Total No. of Questions : 6]

SEAT No. :

P594

[Total No. of Pages : 2

BE/Insem/APR - 192
B.E. (Electrical)
POWER ELECTRONICS CONTROLLED DRIVES
(2015 Pattern) (Semester - II)

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

Instructions to the candidates :

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

Q1) State the essential parts of Electric drives and function of each parts. **[10]**

OR

Q2) a) Explain the steady state stability of a drive, depending on relative characteristics of motor and load. **[5]**

b) A drive has following parameters : J = 1 kg - m2, T = 15 – 0.01 N N-m and passive load torque, T_L = 0.005 N N-m, where N is the speed in rpm. Initially the drive is operating in steady - state. Now it is to be reversed. For this, motor characteristic is altered such that T = –15-0.0 1N N-m for positive as well as negative values of N. Calculate the reversal time. **[5]**

Q3) a) Explain regenerative braking of DC shunt motor along with speed torque characteristics. **[5]**

b) A 400V, 750 rpm, 70A dc shunt motor has an armature resistance of 0.3Ω. When running under rated conditions, the motor is to be braked by plugging with armature current limited to 90A. What external resistance should be connected in series with the armature? Calculate the initial braking torque and its value when the speed has fallen to 300 rpm. Neglect saturation. **[5]**

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OR

Q4) a) Explain the operation of a Chopper controlled Separately excited DC motor drive with suitable waveforms. Draw speed torque characteristics. **[5]**

b) A 220V, 1000 rpm dc series motor takes an armature current of 100A when driving a load with constant torque. Armature and Field resistance are 0.05Ω each. Now it is operated under dynamic braking at twice the rated torque and 800 rpm. Calculate the value of braking current and resistor. Assume linear magnetic circuit. **[5]**

Q5) a) Explain Plugging of 3 phase induction motor. Draw speed torque characteristics. **[5]**

b) A 3-phase, 400V, 50Hz, 6 pole , 925 rpm star connected induction motor has the following parameters : Rs = 0.2Ω, R'r = 0.3Ω, Xs = 0.5Ω, X'r = 1Ω. The motor is fed from a VSI with a constant V/f ratio. The motor is to be braked by plugging from its initial full load speed of 925 rpm. Calculate the initial braking torque. **[5]**

OR

Q6) a) With a neat diagram, explain V/f control of 3 phase induction motor. **[5]**

b) A 3-phase, 2.8 kW, 400V, 50Hz, 4 pole 1370 rpm delta connected squirrel cage induction motor has the following parameters :Rs = 2Ω, R'r = 5Ω, Xs = X'r = 5Ω, Xm=80 Ω. Motor speed is controlled by stator voltage control. When driving a fan load ($T_L = k(1-s)^2$), it runs at rated speed at rated voltage.
Calculate the motor terminal voltage and current at 1200rpm. **[5]**

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