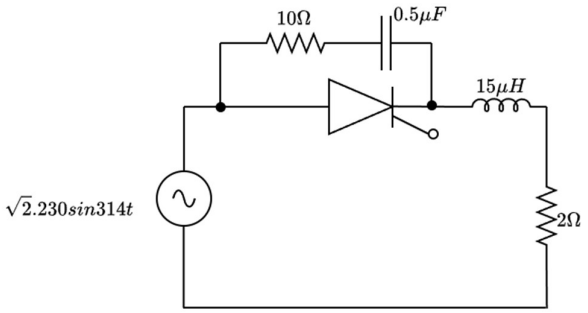
BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : V/ADD**
BRANCH: EEE **SESSION : MO/2025**

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 power electronics-based topologies used in domestic and industrial applications.	[5]	1	1
Q.1(b)	Explain the static *V-I* characteristics of a SCR with all modes of operation with the help of a relevant waveform.	[5]	1	2
Q.2(a)	Explain the function of a snubber circuit. A snubber circuit for thyristor protection is shown below: Calculate: (a) the maximum value of *di*/*dt* and *dv*/*dt* for the SCR. 	[5]	2	3
Q.2(b)	Explain working principle of complementary commutation circuit of SCR and show the SCRs current, SCRs voltage, capacitor voltage and capacitor current waveforms.	[5]	2	3
Q.3(a)	Explain the working principle of single-phase half wave controlled rectifier for *R-L* load with the help of circuit diagram. Sketch different waveforms of input voltage, load voltage and load current.	[5]	3	3
Q.3(b)	A single-phase fully controlled converter bridge is connected to RLE load. The source voltage is 230 V, 50 Hz. The average load current of 10 A is continuous over the working range. For R = 0.4 Ω and L = 2 mH, compute (a) firing angle delay for E = 120 V, (b) firing angle delay for E = –120 V. Indicate which source is delivering power to load in parts (a) and (b). (c) In case output current is assumed constant, find the input pf for both parts (a) and (b).	[5]	3	3
Q.4(a)	Compare the different control strategies for dc-dc chopper.	[5]	4	3
Q.4(b)	Draw and analyse the step-up chopper circuit and derive the output voltage equation. Also draw its input voltage, input current, output voltage and output current waveforms.	[5]	4	4
Q.5(a)	Evaluate the significance of different performance parameters used to assess inverter operation.	[5]	5	6
Q.5(b)	Develop switching technique for 120^0 mode of conduction in three–phase voltage source inverter for resistive load and obtain its phase voltage and line voltage waveforms.	[5]	5	5

::::::24/11/2025::::::M