C.M.R. INSTITUTE OF TECHNOLOGY CMR BANGALORE - 37

CBCS SCHEME

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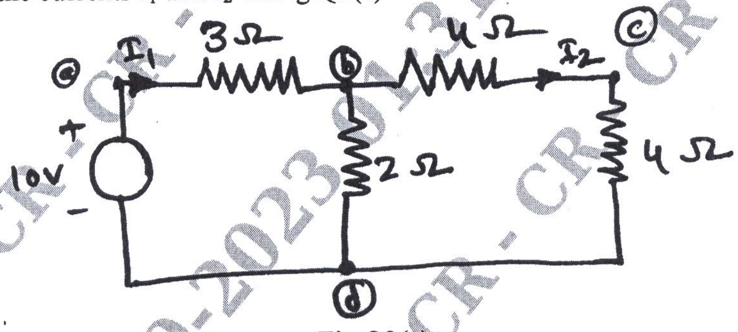
BESCK104B / BESCKB104

First Semester B.E./B.Tech. Degree Examination, June/July 2023

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 a typical electric power system with the help of a single line labelled diagram.	8	L2	CO1
	b.	Draw and explain the working of Hydel power plant.	7	L2	CO1
	c.	A direct – current circuits comprises two resistors, 'A' of value 25 ohms, 'B' of unknown value, connected in parallel, together with third resistor 'C' of value 5 ohms connected in series with the parallel group. The potential difference across 'C' is found to 90V and total power dissipated in the whole circuit is 4320 watts, Calculate : i) The value of resistor 'B' ii) The voltage applied to the whole circuit.	5	L3	CO1
		OR			
Q.2	**a.**	Write a note on conventional and non-conventional energy resources.	7	L2	CO1
	b.	State and explain Kirchhoff's laws applicable to d.c circuits.	7	L2	CO1
	c.	Find the currents I_1 and I_2 of Fig Q2(c)  Fig Q2(c)	6	L3	CO1
		Module – 2			
Q.3	**a.**	Define following terms applied to alternating current wave : i) Average value ii) R.M.S value iii) Form factor iv) Peak factor.	6	L3	CO2
	b.	Establish relation between voltage and current in a.c. circuit containing pure inductance only. Draw the phasor diagram.	8	L3	CO2
	c.	A balanced delta connected load has per phase impedance of (8 + j6) ohm and line voltage is 400V at the load terminals. Find the current p.f and power delivered to the load.	6	L2	CO2

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		OR			
Q.4	**a.**	Explain the generation of three phase a.c and list the advantages.	**6**	**L2**	**CO2**
	b.	A coil has inductance of 0.05H and a resistance of 10Ω. It is connected to a sinusoidal 200V, 50Hz supply. Calculate the impedance, current and power consumed.	**6**	**L3**	**CO2**
	c.	A series RLC circuit is composed of 10Ω resistor, one 0.1H inductance and one 50.00 μF capacitor. A voltage of $v = 141.4\ \text{Sin}\ 100\pi t$ is impressed upon the circuit. i) Find the current ii) Calculate V_R, V_L, and V_C iii) Active power iv) Apparent power.	**8**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Derive E.M.F equation of the D.C generator.	**6**	**L3**	**CO3**
	b.	Explain the characteristics of D.C shunt motor.	**7**	**L2**	**CO3**
	c.	A Shunt generator supplies 195A at 220V Armature resistance = 0.02Ω, shunt field resistance is 44Ω, find the e,m,f generated.	**7**	**L3**	**CO3**
		OR			
Q.6	**a.**	Derive torque equation of the d.c. motor.	**6**	**L3**	**CO3**
	b.	An 8-pole lap wound d.c. Generator armature rotated at 350rpm is required to generate 260V. The useful magnetic flux per pole is 0.05wb. Find the total number of conductors.	**7**	**L3**	**CO3**
	c.	A 6-pole lap wound shunt motor has 500 conductors. The armature and field resistances are 0.05Ω and 25Ω respectively. Find the speed of motor it takes 120A from a d.c. supply of 100V. Flux per pole is 20 mwb.	**7**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Describe the operation of a single phase transformer, explaining clearly the functions of the different parts.	**7**	**L2**	**CO4**
	b.	A 100KVA, 6600/440V, 50Hz single phase transformer has 80 turns on the low voltage winding. Calculate i) the maximum flux in the core ii) the number of turns on the high voltage winding iii) the current in each winding iv) voltage per turn.	**7**	**L3**	**CO4**
	c.	A 3-phase, 6-pole, 50Hz induction motor has a slip of 1% at no load, and 3% at full load. Determine: i) Synchronous speed ii) No-load speed iii) Full load speed.	**6**	**L3**	**CO4**
		OR			
Q.8	**a.**	Explain how rotating magnetic field is producing in the three phase induction motor.	**7**	**L2**	**CO4**
	b.	A 500KVA transformer has an iron loss of 700 w and a full load copper loss of 1800W. Calculate : i) Efficiency at full load, 0.8p.f lagging ii) Efficiency at half load, UPF.	**7**	**L3**	**CO4**

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	c.	A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50Hz. Calculate : i) Speed at which magnetic field is rotating ii) Speed of the rotor when its slip is 0.04	6	L3	CO4
		Module – 5			
Q.9	a.	With neat wiring diagram and truth table explain three way control of lamp.	7	L2	CO5
	b.	In a residential house, the following loads are connected : i) Six lamps of 40w each, switched on for 5 hours a day ii) Two fans of 60w each, switched on for 12 hours a day iii) One 1000w heater working for 2 hours per day iv) One refrigerator of 250w working for 10 hours per day. If each unit of energy costs Rs. 6.50, what will be the total cost in the month of April?	7	L3	CO5
	c.	What is electric shock? List the preventive measures against the shock.	6	L2	CO5
		OR			
Q.10	a.	What is earthing? With neat diagram, explain any one type of earthing.	7	L2	CO5
	b.	Explain working principle of Fuse and miniature circuit breaker.	7	L2	CO5
	c.	What are the desirable characteristics of a tariff and explain two part tariff.	6	L2	CO5

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