Code :R7410202

$\boxed{\textbf{R7}}$

IV B.Tech I Semester(R07) Supplementary Examinations, May/June 2011
POWER SEMICONDUCTOR DRIVES
(Electrical & Electronics Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

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1. (a) Draw and explain the power circuit diagram of semi-converter feeding a separately excited d.c. motor with relevant waveforms.

   (b) A 220V, 960 rpm, 80A separately excited d.c motor has an armature resistance of 0.6Ω. Under rated conditions, the motor is driving a load whose torque is constant and independent of speed. Determine the motor terminal voltage for a speed of 620rpm.

2. (a) Explain the operation of a three phase full converter fed d.c motor drive. Sketch the output voltage waveforms for firing angles of 60^0, 90^0 and 120^0.

   (b) A 220 V, 1500 rpm, 20 A separately excited d.c motor with armature resistance of 1Ω is fed from a three phase fully controlled rectifier. Available a.c source has a line voltage of 440V, 50Hz. Determine the value of firing angle when the motor is running at 800 rpm and twice the rated toque.

3. (a) Briefly discuss about regenerative braking, dynamic braking and plugging.

   (b) Discuss the four quadrant operation of separately excited motor fed from single fully controlled rectifier with a reversing switch.

4. (a) Explain the operation of chopper fed series motor with neat diagrams and derive the expressions for Imax and Imin.

   (b) A d.c chopper is used to control the speed of a d.c shunt motor. The supply voltage to the chopper is 220V. the on time and off time of the chopper is 10ms and 12ms respectively. Assuming continuous conduction of the current and neglecting the armature inductance, determine the average load current when the motor runs at a speed of 140.6 rad/sec and has a voltage constant of 0.495 V/Arad/sec.

5. (a) Discuss briefly the operation of stator voltage control of induction motor.

   (b) Draw the speed torque characteristics and explain motoring, generating and braking modes of operation.

6. (a) Draw and explain the torque speed curves with variable frequency control for operation at constant flux and constant v/f ratio.

   (b) Compare VSI and CSI fed drives.

7. (a) Draw and explain the operation of static scherbius drive.

   (b) Briefly discuss about slip power recovery scheme.

8. (a) Explain about the self-controlled synchronous motor drive.

   (b) Draw the circuit diagram of load commutated CSI fed synchronous motor drive and explain its operation with relevant waveforms.

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