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304207

Seat No.	

T.E. (Electronics) (Semester – II) Examination, 2014
DRIVES AND CONTROLS
(2008 Pattern)

Time : 3 Hours | Max. Marks : 100

SECTION – I

1. a) With the help of a neat circuit diagram and waveforms, explain the operation of 3¢ full converter drive for separately excited DC motor. **10**

   b) Explain the operation of a two quadrant DC drive using chopper. **8**

   OR

2. a) Explain ideal dual converter. Sketch and explain 1¢ dual converter as DC drive. **8**

   b) A 20 HP, 220 V, 1500 rpm separately excited dc motor is driving a load torque of 50 N-m and is running at a speed of 1000 rpm. The motor parameter are, Ra = 0.2Ω , Rf = 150 Ω , La = 10 mH, motor voltage constant 0.7 v/a-rad/sec. The field is supplied by an uncontrolled bridge rectifier operated from mains. If the armature current is continuous and ripple free. Find out following if armature converter is semi-converter (i) developed back emf (ii) required armature vtg. and firing angle a (iii) the rated armature current of motor. **10**

3. a) Explain microcontroller/processor based dc motor drive. **6**

   b) Explain open loop and close loop control of dc drives with transfer function. **10**

   OR

4. a) Explain the concept of power factor on which parameters does the power factor depend ? Enlist the various power factor improvement techniques. Explain the EAC method of P.F. improvement with the help of circuit diagram. Waveforms and mathematical analysis. Compare it with other techniques. **10**

   b) Explain how the DC motor can be controlled using PLL ? **6**

5. a) What is slip power recovery in AC motor drives ? Explain with torque speed characteristics of 3¢ I.M. by using V/F technique. **10**

   b) What is soft start ? Explain in brief. **6**

   OR

P.T.O.

6. Short notes **any four** :
   1) Speed control techniques of series motors.
   2) Protection circuits for DC drives.
   3) Braking techniques of DC motor and AC motor.
   4) Control strategies for speed control of induction motor and explain effect of rotor resistance on induction motor.
   5) Four quadrant chopper drives. **16**

SECTION – II

7. a) Compare synchronous motor with DC and induction motor. **8**
   b) Draw and explain torque versus torque angle characteristics of synchronous motor with salient pole rotor. **8**

OR

8. a) Explain reluctance synchronous motor drive and derive expression for (i) The reluctance torque (ii) The torque angle (iii) The pull out torque. **8**
   b) Draw and explain block diagram of self controlled synchronous motor fed from 3¢ inverter. **8**
9. a) Draw the circuit diagram and explain the working of Chopper drive (unipolar) for stepper motor. **10**
   b) With the help of diagram, explain the operation of a Permanent Magnet Stepper Motor. **8**

OR

10. a) List the drive requirements for stepper motor drive. **8**
    b) A 3¢, 230 V, 60 Hz, 4 pole, Y-connected reluctance motor has $Xd = 22.5\,\Omega$ and $Xq = 3.5\,\Omega$. The armature resistance is negligible. The load torque is TL = 12.5 N-m. The voltage-to-frequency ratio is maintained constant at the rated value. If the supply frequency is 60 Hz. Determine (a) the torque angle ∂ (b) the line current Ia and (c) input power factor. **10**
11. a) Explain the operation of Neural network based PWM controller. **8**
    b) Explain traction motor drive and PI control tuning of a drive. **8**

OR

12. Write short note on **any four** : **16**
    i) Fussy logic based induction motor speed control.
    ii) Fussy logic based wind generation system.
    iii) Variable reluctance stepper motor.
    iv) Neuro fussy system.
    v) Cylindrical rotor synchronous motor.
    vi) Brushless D.C. motor drive.