



# SARDAR PATEL UNIVERSITY, BALAGHAT

Academic session 2023-24 & Onwards

Three Year Diploma in Electrical Engineering (EE)

DEE 301

## BASIC ELECTRICAL ENGINEERING & MATERIALS

Unit I.	<b>D.C. Circuits -</b> Concept of charge, current, voltage, EMF, resistance, resistivity. Ohm's law,. Main parts of circuit, Series and parallel combination of resistances, KCL, KVL, star-delta connection, star to delta and delta to star transformation.
Unit II	<b>A.C. Fundamentals -</b> Concept of inductance, capacitance, reactance, impedance, admittance, phasor diagram of pure resistive, inductive and capacitive circuit. Difference between AC and DC quantities, sinusoidal waveform, frequency, time period. Instantaneous, maximum, average and RMS value, form factor
Unit III	<b>Magnetic effect of electric current -</b> Concept of lines of force, flux, MMF, reluctance, permeability, magnetic flux density, magnetic field intensity. Analogy of electric and magnetic circuit, units. Faraday's laws of electromagnetic induction, self and mutual induction. Lenz's laws, Fleming's left and right hand rule.
Unit IV	<b>Electrical Engineering materials -</b> Definition of conductors, insulators and semiconductors. Intrinsic and extrinsic semi conductor materials. Properties and applications of conducting, semi-conducting and insulating materials, classification of insulating materials on the basis of temperature.
Unit V	<b>Magnetic materials.</b> Different magnetic materials, properties applications. B-H curve



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## LIST OF EXPERIMENTS

1	Study of different types of meters/indicators, Ammeter, voltmeter, wattmeter etc.
2	Measurement of current and voltage in single phase and three phase circuit series and parallel circuit.
3	Measurement of current, voltage and power in single phase circuit.
4	Study of different types of loads i.e. resistive, inductive and capacitive load.
5	Study of multi meter.
6	Verification of ohms law.
7	Study of different types of conducting, insulating, and magnetic materials.
8	Study of different types of primary and secondary cells and batteries.

### Reference Books:-

1. Basic Electrical Engineering By Nagrath Kathari
2. Electrical Engineering Materials By TTTI Madras.
3. Basic Electrical Engineering By Jain & Jain
4. Basic Electrical Engineering By V.K. Mehta



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## DEE 302 ELECTICAL CIRCUIT

Unit I.	<b>CIRCUIT ANALYSIS</b> Active and passive elements, ideal current source and voltage source. Unilateral and bilateral elements. Number of loops, nodes, branches of a network. Analysis of networks by "Mesh" and "Node" methods ,Nodal analysis,
Unit II	<b>NETWORK THEOREMS</b> Superposition Theorem, Thevenin's Theorem, Nortons' Theorem and maximum power Transfer Theorem Millmans Theorem with numerical problems.
Unit III	<b>SINGLE PHASE A.C. CIRCUITS</b> Representation of A.C. quantity by phasor methods, rectangular and polar Representation of A.C. RLC series combinations Circuit. Impedance, power in single phase circuits. Concept of power factor, conductance, admittance and susceptance. Series resonance .
Unit IV	<b>POLYPHASE CIRCUITS</b> Concept of poly phase A.C. circuits, advantages over single phase. Generation of three phase voltage system. Three phase circuits, phase sequence. Star and delta connections, phase and line values of current and voltage, power in three phase circuits.
Unit V	<b>TRANSIENTS</b> Concept of transient, variation of current when connected to D.C. or A.C. series circuit (R.L. combination and R.C. combination). Time constant.



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## LIST OF EXPERIMENTS

S. No.	Name of Experiment
1	Verification of Superposition theorem
2	Verification of Norton's theorem
3	Verification Thevenin's theorem
4	Performance of R-L-C- series circuit
5	Performance of R-L-C- parallel circuit
6	Study of electrical resonance in series circuit
7	Verification of relation between line and phase voltage and current in 3-phase circuit
8	Study of transients

### Reference Books:-

1. Circuit Theory By A K Chakraworty
2. Basic Electrical Engineering By Nagrath Kathari
3. Electrical Engineering Materials By TTTI Madras.
4. Basic Electrical Engineering By Jain & Jain
5. Basic Electrical Engineering By V.K. Mehta



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DEE 303

ELECTICAL MACHINES-I

Unit I.	Energy Conversion Principle - Law of conservation of energy, electromechanical energy conversion classification of machines.
Unit II	D. C. Generator - Principle, construction, armature winding, types of winding, EMF equation, Types of generators, characteristics and applications, losses and efficiency. Simple numericals.
Unit III	D. C. Motors - Principle, production of back EMF, torque equation. Classification, characteristics of D. C. motors, starters, speed control, losses and efficiency, applications of motors.. Simple numericals.
Unit IV	Single phase transformers - Principle, construction, classification. EMF equation, turns ratio, phasor diagram, no load and on load equivalent circuit. Voltage regulation, open and short circuit tests, losses and efficiency, condition of maximum efficiency.
Unit V	Three phase transformer - Connections, groups, Scott and open delta connection. Comparison of three phase transformer with bank of three single phase transformers. Parallel operation.



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## Experiment List

S. No.	Name of Experiment
1	Study of D. C. Machines (Parts)
2	Speed control of D. C. Motor (armature and field control method)
3	To perform Swinburn test of DC Motor.
4	Study of transformer (Parts) (single and three phase)
5	To perform polarity test of single phase transformer.
6	To perform ratio test of single phase transformer.
7	To perform open circuit test of single phase transformer.
8	To perform short circuit test of single phase transformer.
9	Parallel operation of single phase transformer.

