CLASS: BTECH   SEMESTER : V
BRANCH: EEE   SESSION : MO/2024

SUBJECT: EE353 POWER ELECTRONICS

TIME: 3 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	List the names of three controllable semiconductor switches, one uncontrollable semiconductor switch, and one semiconductor switch which is both bidirectional and controllable.	[5]	1	1
Q.1(b)	Draw dynamic characteristics of Power MOSFET. Show the Turn-on Delay-Time, Rise-Time, Turn-off Delay Time, and Fall Time of the drain to source voltage properly.	[5]	1	1
Q.2(a)	Explain the Class-B commutation circuit for a thyristor with a proper circuit diagram and waveform of Load current, voltage across the thyristor, and current through the thyristor. Consider resistive load only.	[5]	2	2
Q.2(b)	Explain the need for Static Equalizing Network, and Dynamic Equalizing Network for series operation of thyristors.	[5]	2	2
Q.3(a)	Analyze the circuit operation of a three-phase fully controlled bridge rectifier to draw the load voltage waveform for 90º and 120º firing angles considering resistive load.	[5]	3	3
Q.3(b)	Analyze the discontinuous conduction mode of a three-phase rectifier and obtain the mathematical expression of the average load current for a resistive load.	[5]	3	3
Q.4(a)	Apply circuit operation principles of a Class-A chopper to determine duty cycle if the chopper id feeding an R-L load of 5Ω, and 40mH respectively from a DC source of 100 V. The Load current varies between 10 A and 12 A. Also determine the average voltage across inductor.	[5]	4	4
Q.4(b)	Apply voltage commutation (i.e. impulse commutation) in a thyristor-based DC-DC chopper feeding R-L load and explain its working principle with the help of waveforms of commutating current, main thyristor current, free-wheeling current, capacitor voltage, and Load voltage.	[5]	4	4
Q.5(a)	Design a control logic of the Sinusoidal PWM technique for a three-phase inverter feeding resistive load.	[5]	5	5,6
Q.5(b)	Design a power converter-based three-phase AC drive being supplied from a three-phase constant voltage and constant frequency source using a block diagram.	[5]	5	5,6

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