U.S.N.										

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: 19EE5PCMC2 **Max Marks: 100**
Course: Electrical Machines - II

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)	With a neat sketch describe the concept of armature reaction in a dc machines.	CO1	PO2	**10**
	b)	Explain any two methods of speed control of dc shunt motor and dc series motor.	CO1	PO2	**10**
		OR			
2	a)	Explain typical T/Ia and N/Ia characteristics of DC Shunt and DC series Motors.	CO1	PO2	**08**
	b)	What is commutation? With a neat sketch explain the process of commutation?	CO1	PO2	**12**
		UNIT - II			
3	a)	With a neat circuit obtain the expression for motor and generator efficiency by conducting test on DC series Motor.	CO2	PO2	**10**
	b)	The Hopkinson's test on two shunt machines gave the following results: Line voltage =230v, line current excluding field current = 30A, motor armature current = 230A, field currents 5A and 4A for generator and motor respectively. The armature resistance of each machine is 0.025ohm. Calculate the efficiency of both the machines.	CO2	PO3	**10**
		UNIT - III			
4	a)	With a neat sketch explain the construction of Rotors in synchronous generators	CO3	PO2	**07**
	b)	Why Synchronous motors are not self-starting? Explain any two methods of starting synchronous motors.	CO3	PO2	**08**
	c)	The core length of a three phase, 6 pole, 50Hz, alternator is equal to the pole pitch. The slot pitch is 3cm, slots per pole per phase is 6 and number of turns per coil in double layer winding is 5.	CO3	PO3	**05**

<table>
<tr><td></td><td></td><td></td><td>Determine a) total number of slots, core diameter, and core length. b) emf generated if the flux per pole is 0.03wb.</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>UNIT - IV</td><td></td><td></td><td></td></tr>
<tr><td></td><td>5</td><td>a)</td><td>Define Voltage Regulation. Describe the pre-determination of voltage regulation using EMF method.</td><td>CO3</td><td>PO2</td><td>10</td></tr>
<tr><td></td><td></td><td>b)</td><td>Describe the slip test on Salient pole alternator and explain how the reactance’s are calculated using it</td><td>CO3</td><td>PO2</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td></td><td>6</td><td>a)</td><td>With a neat circuit diagram Explain the parallel operation of alternators and derive the expression for terminal voltage and circulating current. State the conditions to be satisfied for the parallel operation.</td><td>CO4</td><td>PO2</td><td>12</td></tr>
<tr><td></td><td></td><td>b)</td><td>A 10MVA, 6.6kv, 3 phase star connected alternator gave open circuit and short circuit data as follows.
<table>
<tr><td>Field current(A):</td><td>25</td><td>50</td><td>75</td><td>100</td><td>125</td><td>150</td></tr>
<tr><td>OC Voltage(kv):</td><td>2.4</td><td>4.8</td><td>6.1</td><td>7.1</td><td>7.6</td><td>7.9</td></tr>
<tr><td>SC Current (A)</td><td>288</td><td>528</td><td>875</td><td>-</td><td>-</td><td>-</td></tr>
</table>
Find the voltage regulation at full load 0.8 pf lagging by EMF method. Armature resistance per phase = 0.13 ohm.</td><td>CO4</td><td>PO3</td><td>08</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - V</td><td></td><td></td><td></td></tr>
<tr><td></td><td>7</td><td>a)</td><td>Derive the expression for power exchanged with nus bars and also draw the power angle characteristics of synchronous machine.</td><td>CO4</td><td>PO2</td><td>10</td></tr>
<tr><td></td><td></td><td>b)</td><td>A 5MVA, 10kV, 1500 rpm, 3 phase 50 Hz, 4pole alternator is operating on infinite bus bar. Find the synchronizing power per mechanical degree of angular displacement under no load condition. Xs=20%</td><td>CO4</td><td>PO3</td><td>10</td></tr>
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