

COURSE TITLE- BASICS OF ELECTRICAL ENGINEERING
 COURSE CODE 6E201

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Electrical	Second

1. RATIONALE

Students of electrical engineering diploma need to possess a good understanding of concepts and principles of electrical engineering which is essential to determine the Electrical Engineering parameters. Further, these concepts need to be assimilated by the students to understand concepts of advanced courses and develop skills that are needed by the industry. This will also be needed to analyze the different applications of electrical & electronics engineering circuits.

2. COMPETENCY

At the end of studying this course, students will be able to

“Use basic principles of electrical engineering in electrical system.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/Credits)				Total Credits (L+T+P)	Examination Scheme(Marks)				Total Marks
					Theory		Practical		
L	T	P	C	ESE	PT	ESE(PR)	PA (TW)		
04	--	02	06	80	20	25@	25	150	
Duration of the Examination (Hrs)				3	1	--	--		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE-End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, PR- Practical Examination ; TW - Term Work, # External, @ Internal, ~ Online.



4. COURSE OUTCOMES

At the end of studying this course students will be able to :-

1. Determine electrical circuit parameters using basic laws.
2. Identify the different types of capacitors for different applications.
3. Select magnetic material for given application.
4. Apply the basic laws of electromagnetic induction.
5. Use different terms related to alternating voltage and current.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
Unit-I Fundamentals	1a. Calculate resistance of material at different temperature. 1b. Use Ohms law to simplify series and parallel combination of resistive circuits. 1c. Calculate voltage and current in the given resistive circuits using KCL and KVL. 1d. Calculate electricity bill for simple domestic load.	1.1 Concept of Current, e.m.f, Electric Potential, Potential difference, Resistance, Work, power, Energy. 1.2 Laws of resistance, resistivity, effect of temperature on resistance, Resistance temperature coefficient (simple numerical on 1.2) 1.3 Types of resistance and their applications. 1.4 Ohms law: applications and limitations. 1.5 Series and parallel combination of resistance, current division rule, voltage division rule (simple numerical on 1.5) 1.6 Definitions of node, branch, loop, mesh. Kirchhoff's laws (simple numerical on 1.6). 1.7 Specifications of commonly used domestic electrical appliances, calculation of electricity bill. (simple numerical on 1.7).
Unit-II Electrostatics & Capacitors	2a. Plot charging and discharging curve of capacitor. 2b. Select capacitors for different applications.	2.1 Electric charge, Electric field, Electrostatic induction, Electric flux, Flux Density, Electric field Intensity. 2.2 Capacitance, permittivity, Capacitors in series and parallel. (simple numerical on 2.2) 2.3 Energy stored in a Capacitor. 2.4 Charging and discharging of

3	Select magnetic material for given application.	3	1	1															
4	Apply the basic laws of electromagnetic induction.	3	1	1															1
5	Use different terms related to alternating voltage and current.	2	1																

Course Curriculum Design Committee

Sr Name of the Designation and Institute
No faculty members

- 1 M.D. Kharad Lecturer in Electrical Engineering, Govt. Polytechnic, Aurangabad
- 2 S.J. Ghorpade Lecturer in Electrical Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)



6	A Course in Electrical Technology Vol.1	Gupta J.B.	S.K.Kataria& Sons, 2012 or latest edition
7	Fundamentals of Electrical Engineering	Singh Tarlok	S.K.Kataria& Sons,2012or latest edition

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Sr. No	Name of the Equipment	Brief specification
1	Ammeter	(0-5A)
2	Voltmeter	0-150/300
3	Wattmeter	0-500 watt
4	Multimeter	0-250v, 0-10000kohm,0-20uF
5	Stopwatch	60 seconds
6	Thermometer	-10C to 100C
7	Rheostats	0-50/90/250/350 ohm
8	Capacitors	1uf
9	Inductors	100mH

12. LEARNING WEBSITE & SOFTWARE

- www.allaboutcircuits.com/vol_1/chpt_ml
- http://openbookproject.net/electricCireml
- www.kpsec.freeuk.com
- www.howstuffwork/
- www.mtel/electrical.com

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SNo	Course Outcome	Pos										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Determine electrical circuit parameters using basic laws	1	3	2	1									
2	Identify the different types of capacitors for different applications.		3	1										

