NR

Code No: 52104/MT

M.Tech. – I Semester Supplementary Examinations,
September, 2008

POWER ELECTRONIC CONTROL OF DC DRIVES
(Common to Power Electronics & Electric Drives/
Power & Industrial Drives/ Power Electronics)

Time: 3hours **Max. Marks:60**

Answer any FIVE questions
All questions carry equal marks
- - -

1. With suitable circuit diagram and waveforms explain the principle of operation of speed control of separately excited DC motor fed from single phase fully controlled rectifier for
   a) Continuous and
   b) Discontinuous motor current operations.

2. A 3 phase six pulse bridge converter working on a 500 V, 50Hz supply feeds a D.C motor having a rated voltage of 250V. The motor is separately excited and draws an armature current of 181 Amps at 250V and runs at 1500 rpm. The motor drives a load having a torque-speed characteristic given by $T_L = 0.65\ \omega^2$.
   If the speed control of this motor is required from 1500 to 500 rpm. Determine the range of firing angles. If the firing angle =0 for operation at rated speed, determine the line voltage. What is the firing angle range in this case? What is the advantage of the second use? Resistance of armature=0.1 ohm.

3. A 3-phase full converting is feeding a highly inductive load. Derive the expressions for average output voltage, max. average output voltage, normalized average output voltage and the rms value of the output voltage.

4. Discuss in detail the steady-state analysis of a 3 phase converter controlled DC motor drive.

5. Develop the flow-chart for simulation of a single-quadrant phase controlled DC motor drive. Discuss about the expected simulation results, harmonic and associated problems.

Contd...2

6. Explain the principle of operation of the chopper for the first, second, third, fourth quadrant operations with all relevant diagrams.

7. Draw a block schematic diagram of a speed-controlled separately excited DC motor drive. Discuss in detail about pulse-width modulated current controller and Hysterisis current controller.

8.a) Develop a flow chart for the Dynamic Simulation of the chopper controlled DC motor drive.

b) Discuss about Dynamic performance of one-quadrant chopper controlled separately excited DC motor drive for a step-command in speed reference in normalized form.

^*^*^