

**MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY,
BHOPAL - 462003**

Name of the Program:		B.Tech.	Semester- I & II	Year: 2020-21
Name of the Course:		Basic Electrical and Electronics Engineering		
Course Code:		EE-124		
Core/Elective/Other:		Core		
Pre-requisites:		Engineering Physics		
Course Outcomes:				
1	Understand and solve simple AC and DC electric circuits.			
2	Identify types of transformers and calculate its efficiency for a given application			
3	Identify types of electric machines for a given application.			
4	Understand the working principle of basic semiconductor devices.			
5	Differentiate the characteristics of semiconductor devices.			
Description of Content in Brief:				
1	DC circuits: Review of basic concepts of charge, voltage and current, power and energy, Voltage & Current sources, Ohm's Law and its application, effect of temperature on resistance of conductors, semiconductors and insulators. Voltage & Current sources, KCL, KVL, loop and nodal equations, Network theorems, Star-Delta transformations for resistances, Simple series and parallel circuits.			
2	AC Circuits: Alternating quantities, RMS and average value, Phase and Phase Difference, Power and power factor, Series and Parallel AC circuits, resonance, Concept of Single Phase and Three Phase Supply; 3-phase Star-Delta connections, Inter-Relation between phase and line values of voltages and currents. Faraday's law of electromagnetic induction, its application to transformer and machines.			
3	Transformers: construction, principle of operation, phasor diagrams, equivalent circuit, losses and efficiency, OC/SC tests.			
4	DC machines: Types of DC machines and their Construction, principle of operation, emf and torque equations, speed and torque control methods, starters.			
5	Semiconductor devices and applications: Characteristics of PN Junction Diode and Zener Diode, applications of Zener diodes, half wave and full wave rectifiers, ripple factor, conversion efficiency,			
6	Bipolar Junction Transistor: Principle of operation, Input/output & transfer characteristics of BJT in CB, CE, CC configurations and their applications.			
List of Text Books:				
1	Hughes, Electrical and Electronic Technology, 10 th Edition, Pearson Education, 2010			
2	D.P.Kothari& I.J. Nagrath, Basic Electrical Electronics and Engineering, MC Graw Hill Education, 2006.			
3	V.N.Mittle, Basic Electrical Engineering, MC Graw Hill Education, 2005.			
List of Reference Books				
1	V. Del Toro, Electrical Engineering Fundamentals, 2 nd Edition, Pearson Education, 2015.			
2	A P Malvino and D J Bates, Electronic Principles, 7 th Edition, MC Graw Hill, 2017			

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3	Schaum's Outline Series, Electrical Circuits, 6th, MC Graw Hill Education, 1 Jan 2014.
4	Boylestad&Nashelsky, Electronic Devices and circuit Theory, Pearson Education, 2009.
URLs:	
1	https://nptel.ac.in/courses/108/104/108104139/
2	https://nptel.ac.in/courses/108/101/108101091/
3	https://nptel.ac.in/courses/108/105/108105053/
Lecture Plan	
1.	Review of basic concepts of charge, voltage and current, power and energy, Voltage & Current sources, Ohm's Law and its application, effect of temperature on resistance of conductors, semiconductors and insulators.
2.	Kirchoff's current law (KCL) and nodal equations for simple DC circuits
3.	Practice problems based on KCL for simple DC circuits
4.	Practice problems based on KCL for simple DC circuits
5.	Practice problems based on KCL for simple DC circuits
6.	Kirchoff's voltage law (KVL) and loop equations for simple DC circuits
7.	Practice problems based on KVL for simple DC circuits
8.	Practice problems based on KVL for simple DC circuits
9.	Practice problems based on KVL for simple DC circuits
10.	Network (Superposition) Theorem for simple DC circuits
11.	Practice problems based on Superposition theorems for simple DC circuits
12.	Practice problems based on Superposition theorems for simple DC circuits
13.	Practice problems based on Superposition theorems for simple DC circuits
14.	Network (Thevenin and Norton) Theorems for simple DC circuits
15.	Practice problems based on Thevenin and Norton theorems
16.	Practice problems based on Thevenin and Norton theorems
17.	Practice problems based on Thevenin and Norton theorems
18.	Star-Delta transformations for resistances
19.	Practice problems based on Star-Delta transformations for resistances
20.	Alternating quantities, RMS and average value, Phase and Phase Difference, Power and power factor
21.	Series and Parallel AC circuits, Practice problems
22.	Practice problems based on Series and Parallel AC circuits
23.	Resonance in AC circuits, Practice problems
24.	Practice problems based on Resonance in AC circuits

