

**B.Tech Sem – VI (2007 Course) (Electronics) : WINTER - 2018**

**SUBJECT: POWER ELECTRONIC DEVICES AND CIRCUITS**

Day: Thursday  
Date: 15/11/2018

Time: 10.00 AM TO 01.00 PM  
Max Marks: 80

**W-2018-2859**

**N.B. :**

- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining attempt **ANY TWO** questions from the section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Use of non-programmable electronic **CALCULATOR** is allowed.
- 5) Assume suitable data if necessary.

**SECTION-I**

- Q.1**
- a) Describe power BJT with respect to construction and working. (06)
  - b) Describe the performance parameters of single phase AC/DC converters. (04)
  - c) What are the advantages and disadvantages of current source inverters? (04)
- Q.2**
- a) Describe the protection of power devices by snubber circuit. (06)
  - b) Define the following terms with respect to SCR. (07)
    - i) Latching current
    - ii) Holding current
    - iii) Surge current
    - iv) dv/dt rating
- Q.3**
- a) With the help of neat diagram and relevant waveforms describe the operation of single phase semiconverter for R-load. (07)
  - b) A three phase full wave converter is operated from three phase y- connected 208v, 60Hz supply and load resistance is  $R = 10 \Omega$ . If it is required to obtain an average output voltage of 50% of maximum possible output voltage, calculate:
    - i) Delay angle
    - ii) rms and average output currents
- Q.4**
- a) Describe the operation of push-pull inverter with associated waveforms. (07)
  - b) The single phase half bridge inverter has the DC input of 48V. The load resistance is  $4.8 \Omega$ . Determine:
    - i) RMS value of output voltage.
    - ii) Fundamental component of output voltage waveforms.
    - iii) First three harmonics of output voltage waveforms.

**SECTION-II**

- Q.5**
- a) Compare buck converter and boost converter. (05)
  - b) Explain the principle of phase angle control. (05)
  - c) Compare HVDC and HVAC. (04)
- Q.6**
- a) With the help of neat diagram and waveforms describe the operation of SLR half bridge dc-dc converter. (07)
  - b) A step down chopper has load voltage of 600v and is supplied from a constant input dc source of 200v. If the off time of the chopper is  $50 \mu \text{ sec}$ , calculate the on time of chopper. Now if the desired output voltage is 300v, calculate on-time for the same frequency. (06)
- Q.7**
- a) Describe microprocessor based control schemes for converter. (07)
  - b) What are the various methods of AC voltage regulation? Explain any one of them. (06)
- Q.8**
- a) An online UPS is driving 800w, 0.8 lagging power factor load. The inverter has efficient of 80%. The battery voltage is 48V DC. Assuming batteries are ideal find:
    - i) VA rating of inverter
    - ii) Wattage of rectifier
    - iii) AH capacity of battery for back-up time of 30 min.
  - b) Write note on: Electric welding (06)

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