Roll No ....

MEPS - 105

M.E./M.Tech. I Semester

Examination, June 2013

Advance Course in Electrical Machines

Time : Three Hours

Maximum Marks : 70

Note : 1. *Attempt any five questions.*

2. *All questions carry equal marks.*

1. Explain the basic reason of using transformations in electrical machines. Obtain identical transformations for currents and voltages from a rotating balanced 3-phase winding to a rotating balanced 2-phase winding.

2. a) Enumerate the most common problems concerning the dynamics of 3-phase induction motors.

   b) A 230V, 4-pole, 50Hz, single-phase induction motor has the following constants and losses: Stator resistance = 2.3Ω, leakage reactance = 3.2Ω, rotor resistance = 4.2Ω, leakage reactance 3.2Ω (referred to stator), magnetizing reactance = 74Ω, core loss = 98 watts and friction and windage loss = 30 watts. Determine the stator current, p.f., and torque.

3. Derive the equivalent circuit of a double-cage poly-phase induction motor with the help of its generalized mathematical model.

4. What are the basic parameters of a synchronous machine? Derive expressions for voltage equations for a non-salient-pole synchronous machine. State the advantages of resolving armature mmf in to d-q axes components.

5. a) Write the impedance matrix of a 3-phase salient pole synchronous machine without amortisseurs.

   b) During the balanced 3-phase short-circuit analysis, explain why d-axis parameters are mainly involved.

   c) The effect of damper bars, just after the sudden short circuit, is to increase the amplitude of short circuit current. Explain

6. A cylindrical-rotor synchronous motor, connected to an infinite bus, is working under full load conditions with a load angle of 30°.

   a) If the shaft load is suddenly increased to 1.5 times the full load, determine whether or not the synchronism is maintained.

   b) Determine the maximum additional safe load that can be suddenly thrown on to the motor shaft.

7. a) An alternator is supplying power to an infinite bus. Explain how it can be disconnected from the bus.

   b) Explain how the voltage and frequency of a bus can be controlled.

   c) Compare the operation of an alternator connected to an infinite bus, with a single alternator supplying its own load.

8. Write short notes on any two of the following:

   a) Approximate methods for power system analysis.

   b) CWR & DWR synchronous generator

   c) Cross field theory of DC machine