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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electrical & Electronics Engineering **Duration: 3 hrs.**
Course Code: 19EE5PCPEN **Max Marks: 100**
Course: POWER ELECTRONICS **Date: 07.03.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) What is Power Electronics? Explain the characteristics of practical device? **10**

b) Mention the types of power electronics circuits? Explain any two power electronic convertors with neat circuit diagram, input and output waveform? **10**

OR

2 a) Discuss the importance of providing isolation of gate/base drive from power circuits and explain the two methods? **10**

b) Sketch the structure of n-channel enhancement type MOSFET and explain its working principle? **10**

UNIT - II

3 a) Explain the working principle of step down chopper and drive expression for average output voltage, Output power, and its effective input resistance in terms of chopper duty cycle. **10**

b) A Chopper circuit is operating at a frequency of 2 kHz on a 460 V supply. If the load voltage is 350 volts, calculate the conduction period of the thyristor in each cycle. **04**

c) A dc chopper in figure 3(c) has a resistive load of R = 10Ω and input voltage of V = 200 V. When chopper is ON, its voltage drop is 2V and the chopping frequency is 1 kHz. If the duty cycle is 60%, determine : Average output voltage, RMS value of output voltage, Effective input resistance of chopper, output power. **06**

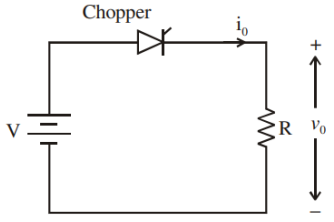

Fig 3(c)

UNIT - III

4	a)	List the different types of Sic power devices? Compare the performance of Sic with Si power devices?	**10**
	b)	Explain the $\mathbf{V_d}$-$\mathbf{I_d}$ characteristics of Sic MOSFET and show the comparison with Si MOSFET with respect to gate voltage and ON state resistance.	**06**
	c)	What are the characteristics features of Wide band gap devices?	**04**

UNIT - IV

5	a)	With the help of a circuit diagram and waveforms, explain the working of single phase full converter with RL load. Derive the rms value of output voltage?	**12**
	b)	A three-phase full-wave converter is operated from a three-phase Y-connected 208 V, 60-Hz supply and the load resistance is R = 10 Ω. If it is required to obtain an average output voltage of 50% of the maximum possible output voltage, calculate (a) the delay angle α (b) the rms and average output currents (c) the average and rms thyristor currents (d) the rectification efficiency.	**08**

OR

6	a)	Explain the operation of three phase fully controlled converters supplying an inductive load. Draw the waveforms of input, output voltage and obtain the expression for average output voltage, rms value of output voltage?	**10**
	b)	What do you understand by power factor correction (PFC)? Explain any one method of Passive PFC and Active PFC?	**10**

UNIT - V

7	a)	The single-phase half-bridge inverter has a resistive load of R = 2.4 Ω and the dc input voltage is Vs = 48V. Determine (a) the rms output voltage at the fundamental frequency (b) the output power (c) the average and peak currents of each transistor (d) the peak reverse blocking voltage V_{BR} of each transistor (e) the average supply current Is.	**06**
	b)	Explain any two modulation technique available for voltage control of a single phase inverter?	**10**
	c)	What are the differences between voltage source Inverter and current source inverter?	**04**

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