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Code No:**R31024** **R10** **Set No. 1**

IIIB.Tech I Semester Supplementary Examinations, October/November -2017

POWER ELECTRONICS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1 a) Draw the constructional details of SCR with doping intensity and width of layers and explain its modes operation. [8M]

b) Draw the dynamic characteristics of SCR and explain different switching times. [7M]

2 a) Discuss the common technique for voltage sharing of series connected SCRs. Derive the expression for resistance, R used for static voltage equalization for series connected string. [7M]

b) Distinguish between (i) natural commutation and forced commutation (ii) voltage commutation and current commutation. [8M]

3 a) What is ripple factor? Why ripple factor is important? Derive the expression for ripple factor for voltage of single phase half wave converter? [7M]

b) Draw the voltage and current waveforms of a single phase half controlled bridge converter circuit with freewheeling diode and R-L load and determine (i) average dc load current (ii) rms load current. [8M]

4 a) What are the advantages of full wave bridge rectifier as compared to full wave center-tapped rectifier? [7M]

b) A single phase fully controlled bridge converter with RLE load supplier from 230 V, 50 Hz ac supply. The average load current is 6A which is constant over the working range. Determine the firing angle for (i) E = 100 V and (ii) E = – 100 V Assume R = 6 Ω and L = 6 mH. [8M]

5 a) Draw the circuit diagram of three phase six pulse controlled rectifier with R –load and discuss its working principle. [7M]

b) Derive the expression for the peak value of circulating current. Write the disadvantages of circulating mode dual converter. [8M]

6 a) A single phase full-wave ac voltage controller is connected with a load of R = 50 Ω with an input voltage of 230V, 50Hz. When the firing angle of thyristor is 60^0, determine (i) power output at load (ii) average value of thyristor current and (iii) rms value of thyristor current [7M]

b) Discuss the operating principle of single phase step up cyclo converter using bridge converters with R-L load. Mention the conduction of various thyristors in the waveforms. [8M]

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7 a) Explain how time ratio control strategy can be used to control output voltage of a step-down chopper. [7M]

b) Explain the principle of operation of the buck-boost converter. What are its disadvantages over the buck and boost converter. [8M]

8 a) Explain how unipolar sine triangle PWM can be employed in a single phase bridge inverter? [7M]

b) Discuss the operating principle of a three phase voltage source inverter with 120^0 mode of operation of switches. [8M]

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