

Total No. of Questions : 6]

SEAT No. :

**P81**

[Total No. of Pages : 2

**APR - 18/BE/Insem. - 39**

**B.E. (Electrical)**

**POWER ELECTRONICS CONTROLLED DRIVES**

**(2012 Pattern) (Semester - II) (403148)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) *Attempt Que. 1 or Que. 2, Que. 3 or Que. 4, and Que. 5 or Que. 6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Derive criteria of steady state stability of an electrical drive system. [5]  
b) State the factors on which the choice of an electrical drive depends. [5]

OR

- Q2)** a) A drive has following equations for motor and load torque: [4]  
$$T = A + B\omega_m \text{ and } T_L = C + D\omega_m$$
  
Obtain equilibrium points and determine condition of steady state stability.  
b) Explain components of load torque required by the load at the shaft. [6]

- Q3)** a) Explain DC series motor plugging with its speed torque characteristics. [5]  
b) Explain chopper controlled fed DC separately excited drive for motoring operation. Draw output voltage and current waveform also. [5]

OR

*P.T.O.*

- Q4) a)** What are the advantages of electrical braking over mechanical braking. [4]
- b) A 220V, 1500rpm, 10A,  $R_a = 2\Omega$  separately excited DC motor is fed from a 1 $\phi$  fully controlled rectifier with an ac source voltage of 230V, 50Hz. Assuming continuous conduction, calculate firing angle  $\alpha$  for:
- Half rated motor torque and 500rpm
  - rated motor torque and (-1000) rpm [6]

- Q5) a)** Explain AC dynamic(rheostatic) braking of 3 $\phi$  Induction motor with two lead connection. [5]
- b) Explain thyristorised stator voltage control of 3 $\phi$  Induction motor. State the limitation of stator voltage control method. [5]

OR

- Q6) a)** A star connected squirrel cage Induction motor has following ratings and parameters: 400V, 50Hz, 4pole, 1370rpm,  $R_s = 2\Omega$ ,  $R_r = 3\Omega$ ,  $X_s = X_r = 3.5\Omega$ . I.M. is controlled by VSI at constant V/f ratio. Inverter allows frequency variation from 10Hz to 50Hz. For regenerative braking operation of VSI fed I.M. determine: [6]
- Speed for frequency of 30Hz and 80% of full load torque.
  - Frequency for a speed of 1000rpm and full load torque.
- b) Explain closed loop speed control of three phase Induction motor. [4]

