EVENING

11 JAN 2023

Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

[Total No. of Questions: 09] [Total No. of Pages: 02]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: **4**
Name of Subject: **Power Electronics**
Subject Code: **PCEE-107**
Paper ID: **16188**
Scientific calculator is Allowed

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Define latching and holding current.
b) Why freewheeling diode is used in phase controlled rectifier circuits?
c) What did you understand by term commutation?
d) State the purpose of Gate in SCR.
e) How can the output frequency of a cycloconverter be changed?
f) Why freewheeling diode is used in phase controlled rectifier circuits?

Part – B **[Marks: 04 each]**

Q2. Enumerate the various mechanisms by which thyristors can be triggered into conduction.

Q3. Describe impulse commutation technique with required wave-shapes.

Q4. Explain various techniques for reduction of harmonics in the inverter output voltage.

Q5. Discuss the main types of dc choppers. Which of these is more commonly employed and why?

Q6. Discuss the working of single phase full bridge inverter.

Q7. Explain various control strategies used for chopper.

Part – C

[Marks: 12 each]

Q8. Explain the operation of dual converter with non-circulating current mode. Discuss its operation with the help of voltage waveforms across each converter. Take $\alpha_1 = 30^o$.

OR

Explain switching (dynamic/ turn off-on) characteristics of SCR.

Q9. For a single phase one-pulse SCR controlled converter system, sketch waveforms for load voltage and load current for:

I. RL Load

II. RL Load with freewheeling diode across RL

From a comparison of these waveforms, discuss the advantages of using a freewheeling diode.

OR

A single phase to single phase mid-point cycloconverter is delivering power to resistive load. The supply transformer has turn ratio of 1:1:1. The frequency ratio is $f_o/f_s = 1/3$. The firing angle delay for all the four SCRs are the same. Sketch the time variations of the following waveforms for $\alpha = 30^o$.

a) Supply voltage

b) Output current and supply current.

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