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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, B.E. - Semester End Examination; October - 2022

Basic Electrical Engineering

(Common to All Branches)

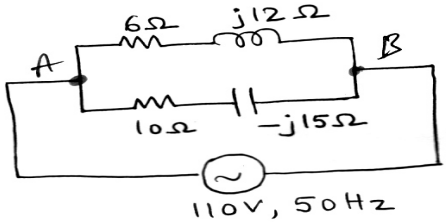
Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:
CO1: Analysis of single phase AC circuits.
CO2: Illustrate the working DC Machine as a Generator and Motor.
CO3: Analyze the three phase AC circuits and explain the working of three phase induction motor.
CO4: Discuss the working of transformer and alternator.
CO5: Describe the concept of green energy and basics of power systems.

***Note**: I) **PART - A** is compulsory. **Two** marks for each question.*
*II) **PART - B**: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs
	I : PART - A	**10**		
1 a.	Calculate the power consumed by a single phase AC circuit having 55 kVA apparent power and a power factor of 0.85.	2	L1	CO1
b.	Write the emf equation of a DC generator and mention the parameters in the equation.	2	L1	CO2
c.	Calculate the rotor current frequency in an Induction motor, if the supply is 50 Hz and slip is 3%.	2	L1	CO3
d.	The primary current of a transformer is 25 A and the transformation ratio is 0.6. Determine the secondary current.	2	L1	CO4
e.	Define renewable energy sources.	2	L1	CO5
	II : PART - B	**90**		
	UNIT - I	**18**		
2 a.	i) Explain the significance of power factor in an AC circuit.	3	L1	CO1
	ii) Determine the current through a series circuit having 20 Ω resistance in series with a capacitor of 16.67 μF and an inductance of 0.5 H. Also determine the power factor of the circuit. Assume a supply of 110 V, 50 Hz across the RLC series combination.	6	L1	CO1
b.	Give a detailed analysis of RL series circuit supplied by an AC source, with relevant waveforms and phasor diagram.	9	L1	CO1
c.	Determine the branch currents and main current in the following circuit Q2(c). What is the equivalent impedance between points A and B.	9	L2	CO1



Circuit Q2(c)

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UNIT - II **18**

3 a.	Explain the construction of DC machines with neat sketch.	9	L1	CO2
b.	i) What is back emf? Explain the significance.	3	L1	CO2
	ii) A four pole, lap wound DC shunt generator has a useful flux per pole of 0.08 wb. The armature winding consists of 260 turns, each of resistance 0.006 Ω. Determine the terminal voltage of the generator when it is running at 1000 rpm and supplying a load current of 55 A.	6	L1	CO2
c.	i) Mention the application of DC series motor and DC shunt motor.	3	L2	CO2
	ii) An 8 pole DC shunt generator has 778 wave connected conductors on its armature. While running at 500 rpm it supplies power to a load of 12.5 Ω at 250 V. The armature and shunt field resistances are 0.24 Ω and 250 Ω respectively. Determine the armature current the emf induced and the flux per pole.	6	L2	CO2

UNIT - III **18**

4 a.	i) Derive relation between line and phase quantities in a delta connected system.	6	L1	CO3
	ii) Three equal impedances (10+j16) Ω are connected in star across a 400 V, 60 Hz supply. Determine the total power consumed by the load.	3	L1	CO3
b.	Three coils having impedances of (8+j6) Ω are connected; i) Star ii) Delta, across a 440 V, 50 Hz 3 phase line. Calculate line current and total power consumed in each case.	9	L2	CO3
c.	I) Explain the construction of; i) Slip ring rotor ii) Squirrel cage rotor of an induction motor	6	L2	CO3
	II) A 6 pole induction motor is fed from 50 Hz supply. If the frequency of rotor emf at full load is 2 Hz, find the full load slip and speed.	3	L2	CO3

UNIT - IV **18**

5 a.	i) Derive the emf equation of an alternator.	6	L2	CO4
	ii) Compare the salient and non-salient rotors of an alternator.	3	L2	CO4
b.	I) Derive the emf equation of a single phase transformer.	5	L1	CO4
	II) A 25 kVA transformer has 500 turns on the primary and 40 turns on the secondary winding the primary winding is connected to a 3 kV, 50 Hz AC sources calculate; i) Primary and secondary current on full load ii) The maximum flux in the core	4	L1	CO4

Contd ... 3

c.	I) Write a note on the losses in a transformer.	3	L1	CO4
	II) A single phase 50 Hz transformer has 30 primary and 350 secondary turns the net cross sectional area of the core is 250 cm^2. If the primary winding is connected to a 230 V, 50 Hz supply, calculate; i) The peak value of the flux density in the core ii) Voltage induced in the secondary winding iii) Primary current when secondary current is 100 A	6	L1	CO4
	UNIT - V	**18**		
6 a.	With a neat diagram, explain the working of wind power plant.	9	L1	CO5
b.	i) What are circuit breakers? Give its classification.	4	L1	CO5
	ii) Explain the construction and operation of HRC fuse.	5	L1	CO5
c.	With a neat sketch, explain the pipe earthing system.	9	L2	CO5

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