BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2024)

CLASS: BTECH **SEMESTER : VI**
BRANCH: ECE **SESSION : SP/2024**

SUBJECT: EC375 INDUSTRIAL ELECTRONICS

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Differentiate between latching current and holding current of the SCR.	[2]	1	4
Q.1(b)	Explain the working of SCR by giving two transistor analogy schematic circuit.	[3]	1	2
Q.2(a)	Explain various methods for turning on and SCR. Which method is most widely used and why?	[2]	1	2
Q.2(b)	What are the important factors for designing the triggering circuits for a SCR? Why are R and RC triggering circuits not preferred for triggering the SCR?	[3]	1	1
Q.3(a)	Explain the working of single-phase half wave-controlled rectifier circuits with RL load by giving suitable circuits and waveforms. Derive the expression for the average load voltage. Modify the circuit to increase the average load voltage.	[3]	2	2,6
Q.3(b)	The latching current for a SCR inserted between a dc source voltage of 100V and a load being 75mA. Calculate the minimum width of the gate-pulse required to turn-on the SCR when the load is consisting of resistance and inductance of 10 ohm and 100mH respectively.	[2]	1	4
Q.4(a)	Differentiate between single-phase semi converter and full converter circuit with RL loads.	[2]	2	4
Q.4(b)	Derive the expression for average load voltage for 3 phase half wave-controlled rectifier with resistive load. Show the circuit and waveforms and explain why SCR cannot be triggered below 30^0.	[3]	2	1
Q.5(a)	Explain the working of a single-phase bidirectional controller with resistive load by giving circuit and waveforms. Derive the expression for RMS load voltage.	[2]	2	1
Q.5(b)	Design a DC regulated power supply to deliver 12V 3 A. Use Resistors, stepdown transformer, diodes, Zener diodes, OPAMP and transistors of proper ratings.	[3]	2	6

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