



	InSem Examination-II Summer 2024		
	Exam Seat No.:		
	Academic Year: 2023-2024	Semester: IV	
	Name of Programme: SY B.Tech Electrical	Pattern: 2022	
	Name of Course: Power Electronics	Course Code: ELE222013	
	Max. Marks: 30	Duration: 1	

	<p>Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none">1. This question paper contains 02 page(s).2. Answer to each new question is to be started on a new page.3. Assume suitable data wherever required, but justify it.4. Draw the neat labelled diagrams, wherever necessary.5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.	
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Question No. 1 Attempt following Question

- a) (i) Draw the construction and VI characteristic of SCR with proper labels. **---(3Marks)** (7) CO1
(ii) Explain the working of SCR in different working region. **---(4Marks)**

OR

- b) (i) With neat construction diagram explain working of power MOSFET. **---(3Marks)** (7) CO1
(ii) Draw and explain transfer and VI characteristic of power MOSFET. **---(4Marks)**

- c) A single phase fully controlled converter is connected across a RL load where inductance is sufficiently high to maintain the constant current. (8) CO3

Derive

- (i) average voltage and current **---(2Marks)**
- (ii) rms voltage and current **---(2Marks)**
- (iii) AC output power **---(1.5Marks)**
- (iv) DC output power **---(1.5Marks)**
- (v) Rectification efficiency. **---(1Marks)**

OR

- d) A RLE of $R=10\ \Omega$, $L=10\text{mH}$, $E=100\text{V}$ is connected across the full controlled converter. The output current is ripple free. The converter is fed from 230V, 50Hz supply. For the firing angle of 30 degree, calculate (8) CO3
- (i) The average output voltage and current--(4Marks)
- (ii) The rms output voltage and current--(2Marks)
- (iii) Calculate dc power output and comment on the result.--(2Marks)

Question No. 2 Attempt following Question

- a) What are the different methods to turn on SCR using gate? Explain any one in detail with the help of circuit diagram and waveform. --(7Marks) (7) CO2

OR

- b) Draw the circuit diagram of three phase full controlled converter with R load and explain working with help of waveforms. --(7Marks) (7) CO2
- c) A solar panel of 72V is connected to the grid of 230V, 50Hz supply through half controlled converter. A resistor of 2 Ω and very high inductance is connected in series with solar panel to maintain the constant current fed by solar panel to 10A. Calculate the average output voltage required and corresponding firing angle of the converter.--(8Marks) (8) CO4

OR

- d) A 110V, 10Ah battery in a substation is connected to fully controlled converter output with resistance of 1 Ω and high value of inductance to maintain constant charging current of 1A. A source connected to converter is 230V, 50Hz single phase AC supply. Calculate the average output voltage and corresponding initial firing angle --(8Marks) (8) CO4

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