

Code No: R31024

R10

Set No: 1

III B.Tech. I Semester Supplementary Examinations, June/July -2014

POWER ELECTRONICS
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a).Mention the advantages possessed by power electronic systems.
(b). explain the working of IGBT.
2. Describe the parallel operation of two SCRs and explain their characteristics.
3. Draw the circuit diagram of single-phase half wave circuit with RL load. Explain its voltage and current wave forms.
4. Explain the voltage and current wave forms for discontinuous load current for a single phase full converter.
5. For a three-phase 3-pulse converter obtain the RMS value of output voltage and current when firing angle less than 30° .
6. (a). Mention the applications of cycloconverter.
(b). Describe the principle of phase control in single-phase half wave ac voltage controller.
7. What are various control strategies for varying duty cycle α . explain them neatly.
8. (a). What is an inverter? List a few industrial applications of inverters.
(b). what are the two main types of inverters. Distinguish between them.



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(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the characteristics of power diodes. Explain them with a neat sketch.
(b). Obtain the relation between forward current gain α and current gain β .
2. Explain the principle and operation of thyristor with the use of two-thyristor model.
3. (a). Single phase 230v, 1kwh heater is connected across 1-phase, 230v, 50hz supply through an scr, for firing angle delay of 45° and 90° . Calculate the power absorbed in the heater element.
(b).explain the importance of phase control technique.
4. Explain the operation of single-phase full converter bridge with RLE Load, if polarity of load emf E reversed with α greater than 90° .
5. A 3-phase M-3 converter is operated from 3-phase, 230 v, 50 Hz supply with load resistance $R=10$ ohms. An average output voltage of 50% of the maximum possible output voltage is required. Determine (a) firing angle (b) average and rms values of load current and (c) rectification efficiency.
6. Obtain the expression for power factor for a single -phase voltage controller with R load.
7. Draw and describe the power circuit diagram of a step-down chopper with its relevant current wave forms.
8. Describe about the harmonic current in single-phase modulation.



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Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- (a) Draw a bipolar junction transistors'. And describe its operation for both npn type and pnp type.
(b). Give the comparison between PMOSPET and BJT.
- Mention the anode voltage ratings during the blocking state of a thyristor.
- Draw the circuit diagram of single-phase half wave circuit with RLE load. Explain its voltage and current wave forms.
- (a). Show that the average value of a thyristor current is half that average value of load-current for a full converter.
(b). SCRs with peak forward voltage rating of 1000v and average on-state current rating of 40 A are used in single-phase midpoint converter and single -phase bridge converter. Find the power that these two converters can handle. Use a factor if safety of 2.5.
- A single-phase full-converter is supplied from 230 V, 50Hz source. The load consists of $R=10$ ohm and a large inductance so as to render the load current constant. for a firing angle delay of 30^0 , determine (i) average output voltage (ii) average output current (iii) average and rms values of thyristor currents and (iv) the power factor.
- (a). What is the need of AC voltage controller? What are its applications?
(b). A single phaser voltage controller has input voltage of 230 V, 50Hz and a load of $R= 15$ ohms. for 6 cycles on and 4 cycles off, determine (i) rms output voltage (ii) input pf.
- Describe the principle of dc chopper operation. Derive an expression for its average output voltage.
- Describe the working og a single -phase half bridge inverter. What is its main drawback? Explain how this drawback is overcome.



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Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the thyristor turn-on methods.
2. (a). Draw the snubber circuit across SCR and explain it.
(b). Explain the line commutation and forced commutation.
3. For a single-phase half wave circuit with RLE load, derive the value of average load voltage and current.
4. Explain the operation of single -phase full wave converter using a centre-tapped transformer.
5. (a). Give at least five applications of phase controlled rectifiers.
(b). what is an ideal thyristor switch.
6. (a). Explain the principle and operation of cycloconverter.
(b). A single-phase bridge -type cycloconverter has input voltage of 230V, 50 Hz and load of $R=10$ ohms output frequency is one-third of input frequency. for a firing angle delay of 30 degrees , calculate (i) rms value of output voltage (ii) rms current of each converter.
7. (a). Explain the principle and operation of Buck-Boost converter.
(b). mention the applications of High frequency DC-DC Converter.
8. Draw and explain the output voltage wave forms with sinusoidal pulse modulation.
