solar Collectors, Solar Concentrating Collectors Fundamentals, Parabolic Concentrators, Compound Parabolic Concentrators (CPCs), Fresnel Lens Concentrators, Heliostats, Tracking Systems, Solar Thermal Systems-Passive and Active Solar Thermal Systems.

Total Period 05

Unit III

Green Energy Sources: Basic principle of wind energy Conservation characteristics of wind power, Extractable wind power, Different types of Wind Machines, Performance Estimation of Wind turbines. Basic principle of Geothermal Energy, Estimations of Geothermal Power, Applications of Geothermal Energy.**:** Basic Principle and working of **Fuel cell** classification of Fuel Cells, Conversion efficiency of fuelcells, Applications, Basic Theory of **Ocean Energy,** Wave Energy, Tidal Energy.

Total Period 07

Unit IV

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution. Different types of Pollutions: Water, Soil, Marine, Noise, and Thermal pollution. Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster management: floods, earthquake, cyclone, and landslides.

Total Period 5

Unit V

Social and the Environment Issues: Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion.

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

Total Period 06

Course outcomes:

1. Students must apply both mathematics and chemistry to understand and solve problems in this course.
2. Students perform design type analyses and solve engineering problems using green engineering.
3. There are many aspects of contemporary issues addressed in this course, especially with regard to power plant environmental and sitting issues.
4. Students will have a basic understanding of different types of Green Energy Sources.
5. Students will have a basic understanding of Environmental Pollution and Social and the Environment Issues

Text Books

1. Fowler, J.M., Energy and the Environment, 2nd Ed. ,McGraw Hill, New York, 1984.
2. G D Rai, 'Non-Conventional Energy Sources', Khanna Publishers. Delhi, 2010

3. S P Sukhatme, ‘Solar Energy-Principles of Thermal Collection & Storage’, Tata McGraw Hill PublishingCompany Ltd., New Delhi.
4. Kaldellis, John K., Stand-alone and hybrid wind energy systems: technology, energy storage and applications. Elsevier, 2010.
5. Masters , G.M., “Introduction to Environmental Engineering and Science”, Prentice –Hall of India Pvt. Ltd. , 1991
6. Nebel , B.J., “Environmental Science”, Prentice –Hall Inc., 1987

Reference Books

1. 1. John A Duffie& William A Beckman, ‘Solar Energy Thermal processes’, Wiley Interscience publication .
2. 2. P Garg & J Prakash,’ Solar Energy - Fundamentals and Applications’, Wiley Interscience publication.
3. 3. Jay Cheng, ‘Biomass to Renewable Energy Processes’, 1st Edition, CRC press, 2009.
4. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards’, Vol I and II, Enviro Media (R)
5. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
6. Generation of electrical energy by BR Gupta, S. Chand Publications.
7. A Course in Electrical Power by Chakravoarty,Soni Gupta, Bhatnagar – DhanpatRai Publications.
8. Elements of Power Station Design by M.V.Deshpande, PHI publications.
9. Water Pollution & Management – Varshney C.K., New Age International.
10. Environmental Pollution Control Engg – Rao C.S., New Age International.
11. Man, Nature & Environment – De A.K., New Age International.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Technology**

Branch: **Electrical & Electronics** Semester: **III**

Subject: **Electrical Machines-I Laboratory** Code: **B000321(025)**

Total Lab Periods: **36** Batch Size: **30**

Maximum Marks: **40** Minimum Marks: **20**

List of Experiments: *(At least ten experiments are to be performed by each student)*

1. To determine the equivalent circuit parameters of a single phase transformer.
2. To determine the voltage regulation of a single phase transformer operating at lagging and upf condition.
3. To determine the efficiency of a single phase transformer under different loading condition
4. To perform the tests required for parallel operation of transformers.
5. To perform parallel operation of two single phase transformer.
6. To study the voltage/current ratios for different types of three phase transformer connection.
7. To perform Back to Back test on two single phase transformer.
8. To perform 3- phase to 2- phase conversion (Scott connection)
9. To study the various routine tests performed on three phase transformers as per IS code.
10. To determine the armature & field winding resistance of D.C machine by voltmeter/ammeter method.
11. To determine the magnetization or Open circuit characteristics of a D.C machine
12. To perform load test on D.C shunt generator.
13. To perform Swinburne's test a D.C machine & calculate its efficiency at full load operating condition.
14. To study three point and four point motor starters and observe its impact on the motor staring current.
15. Speed control of D.C shunt motor by (a) Varying field current with armature voltage kept constant; (b)

Varying armature voltage with field current kept constant.

