Duration: - Three Hours   **Total Marks assigned to the paper: - 80**

Instructions to the candidates, if any: -

Note:
- Question No. 1 is compulsory.
- Answer any **three** from the remaining five questions.
- Assume suitable data if necessary and justify the same.
- Figures to the right indicate the marks.

Q. 1 Solve any four.   20M

    A) Write short note on thyristors family.

    B) Explain the principle of operation of power MOSFET.

    C) Draw the circuit diagram of any one application using Triac & Diac and compare their V-I characteristics

    D) State the conditions for getting inversion mode of operation in case of line commutated rectifiers

    E) Why there is a restriction on the firing angle in case of ac voltage controllers feeding highly inductive load

Q2	a	Explain the concept of space vector modulation.	05M
	b	Compare the properties of power BJT, power MOSFET and IGBT	05M
	c	Explain with relevant circuit diagrams and waveforms the working of a single phase bidirectional phase control type AC voltage controllers connected to R load and obtain a relationship between the r.m.s. output voltage and the r.m.s. input voltage.	10M
Q3	a	Draw a neat circuit and explain the working of full wave fully controlled 6-pulse 3 ϕ bridge circuit with resistive load. Draw the corresponding input and output voltage waveforms when the firing angle α=90°.	10M
	b	A single phase full wave fully controlled bridge rectifier is operated with an R-L load. Calculate average D.C. output voltage, input power factor, displacement factor and Total Harmonic distortion, if a 50 Hz. Sinusoidal voltage of 220 V. peak is applied.	10M
Q4	a	Explain with a neat circuit diagram and relevant waveforms, the working of a boost regulator and derive the expression for output voltage, filter capacitance and filter inductance.	10M

	b	Explain dynamic characteristics of SCR with wave forms.	10M
Q5	a	Explain with relevant wave forms any one method to control the magnitude and frequency of the output voltage of the single phase inverter.	10M
	c	Explain with circuit diagram and waveforms, three phase bridge inverter for 120° conduction mode.	10M
Q6		Explain the following	20M
	a	Basic working principle of Matrix converter.	
	b	Any two commutation circuits of SCR	
	c	Comparison of fully controlled and half controlled full wave rectifier with R-L load.	
	d	Snubber circuit of SCR.	

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