Total No. of Questions : 10]

SEAT No. :

P2299

[Total No. of Pages : 3

[5254]-633

B.E. (Electrical)

POWER ELECTRONICS CONTROLLED DRIVES

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Derive the fundamental torque equation of a motor load system. Write down the conditions of steady state, acceleration and deceleration. **[5]**

b) A drive has following equations for motor and load torques: **[5]**

$T = (20 + 0.5\omega_m)$ and $T_l = 5 + 0.6\omega_m$ Obtain the equilibrium speed and comment on its steady state stability.

OR

Q2) a) A 220 V, 1500 rpm, 10 A separately excited dc motor is fed from a single phase fully controlled rectifier with an AC source voltage of 230 V, 50 Hz. Ra = 2Ω . Assuming continuous conduction calculate firing angle for rated motor torque and (1000) rpm. **[5]**

b) Explain Regenerative braking method along with the torque speed characteristics of DC separately excited motor. **[5]**

Q3) a) A 220 V, 970 rpm, 100 A dc separately excited motor has an armature resistance of 0.05Ω. It is braked by dynamic braking from an initial speed of 900 rpm. Calculate the resistance to be placed in armature circuit to limit braking current to the full load value. **[6]**

b) With a neat diagram explain the regenerative braking mode of DC separately excited motor using class B chopper. **[4]**

P.T.O.

OR

Q4) a) Why variable frequency control of induction motor is more efficient than stator voltage control? **[5]**

b) Explain the thyristorised stator voltage control of 3 ph induction motor. What are its demerits? **[5]**

Q5) a) Draw Torque speed characteristics and explain multi quadrant operation of Induction motor drives. **[10]**

b) Compare 6 step and PWM inverter used to operate Induction Motor. **[6]**

OR

Q6) a) How speed control is achieved using Vector control of induction motor? Draw vector diagram and explain. **[10]**

b) Write in brief about control and applications of AC Servo Drives. **[6]**

Q7) a) Draw neat diagram to explain Permanent Magnet Brushless DC Motor. **[8]**

b) How constant torque angle control is used for Permanent Magnet Brushless DC Motor? **[8]**

OR

Q8) a) Explain unity power factor control of Permanent Magnet Brushless DC Motor. **[8]**

b) Comment on use of Sensorless control of PM BLDC drives. **[8]**

Q9) Solve any Three :

a) What is the selection criterion for motors? How rating of a motor subjected to variable load duty is decided? **[6]**

b) What are the requirements of drive for textile mill operations? **[6]**

c) What are the characteristics for drives used in Traction applications? Explain. **[6]**

d) What are the requirements of drive in sugar mills? Explain duty cycle of sugar centrifuge **[6]**

OR

Q10) Solve any Three :

a) What are various motor duty patterns ? how are motors classified based on duty? **[6]**

b) What motors are suitable for Sugar mill drive applications? **[6]**

c) How motor duty and heating and cooling cycle affects the temperature of motor? **[6]**

d) Why 4 quadrant operation of drive is needed for rolling mill drive? **[6]**