Total No. of Questions :8] *[Total No. of Printed Pages :1*

Roll No .....

MEPS - 105

M.E./M.Tech., I Semester Examination, June 2016

Advance Course in Electrical Machines

Time : Three Hours ***Maximum Marks : 70***

Note : i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Explain the basic reason of using transformations in electrical machines.
   b) Obtain an expression for the electrical torque of the kron's primitive machine. Show that no torque is produced by interaction between the flux and current on the same axis.

2. a) Derive the transformations for currents between a rotating balanced 2- phase (α, β) winding and a pseudo-stationary 2-phase (d,q) winding.
   b) Write the general voltage equations for a metadyne generator with zero compensation.

3. a) Draw the equivalent circuit for a polyphase induction motor and state what is represented by the various parameters involved in this circuit.
   b) A 3- phase, 4- pole, 50Hz induction motor develops an electrical torque of 50Nm at a slip of 0.10 under no load, the motor is running with slip of 0.01. If a load torque 30Nm is suddenly applied to the motor shaft, find the speed as a function of time. Total inertia of motor and connected load is 6kgm^2.

4. A 230V, 4-pole,50Hz single phase induction motor has the following constants and losses.
   Stator resistance and leakage reactance: 2.3Ω, 3.2Ω. Rotor resistance and leakage reactance: 4.2Ω,3.2Ω, (Referred to stator).
   Magnetizing reactance: 74Ω
   Core loss =98 Watts,
   Friction and windage loss=30watts.
   Determine the stator current, P.F., power output, torque and efficiency at a slip of 0.05, with the auxiliary winding open.

5. a) What are the two characteristics of a polyphase synchronous machine that distinguish it from other rotating machines?
   b) Explain the constructional features of a schrage motor. How does it differ from an ordinary induction motor?

6. a) From the torque matrix of a 3-phase salient pole alternator and its phasor diagram obtain an expression for synchronous power interms of the load angle.
   b) Derive simplified equations of a synchronous machine with two damper coils.

7. a) Explain how park's transformations transform equations in a, b, c variables to d, q, o variables.
   b) Explain the various reactances and time constants from the 9- axis equivalent circuits of a 3-phase synchronous machine.

8. Write short notes on any two of the following:
   a) Approximate methods for system analysis.
   b) Application of Approximate method to power system analysis.
   c) Operational impedances for a synchronous machine with four rotor windings.
   d) Problems of power system analysis.

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