

Total No. of Questions : 10]

SEAT No. :

**P3918**

**[5561]-588**

[Total No. of Pages : 2

**B.E. (Electrical Engineering)**  
**POWER ELECTRONICS CONTROLLED DRIVES**  
**(2015 Pattern) (Semester - II) (403148)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

**Q1) a)** Explain load equalization in an electric drive. How flywheel helps in load equalization process. **[5]**

b) Explain plugging braking of DC motor along with speed torque characteristics. **[5]**

OR

**Q2) a)** Justify “steady state stability depends on relative characteristics of the motor and load both”. **[5]**

b) A 200 V, 875 rpm, 150A DC separately excited motor has an armature resistance of  $0.06 \Omega$ . It is fed from single phase fully controlled rectifier with an AC source of 220 V, 50 Hz. Assuming continuous conduction, calculate: **[5]**

- i) Firing angle for rated motor torque of 500 rpm.
- ii) Motor speed for  $\alpha = 160^\circ$  and rated torque.

**Q3) a)** Explain closed loop control speed control of DC motor with inner current control loop. How below and above speed control is obtained. **[5]**

b) A 220 V, 970 rpm, 100 A DC separately excited motor has an armature resistance of  $0.05 \Omega$ . It is braked by plugging from an Initial speed of 100 rpm. Calculate: **[5]**

- i) Resistance to be placed in armature circuit to limit braking current to twice the fault load value.
- ii) Braking torque
- iii) Torque when the speed has fallen to zero.

OR

**P.T.O.**

- Q4) a)** What is the V/f control strategy? Explain with necessary diagram V/f control method using power control devices. [5]
- b)** A drive has following parameters:  $J=10 \text{ kg-m}^2$ ,  $T = 100-0.1N$ , N-m, passive load torque  $T_l = 0.05N$ , N-m, where N is speed in rpm. Initially the drive is operating in steady state. Now it is to be reversed. For this motor characteristics is changed to  $T = -100-0.1N$ , N-m. Calculate the time of reversal. [5]
- Q5) a)** Explain the principal of vector control of Induction motor. [8]
- b)** How Induction Motor is converted to Characteristics of DC motor. [8]
- OR
- Q6) a)** Write in brief about topology, control and applications of AC servo motor drives. [8]
- b)** With the help of block diagram explain vector control of induction motor. [8]
- Q7) a)** With the help of neat block diagram, explain the closed loop speed control of self controlled synchronous motor drives fed from CSI. [8]
- b)** Write a brief note on Thermal model for heating and cooling. [8]
- OR
- Q8) a)** With the help of neat block diagram, explain the closed loop speed control of self controlled synchronous motor drives fed from VSI. [8]
- b)** What is the selection criterion for motors? How ratings of the motor subjected to variable load duty is decided. [8]
- Q9) a)** Write a short note on Solar and battery powered drives. [10]
- b)** Explain Industrial application of Electric drives in Electric Traction. [8]
- OR
- Q10) a)** Write a short note on Drives used in Sugar mills. Also mention the load requirements like power ratings, speed, duty cycle etc. [10]
- b)** Write a short note on applications of drives in machine tool. [8]

