

N.B. 1: Q No 1 is compulsory

2: Attempt any three from the remaining questions.

3. Figure to the right indicate full marks

4. Assume data if necessary & justify

- Q 1, a: Explain (1). Distribution Factor, (2) Pitch Factor, in case of synchronous machine 5
b. Explain why synchronous motor is called as synchronous condenser. 5
c. Draw a neat diagram & explain in brief generalized representation of synchronous machine with & without damper windings 5
d. Draw & explain the primitive representation of Induction Machine. 5

Q 2, a: A 3 phase 8 pole 750 rpm star connected alternator has 72 slots on the armature. Each slot has 12 conductors and winding is shorted by 2 slots. Find the pitch factor and distribution factor for the winding and calculate the induced E.M.F. between the line if the flux per pole is 0.06 Webbers 10

Q 2, b: What is Armature Reaction? Explain the effect of armature reaction on terminal voltage of an alternator at unity power-factor load, zero power-factor lagging load, zero power-factor leading load. Draw the relevant phasor. 10

Q 3, a: A 11 KV, 1000 KVA, 3 phase star connector alternator has a resistance of 2 ohm per phase, the open circuit curve & the characteristic with rated full load current at zero power-factor are given in the following Table; find the voltage regulation of the alternator for full load current at power factor of 0.8 lagging. 10

I_r ampere	---	40	50	110	140	180
Line Voltage	---	5800	7000	12500	13750	15000
Line Voltage, Zero Power-Factor	---	0	1500	8500	10550	12500

Q 3, b: Explain with neat diagram excitation circle & 'O' curve of synchronous motor. 10

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EM III

Q4, a: Two 3 phase alternators operate in parallel, the rating 1 machine is 50 MW & the other is 100 MW. Both alternators are fitted with a governor having a drop of 4%. How will these two machine's share a load of 100 MW? 10

b. Explain starting methods of synchronous motor. 10

Q 5, a: A 1,000 KVA, 11,000 V, 3- phase star connected synchronous motor has an arm resistance & reactance per phase of 3.5 ohms & 40 ohms respectively; determine the induced EMF and angular retardation of the rotor when fully loaded at U.P.F, 0.8 P.F lagging, 0.8 P.F leading. 10

b: Deduce an expression for synchronizing power & synchronizing torque of a 3 phase synchronous machine. 10

Q 6, : Write Notes on

(a). Blondel's 2 reaction theory

(b). Slip Test

(c). Steady state analysis of induction machine 20