

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 0.06Ω . 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 0.05Ω . 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

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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: $J=10 \text{ kg-m}^2$, $T = 100-0.1N$, N-m, passive load torque $T_1= 0.05N$, 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]
