 Roll No .....

# MEPE - 105

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

Examination, June 2014

## Electric Drive

*Time : Three Hours* *Max. Marks : 70*

*Note:* i) Attempt any five questions.
ii) All questions carry equal marks.
iii) Assume any missing data.

1. a) Draw and explain the torque slip characteristics of three phase induction motor in three mode of operation.
   b) A-4 pole, 50Hz, 3-phase, induction motor has rotor resistance and stand still rotor reactance of 0.04Ω and 0.16 ohm per phase respectively.
   Calculate the value of the external rotor resistance per phase to be inserted to obtain 70 percent of maximum torque at starting.

2. Describe various starting methods of three phase induction motors and synchronous motors with neat and clean circuit diagrams.

3. a) Explain the constant torque and constant power characteristics of D.C. and A.C. motors with graph.
   b) A-2 pole series motor runs at 707 rpm when taking 100amp at 85 volt with field coils in series. The resistance of each field coil is 0.03Ω and that of the armature is 0.04Ω. If the field coils are connected in parallel and load torque remains constant find
      i) Speed
      ii) The additional resistance to be inserted in series with the motor to restore the speed to 707 rpm.





4. Give the analysis of transient behaviour of the three phase induction motor drive while starting and braking in detail.

5. a) Give the block diagram using solid state control forward Leonard method of speed control of D.C. shunt motor with explanation in brief.
   b) Describe the adjustable speed control of synchronous motor operate in self mode with block diagram.

6. a) Explain multi quadrant operation of D.C. motor drive using chopper control as solid state device.
   b) Discuss various types of braking used in the industries in brief for induction motor and d.c. series motor drives only.

7. The points on the motor duty cycle, estimated on the basis of the proposed rolling schedule and previous experience with rolling mills, are given in the following table:

| Time, sec | 0 | 5 | 36 | 39 | 55 | 80 | Repeat cycle |
|---|---|---|---|---|---|---|---|
| Output, KW | 150 | 1000 | 1400 | 300 | 150 | 50 | |

Determine the KW rating of the motor (continuous rating) with load diagrams also.

8. Write short notes on any two of the following
   a) Duty cycles and load diagrams
   b) VVVf control of synchronous motor
   c) Transients of D.C. drives
   d) Voltage injection in the rotor circuit
   e) Reversal of electric drives

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