16. To study the reversal of D.C shunts motor.

Equipment/Machines/Instruments/Tools/Software Required:

Single Phase Transformer, Three Phase Transformer, Three Phase Auto Transformer, DC Shunt Generator

Set, DC Shunt Motor, DC series Motor, Ammeters (AC & DC), Voltmeter (AC & DC), Wattmeter, Tachometer

Recommended Book:

Laboratory courses in electrical engineering by S.G. Tarnekar& P.K. Kharbanda

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Technology**

Branch: **Electrical & Electronics** Semester: **III**

Subject: **Electronics Devices & Circuits Laboratory** Code: **B000322(025)**

Total Lab Periods: **36** Batch Size: **30**

Maximum Marks: **40** Minimum Marks: **20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. To study the operation of CRO and DSO (Digital oscilloscope).
2. To draw the characteristics of a semi-conductor diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance.
3. To draw the characteristics of a zener diode.
4. To design a half wave rectifier and to determine its efficiency and ripple factor.
5. To design a-full wave rectifier and determine the ripple factor and efficiency with & without filter.
6. To design and analysis of biased and unbiased Clamper circuit.
7. To design and analyze biased and unbiased series Clipper.
8. To design and analyze biased and unbiased parallel Clipper.
9. To draw the characteristics of CB configuration of a transistor amplifier.
10. To draw the characteristics of CC configuration of a transistor amplifier.
11. To design a Zener regulator circuit and to find the regulation characteristics.
12. To draw the load line of a transistor amplifier under CE configuration.
13. To draw the characteristics of FET
14. To study Wein Bridge Oscillator & R-C phase shift oscillator.
15. To design the positive voltage regulator.

Equipment/Machines/Instruments/Tools/Software Required:

Circuit components, Breadboard, Hook-up wire, Power supply, CRO, DSO,Function generator

Recommended Book:

Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Technology**

Branch: **Electrical & Electronics** Semester: **III**

Subject: Electrical Circuit Analysis **Laboratory** Code: **B000323(025)**

Total Lab Periods: **36** Batch Size: **30**

Maximum Marks: **40** Minimum Marks: **20**

List of Experiments: *(At leastTen experiments are to be performed by each student)*

1. To plot voltage vs resistance characteristics of Incandescent lamp.
2. To calculate the value of resistor using color coding and verify it through measurement.
3. To study the different functions of a Analog/Digital multimeter
4. To verify Superposition theorem for DC/AC Circuits.
5. To verify Thevenins theorem for DC/AC Circuits.
6. To verify Norton's theorem for DC/AC Circuits.
7. To verify Reciprocity theorem for DC/AC Circuits.
8. To verify Millman's theorem for DC/AC Circuits.
9. To connect a tube light and study its min. operating voltage, nature of current, power and power factor.
10. To Measure Q Factor of Series RLC Circuit
11. To Measure Q Factor of Parallel RLC Circuit
12. To verify the voltage and current relation in star and delta connected three phase system.
13. To verify the effect of three phase unbalanced star connected system.
14. To measure three phase power using Two-watt meter method.

Equipment/Machines/Instruments/Tools/Software Required:

Voltmeter, ammeter, Wattmeter, Power factor meter, Resistors, Capacitors, Lamp load, DC supply, Three-phase

autotransformer, Multimeter, Simulation tools like MATLAB,PSIM, MULTISIM

Recommended Book:

1. Experiments in basic electrical engineering, S.K.Bhattacharya.
2. Basic shop practical, Mehta & Gupta
3. Practical in electrical engineering, Dr. N.K.Jain