BE – 107

VI Semester B.E. (E&E) Degree Examination, December 2016
(2K11 Scheme)
EE – 603 : ELECTRIC DRIVES

Time : 3 Hours Max. Marks : 100

Instruction *: Answer* ***any five full*** *questions choosing atleast* ***two*** *from* ***each*** *Part.*

PART – A

1. a) Explain the speed torque conventions and four quadrant operation of a motor driving a hoist load. **10**

   b) A drive has the following parameters : T = 150 – 0.1 N, N-m where N is the speed in rpm. Load torque T_L = 100 N-m. Initially the drive is operating in steady state. The characteristics of the load torque are changed to T_L = – 100 N-m. Calculate initial and final equilibrium speed. **10**

2. a) Describe the operation of single phase fully controlled rectifier control of DC separately excited motor. **10**

   b) A 440 V, 3 phase, 50 Hz, 6 pole, 945 rpm, delta connected I.M. has following parameters referred to the stator.

   $R_s = 2.0\ \Omega$, $R_r^1 = 2.0\Omega$, $X_s = 3\ \Omega$, $X_r^1 = 4\Omega$

   When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Calculate :

   i) Motor terminal voltage, current and torque at 800 rpm.

   ii) Motor speed, current and torque for the terminal voltage of 280 V. **10**

3. a) With a neat block diagram explain closed loop system of a multimotor drives. **10**

   b) A 4 pole, 10 HP, 460 V, motor is supplying its rated power to a centrifugal load at a 60 Hz frequency. Its rated speed is 1746 rpm calculate its speed, slip frequency and slip when it is supplied by a 230 V, 30 Hz source. **10**

4. a) Explain the operation of variable frequency control from voltage source. **10**

   b) Describe the speed control of 3ϕ Induction motor by static rotor resistance control. **10**

P.T.O.

PART – B

5. a) Explain in detail BLDC drives for servo applications and mention its advantages. **10**

   b) Describe the operation of a variable reluctance stepper motor. What is micro-stepping ? **10**

6. a) Write a short notes on :

      a) Permanent Magnet Synchronous Machine. **(5+5)**

      b) Current source inverter fed S.M.

   b) Describe the principle of operation of a switched reluctance motor. What are the difference b/w this motor and sychronous reluctance motor ? **10**

7. a) Develop an expression for the temperature r is in case of motors. Draw heating and cooling curves. **10**

   b) On the basis of heating select a suitable motor for the following intermitted duty.

      1) P_1 = 35 Kw for t_1 = 3 Sec. P_2 = 17 Kw for t_2 = 20 Sec

      2) P_3 = 35 kw for t_3 = 2 Sec. P_4 = 13 kw for t_4 = 15 Sec.

      Between the operating periods 1) and 2) above, there is a rest period of 37 sec. and at the end of the cycle there is another rest period of 40 sec. plot the load curve. **10**

8. a) With a neat sketch, explain paper mill drive system. **10**

   b) Draw and explain schematic diagram of various stages in the reversing hot rolling mills. **10**

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