T-E Electrical V RBSGS 40+40+2=7 19.12.16 (100)
Power Electronics

QP Code:584402

(3 Hours) [Total Marks :80

N.B. : (1) Question No. **1** is **compulsory.**
(2) Answer any **three** from the remaining **five** questions.
(3) **Assume** suitable **data** if necessary and justify the same.
(4) **Figures** to the **right** indicate the marks.

1. Solve any **four**. All the questions carry equal marks. **20**
   (a) Explain the operation of DIAC along with structured diagram and characteristics.
   (b) Compare the performance of MOSFET, BJT and IGBT with respect to voltage rating, current rating, switching frequency, power application and gating.
   (c) Explain the effect of freewheeling diode in single- phase half- wave rectifier with RL load.
   (d) Explain the SPWM technique to control the output voltage of an inverter.
   (e) In a boost converter consider all components to be ideal Assume output voltage V_0 = 20V, fs =25kHz, L = l2mH, C = 200μF. Calculate ΔV_0 if Vd=8V and lo = 500mA.

2. (a) State the limitations of R-firing circuit and explain the working of RC half wave triggering circuit. **10**
   (b) Explain with neat circuit diagram and waveform the operation of Buck converter and derive the expression output voltage, inductor current ripple and output voltage ripple. **10**

3. (a) Explain the working of fully controlled 6-pulse three phase bridge converter with R load. Draw the corresponding input and output voltage waveform when the firing angle is 60^0. **10**
   (b) Explain with circuit diagram and waveform the working of single - phase bidirectional phase control type AC voltage controller connected to RL load. **10**

4. (a) Explain the operation of three- phase bridge inverter for 120^0 conduction mode, draw the necessary waveform for line voltage and phase voltage. Justify it. **10**
   (b) Discuss the operation of single- phase full wave controlled rectifier for RL load. Derive expression of average output voltage and draw the necessary waveform for (i) gate pulse and input voltage, (ii) output voltage and current and (iii) thyristor voltage. **10**

5.	(a)	What is space vector modulation? Write its switching state and explain it in details.	10
	(b)	Explain the dynamic tum ON and OFF characteristics of SCR.	10
6.	(a)	Discuss any one application of DC to DC converter in detail.	10
	(b)	Explain the operation of MOSFET along with its characteristics.	5
	(c)	Explain the step down chopper with CCM Mode	5