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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2020

Sixth Semester

Choice Based Course—POWER ELECTRONICS

(For B.Sc. Electronics)

[2013—2016 Admissions]

Time : Three Hours

Maximum Marks : 80

Part A

Answer all questions briefly.

Each question carries 1 mark.

1. Thyristor is a _____ layer _____ junction PNP semiconductor switching device.
2. The VI characteristics after avalanche breakdown during reverse blocking mode is applicable only when load resistance is _____
3. Expand IGBT.
4. The turning off or commutation, of a thyristor by supply voltage itself is called _____ commutation.
5. _____ is defined as the angle between the instant thyristor would conduct if it were a diode and the instant it is triggered.
6. Cycloconverter is a device which converts _____.
 - (a) Input power at one frequency to output power at a different frequency with one stage conversion
 - (b) Input power at one voltage to output power at a different voltage with one stage conversion
 - (c) Input power at one voltage to output power at a different frequency with two stage conversion
 - (d) Input power at one frequency to output power at a different frequency with two stage conversion
7. List any *two* industrial applications of inverters.

Turn over

8. In d.c. choppers, per unit ripple is maximum when duty cycle α is :
- (a) 0.2. (b) 0.5.
(c) 0.7. (d) 0.9.
9. The output dc voltage of SMPS is controlled by varying the duty cycle of chopper by _____ or _____ techniques.
10. UPS stands for _____.

(10 × 1 = 10)

Part B

Answer any eight questions.

Each question carries 2 marks.

11. Compare SCR forward conduction mode and forward blocking mode.
12. Write notes on PUT.
13. Differentiate The DIAC and the TRIAC.
14. List the switching characteristics of MOSFET.
15. What are the advantages of using freewheeling diode in single phase half wave controlled rectifier circuit ?
16. What do you mean by commutation ? Compare load commutation and resonant pulse commutation.
17. How the voltage across the commutating capacitor is reversed in a commutating circuit ?
18. List the advantages of static switches over mechanical and electromechanical switches.
19. Derive the expression for average dc output voltage of a dc chopper.
20. Write notes on bidirectional power supply.
21. Write notes on buck boost regulator.
22. What do you meant by regenerative breaking ?

(8 × 2 = 16)

Part C

Answer any six questions.

Each question carries 4 marks.

23. What are the thyristor turn on methods ? Explain any *two* methods.
24. Draw the firing circuit for a triac using a diac. Explain the working of firing circuit.

25. Explain the working principle of single phase half wave controlled rectifier circuit with RL load.
26. A single phase 230 V, 1 kW heater is connected across 1-phase, 230 V, 50 Hz supply through an SCR. For firing angle delays of 45° and 90° , calculate the power absorbed in the heater element.
27. What do you mean by single phase half bridge inverter? Explain its working with neat diagrams.
28. Describe the principle of d.c. chopper operation. Derive an expression for its average dc output voltage.
29. With the help of circuit diagram of a UPS in which the load is connected to inverter and explain its operation.
30. Describe the basic structure of power diode. Explain its VI characteristics.
31. Draw the circuit diagram of illumination control using TRIAC. Explain its working

(6 × 4 = 24)

Part D

*Answer any two questions.
Each question carries 15 marks.*

32. What is SCR? Explain the working of SCR with the help of suitable diagrams.
33. Explain the need of commutation in Thyristor circuits. What are the different methods of commutation schemes? Explain about the class C commutation technique with neat schematic and waveforms.
34. What are solid state relays? How is electrical isolation obtained in these relays? Describe the dc solid state relays and a.c. solid state relays with relevant circuit diagrams.
35. What is SMPS? List the various types of SMPS. Explain the working of flyback SMPS with relevant circuits and waveforms.

(2 × 15 = 30)