

Code: 9A02601

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2017

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain the constant power mode and constant torque modes of operation of separately excited d.c motor drives.
(b) A 220 V, 1200 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 0.07Ω . Find the firing angle for rated motor torque and (-700) rpm.
- 2 Explain the Speed-torque characteristics of a dc series motor connected to a three-phase fully controlled converter.
- 3 (a) What is 4-quadrant operation and explain with converters.
(b) Discuss in detail counter current and dynamic braking operations of D.C shunt motors.
- 4 (a) Discuss with the suitable diagrams I quadrant and II quadrant choppers.
(b) A constant frequency TRC system is used for the speed control of dc series traction motor from 200 V dc supply. The motor is having armature and series field resistance of 0.02Ω and 0.01Ω respectively. The average current in the circuit is 100 A and the chopper frequency is 500 Hz. Calculate the pulse width if the average value of back e.m.f is 50 volts.
- 5 (a) Discuss the merits and demerits of AC voltage controller fed induction motor drives.
(b) A 2.8 KW, 400 V, 50 Hz., 4 pole, 1370 rpm, delta connected squirrel cage induction motor has following parameters referred to the stator: $R_s = 2 \Omega$, $R_r^1 = 5 \Omega$, $X_s = X_r^1 = 5 \Omega$, $X_m = 80 \Omega$. Motor speed is controlled by stator Voltage control. When driving a fan load it runs at rated speed and rated voltage. At 1200 rpm, calculate: (i) Motor terminal voltage. (ii) Current. (iii) Torque.
- 6 Explain how PWM inverter eliminates the drawbacks of Cyclo-converter fed Induction motor drives.
- 7 (a) How a static Kramer control differs from Static Scherbius drive?
(b) What is slip power recovery? What modifications can be suggested for improving the power factor of the slip energy recovery scheme?
- 8 Describe the converter used for low frequency high power synchronous motor drives with relevant wave forms.
