

SUBJECT : POWER DEVICES AND MACHINES

Day : Tuesday
Date : 14/05/2019

S-2019-2675

Time : 10.00 AM TO 01.00 PM
Max. Marks : 60

N. B. :

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat diagrams **WHEREVER** necessary.

- Q.1 a) Draw and explain switching characteristic of power diode. (06)
b) Describe firing schemes for SCR. (04)

OR

- Q.1 With the help neat diagram describe the operation of GTO. Compare GTO and SCR. (10)

- Q.2 Describe the operation of single phase semiconverter with RL load with and without freewheeling diode. Draw the relevant waveforms. (10)

OR

- Q.2 A single phase fully controlled bridge converter supplies an inductive load. Assuming that the output current is virtually constant and equal to I_{DC} . Determine the following performance measures, if the supply voltage = 220V and $\alpha = 60^\circ$ (10)

- | | |
|-------------------------------------|----------------------------|
| i) Average output voltage | ii) Supply rms current |
| iii) Supply fundamental rms current | iv) Supply power factor |
| v) Displacement factor | vi) Supply harmonic factor |

- Q.3 Describe the operation of three phase full converter with R - load. (10)

OR

- Q.3 A three phase semiconverter is operated from a three phase Y – connected 220V, 50Hz supply and load resistance $R = 10\Omega$. If the average output voltage is 25% of maximum possible average output voltage, determine:

- | | |
|----------------------------------------|------------------------------------|
| i) delay angle | ii) rms and average output current |
| iii) average and rms thyristor current | iv) rectification efficiency |

- Q.4 Describe different PWM techniques used in single phase voltage source inverters. (10)

OR

- Q.4 A single phase full-bridge inverter is operated from 48V battery and is supplying power to a pure resistive load of 10Ω .

Determine:

- | |
|--------------------------------------------------|
| ii) rms output voltage at fundament frequency |
| iii) Output power |
| iii) Average and peak currents of each thyristor |
| iv) Peak reverse blocking of each thyristor |

- Q.5 Describe step down chopper with RL load for continuous load current and discontinuous load current. Derive for average and rms value of load voltage. (10)

OR

- Q.5 A first quadrant chopper is operated from 220V DC and the surfacing frequency is 1KHz for duty cycle of 0.7. find:

- | | |
|---------------------------|------------------------|
| i) Average output voltage | ii) RMS output voltage |
| iii) form factor | iv) ripple factor |

- Q.6 Describe the uncompensated and compensated universal motor. List its advantages, disadvantages and applications. (10)

OR

- Q.6 With the help of block diagram describe the operation of different types of UPS (10)

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