Roll No. ..... Total Pages : 03

BT-7/D-18 37134

POWER ELECTRONIC

ECE-405-N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) What do you mean by Bipolar junction transistor ? Explain its steady state characteristics in brief. 8

   (b) Draw a comparison between power transistor, power MOSFET and IGBT in relation to their applications in power electronics. 7

2. (a) Discuss the overvoltage, over current di/di and dv/dt protection of power semiconductor device. 8

   (b) Write a brief note on static induction transistor in brief. 7

Unit II

3. (a) Draw the V-I characteristics of SCR and mark the holding current and latching current in the characteristics. 5

(b) Why is pulse triggering preferred over RC triggering ? 5

(c) Discuss, how SCRs suffer from unequal voltage distribution across them during their turn-on and turn-off process. 5

4. (a) What is Commutation ? Differentiate between natural and forced commutation. 8

(b) A circuit employing parallel-resonance turn-off circuit has C = 50 μF, L = 20 μH, V_s = 200 V and initial voltage across capacitor is 200 V. Determine the circuit turn-off time for main thyristor for load R = 1.5 Ω. 7

Unit III

5. (a) Explain the operation of a single phase fully controlled bridge converter connected with R-L load. Show that possible waveforms of the output voltage, SCR current and source current for a firing angle and Considering ripple free output current. 8

(b) Explain the effect of freewheeling diode. Also justify the statement "freewheeling diode improves power factor of the system". 7

6. (a) With the help of a circuit schematics describe principle of step up chopper. Obtain the expression for average output output voltage in terms of duty ratio. 8

(b) What is the need for controlling the output of an inverter ? Discuss briefly and compare the various methods employed for the control of output voltage of inverters. 7

Unit IV

7. What do you mean by AC voltage controller ? Explain the principle and working of Integral cycle controller with various waveforms and equations. 15

8. (a) What do you mean by cycloconverter ? Explain its various types in brief. 8

(b) Derive the output voltage equation for a cycloconverter. 7