Unit	Course Outcome	Programme Outcome
Unit-III Magnetism	3a.Compare Electric and Magnetic circuits. 3b. Select a suitable magnetic material for given application. 3c.Solve numerical on series and parallel magnetic circuits.	capacitors. 2.5 Types of capacitors and their applications. 3.1 Magnetic field, types of magnet, permanent and electromagnet, its applications 3.2 Flux, flux density, magnetic field strength, mmf, reluctance, permeability. 3.3 Comparison between electric and magnetic circuits. 3.4 Magnetization curve, magnetic hysteresis, hysteresis loop, hysteresis loss and methods to minimize it. 3.5 Ohms law of magnetic circuits. 3.6 Concept of series and parallel magnetic circuits.(simple numerical on series magnetic circuit)
Unit-IV Electromagnetic Induction & Inductors	4a.Apply Faraday's law, Lenz's law, Fleming's right hand rule, Fleming's left hand rule in different applications. 4b.Differentiate between Statically and dynamically induced EMF. 4c. Select a suitable inductor for given application.	4.1 Faraday's laws of electromagnetic induction, Lenz's law, Fleming's right rule and left hand rule, Statically and dynamically induced emf. 4.2 Self and Mutual inductance. 4.3 Types of inductor and their applications. 4.4 Energy stored in inductor.(Only Expression)
Unit-V AC Fundamentals	5a.Use different terms related to AC supply. 5b.Choose a suitable supply for given load.	5.1 Principle of generating an alternating voltage 5.2 Concept of AC and DC 5.3 Cycle, Time period, Frequency, Amplitude, Average value, R.M.S. value, Form factor, Peak Factor 5.4 Phase and Phase difference, (simple numerical on 5.2 &5.3)

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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			TOTAL
			R Level	U Level	A Level	
1	Fundamentals	18	06	08	08	22
2	Electrostatics & Capacitors	12	04	04	06	14
3	Magnetism	14	06	04	08	18
4	Electromagnetic Induction & Inductors	13	06	04	06	16
5	AC Fundamentals	07	04	04	02	10
Total		64	26	24	30	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	A) Prepare a layout of electrical laboratory major and minor electrical equipments/instruments with their specification.	02
		B) Prepare charts of electrical safety, while handling equipments/instruments.	02
		C) Demonstrate for use of electrical tools (pliers, screw driver, insulation cutter, tester etc.)	02
2	1	Measure voltage and current for a given electrical circuit.	02
3	1	Determine equivalent resistance in parallel and series combination.	02
4	1	Use rheostat to regulate current and divide potential.	02
5	1	Use Ohm's Law to determine current in simple circuit.	02
6	1	Use Kirchhoff's current law to measure current in a particular branch of the given electrical circuit.	02
7	1	Use Kirchhoff's Voltage Law to measure voltage drop in a closed loop of the given electrical circuit.	02



8	2	Plot charging and discharging curves for capacitors	02
9	3	Plot B-H curve for given magnetic material.	02
10	4	a) Use Faraday first law of electromagnetic induction to analyse behavior of statically induced emf in a given circuit.	02
		b) Use Faraday first law of electromagnetic induction to analyse behavior of dynamically induced emf in a given circuit	02
11	5	Use CRO to measure peak value, RMS value, Period and frequency of alternating quantity.	02
Total Hours			28

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:

- Assignments on solving numerical
- Identify and select various measuring instruments as per required range.
- Identify and select resistors based on color code.
- Identify and select capacitors based on color code
- Calculate electricity bill for student's hostel
- Write the specifications of appliances used at home.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

- Demonstration
- Activity based learning

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1	Electrical Technology Vol-1	Theraja, B. L.	S. Chand & Co. Ltd., 2011 or latest edition
2	Basic Electrical Engineering	Mittle V.N.	Tata McGraw-Hill latest edition.
3	Principles of Electrical Engineering	Gupta B.R.	S.K. Kataria, 2012 or latest edition
4	Basic Electrical Engineering	Rao Uma. K.	Pearson Education, India, 2012 or latest edition
5	Basic Electrical Engineering	Murthy R. S.	Pearson Education, India, 2011 or latest edition