Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

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B.Tech. (EE) (2011 Onwards)/(EE)PT/(Electrical Engg. & Industrial Control) (2012 Onwards)/(Electrical and Electronics)(2011 & 2012 Batch)

(Sem.5)

SYNCHRONOUS MACHINES

Subject Code : BTEE-501

Paper ID : [A2107]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) What are the causes of changes in terminal voltage of Alternators when loaded?

b) What do you mean by synchronous reactance?

c) Name the various methods for predetermining the voltage regulation of 3-phase Alternator.

d) Why is the synchronous impedance method of estimating voltage regulation considered as pessimistic method?

e) Why synchronous generators are to be constructed with more synchronous reactance and negligible resistance?

f) Where the damper windings are located? What are their functions?

g) What are the advantages of salient pole type construction used for Synchronous machines?

h) What is meant by hunting in synchronous motor?

i) Draw the speed - torque characteristics of synchronous reluctance motor.

j) Write the principle of working of hysteresis motor.

SECTION-B

2. Derive the emf equation of an alternator.

3. A 3 phase, 6 pole, star-connected alternator revolves at 1000 r.p.m. The stator has 90 slots and 8 conductors per slot. The flux per pole is 0.05 wb (sinusoidally distributed). Calculate the voltage generated by the machine if the winding factor is 0.96.

4. Discuss the parallel operation of two alternators with identical speed/load characteristics.

5. Explain the various starting methods of a synchronous motor.

6. Draw and explain the phasor diagram of a synchronous motor operating at lagging and leading power factor.

SECTION-C

7. A 1000 KVA, 11000 V, 3-phase star-connected synchronous motor has an armature resistance and reactance per phase of 3.5 Ω and 40 Ω respectively. Determine the induced emf and angular retardation of the rotor when fully loaded at 0.8 p.f. lagging and 0.8 p.f. leading.

8. A 3300V, 3 phase synchronous motor running at 1500 rpm has its excitation kept constant corresponding to no-load terminal voltage of 3000V. Determine the power input, power factor and torque developed for an armature current of 250A if the synchronous reactance is 5 Ω per phase and armature resistance is neglected.

9. Write short notes on the followings :

   a) Principle of operation of reluctance motor.

   b) Transient stability of synchronous motor.

   c) Synchronization with grid.

   d) Power factor control of an alternator.