GANPAT UNIVERSITY
B.TECH SEM.5th ELECTRICAL ENGINEERING
REGULAR EXAMINATION NOV-DEC 2013
2EE503 - POWER ELECTRONICS DEVICES & CIRCUITS

TIME:-3 HOURS　　　　　　　　　　　　　　　　　　　　　　　**TOTAL MARKS-70**

INSTRUCTION:- 　1. Attempt all questions.
　　　　　　　　　2. Make suitable assumptions wherever necessary.
　　　　　　　　　3. Figures to the right indicate full marks.

Section-I

Que-1

(a) A single-phase half-wave SCR circuit feeds power to a resistive load. Draw waveforms for source voltage, load voltage, load current, and voltage across the SCR for a given firing angle α. Hence obtain expressions for average and rms load voltages in terms of source voltage and firing angle. **(06)**

(b) Derive the expression for the average output voltage of single phase full converter. Assume the load to be highly inductive. Draw the variation of average output voltage with α. Also draw the output voltage waveforms. **(06)**

OR

Que-1

(a) Explain the operation of Jone's chopper. **(06)**

(b) Explain turn OFF switching Characteristics of SCR. **(06)**

Que-2

(a) Explain the need of a four quadrant chopper with the help of circuit diagram. Explain the quadrants in which it operates. **(06)**

(b) Write a short note on: 1-phase Dual Converter. **(05)**

OR

Que-2

(a) Explain 3-phase half -wave controlled converter with R-L load and Freewheeling Diode. **(06)**

(b) Explain Load commutation **(05)**

Que-3 **Attempt any three.** **(12)**

(a) Differentiate between Step up and Step down chopper.

(b) Explain di/dt and dv/dt protection.

(c) Differentiate between symmetrical and asymmetrical configurations semiconverter.

(d) Merits and Demerits and Application of a Power MOSFET.

Section-II

Que-4

(a) Explain the operation of single phase full bridge inverter with R-L load. (06)

(b) Explain the operating principle of a thyristor in terms of the "two transistor analogy" (06)

OR

Que-4

(a) Define THD. Obtain THD of a square wave. (06)

(b) With the help of neat circuit diagram and relevant waveforms, explain the working of Type D chopper. (06)

Que-5

(a) Describe the external AC output voltage control method of an inverter. (06)

(b) Explain any one configuration of single phase Cycloconverter. (05)

OR

Que-5

(a) Describe multiple pulse width modulation technique of inverter voltage control. (06)

(b) Explain the working of an AC voltage regulator with phase angle control. (05)

Que-6

(a) Explain the operation of 180 degree mode of three-phase bridge inverter with the help of circuit diagram, all the six gate currents and any one phase or line voltage. (07)

(b) A single-phase 220 V, 1kW electric room heater is connected across 220 V AC supply through a TRIAC. For a delay angle of 90°, calculate power dissipated by the heater element. (05)

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