T.E. Electrical V CBGS
Power Electronics

11.12.15
QP Code : 5725

(90)

(3 Hours) [Total Marks: 80]

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

1 Each question carry four marks — 20
- a Briefly explain Latching current and holding current.
- b Compare the BJT and MOSFET.
- c List the merits and demerits of ON – OFF control.
- d What are the advantages of current source inverter over voltage source inverter?
- e What is the inversion mode of the converter?

2 a Explain the constructional details of IGBT with equivalent circuit and discuss its characteristics. — 10

b Sketch the gate characteristics of SCR and explain different regions of gate characteristics. Also indicate different regions, different voltages, and different currents on gate characteristics. — 10

3 a With the necessary waveforms explain the single phase Full wave ac voltage controller with R-L load. Derive the expression for the rms output voltage. — 10

b Explain the operation of a single phase full bridge converter with RL load for continuous and discontinuous load currents. — 10

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4 a Write and explain the performance parameters of an inverter. — 10

b A single phase fully controlled full wave rectifier is connected to 220V, 50Hz. A load of R=10Ω is connected in series with a large inductance and load current is ripple free. If the firing angle of converter is 60°, — 10

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determine (a) Rectification efficiency (b) Form factor (c) Input power factor.

5 a With the circuit diagram, and waveform, explain the principle of operation of dual converter, with and without circulating current. 10

b Draw the circuit of a boost regulator and obtain an expression for the output voltage.What is the minimum inductance for continuous conduction? 10

6 a Draw and explain the two transistor model of a thyristor and derive an expression for the anode current in terms of the common base current gain of the transistor. 10

b Explain with circuit diagram and waveforms, operating principle of three phase bridge inverter for 120° conduction mode. 10
