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SF-8338

B. E. III (Sem. - VI) (Electrical) Examination

May/June – 2011

Electrical Machine - III

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. III (Sem - VI) (Electrical)**

Name of the Subject :

☛ **Electrical Machine - III**

☛ Subject Code No. : **8 3 3 8** ☛ Section No. (1, 2,.....) : **1, 2**

Seat No. :

Student's Signature

(2) Attempt all questions from both section.

(3) Figure to the right indicate full marks.

(4) Assume suitable data if required.

SECTION - I

1 (a) Answer in short : (each two marks) **10**

(1) Why a 3-phase synchronous motor will always run at synchronous speed ?

(2) What is meant by synchronous condensor ?

(3) What is the purpose of dampor winding ?

(4) Why are alternators put in parallel ?

(5) What is the effect of varying excitation of an alternator running in parallel with an other alternator ?

(b) Write the conditions for parallel operation of an alternator with infinite bus-bar. **5**

(c) Explain effect of field excitation on armature current and power factor in synchronous machine with the help of vector diagram. **5**

2 (a) List out the various methods used to find out regulation of an alternator. Describe procedural steps involved in synchronous impedance method. 8

(b) A 2400 kVA, $8000\sqrt{3}$ volts, 3-phase star connected alternator has synchronous impedance of $1.5 + j.30\,\Omega$ per phase. Calculate the full load % regulation at pf of 0.866 leading and 0.866 lagging. 7

OR

2 (a) How X_d and X_q can be determined from slip-test ? 8

(b) A 3-phase star-connected salient pole synchronous generator is driven at a speed near synchronism with field circuit open and the stator is supplied from a balanced 3-phase supply. Voltmeter connected across the lines gave minimum and maximum reading of 2480V and 2500 volts. Line current fluctuates between 320A and 250A. Find synchronous reactance per phase. Neglect armature resistance. 7

3 Attempt any three : 15

(1) 'V-curves' of synchronous motor.

(2) Explain the construction of 3-ϕ alternator with neat sketch.

(3) Compare : Synchronous motor and Induction motor.

(4) Hunting of synchronous machines and its prevention.

(5) Synchronous phase modifiers.

SECTION - II

4 (a) Answer in short : (each two marks) 10

(1) What are the components of iron-loss in dc machine and in which part of the machine it occurs ?

(2) Why is it necessary to keep the brake applied tight while applying brake test to a dc series motor ?

(3) State with reason whether field test on two identical dc series machine is not regenerative method ?

(4) What are the application of ac servomotor ?

(5) What is an inverted induction machine ?

(b) State the advantages, disadvantages and application of switched reluctance motor. **5**

(c) Compare ac and dc servomotor. **5**

5 (a) Describe the Hopkinson's test for obtaining the efficiency of two similar shunt motors. **8**

(b) In a brake test, the dc motor took 42A from a 220V supply mains. The brake pulley of radius 30 cm had an effective load of 35 kg and the speed was 12 rps. Find the bhp (metric) and efficiency at the above load. **7**

OR

5 (a) Explain the construction, operation, advantages and applications one of a single-phase reluctance motor. **8**

(b) The result of Hopkinson's test on two similar dc machine are as follows : Line voltage 220V, Motor armature current 23A, Generator armature current 20A, Generator field current 0.4A. Motor field current 0.3A, Armature resistance of each machine 0.5 Ω. Calculate the efficiency of each machine. **7**

6 Write short notes : (any three) **15**

(1) Permanent magnet synchronous motor

(2) Hysteresis loops for hard and soft magnetic materials

(3) AC servomotor

(4) Axial flux PM machine

(5) Comparison between Brake test and Hopkinson's test.
