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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2024 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**
Course Code: 22EE5PCDSM **Max Marks: 100**
Course: DC & Synchronous Machines

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Differentiate between separately excited and self-excited DC shunt generators.	CO1	PO1	**04**
	b)	Explain Armature reaction in DC generators	CO1	PO1	**08**
	c)	A DC series motor has Ra = 0.1 ohm and Rse =0.3 ohm. The motor draws 25 A from a 250 V supply and runs at 1200 rpm. The armature of the motor is shunted by a resistance of 25 ohm. Find the speed of the motor with shunted armature connection if the magnetic circuit is unsaturated and the load torque is constant. What is the no load speed of the motor?	CO1	PO1	**08**
		OR			
2	a)	Show the power flow in a DC motor	CO1	PO1	**04**
	b)	Describe the process of commutation in DC generators	CO1	PO1	**08**
	c)	A DC shunt motor drives a centrifugal pump whose torque varies as the square of the speed. The motor is fed from a 200V supply and take 50A when running at 1000 rpm. What resistance must be inserted in the armature circuit in order to reduce the speed to 800 rpm? The armature and field resistances of the motor are 0.1 ohm and 100 ohm respectively.	CO1	PO1	**08**
		UNIT - II			
3	a)	What is the purpose of the Field test on DC series motors? Describe the test procedure.	CO2	PO1, 2	**10**
	b)	Two similar DC machines each rated 500V, 1000kW tested by regenerative method gave the following data: Output current of generator = 2000A; Input current from supply mains =380A; Shunt field current of generator = 22A; shunt field current of motor = 17 A; Armature resistance of each machine is 0.01 ohm. Find i) Stray losses of each machine ii) Total losses in the Motor	CO2	PO1, 2	**10**

			iii) Total losses in the Generator. Assume iron and mechanical losses of both the machines are same.			
			UNIT - III			
	4	a)	Describe the constructional features of two types of rotors of a synchronous machine	CO3	PO1, 2	**06**
		b)	"Synchronous motor is not a self-starting motor" Justify. What should be the rotor speed for it to rotate continuously, Explain?	CO3	PO1, 2	**07**
		c)	A three phase, 4 pole, 50Hz, star connected alternator has 60 slots with 2 conductors per slot. Coils are short pitched by 3 slots. Find the useful flux per pole required to induce a line voltage of 6.6kV	CO3	PO1, 2	**07**
			UNIT - IV			
	5	a)	Explain synchronization of a three phase synchronous generator with bus bars using lamps as indicators. How do you satisfy the required conditions if the lamp indications are not correct ?	CO4	PO1, 2	**10**
		b)	A three phase, star connected 1000kVA,11,000 V alternator has rated current of 52.5 A. The effective resistance of the winding per phase is 0.45 ohm. The test results are given below: OC test: Field current = 12.5A, Voltage between lines 422V SC test: Field current = 12.5A, Line current =52.5A. Determine the full load regulation of the alternator at power factors a) 0.8 lagging b) 0.8 leading	CO4	PO1, 2	**10**
			OR			
	6	a	Show how you obtain synchronous impedance of a synchronous generator by conducting suitable experiments.	CO3	PO1, 2	**06**
		b	Show that E = $V\cos(\partial) + IR_a\cos(\theta) + I_d X_d$ for a salient pole type alternator with the help of Phasor diagram.	CO3	PO1, 2	**08**
		c	Two 50 MVA, three phase alternators operate in parallel. The setings of the Governors are such that the rise in speed from full load to no load is 2% in one machine and 3 % in the other, the characteristics being straight lines in both the cases. If each machine is fully loaded when the total load is 100MW, what would be the load on each machine when the total load is 60 MW?	CO4	PO1, 2	**06**
			UNIT - V			
	7	a)	Deduce the expression for power exchanged between non salient pole synchronous machine and bus bars i) Synchronous machine is in generating mode ii) Synchronous machine is in motoring mode	CO3	PO1, 2	**10**
		b)	Illustrate the effect of i) change in prime mover input ii) change in load of a Synchronous generator connected to infinite bus bars.	CO3	PO1, 2	**10**

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