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25.	Concept of Single Phase and Three Phase Supply, 3-phase Star-Delta connections, Inter-Relation between phase and line values of voltages and currents.
26.	Practice problems based on three phase AC circuits
27.	Practice problems based on three phase AC circuits
28.	Faraday's law of electromagnetic induction, its application to transformer and machines.
29.	Transformers: construction, principle of operation
30.	Transformers: equivalent circuit
31.	Transformers: Phasor diagrams
32.	Transformers: losses and efficiency
33.	Transformers: OC and SC tests
34.	Practice problems based on Transformers
35.	Practice problems based on Transformers
36.	DC machines: Types of DC machines and their Construction
37.	DC machines: principle of operation, emf and torque equations
38.	DC machines: Starters
39.	DC machines: Speed and torque control
40.	Practice problems based on DC Machines
41.	Practice problems based on DC Machines
42.	Characteristics of PN Junction Diode and Zener Diode
43.	Applications of Zener diodes
44.	Half wave rectifiers: Circuit operation, Ripple factor, conversion efficiency
45.	Full wave rectifiers: Circuit operation, Ripple factor, conversion efficiency
46.	Bipolar Junction Transistor (BJT): Principle of operation, Input/output and transfer characteristics of BJT in CB configuration and its applications
47.	Input/output and transfer characteristics of BJT in CE configuration and its applications
48.	Input/output and transfer characteristics of BJT in CC configuration and its applications
49.	Problem solving related to any topics above
50.	Problem solving related to any topics above

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Name of the Program:		B.Tech	Semester- I & II	Year: 2020-21
Name of the Course:		Basic Electrical and Electronics Engineering Laboratory		
Course Code:		EE-127		
Core/Elective/Other:		Core		
Pre-requisites:		Engineering Physics		
Course Outcomes:				
1	Understand the safety measures of handling electrical equipment			
2	Identify and use different electrical tools and equipments			
3	Connect the measuring instruments and record the measured values correctly			
4	Analyze the results of given electrical circuit and plot the desired characteristics			
Description of Content in Brief:				
1	Study of basic electrical safety equipment's such as Fuses, Earthings, MCBs, ELCBs and their operation.			
2	Study of various Electrical lab tools and their applications.			
3	Fault diagnosis and removal in general electrical connection /apparatus.			
4	Selection and replacement of different passive components e.g. fuses, lamps and lamp holders, switches, cables, cable connectors etc.			
5	Verification of Kirchoff's current law (KCL).			
6	Verification of Kirchoff's voltage law (KVL).			
7	Measurement of various characteristic values of a Sinusoidal waveform with the help of CRO.			
8	Measurement of power and power factor in single phase AC circuits.			
9	Measurement of losses in a single-phase transformer using OC and SC Tests.			
10	Load test and voltage regulation measurement in a single-phase transformer.			
11	Starting and reversing various AC and DC motors.			
12	Speed control of DC shunt motor below and above base speed.			
13	Measurement of output voltage of Half wave diode rectifier and visualization of its waveforms.			
14	Measurement of output voltage of full wave diode rectifier and visualization of its waveforms.			
List of Text Books:				
1.	Laboratory Manual of Basic Electrical and Electronics Engineering Lab, MANIT Bhopal			
2.	S G Tarnekar, Laboratory Courses in Electrical Engineering, S Chand, 2006.			
List of Reference Books				
1.	D.P.Kothari& I.J. Nagrath, Basic Electrical Electronics and Engineering, MC Graw Hill Education, 2006.			
2.	V.N. Mittle, Basic Electrical Engineering, MC Graw Hill Education, 2005			
URLs:				
1	https://nptel.ac.in/courses/108/108/108108076/			

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Lab Plan	
1.	Introduction of lab equipments, experiments and demonstration of safety measures
2.	Study of basic electrical safety equipments such as Fuses, Earthings, MCBs, ELCBs and their operation.
3.	Study of various Electrical lab tools and their applications.
4.	Fault diagnosis and removal in general electrical connection /apparatus.
5.	Selection and replacement of different passive components e.g. fuses, lamps and lamp holders, switches, cables, cable connectors etc.
6.	Verification of Kirchoff's current law (KCL).
7.	Verification of Kirchoff's voltage law (KVL).
8.	Measurement of various characteristic values of a Sinusoidal waveform with the help of CRO.
9.	Measurement of power and power factor in single phase AC circuits.
10.	Measurement of losses in a single-phase transformer using OC and SC Tests.
11.	Load test and voltage regulation measurement in a single-phase transformer.
12.	Starting and reversing various AC and DC motors.
13.	Speed control of DC shunt motor below and above base speed.
14.	Measurement of output voltage of Half wave diode rectifier and visualization of its waveforms.
15.	Measurement of output voltage of full wave diode rectifier and visualization of its waveforms.