

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2016

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Draw and explain the speed torque characteristics of a single phase fully controlled rectifier fed d.c separately excited motor.
(b) A 220 V, 1050 rpm, 120 A separately excited DC motor is fed from 1- Φ , fully controlled converter with an ac source 230 V, 50 HZ supply. The thyristor is triggered continuously by a DC signal. The resistance of armature circuit is 0.07 Ω . Find the motor speed for firing angle 120° and rated torque.
- 2 Draw and Explain the Speed–Torque Characteristics of a separately excited dc motor connected to a three-phase semi controlled converter.
- 3 A 400 V, 1500 rpm, 100 A d.c shunt motor has an armature resistance of 0.3 Ω when running under rated conditions, the motor is to be braked by plugging with armature current limited to 90 A. 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 1000 rpm.
- 4 Explain the operation of four quadrant chopper fed to the D.C series motor and also draw the current and voltage wave forms for continuous current operation
- 5 (a) What is stator voltage control for speed control of induction motor drive? List the applications where stator voltage control is used speed control
(b) A three phase squirrel cage induction motor drives a blower type load. No load rotational losses are negligible. Show that rotor current is maximum when motor runs at a slip $s = 1/3$. Also find an expression for maximum rotor current.
- 6 (a) Explain the principle of Variable frequency speed control of induction motor with help of a neat block diagram.
(b) Explain why the ratio V/f is maintained constant in variable frequency control of Induction motor.
- 7 Draw the Block diagram of closed loop control of Induction Motor with chopper controlled resistance? And explain it.
- 8 A 6 MW, 3-phase, 11 KV, Star connected, 6-pole, 50 Hz, 0.9(leading) power factor synchronous motor has $X_s = 9$ ohms and $R_s = 0$ ohms. Rated field current is 50 A. Machine is controlled by variable frequency control at constant V/f ratio up to the base speed and at constant V above base speed. Determine:
(a) Torque and Field current for rated armature current 750 rpm and 0.8 pf leading.
(b) Armature current and power factor for half the rated motor torque, 1500 rpm and rated field current.
