

Code: 9A02601

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2014/2015

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 speed-torque characteristics of semi converter feeding a D.C series motor.
(b) Derive the speed, torque equations of a fully controlled converter connected to separately excited D.C motor with continuous current operation with necessary waveforms.
- 2 Explain the speed-torque characteristics of a separately excited dc motor connected to a three phase semi controlled converter.
- 3 Explain with neat diagrams the merits and demerits of mechanical braking, dynamic braking and regenerative braking.
- 4 (a) Explain the operation of two quadrant chopper feeding to a separately excited DC motor and also draw the current and voltage wave forms for continuous current operation.
(b) Discuss with the suitable diagrams I quadrant and II quadrant choppers.
- 5 State and discuss various methods of speed control of induction motors.
- 6 Explain the working of 3-phase, 3 pulse cyclo-converter fed induction motor with the help of a neat sketch
- 7 A 3-phase, 400 V, 50 Hz, 4-pole, 1400 rpm, Y-connected wound rotor induction motor has the following parameters referred to the stator: $R_s = 2 \Omega$, $R_r^1 = 3 \Omega$, $X_s = X_r^1 = 3.5 \Omega$. The stator to rotor turns ratio is 2. The motor speed is controlled by static Scherbius drive. The inverter is directly connected to the source.
Determine: (i) The speed range of the drive when $\alpha_{max} = 165^\circ$.
(ii) The firing angle for 0.4 times the rated motor torque and a speed of 1200 rpm.
(iii) Torque for a speed of 1050 rpm and firing angle of 95° .
- 8 (a) Distinguish between separate control and self control of synchronous motors.
(b) Why cyclo-converter fed synchronous motors are preferred for low speed
