Code: 9A02601 **R09**

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2015/2016

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 how the speed control of a dc motor is achieved by 1-phase converters illustrating the circuits and waveforms.

(b) A 220 V, 1000 rpm, 150 A separately excited DC motor is fed from 1-Φ, fully controlled converter with an ac source 230V, 50 HZ supply. The thyristor is triggered continuously by a DC signal. The resistance of armature circuit is 0.06 Ω. Find the firing angle of the converter 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) With neat circuit diagram and waveforms, explain dynamic braking of separately excited motor by single phase converter.

(b) A 400 V, 750 rpm, 70 A dc shunt motor has an armature resistance of 0.3 Ω when running under rated conditions, the motor is to be braked by plugging with armature current limited to 90 A. What external resistance should be connected in series with the armature? Calculate the initial braking torque and its value when the speed has fallen to 300 rpm.

4 (a) Explain the Dynamic breaking of D.C series motor by Chopper control.

(b) A class-A chopper, operating in time-ratio control, is supplying the armature of the separately excited dc motor. Derive the motor speed-torque relationship.

5 (a) Why Stator voltage control is suitable for speed control of induction motors in Fan and Pump drives?

(b) A 440 V, 3-phase, 50 Hz, 6-pole, 945 r.p.m delta connected induction motor has following parameters referred to the stator: $R_s = 2.0\,\Omega$, $R^1_r = 2.0\,\Omega$, $X_s = 3\,\Omega$, $X^1_r = 4\,\Omega$. When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. At 800 rpm, determine: (i) Motor terminal voltage. (ii) Current. (iii) Torque.

6 (a) Explain the special features of Cyclo-converter fed induction motor drives.

(b) What is flux weakening method of speed control? Explain

7 A 440 V, 50 Hz, 6-pole star connected, wound rotor induction motor has the following parameters referred to the stator: $R_1 = 0.08$, $R_2' = 0.12$, $X_1 = 0.25$, $X_2' = 0.35$, $X_0 = 10$. An external resistance is inserted into the rotor circuit so that the T_{max} is produced at $S_m = 2.0$. The motor connections are now changed from motoring to single phase AC dynamic braking with three lead connections (one phase in series with other two phases in parallel). Calculate the braking current (line) and torque for a speed of 900 r.p.m.

8 With the help of neat circuit diagram, explain the operation of Self Controlled Synchronous motor fed form Bridge type cyclo-converter.

*****