U.S.N.										

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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**
Course Code: 22EE5PCPE1 **Max Marks: 100**
Course: Power Electronics - I

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	CO	PO	Marks
1	a)	List the properties of SiC and GaN as materials for power semiconductor devices.	CO1	PO1	**06**
	b)	Give the classification of Power semiconductor devices? Explain the meaning of controlled turn on and controlled turn off.	CO1	PO1	**07**
	c)	What are the different types of power electronic circuits? Explain any two with the help of circuit diagram and waveforms	CO3	PO2	**07**
		OR			
2	a)	Bring out the differences between characteristics of Ideal and practical devices	CO1	PO1	**10**
	b)	What are the peripheral effects of power electronic circuits? Discuss about its effects and remedies.	CO3	PO2	**10**
		UNIT - II			
3	a)	Explain the reverse recovery characteristics of power diode? Obtain an expression for peak reverse recovery current.	CO2	PO3	**10**
	b)	List and explain the performance parameters of a single-phase diode bridge rectifier.	CO2	PO3	**10**
		OR			
4	a)	Briefly explain different types of diodes and their applications.	CO1	PO1	**10**
	b)	The power diode DQ60SG when turned off while carrying a forward current of 30A, the rate of fall of current is 600A/µs. The reverse recovery charge is 850 nC. Find reverse recovery time. Sketch reverse recovery characteristics of power diode and mark reverse recovery time.	CO3	PO2	**10**

			UNIT - III			
	5	a)	With the help of waveform explain the switching characteristics of power BJT.	*CO3*	*PO2*	**08**
		b)	With the help of neat diagram explain the structure and working of depletion type MOSFET.	*CO1*	*PO1*	**08**
		c)	State the differences between Depletion type and Enhancement type MOSFETs	*CO1*	*PO1*	**04**
			OR			
	6	a)	With the help of neat diagram explain the structure and working of enhancement type MOSFET	*CO1*	*PO1*	**08**
		b)	Discuss about SiC MOSFET.	*CO1*	*PO1*	**06**
		c)	Sketch and explain the steady state characteristics of n-channel type enhancement MOSFET	*CO3*	*PO2*	**06**
			UNIT - IV			
	7	a)	Explain the structure and working of IGBT in detail	*CO1*	*PO1*	**08**
		b)	With the help of a circuit diagram describe the working of a BJT gate drive circuit.	*CO4*	*PO2*	**08**
		c)	Compare power MOSFET and power IGBT.	*CO1*	*PO1*	**04**
			OR			
	8	a)	What is the necessity for providing isolation of Base/Gate drive circuits? Explain any one method of providing isolation of drive circuit.	*CO4*	*PO2*	**07**
		b)	Sketch and explain the switching characteristics of IGBT.	*CO3*	*PO2*	**07**
		c)	Explain the working of diode clamp anti-saturation power BJT base drive circuit.	*CO4*	*PO2*	**06**
			UNIT - V			
	9	a)	With the help of a two-transistor model, derive an expression for anode current of a thyristor. Comment on the effect of current gains α_1 and α_2.	*CO1*	*PO1*	**10**
		b)	With the help of a neat circuit diagram explain the working of TRIAC firing circuit using DIAC	*CO4*	*PO2*	**10**
			OR			
	10	a)	Sketch and explain the different regions of V-I characteristics of SCR. Define holding current and latching current.	*CO1*	*PO1*	**10**
		b)	Describe the working of UJT triggering circuit for thyristors in detail.	*CO4*	*PO2*	**10**

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