MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
Model question paper-II
Power Electronics
III YEAR I SEMESER
EEE

Time: 3 hours **Max Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks. **5*14=70M**

SECTION-I

1.a) Discuss the need for parallel connections of SCRs with necessary diagrams. [7M]

b) With neat circuit diagram explain how UJT firing circuit will generate pulse for an SCR. [7M]

OR

2.a) Give the constructional details of SCR with the help of schematic diagram and circuit symbol. [7M]

b)Explain in detail the two transistor analogy of SCR. [7M]

SECTION-II

3.a) Describe with neat circuit diagram and associated waveforms, operation of a 1- Φ half wave controlled converter with R load. [7M]

b) A 1- phase full bridge converter using four SCRs feeds power to RLE load with R=10 Ω, L = 100mH, and E = 100V. The ac source voltage is 230 V at 50Hz. [7M]

OR

4.a) Explain the operation of 3- phase half-wave converter for resistive load with necessary waveform and circuit diagram. [7M]

b) A 1- phase semi-converter delivers power to RL load with R= 5 Ω, L = 10 mH. The a.c. supply voltage is 230 V, 50 Hz. For the continuous conduction, find the average value of output voltage and current for the firing angle of 45^0. [7M]

SECTION-III

5.a) A step-up chopper has input voltage of 220V and output voltage of 660V. If the conducting time of thyristor-chopper is 100μs, compute the pulse width of output voltage. In case the output-voltage pulse width is halved for constant frequency operation, find the average value of new output voltage? [7M]

b) What is time ratio control in dc choppers? Explain the use of TRC for controlling the output voltage in choppers. [7M]

OR

6. a) Derive the expression for the output voltage of step down chopper. [7M]

b) The step-down dc chopper has a resistive load,R=20Ω and input voltage,V=220 v. When the chopper remains on, its voltage drop, Vch = 1.5 V and chopping frequency, f=10kHz. If the duty cycle is 80 %, Estimate the: (i) average output voltage (ii) rms output voltage, and (iii) Chopper efficiency. [7M]

SECTION-IV

7.a) Describe the operation of a single phase AC voltage controller with a neat circuit diagram and output wave forms with respect to source voltage waveforms at $\alpha = 60^0$ for R-load. [7M]

b) A single phase voltage controller has input voltage of 230 V, 50 Hz and a load of R = 15 Ω. For 6 cycles on and 4 cycles off, determine. (i) rms output voltage (ii) input pF and (iii) average and rms thyristor currents. [7M]

OR

8)Describe the operating principle of single-phase to single-phase step-up cycloconverter with the help of mid-point and bridge type configuration. Illustrate your answer with appropriate circuit and waveforms. [14M]

SECTION-IV

9.a) Discuss the following: [7M]

a) Single pulse Modulation b) SPWM Technique

b) A three phase bridge inverter delivers power to a resistive load from a 300V DC source. For a star connected load of 6Ω per phase, determine RMS value of load current and RMS value of thyristor current for 120 degree conduction mode of operation. [7M]

OR

10.Explain the 120 Degree conduction mode of operation of three phase inverters with necessary circuit diagram and waveforms. [14M]

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Model question paper-III

Power Electronics

III YEAR I SEMESER

EEE

Time: 3 hours **Max Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks. **5*14=70M**

SECTION-I

1.a) Draw and explain the simultaneous triggering circuit of series connected SCRs. [7M]

b) Discuss the switching characteristics of SCR by mentioning its salient features. [7M]

OR

2.a) Describe the different modes of operation of a thyristor with the help of its V-I characteristics. [7M]

b) Two thyristors having a difference of 4mA in latching current are connected in series in the circuit. Voltages across the devices are 450V and 300V. Calculate the required equalizing resistance and capacitance, if the permissible difference in blocking voltage is 10V and the difference in the recovery charge is 5μC.. [7M]

SECTION-II

3.a) Explain the operation of single phase fully controlled converter with RL load. Derive the output voltage and current expressions for firing angle of 45 degrees. [7M]

b) A single phase fully rectifier is used to supply power to load having impedance 200 ohms and 150 mH, from 230V, 50Hz, ac supply at a firing angle of 90 degrees. Calculate [7M]

i) Average values of output voltage and current

ii) RMS values of output voltage and current.

