USN

BESCK104B /BESCKB104

First Semester B.E./B.Tech. Degree Examination, Jan./Feb. 2023
Introduction to Electrical Engineering

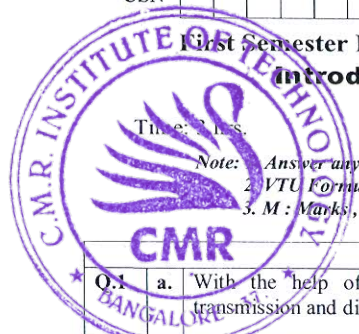Time: 3 hrs.   Max. Marks: 100

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.	With the help of single line diagram, explain the electrical power transmission and distribution system.	6	L2	CO2
	b.	Explain the working of hydro power generation using relevant block diagram.	8	L2	CO1
	c.	A resistance R is connected in series with a parallel circuit comprising of two resistance 12Ω and 8Ω. The total power in the circuit is 70W, when the applied voltage is 20V. Calculate R.	6	L3	CO1
		OR			
Q.2	a.	State Kirchhoff's law for DC circuits. Illustrate with an example.	6	L2	CO1
	b.	With the help of block diagram, explain the working of Solar power generation.	8	L2	CO1
	c.	For the circuit shown in Fig. Q2(c), find the current supplied by each battery and power dissipated in 1Ω resistor.	6	L3	CO2

Fig. Q2(c)

		Module – 2			
Q.3	a.	A pure inductor excited by sinusoidal varying AC voltage, show that the average power consumed by inductor is zero.	8	L2	CO1
	b.	Define i) Real power ii) Reactive power iii) Apparent power iv) Power factor.	6	L1	CO1
	c.	The current in a circuit is $(8 – j10)$A, when the applied voltage is $(50 + j25)$ volts. Determine i) The magnitude of the current ii) Impedance iii) The circuit elements iv) Power factor v) Power.	6	L3	CO2
		OR			
Q.4	a.	Develop an equation for the power consumed by a R – C series circuit. Draw the waveform of voltage, current and power.	8	L2	CO3
	b.	With relevant diagrams, explain the concept of line values of voltage and current and phase values of voltage and currents in 3 φ star and delta connections.	6	L2	CO3

			M	L	C
	c.	A circuit having a resistance of 12Ω on inductors of 0.15H and a capacitance of $100\mu F$ in series is connected across a 100V, 50Hz supply. Calculate i) Impedance ii) Current iii) Power factor iv) Phase difference between the current and supply voltage v) Power.	6	L3	CO3
		Module – 3			
Q.5	a.	With the help of neat diagram, explain the construction of DC generator.	8	L2	CO4
	b.	With usual notations, derive the torque equation of a DC motor.	6	L2	CO4
	c.	A d.c. shunt generator has a shunt field winding resistance of 100Ω, it is supplying a load of 5kW at a voltage of 250V. If its armature resistance is 0.22Ω and per brush voltage drop is 1 volt. Calculate the induced e.m.f of generator.	6	L3	CO4
		OR			
Q.6	a.	Give the classification of DC generator. Obtain the expression for EMF equation of a DC generator.	8	L2	CO4
	b.	With neat diagrams, explain the speed control of DC shunt motor.	6	L2	CO4
	c.	A 4 pole dc shunt motor takes 22 A from 220V supply. the armature and field resistances are respectively 0.5Ω and 100Ω. The armature is lap connected with 300 conductors. If the flux per pole is 20 mwb, calculate i) Speed ii) Gross torque.	6	L3	CO4
		Module – 4			
Q.7	a.	Explain the working principle of single phase transformer and its necessity in power system.	8	L1	CO1
	b.	Explain the concept of rotating magnetic field in a 3 – phase induction motor with neat vector diagrams.	6	L2	CO2
	c.	The maximum efficiency at full load and unity power factor of a single – phase 25KVA, 500V/1000V, 50Hz, transformer is 98%. Determine its efficiency at i) 75% load, 0.9 p.f. ii) 50% load, 0.8 p.f.	6	L3	CO2
		OR			
Q.8	a.	With relevant diagrams, explain the construction of 3 – phase induction motors.	8	L2	CO2
	b.	Derive an EMF equation of single phase transformer with usual notation.	6	L2	CO2
	c.	A 3 – phase, 50Hz, 4 pole induction motor, its rotor induced e.m.f is 1.5 Hz frequency. Calculate i) Synchronous speed ii) Full load slip iii) Actual speed.	6	L3	CO3
		Module – 5			
Q.9	a.	List the types of wiring system used for domestic / industry. Explain suitable wiring used for staircase, give the schematic / circuit diagram.	6	L1	CO5
	b.	What is Earthing? With a neat diagram, explain plate earthing.	8	L2	CO5
	c.	Define Unit and Tariff. Explain the two port tariff with its merits and demerits.	6	L2	CO5

		OR			
Q.10	a.	What is Fuse? With neat diagram, explain the working principle of fuse.	6	L2	CO5
	b.	Define Electric shock. What are the safety precaution to be taken against to avoid electric shock?	8	L2	CO5
	c.	An electric boiler draws 6A current at 230V for 4 hrs. The electricity costs Rs 3/- per unit. Determine the total cost.	6	L3	CO5

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