U.S.N.										

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: 22EE5PCPEN **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.

UNIT - I

1 a) Explain any two types of power electronic converter circuits. Draw the input and output characteristics. **06**

b) With the help of waveform, explain the reverse recovery characteristics of a diode? **08**

c) Give the classification of power devices. State any one difference between diode and a transistor and Transistor and a Thyristor. **06**

UNIT - II

2 a) Explain steady-state characteristics of BJT with a neat circuit, input, output and transfer characteristics, equations and explanation? **10**

b) Explain the switching characteristics of MOSFETs with waveforms and times, equivalent circuits and switching model? **10**

OR

3 a) Discuss the importance of providing isolation of gate/base drive from power circuits and explain any two methods? **07**

b) The bipolar transistor in figure 3(b) is specified to have β_F in the range of 8 to 40. The load resistance is R_C = 11 Ω. The dc supply voltage is V_{CC} = 200 V and the input voltage to the base circuit is V_B = 10 V. If V_{CEsat2} = 1.0 V and V_{BEsat2} = 1.5 V, find (a) the value of R_B that results in saturation with an ODF of 10, (b) the βforced, and (c) the power loss PT in the transistor. Comment on the increase in ODF(transistor) **06**

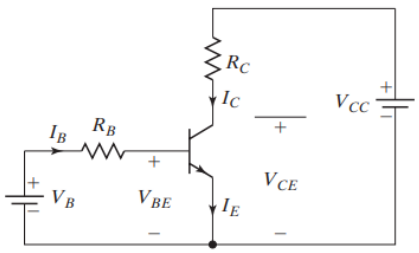

Fig 3(b)

	c)	With a neat structure and symbol explain the construction and working of IGBTs?	**07**

UNIT - III

4	a)	With a circuit diagram and waveform, explain the working of a single phase full wave rectifier with RL load. Derive an expression for the average voltage across the load?	**10**
	b)	Explain the working principle of step up chopper. Draw the relevant arrangement for step up operation along with arrangements for transfer of energy?	**10**

UNIT - IV

5	a)	Explain any two modulation technique available for voltage control of single phase inverter in detail?	**10**
	b)	What is the principle of zero-current switching (ZCS) resonant converters?	**10**

OR

6	a)	Explain the operation of zero voltage switching converter with the help of circuit diagram and waveforms.	**12**
	b)	What is a multilevel inverter? Explain the principle of operation and features of multilevel inverters?	**08**

UNIT - V

7	a)	Derive an expression for the anode current of thyristor with the help of two transistor analogy.	**10**
	b)	With a neat circuit diagram and waveform explain the working of single phase full converter with highly inductive load? Derive the rms value of the output voltage?	**10**

****