# BT/IV/ 2018
# POWER ELECTRONICS-I
## (EE-206C)

Time : 3 Hours]                                      [Max. Marks : 75

**Instructions :**

(i)   Question Paper consists of two parts namely Part-I and Part-II. Part-I consists of 10 small questions of 1.5 marks each and Part-II comprises of 6 questions of 15 marks each.

(ii)  Part-I is compulsory to attempt. Answer any four questions from Part-II.

## PART–I

1.    (i)   What is the significance of $di/dt$ in SCRs?

      (ii)  Define reverse recovery time.

      (iii) Define latching current and holding current as applicable to an SCR.

      (iv)  Sketch the circuit symbol of (a) IGBT (b) TRIAC (c) UJT (d) MOSFET.

      (v)   What is the purpose of $dv/dt$ protection ?

      (vi)  What is a snubber network?

      (vii) What is a self-commutation?

      (viii) List *five* industrial applications of rectifiers.

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(ix) What is the cause of circulating current in dual converters?

(x) Why heat sink is required for connecting the thyristor?

(1.5×10=15)

## PART-II

POWER ELECTRONICS-II

2. (a) Describe the different modes of operation of a thyristor with the help of its static V-I characteristics and define terms related to it. (8)

(b) Draw and explain the working of UJT and RC firing circuits. (7)

3. (a) A 230 V, 1 kW resistive load is connected to a half wave rectifier. Input voltage of the rectifier is 230 V ac. Find the values of (i) output dc power, (ii) output ac power, (iii) input power factor. (9)

(b) Discuss the operation of Three phase full wave rectifier with appropriate circuit and suitable waveforms. (6)

4. (a) Explain the working of a single phase full wave fully controlled SCR based converter with R L load through the waveforms of supply voltage, load voltage, load current and voltage across the SCR at an firing angle $\alpha = 45$ degree. Assume discontinuous load current. (9)

(b) Describe the effect of source Inductance on the performance of three phase controlled rectifier with the help of phase voltage waveform. (6)

5. (a) Give the classification of controlled rectifiers ; also give their circuit diagrams along with a brief description of operation. (9)

(b) Why is the power factor of semiconverters better than that of full converters? (6)

6. (a) Draw two transistor model of thyristor and explain working. (8)

(b) Describe switching characteristics of power diode. (7)

7. Discuss any *three* of the following :

(i) Dynamic characteristics of SCR.

(ii) Commutation Techniques.

(iii) Series and Parallel operation of Thyristors.

(iv) Dual Converter.

(5×3=15)

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