Code No.: 9A02601/R09

Set-2

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 operation of single phase fully controlled rectifier fed D.C series motor with relevant diagrams. **(Unit-I, Topic No. 1.3)**

   (b) A series motor is supplied from a full converter whose $\alpha = 65^{\circ}$, 1- ϕ supply of 230 V r.m.s, 50 Hz frequency. The armature and field resistance together equal 2 Ω. The torque constant is 0.23 H and the load torque is 20 Nm. Neglect damping and find the average armature current and speed. **(Unit-I, Topic No. 1.3)**

2. Explain the speed - torque characteristics of a separately excited d.c motor connected to a three phase semi controlled converter. **(Unit-II, Topic No. 2.1)**

3. (a) Explain the principle of operation of a dual converter in circulating current mode. How the same is used for speed control of d.c drive?

   (b) Discuss in detail counter current and dynamic braking operations of D.C shunt motors.

4. (a) Draw and explain in detail of motoring and regenerative braking operation of chopper control of separately excited D.C motor.

   (b) A 220 V, 24 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 500 Hz and the input voltage is 230 V. Calculate the duty ratio for a motor torque of 1.2 times rated torque at 500 r.p.m.

5. (a) Using a 3-phase solid state A.C voltage controller explain clearly how it is possible to achieve 4-quadrant operation of 3-phase induction motor.

   (b) Draw a closed loop speed control scheme of an induction motor with A.C voltage controller.

6. Compare VSI and CSI fed induction motor drives.

7. (a) What is the range of firing angle of thyristors in line communicated inverter fed static scherbius drive? Describe in detail.

   (b) In a static Kramer drive system of an induction motor how speeds can be controlled from synchronous speed to stand still.

8. Explain the variable frequency control of synchronous motor in detail.