

**(OLD COURSE)****QP Code : 4260****(3 Hours)****[Total Marks : 100**

Note:- i) Question No. 1 is compulsory.

ii) Attempt any four out of remaining

Q1	A	Explain hunting in synchronous motor.	(10)
	B	Derive an expression for distribution factor and coil span factor for a three phase winding	(10)
Q2	A	Explain excitation circles and power circles.	(10)
	B	A 400V three phase mesh connected synchronous motor runs at rated voltage and with an excitation emf of 510V. Its synchronous impedance is $(0.5 + j4)$ ohm per phase and friction, windage and iron losses are 900W. Calculate shaft power output, line current, power factor for maximum power output.	(10)
Q3	A	Explain slip test to determine $X_d$ and $X_q$ .	(10)
	B	A 20MVA three phase star connected 11KV, 12 pole, 50 Hz salient pole synchronous motor with negligible armature resistance has reactances of $X_d = 5.0$ ohm and $X_q = 3$ ohm. At full load, unity power factor and rated voltage, compute the excitation voltage and power.	(10)
Q4	A	Explain Bondel's two reaction theory for salient pole synchronous machine.	(10)
	B	A three phase, 6 poles, 1000 rpm alternator has fundamental flux per pole = 0.0187 Wb, third harmonic flux per pole = 0.00172 Wb and fifth harmonic flux per pole = 0.0006 Wb. It has 4 slots per pole per phase with 8 conductors per slot. The winding is chorded by one slot. If the alternator is star connected, find the magnitude of line and phase emf induced.	(10)
Q5	A	Explain stepper motor.	(10)
	B	Explain armature reaction in synchronous alternator.	(10)
Q6	A	Explain the different conditions to be fulfilled for parallel operation of synchronous generator.	(10)
	B	Write a short note on 'Different starting methods of synchronous motor'.	(10)
Q7		A 220V, 50Hz, 6 pole star connected alternator with ohmic resistance of 0.06 ohms per phase, gave the following data for open circuit, short circuits and full load zero power factor characteristics. Find the percentage voltage regulation at full load current of 40A at pf of 0.8 lag by EMF, MMF and ZPF method.	(20)

**[TURN OVER**

Field current A	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.8	2.2	2.6	3.0	3.4
Open circuit voltage $E_f$ in V	29	58	87	116	146	172	194	232	261.5	284	300	310
Short circuit current in A	6.6	13.2	20	26.5	32.4	40	46.3	59	-	-	-	-
Zpf terminal voltage in V	-	-	-	-	-	0	29	88	140	177	208	230