Total No. of Questions : 6]

SEAT No. :

P214

[Total No. of Pages : 2

BE/INSEM/APR-543

B.E. (Electrical) (Semester - II)

403148 : POWER ELECTRONIC CONTROLLED DRIVES

(2015 Pattern)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Attempt Q. 1 or Q. 2, Q. 3 or Q. 4 and Q. 5 or Q. 6.***
2) ***Figures to right indicates full marks.***

Q1) a) What are different components of load torque? Explain with their characteristics. **[6]**

b) A drive has the following parameters: T = 150-0.1N, Nm where N is speed in RPM. Load torque T_l =100, Nm. Initially the drive is operating in steady state. The characteristics of the load torque are changed to T_l = – 100, Nm. Calculate initial and final equilibrium speeds. **[4]**

OR

Q2) a) Derive the criteria of steady state stability of an electrical drive system. **[5]**

b) A weight of 500 kg is being lifted up at a uniform speed of 1.5 m/s by a winch driven by a motor running at a speed of 1000 RPM. The moment of inertias of the motor and winch are 0.5 kg-m^2 and 0.3 kg-m^2 respectively. Calculate the motor torque and the equivalent moment of inertia referred to the motor shaft. In the absence of weight, motor develops a torque of 100 Nm when running at 1000 RPM. **[5]**

Q3) a) Explain plugging of DC separately excited motor along with speed torque characteristics. **[5]**

b) A 230 volts, 870 RPM, 100 A separately excited motor has an armature resistance of 0.05 ohm. It is coupled to an overhauling load with a torque of 400 Nm. Determine the speed at which motor can hold the load by regenerative braking. **[5]**

P.T.O.

OR

Q4) a) Explain motoring operation of chopper controlled separately excited DC motor drive with suitable waveforms. **[5]**

b) A 220 volts, 1500 RPM, 10 A separately excited dc motor is fed from single phase fully controlled rectifier with an AC source voltage of 230 V, 50 Hz. Armature resistance is 2 ohm. Conduction can be assumed continuous. Calculate firing angle for half the rated torque and 500 RPM. **[5]**

Q5) a) Explain AC dynamic (rheostatic) braking of three-phase induction motor with the two-lead connection. **[5]**

b) A 400 volt, star connected, three-phase 6 pole induction motor has following parameters referred to stator : ohm, ohm. For the regenerative braking operation of this motor determine maximum overhauling torque it can hold and range of the speed for the safe operation. **[5]**

OR

Q6) a) Explain with neat circuit diagram V/f control of three-phase induction motor. What is the range of speed control? **[5]**

b) Compare CSI and VSI control of induction motor with their relative merits and demerits. **[5]**