### Reference Books:-

1. Electrical Technology Vol. II by B. L. Thareja Khanna Publisher
2. Electrical Machines by Bhattacharya, T.T.T.I.
3. Electrical Machines by Nagrath & Kothari, PHI Publication
4. Electrical Machines Vol. I & II by P.S. Bhimbra, Khanna publishers



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DEE 304

## ELECTRICAL AND ELECTRONICS MEASUREMENTS AND MEASURING INSTRUMENTS

Unit I.	Classification of measuring instruments, Indicating, recording and integrating types of meters. Errors and types of errors, accuracy, precision and sensitivity,.
Unit II	Electrical measuring instruments - Construction, operation. Deflecting, controlling and damping forces, supporting systems, moving coil, electro-dynamometer, moving iron and induction type instruments, simple numerical. Hot wire type instruments, vibration galvanometer, shunt and multipliers, CT & PT.
Unit III	Wattmeter and Energy meters – Dynamometer and induction type wattmeter, Induction type energy meters. measurement of 1-phase and 3-phase power in balanced and unbalanced load condition, 3 phase wattmeter.
Unit IV	Measurement of resistance – Classification of resistance, measurement of low, medium, and high resistance. Kelvin's double bridge, wheat-stone bridge, Ammeter, voltmeter method and ohmmeter, multimeter, megger. Importance of earth resistance, Earth tester.
Unit V	A. C. Bridges – Measurement of inductance and capacitance by A.C. bridges. Maxwell, Anderson, Hays, Desauty and Wien's bridge. (no phasor diagram)



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## LIST OF EXPERIMENTS

S. No.	Name of Experiment
1	Measurement of low resistance by Kelvinn Double bridge.
2	Measurement of medium resistance by wheat stone bridge.
3	Measurement of insulation resistance by Megger.
4	Measurement of inductance by Maxwell's bridge.
5	Calibration of Voltmeter, Ammeter, Wattmeter, Energy meter.
6	Measurement of P.F. by ammeter, voltmeter and wattmeter method.
7	Plot B.H. curve by method of reversal using B.G.
8	Use of CRO for measurement of voltage, current, phase and frequency etc.





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BASIC ELECTRONICS

S.No.	COURSE CONTENTS
1.	<p>Semiconductor Devices –</p> <p>(a) Concept of electronic emission – Different methods of electronic emission and their applications.</p> <p>(b) Diodes - Formation of PN junction, forward biasing and reverse biasing of PN junction, construction, characteristics and application of different types of diodes, Zener diode .</p> <p>(c) Transistor - PNP/ NPN Junction Transistors, different configurations: CB, CE, CC. Transistors Characteristics, and applications.</p> <p>(d) Special Semiconductor devices – Construction, symbol and</p> <p>Application of Tunnel diode, photo diode, varactor, FET, MOSFET, UJT.</p>
2.	<p>Rectifiers –</p> <p>Single phase, half wave, full wave and bridge types of rectifiers. calculation of output voltage, average and RMS values, ripple factor and rectification efficiency. Filter, and types of filters.</p>
3.	<p>Regulated Power Supply - Difference between linear and switch mode power supply, regulated power supply and its limitations, series and shunt power supply using transistors, SMPS ( Block diagram only ), IC regulated power supply (78XX and 79XX series).</p>
4.	<p>Amplifiers - Principal of amplification, types of transistor amplifiers, biasing techniques, RC coupled, transformer coupled, and direct coupled amplifiers, push pull Amplifier, advantages and disadvantages, detailed study of circuit diagram, working principal and applications of above amplifiers, use of operational amplifier as comparator, multiplier, summer, integrator and differentiator.</p>
5.	<p>Digital Techniques - Number system, binary, decimal number system. Addition, subtraction, multiplication &amp; division of binary numbers. Logic gates- their symbols, truth table and applications.</p>



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## LIST OF EXPERIMENTS

S. No.	Name of Experiment
1	Study of C.R.O. & multimeter
2	Study of electrical and electronic components
3	Colour coding of Resistors
4	Testing of Diode and Transistor
5	Study of half wave rectifier, full wave rectifier, bridge rectifier with and without filter
6	Study of Zener regulated power supply
7	Study of transistor characteristics
8	To plot the characteristics of diode

### Reference books:-

1. Basic Electronics & Linear Circuits- : By Bhargawa , T.T.T.I. Chandigarh .
2. Basic Electronics -: By V.K. Mehta
3. Electronics Principal - : By mahta.
4. Digital Electronics -: By Mahino & Leach .
5. Electronics Devices & Circits -: By G.K. Mithal



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**DEE306P**

## **Professional Activities**

### OBJECTIVES:

1. To allow for professional development of students as per the demand of engineering profession.
2. To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
3. TO allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
4. To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
5. To provide time for organization of technical quiz or group discussion or any other group activity.
6. To provide time for visiting library or using Internet.
7. To provide time for group discussion or solving case studies.
8. To provide time for personality development of students.
9. To provide time for working for social cause like awareness for environmental and ecology etc.

### DETAILED INSTRUCTIONS TO CONDUCT PROFESSIONAL ACTIVITIES

- A. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.
- B. This course should be evaluated on the basis of grades and mark sheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities (PA).
- C. Following grade scale of evaluation of performance in PA has been established.

<u>Grades</u>	<u>Level of performance</u>
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

- D. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.
- E. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term.

Candidate abstaining from the prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.

- F. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest,



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presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programme of study.

- G. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.
- H. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.
- I. Compendium shall contain following:
  - III. Abstract of the guest lectures arranged in the Institution.
  - IV. Topic and outcome of the group discussion held.
  - V. Report on the problems solved through case studies.
  - VI. Report on social awareness camps( organized for social and environmental prevention).
  - VII. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.
- J. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content. These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development. Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective.

Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.