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EE/EX-7002-CBGS

B.E. VII Semester

Examination, December 2020

Choice Based Grading System (CBGS)

Electric Drives

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) What are the problems on converter fed d.c. motor? Give N-T characteristics of d.c. motors.

   b) Draw the block diagram and state modes of operation of electric drive.

2. a) Explain various static speed control method of three-phase induction motor.

   b) A 3-phase induction motor having the following equivalent circuit parameters is fed from a consent current source of 60A.

   $R_1 = 0.1\Omega; R'_2 = 0.2\Omega; X_1 = 0.1\Omega$

   $X^1_2 = 1.0\Omega; X'_m = 20\Omega$; (parameters are at 50 Hz). Determine the torque-speed characteristics when the current source has a frequency of (i) 30Hz (ii) 3Hz.

3. a) Discuss the operation of a four quadrant chopper fed variable speed reversible D.C series motor drive. Derive the relevant mathematical expression.

b) Explain the following breaking techniques of D.C motor drive in detail.
   i) Plugging
   ii) Rheostatic braking/ Dynamic braking
   iii) Regenerative braking

4. a) Describe static Scherbius drive with help of neat diagram.
   b) Explain Static Kramer Drive with performance.

5. A 220 V, 17.6 kW DC shunt motor running at its rated speed of 1200 rpm is to be broked by plugging. The armature resistance is 0.1 Ω and the rated efficiency of the motor is 80% calculate.
   i) The resistance to be connected in series with the armature to limit the initial braking current to twice the rated current.
   ii) The torque when the speed of the motor falls to 400rpm.

6. a) Write short notes on the following.
      i) Slip power recovery static Scherbius drive
      ii) Load commutated CSI-fed synchronous motor
   b) What are the types of Slip recovery system and draw the speed torque characteristics of rotor resistances control?

7. a) Explain the four-quadrant operation of DC motor using Dual-converters with neat and clean illustrations.
   b) Discuss the variable frequency control of induction motor fed from voltage-source inverter.

8. a) Discuss variable frequency control of induction motor drive, draw the relevant speed torque characteristics.
   b) Draw and explain the circuit diagram of AC voltage controller for delta connected controller of induction motor.

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