

(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
- What is the range of firing angle, ' α ', in Resistance triggering circuit of a SCR? How do you extend the range of α ?
 - How a single phase full converter operates as an inverter?
 - What are the requirements of a good base drive circuit of BJT?
 - Write Fourier series expression for output voltage of single phase half bridge inverter.
 - What is the working principle of a single phase PWM rectifier?
- 2 a With neat sketch explain the working of an enhancement type power MOSFET with characteristics. 10
- b Draw the V-I characteristics of a TRIAC and explain different operating regions. What are the applications of TRIAC? 10
- 3 a What is the need for controlling the output voltage of an inverter? What are the different techniques used to control the output voltage of an inverter? Explain any one technique with suitable diagram. 10
- b Explain the operation of a single phase fully controlled bridge converter with RL load for highly inductive load with and without free-wheeling diode. 10
- 4 a Draw the single phase bidirectional ac voltage controller with R load and explain its working principle with waveforms. Derive the expression for rms output voltage of bidirectional ac voltage controller. Compare bidirectional ac voltage controller with unidirectional. 10
- b Explain with circuit diagram and waveforms, operating principle of three phase bridge inverter for 180° conduction mode. 10

TURN OVER

T.E Electrical V-CBGS
Power Electronics

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QP Code : 31210

- 5 a Explain the working of single phase cyclo converter in detail with circuit diagram and waveforms. 10
- b A buck converter has input voltage of 15 V and the required output voltage is 6V at $R=400\Omega$ and the peak to peak output ripple voltage is 20mV. If it operates at 20kHz and peak to peak ripple current of inductor is 0.75A, determine (a) duty cycle ratio (b) filter inductance L, (c) filter capacitance C and (d) critical values of L and C 10
- 6 a What are the types of switching characteristics of SCR? Draw the turn OFF characteristics of SCR and explain briefly. 10
- b A single phase fully controlled bridge converter with RL load is supplied from 220V, 50 Hz ac supply. If the firing angle is 45° , determine (a) average output voltage, (b) displacement factor, (c) input power factor and (d) harmonic factor. 10