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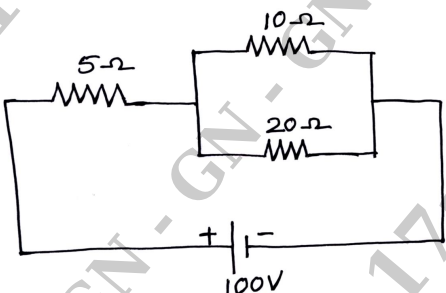
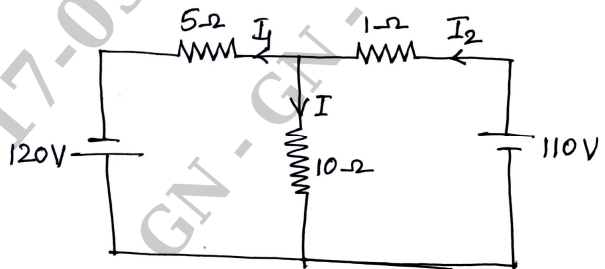
First Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024

Introduction to Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. VTU Formula Hand Book is permitted.
 3. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	Explain the general structure of electrical power system using single line diagram approach.	06	L2	CO5
	b.	Find the current and power in each resistor for the circuit shown in Fig.Q1(b). <div style="text-align: center;">  <p>Fig.Q1(b)</p> </div>	06	L3	CO2
	c.	Explain the operation of Nuclear power generation plant with the help of block diagram.	08	L2	CO1
OR					
Q.2	a.	State and explain Kirchoff's laws.	06	L2	CO1
	b.	Distinguish between conventional and nonconventional sources of energy.	06	L3	CO1
	c.	Find the current I_1 , I_2 and I in the network shown in Fig.Q2(c). <div style="text-align: center;">  <p>Fig.Q2(c)</p> </div>	08	L3	CO2
Module – 2					
Q.3	a.	Define the following terms: (i) Average value (ii) RMS value (iii) Phase difference (iv) Amplitude	06	L1	CO2

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	b.	A pure inductor excited by sinusoidal varying AC voltage, show that the average power consumed by inductor is zero. Also draw the voltage, current and power waveforms.	08	L2	CO2
	c.	A star connected load consists of 6Ω resistance and 8Ω inductive reactance in each phase. A supply of 440 V at 50 Hz is applied to the load. Find the line current, power factor and power consumed by the load.	06	L3	CO2
OR					
Q.4	a.	Develop an equation for the power consumed by an RC series circuit. Draw the waveforms of voltage, current and power.	08	L2	CO2
	b.	What are the limitations and advantages of three phase system?	06	L3	CO2
	c.	A circuit consists of resistance 10Ω , an inductance of 16 mH and a capacitance of $150\ \mu\text{F}$ connected in series. A supply of 100 V at 50 Hz is given to the circuit. Find the current, power factor and power consumed.	06	L3	CO2
Module – 3					
Q.5	a.	With the help of neat diagram, explain the construction of D.C generator.	08	L2	CO3
	b.	Give the classification of DC generator. Obtain the expression for EMF equation of a DC generator.	06	L2	CO4
	c.	A four pole d.c. shunt motor takes 22.5 Amps from a 250 V supply, $R_a = 0.5\ \Omega$ and $R_{sh} = 125\ \Omega$. The armature is wave connected with 300 conductors. If the flux per pole is 0.02 wb, calculate: (i) The speed (ii) Torque developed (iii) Power developed	06	L3	CO4
OR					
Q.6	a.	What is back emf in a dc motor? What is its significance?	06	L1	CO4
	b.	Sketch N-I and T-I characteristics of DC: (i) Series (ii) Shunt motors. Mention two applications of each motor.	08	L4	CO4
	c.	A 8 pole wave wound DC shunt generator has 36 slots, 10 conductors in each slot. The flux/pole is 0.01 wb. It runs at 1200 rpm. The armature and field resistance are $0.1\ \Omega$ and $100\ \Omega$ respectively. Calculate the terminal voltage when the load current is 120 A. Neglect armature reactions.	06	L3	CO4
Module – 4					
Q.7	a.	Discuss various types of losses in a transformer.	08	L2	CO4
	b.	With neat sketch, explain the construction and working principle of 1 ϕ transformer.	06	L2	CO3
	c.	A 3 phase induction motor with 4 poles is supplied from an alternator having six poles and running at 1000 rpm. Calculate: (i) Synchronous speed of the IM (ii) Its speed when slip is 0.04 (iii) Frequency of the rotor emf when the speed is 600 rpm	06	L3	CO4

OR

Q.8	a.	With relevant diagram, explain the construction of three phase induction motor.	08	L2	CO3
	b.	Define slip of a 3-phase induction motor and derive the relation between supply frequency and rotor current frequency.	06	L2	CO4
	c.	The primary winding of a 25 KVA transformer has 200 turns and is connected to 230 volts, 50 Hz supply. The secondary turns are 50. Calculate: (i) No load secondary induced emf (ii) Full load primary and secondary currents (iii) The flux density in the core, if the cross section of the core is 60 cm ² .	06	L3	CO4

Module – 5

Q.9	a.	Mention the different types of wiring with relevant circuit diagram and switching tables, explain two-way and three way control of lamps.	08	L2	CO5
	b.	Define tariff. Explain briefly the two part tariff with its advantages and disadvantages.	06	L2	CO5
	c.	Explain the working principle of fuse and MCB.	06	L2	CO5

OR

Q.10	a.	What is earthing? Why earthing is required? With the help of neat sketch, explain plate earthing.	08	L2	CO5
	b.	Write a short note on precautions against an electric shock.	06	L2	CO5
	c.	List out the power rating of household appliances including air conditioners, PCs, Laptops, printers etc. Find the total power consumed.	06	L2	CO5
