T.E. Electrical VI CBGS

EM - III

16.5.16

(85)

QP Code :584602

(3 Hours) **[Total Marks: 80]**

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 the effect of distribution of winding & use of short pitch coil on the magnitude of generated voltage of an alternator & hence give expression for distribution factor & coil span factor. 5

Q 1, b. Explain the principle of operation of a 3 phase synchronous motor. 5

Q 1, c. Derive the expression for armature to field mutual inductance and armature self inductance for a salient pole synchronous machine. 5

Q 1, d. Explain in detail steady state analysis of induction machine using generalized theory of primitive representation. 5

Q 2, a: A 10 MVA 1KV 50 HZ 3 phase 4 pole 750 rpm star connected alternator is driven at 300 rpm.The armature winding is housed in 360 slot with 6 conductor per slot. The coil span is 5/6 of a pole pitch .Calculate the flux per pole required to give 11 kv line voltage on open circuit. 10

Q 2, b: Derive an expression for power developed in synchronous generator and also the condition for maximum power output. 10

Q 3, a: A 11KV and 1000 KVA, 3 phase cylindrical-rotor type alternator has the following open circuit characteristic at rated speed,

I, ampere	---	40	60	80	100
Line Voltage	---	7300	10300	12400	14000

The excitation to produce full load current on short circuit is 34 Amp & when the machine supplies full load output at 11 KV & Zero Power factor, the excitation is 106 Amp. Determine (a) the % synchronous

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reactance drop, (b) the % leakage reactance drop, and (c) the armature reaction in equivalent field Amp at full load; neglecting the armature resistance.

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

Q4, a: Two identical alternators of rating 2000 KVA operate in parallel, the drop in the frequency of the first machine is from 50 Hz on "NO LOAD" to 48 Hz on "FULL LOAD". The corresponding uniform speed drop of the second machine is 50 Hz to 47.5 Hz. How will the two machines share a load of 3000 KW. What is the maximum load at unity power factor that can be delivered without over loading either machine? 10

Q 4, b. Explain the behavior of Synchronous motor catering to constant power output with changing excitation. Draw the Phasor diagram. 10

Q 5, a: A 3,000 V 3-phase synchronous motor running at 1500 rpm has its excitation kept constant corresponding to "NO LOAD" terminal voltage of 3000 Volts. Determine the power input, power factor and torque developed for an armature current of 250 Amp. If synchronous reactance is 5 Ohms/phase and armature resistance is neglected. 10

Q 5, b: Explain the effect of changing excitation on alternator connected to infinite bus. 10

Q 6 : Write Notes on

(a). Synchonising Power & Synchronising Torque

(b). Slip Test

(c). Steady state analysis of synchronous machine 20