[Total No. of Questions: 09]   [Total No. of Pages: 02]
Uni. Roll No. …………………..

Program: B. Tech.
Semester: 4th
Name of Subject: POWER ELECTRONICS
Subject Code: PCEE-107
Paper ID: 16188

20-01-2022(M)

Time Allowed: 02 Hours   **Max. Marks: 60**

NOTE:

1) Each question is of 10 marks.
2) Attempt any six questions out of nine.
3) Any missing data may be assumed appropriately.

Q1. **a.** Explain V-I static characteristics of a thyristor. **(4)**

b. Enumerate the various mechanisms by which thyristors can be triggered into conduction. **(6)**

Q2. **a.** Describe impulse commutation technique with required wave-shapes. **(4)**

b. Discuss the main types of dc choppers. Which of these is more commonly employed and why? **(6)**

Q3. Explain modified McMurray half bridge inverter with different operating modes and corresponding waveforms. **(10)**

Q4. For a three phase full converter explain how output voltage wave for firing angle of 0° (zero degree) is obtained by using phase voltages and line voltages. **(10)**

Q5. **a.** A step up chopper has input voltage of 110 V and output voltage of 330 V. If conducting time of thyristor chopper is 60μs, compute the pulse width of output voltage. In case output voltage pulse width is halved for the constant frequency operation, find the average value of new output voltage. **(5)**

b. Discuss control strategies of DC chopper. **(5)**

Q6. **a.** Explain the operation of dual converter with circulating current mode. Discuss its operation with the help of voltage waveforms across each converter, load **(5)**

Page 1 of 2

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and reactor. Take $\alpha_1 = 30°$.

b. A DC battery is to be charged from a constant DC source of 250 volt. The DC battery is to be charged from its internal EMF of 100 volt to 150 volt. The battery has internal resistance of 02 ohm. For a constant charging current of 12.5 ampere, compute the range of duty cycle. **(5)**

Q7. Explain the various methods to reduce harmonics in inverter output voltage. **(10)**

Q8. Describe the working of single phase to single phase step down cycloconverter for bridge type configuration. The frequency ratio is $^1/_2$. The firing angle delay for all SCRs is same. Sketch the time variation of waveforms for $\alpha = 45°$. **(10)**

Q9. A single phase full wave mid point configuration (M-2) converter is connected to RL load. For continuous load current mode, draw the source voltage, output voltage, load current and voltage across each SCR with the help of circuit diagram. Also derive the expression for output voltage, load current and power. Taking firing angle $\alpha = 60°$. **(10)**

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