CBCS SCHEME

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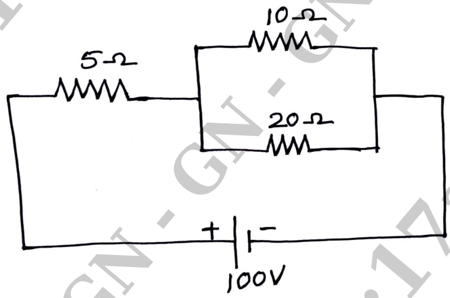
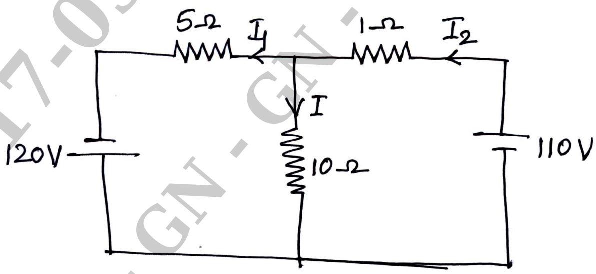
BESCK104B / BESCKB104

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).  Fig.Q1(b)	**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).  Fig.Q2(c)	**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**

	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 μF 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 Ω and R_{sh} = 125 Ω. 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 Ω and 100 Ω 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 1ϕ 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**

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