Total No. of Questions :8] *[Total No. of Printed Pages :2*

Roll No .....

MEPE-105

M.E./M.Tech., I Semester

Examination, December 2016

Electric Drive

Time : Three Hours

Maximum Marks : 70

Note: Attempt any five questions. All questions carry equal marks. Assume any missing data.

1. a) Draw and explain the block diagram of an electric drive. What are the functions of power modulation.
   b) A 15 BHP, 3-phase, 6-pole, 50Hz, 400V induction motor runs at 960 rpm on full load. If its takes 80 amps on direct -on-line switching, find the ratio of starting torque to full load torque in following cases, taking efficiency 95% and power factor 0.8.
      i) When started on DOL
      ii) When started by star delta
      iii) When started by auto transformer starter with 60% tapping.

2. a) Explain various starting methods of synchronous motors.
   b) A 220V d.c. series motor runs at 1000 rpm and takes an armature current of 100 A when driving a load with a constant torque. Resistances of the armature and field winding are 0.05Ω each, operated under dynamic braking at twice the rated torque and 800rpm. Calculate the value of braking current and resistor. Assume given magnetic circuit.

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3. a) Explain the constant torque and constant HP characteristics of A.C. and D.C. motors.
   b) Explain static scherbius drive with the help of circuit diagram for speed control.

4. Give the analysis of transient behaviours of the their three phase induction (motor) drive while starting and braking.

5. Explain the synchronous motor for adjustable speed drives with the help of circuit diagram. Also give the field of applications.

6. Explain VVVF method using solid state control for the three phase induction motor.

7. a) What are the general consideration in selection of drive for industrial applications?
   b) A constant speed drive has the following duty cycle.
      i) Load rising from 0 to 400 kN : 5 min.
      ii) Uniform load of 500 kN : 5 min.
      iii) Regenerative power of 400 kN returned t supply : 4min.
      iv) Remains idle for : 2min.

      Estimate power rating of the motor. Assume losses to be proportional to $(\text{power})^2$.

8. Write a short notes any two of the following :
   a) Types of duty cycle
   b) Stator voltage control of the induction motor
   c) Reversal of electric drives
   d) Starting methods for the three phase induction motors

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