

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
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B. Tech 5th Semester Examination
Power Electronics & Its Applications (NS)

EC-313

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question each from sections A, B, C and D. Section - E is compulsory.

SECTION - A

1. (a) Discuss the turn on and turn off timings in a thyristor. Draw graphs of currents and voltages during both these processes. (10)
- (b) Draw static and dynamic equalising circuits for thyristors in series and explain their operation. (10)
2. (a) Draw circuits and explain any two methods of forced commutation of thyristors. (10)
- (b) What is meant by Diac and Triac? How Triac is different from thyristor? Explain modes of operation of Triac. (10)

SECTION - B

3. (a) Draw and explain the waveshapes of supply voltage, output voltage, load current, current through thyristor, current through free wheeling diode and voltage drop across thyristor of a single phase half wave controlled rectifier feeding R-L load. (10)

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- (b) A single phase 110 V, 50 Hz ac supply is rectified by a continuously fired thyristor and fed to a dc motor. The motor armature resistance is 10 ohms. Assume that back emf of motor is 55.5 V and neglect the armature inductance. Find the average current in the circuit. (10)

4. Briefly describe the constructional feature and operation of various switch mode dc-dc converters. (20)

SECTION - C

5. (a) How is the working of a full bridge single phase inverter different from that of half bridge circuit? Explain with the diagrams. (10)
- (b) A single phase half bridge inverter has a resistive load of 3 ohms. The dc input voltage is 30 V. Find (i) rms value of fundamental component of output voltage (ii) output power (iii) peak current in each thyristor (iv) average current of each thyristor (v) peak reverse blocking voltage. (10)
6. (a) Explain the working of an online and offline UPS. (10)
- (b) What is buck-boost regulator? Draw its circuit and explain its working. (10)

SECTION - D

7. (a) Discuss the basic characteristics of dc motors. Briefly explain speed control of dc motor using feed back loops. (10)
- (b) Explain speed control of 3 phase induction motor by stator voltage and frequency control. (10)
8. (a) Discuss the salient features of space heating and air conditioning. (10)
- (b) Write short note on dielectric and induction heating. (10)

SECTION - E

9. Answer the following short questions:

- (a) Why gate triggering is commonly used in thyristors?
- (b) What is free wheeling diode?
- (c) Why is a heat sink needed for a thyristor?
- (d) What are the various power ratings of a thyristor?
- (e) Draw snubber circuit and give its significance.
- (f) What is the necessity of using series converter?
- (g) Give advantages of high frequency series inverter.
- (h) What is sinusoidal pulse width modulation? How is it obtained?
- (i) Name the different power line disturbances,
- (j) Give salient features of Cuk dc-dc converter.

(10×2=20)