

328833(28)

**BE (8th Semester)
Examination, April - May, 2017**

**[New Scheme]
Power Electronics**

Time Allowed : 3 hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : (i) Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) of each question.

(ii) The figures in the right-hand margin indicate marks.

UNIT-I

- 1. (a) Define the following : [2]
 - (i) Forward breakover voltage
 - (ii) Latching and holding current
- (b) Draw two transistor analogy of SCR and describe the condition for conduction. [7]
- (c) Explain VI characteristics of SCR with operating modes. [7]

- (d) Explain Asymmetric IGBT under following heads : [7]
 - (i) Creation of inversion layer
 - (ii) Conductivity modulation
 - (iii) VI characteristic

UNIT-II

- 2. (a) Mention the different methods of turn ON and turn OFF of SCR. [2]
- (b) Describe the dynamic turn ON switching characteristic of SCR. [7]
- (c) A thyristor string is formed by series and parallel connection of thyristor. The voltage and current ratings of string are 6 kV and 4 kA respectively. Available thyristor have voltage and current ratings of 1.2 kV and 1 kA respectively. If the string efficiency is 90% for both parallel and series connection, then calculate the number of thyristors to be connected in series and parallel. If the maximum blocking current is 15 mA. Calculate the value of resistance R. [7]
- (d) Explain single-phase half-wave rectifier with RLE load. [7]

UNIT-III

- 3. (a) Write two differences between circulating and non-circulating current type dual converter. [2]
- (b) Explain full bridge converter with RL load with suitable waveforms. [7]
- (c) Describe with the help of waveforms and circuit diagram circulating current type dual converter. [7]
- (d) Explain three-phase three-pulse converters and draw output waveforms for $\alpha=0^\circ$ and $\alpha=30^\circ$. [7]

UNIT-IV

- 4. (a) Define duty cycle and chopper efficiency. [2]
- (b) Explain McMurray full bridge inverter in detail with circuit diagram and waveforms. [7]
- (c) Explain with neat circuit diagram and waveforms of Jones Chopper. [7]
- (d) A DC chopper has resistive load of $R=10\Omega$ and input voltage drop of 2V and chopping frequency is 1 kHz. If the duty cycle is 60% and input voltages (V_s) is 200 V determine : [7]
 - (i) Average output voltage
 - (ii) RMS output voltage
 - (iii) Effective input resistance of chopper
 - (iv) Chopper efficiency

UNIT-V

- 5. (a) What is cycloconverter? [2]
- (b) Draw the circuit diagram of three-phase to single-phase cycloconverter and explain its working principle with waveforms. [7]
- (c) Explain in detail TRIAC based AC voltage Regulator. [7]
- (d) State and explain types of power control techniques used in AC controllers with suitable waveforms. [7]

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