P3918

[5561]-588

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 Ω. 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 a = 160° 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 Ω. 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 sped has fallen to zero.

OR

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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 kg-m², 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]**

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