Code No.: 9A02601/R09

Set-3

B.Tech. III Year II Semester Regular & Supplementary Examinations

April/May - 2013

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 Hours | Max. Marks: 70

*Answer any **FIVE** Questions*

***All** Questions carry **equal** marks*

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1. (a) Explain the concept of constant torque control and constant power control.

   (b) Explain how the speed control of D.C motor is achieved illustrating the triggering circuit of the thyristors.

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2. A 100 kW, 500 V, 2000 r.p.m separately excited D.C motor is controlled by a three-phase fully controlled converter and is fed from a 400 V, 50 Hz supply. The voltage drop in conducting the thyristor is 2V. Motor parameters are $R_a = 0.1\ \Omega$, $L_a = 8$ mH, $K_m = 1.6$. Rated armature current = 210 A. No load current is 10% of rated current.

   (a) Find no load speed at firing angle of 30^0.

   (b) Find the firing angle to obtain 2000 r.p.m at rated armature current. Also find supply power factor.

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3 With neat circuit diagram and waveforms, explain dynamic braking, regenerative braking and plugging of separately excited motor.

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4 (a) Deduce the mathematical expression for minimum and maximum currents for a class A chopper operated D.C motor with back e.m.f.

   (b) A 220 V, 12 A, 1000 r.p.m separately excited D.C motor having an armature resistance of 2 Ω is controlled by a chopper. The chopping frequency is 200 Hz and the input voltage is 230 V. Calculate the duty ratio for a motor torque of 2 times rated torque at 750 r.p.m.

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5 Explain various speed control methods of induction motor applicable for both squirrel cage and slip ring induction motors.

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6 Explain with suitable block diagrams, the various types of VSI controlled induction motor drives.

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7 (a) Describe the operation of static scherbius. Drive with a neat schematic.

   (b) Why a resistance starter is generally required for the induction motor drive employing slip-power recovery?

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8 (a) Explain the advantages and applications of load commutated CSI fed synchronous motors.

   (b) Explain the speed torque characteristics.