OR

4.a) Explain the operation of 3 phase bridge type full converter with RL load with neat waveforms. [7M]

b) A1- phase full bridge converter using four SCRs feeds power to RLE load with R=10 Ω, L = 100mH, and E = 100V. The ac source voltage is 230 V at 50Hz. Assuming continuous conduction; determine the average value of load current for firing delay angle 45 degree. [7M]

SECTION-III

5.a) Explain the operation of a step down chopper with RL load. Derive the necessary output voltage and current expressions. [7M]

b) A step-down chopper is fed from a 220 V DC source to deliver a load voltage of 100V. If the non-conduction time of transistor is 100μs. The required pulse width would be? [7M]

OR

6. a) Explain indeatail about the class C chopper.? [7M]

b) A dc chopper is connected to an inductive load with a resistance of 5 Ω and an input voltage of 300 V. The on time and off time of the chopper are 20 ms and 10 ms respectively. Estimate the duty ratio, chopping frequency, average load voltage and average load current. [7M]

SECTION-IV

7.a) Describe the operation of a single phase AC voltage controller with RL load.? [7M]

b) A single phase half wave AC voltage controller has a resistive load of R = 40 ohms and the input voltage is Vs = 230V, 50Hz. The Delay angle of thyristor is 50 degrees. Determine [7M]

i)The rms value of output voltage V0,
ii)The input power factor,
iii)The average input current.

OR

8)Describe the operating principle of single-phase to single-phase step-up cycloconverter With R and RL loads? [14M]

SECTION-V

9.a) Draw the circuit diagram of a basic series inverter and explain its operation.? [7M]
operation.?

b)A three phase bridge inverter delivers power to a resistive load from a 500V DC source. For a star connected load of 12Ω per phase, determine RMS value of load current and RMS value of thyristor current for 180 degree conduction mode of operation. [7M]

OR

10.a) Explain voltage control techniques for invereters? [7M]

b)A single phase bridge inverter is fed from a 200 DC. In the output voltage wave, only fundamental component of voltage is considered. Determine the RMS current ratings of an SCR and a diode of the bridge for a resistive load of R = 5Ω. [7M]

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Model question paper-IV

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Time: 3 hours **Max Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks. **5*14=70M**

SECTION-I

1.a) Mention the importance of snubber circuit which is connected across SCRs. [7M]

b) Draw and explain the transfer and output characteristics of n-channel enhancement type MOSFET's. [7M]

OR

2.Explain indetail about the TURN-ON and TURN-OFF methods of SCR .? [14M]

SECTION-II

3.a) Explain the operation of single phase fully controlled bridge converter with R load. Derive the output voltage and current expressions? [7M]

b) The dc voltage from a 1- phase fully controlled bridge converter with RL load is 110 V. The ac source voltage is 220 V rms. The load resistance, $R = 0.5\ \Omega$, and load inductance L is large enough to cause the load current to be essentially constant. Determine the delay angle α ii) Estimate the power delivered to the load. [7M]

OR

4.a) Explain the operation of 3 phase bridge type full converter with RL load with neat waveforms. [7M]

b) Explain indetail about the single phase Dual converter ? [7M]

SECTION-III

5.a) a) Explain indeatail about the class D chopper. ? [7M]

b) A step-down chopper is fed from a 330 V DC source to deliver a load voltage of 110V. If the non-conduction time of transistor is 150μs. The required pulse width would be? [7M]

OR

6. a) Explain indeatail about the class E chopper.? [7M]

b) A dc step up chopper is connected to a resistance of 5 Ω and an input voltage of 300 V and an input voltage of 300 V. The on time and off time of the chopper are 20 ms and 10 ms respectively. Estimate the duty ratio, chopping frequency, average load voltage and average load current. [7M]

SECTION-IV

7.a) Explain indeatail about single phase two SCR's connectedin anti parallel with R load.? [7M]

b) A single phase bidirectional controller supplies a resistance load of R = 10 Ω. [7M]

Determine the output voltage and power consumed by the load for following cases:

(i) α = 300 (ii) α = 750 (iii) α = 1200.

OR

8)Describe the operating principle of single-phase to single-phase step-up cycloconverter With R and RL loads? [14M]

SECTION-IV

9) Describe indetail about PWM techniques .? [14M]

OR

10)Explain the 180 Degree conduction mode of operation of three phase inverters with necessary circuit diagram and waveforms and derive the expression for line voltage, phase voltage [14M]

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