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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**

Course Code: 22EE6PCPE2 **Max Marks: 100**

Course: Power Electronics - 2

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)	Explain the operation of a single-phase full converter with R-L-E load with the help of waveforms for continuous load current.	*CO3*	*PO2*	**08**
	b)	A three phase fully controlled converter is operated from a three phase star connected 200V, 50Hz supply. The load resistance is R_L =10 Ω. Calculate i) Maximum possible output voltage. ii) Delay angle α to obtain 50% of maximum possible output voltage. iii) Average load current with the delay angle as in (ii). iv) RMS value of the output voltage for the same delay angle	*CO2*	*PO1* *PO2*	**10**
	c)	Give the equation of Harmonic factor of input supply current of a single-phase full converter.	*CO2*	*PO1* *PO2*	**02**
		OR			
2	a)	Obtain the expression for average output voltage of a single-phase full converter with R-L-E load with a delay angle α. Sketch the waveform.	*CO2*	*PO1* *PO2*	**10**
	b)	A single-phase full converter is connected to 230 V, 50 Hz source. The converter is feeding a resistive load in series with a large inductance. The load resistance R = 10 Ohm. For a delay angle (α) of 45 degrees calculate: : i) average output voltage ii) Average load current iii) RMS value of output current iv) DC output power v) AC input Power.	*CO2*	*PO1* *PO2*	**10**
		UNIT - II			
3	a)	Explain the operation of a Buck Regulator with equivalent circuits of both the modes and waveforms.	*CO3*	*PO2*	**10**

		b)	A boost regulator has an input voltage of Vs = 5V. The output voltage is 15 V and average load current 0.5A. The circuit components L = 150 μH and C = 220 μF. Determine: i) Duty cycle ii) The inductor ripple current iii) Peak inductor current iv) ripple voltage of filter capacitor v) load resistance and value of critical inductance. Take the switching frequency as 25kHZ.	*CO2*	*PO1* *PO2*	**10**
			OR			
	4	a)	Illustrate the principle of operation of a step down converter with R load and obtain the expressions for average output voltage, RMS output voltage and output power. Assume a lossless converter.	*CO2*	*PO1* *PO2*	**10**
		b)	Explain the operation of a single inductor dual output boost converter with circuit and waveforms.	*CO3*	*PO2*	**10**
			UNIT - III			
	5	a)	For a DC to AC converter define the following with equations: i) Ripple factor of input current ii) Harmonic factor iii) Total harmonic distortion iv) Distortion factor	*CO2*	*PO1* *PO2*	**10**
		b)	Explain the operation of a single-phase current source inverter with circuit diagram, waveforms and switch states.	*CO3*	*PO2*	**10**
			OR			
	6	a)	Describe the operation of a three-phase bridge inverter in 180-degree conduction mode with gating signals and any one line voltage.	*CO3*	*PO2*	**12**
		b)	Obtain Fourier series expression for output voltage of a single-phase full bridge inverter.	*CO2*	*PO1* *PO2*	**08**
			UNIT - IV			
	7	a)	What are the different types of resonant power converters? Discuss the limitations of resonant power converters.	*CO4*	*PO3*	**10**
		b)	Explain the working of DC-DC M-type ZCS buck resonant converter with circuit diagrams and waveforms.	*CO4*	*PO3*	**10**
			OR			
	8	a)	Explain the four modes of operation of a ZVS resonant converter along with circuit and waveforms.	*CO4*	*PO3*	**12**
		b)	Explain the operation of a single pole multilevel inverter. Bring out the difference between outputs of a single-phase bridge inverter and single pole multilevel inverter.	*CO4*	*PO3*	**08**

			UNIT - V			
	9	a)	Discuss the operation of a fly back converter along with the circuit diagram and waveforms.	*CO1*	*PO2*	**12**
		b)	With the help of relevant diagrams explain the operation of uninterruptible power supplies (UPS).	*CO1*	*PO2*	**08**
			OR			
	10	a)	Explain the working of a Static VAR compensator along with vector diagrams indicating the flow of reactive power.	*CO1*	*PO2*	**12**
		b)	Explain the operation of a Static AC circuit breaker.	*CO1*	*PO2*	**08**

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