

6E6053**6E6053**

B.Tech. VI Semester (Main & Back) Examination, April/May - 2017
Applied Electronics & Instrumentation Engg.
6AI3 Industrial Electronics
Common EC & AI

Time : 3 Hours

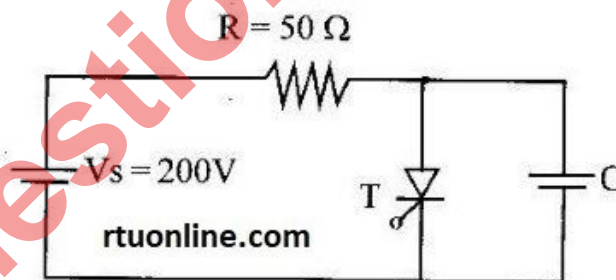
Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit-I

1. a) In the circuit shown in figure SCR is forced commutated by circuitry. Compute the minimum value of 'c' so that SCR does not get turned on due to re-applied dv/dt . The SCR has minimum charging Current of 5mA to turn it on and its junction capacitance is 25 pf. (8)



- b) Define latching and holding currents as applicable to an SCR. Show these currents on its static I-V characteristics. What are the necessary conditions for turning - on of an SCR? (8)

OR

1. a) Describe the switching characteristics of an IGBT. How does latch up occur in an IGBT? (8)
- b) Discuss why PMOSFET has no reverse blocking voltage where as in an IGBT. (4)
- c) An SCR has half cycle surge current rating of 3000A for 50Hz supply. Calculate its one cycle surge rating and I^2t rating. (4)

Unit-II

2. a) A 3 phase bridge rectifier, using diodes delivers power to a load of $R = 10 \Omega$ at a dc voltage of 400V. Determine the ratings of the diodes and of the three phase delta star transformer. (10)
- b) Describe the evaluation of three phase six pulse diode rectifier from 3 phase 3 pulse diode rectifier with appropriate circuits. (6)

OR

2. a) Describe a single phase current source inverter with L load. Write appropriate expression governing its performance and prove there from that total circuit turn-off time for this inverter is given by $t_o = \left(1 + \frac{\pi}{2}\right) \sqrt{LC}$. (12)
- b) Compare the voltage and current source inverters. (4)

Unit-III

3. a) Describe flyback SMPS with relevant circuits and waveforms. Derive the various expressions for voltage and current involved. (12)
- b) Briefly explain the principle of uninterrupted power supply. (4)

OR

3. a) A step down/up chopper has input dc voltage of 660V. If the conduction time of thyristor is $120 \mu \text{ sec}$. Compute the pulse width of load voltage. In case pulse width is increased three times its previous value, for constant frequency operation, calculate the new value of average output voltage. (8)
- b) Draw the circuit diagrams and relevant waveforms for A,B,C,D,E choppers. (8)

Unit-IV

4. a) The speed of a separately excited dc motor is controlled by a 3- ϕ semiconverters, 415V, 50Hz supply. The motor constants are $L = 10 \text{ mH}$, resistance 0.9Ω , armature constant 1.5 rad/s (Nm/A) . Calculate the speed of this motor at a torque of 50 Nm , when the converter is fired at 45° . (8)
- b) Describe how the speed of a separately excited dc motor is controlled through the use of two three phase full converter. (8)

OR

4. a) Describe how the speed of dc series motor can be controlled by means of a dc chopper. (8)

- b) Describe the use of 3- ϕ semiconverter for a speed control of dc series motor. (8)

Unit-V

5. Write the short note on any three : (6+5+5 = 16)

- i) Dielectric heating
- ii) Expression for induction heating loss
- iii) Variable reluctance stepper motors
- iv) Hybrid stepper motors
- v) Factors affecting induction heating and applications

