



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-II Summer 2025	
Exam Seat No.:	
Academic Year:2024-2025	Semester:VI
Class:TY	Program:B.Tech
Branch Code:ETC	Pattern:2022
Name of Course:Power Electronics	Course Code: ETC223012
Max. Marks:30	Duration: 1.15 Hrs.

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.

1. Q.1 and Q.3 are compulsory.
2. This question paper contains 2 pages.
3. Answer to each new question is to be started on a new page.
4. Assume suitable data wherever required, but justify it.
5. Draw the neat labelled diagrams, wherever necessary.
6. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1 a) Compare SCR, MOSFET and IGBT. (7) CO1

Question No. 2

- 2 a) Design the UJT triggering circuit for an SCR. Explain how gate pulses are generated using UJT. Draw suitable waveforms to support your answer. (8) CO1

OR

- 2 b) Draw and explain switching characteristics of MOSFET. Also explain the following terms with respect to it. (8) CO1

- a. Turn on delay time
- b. Rise time
- c. Turn off delay time
- d. Fall time
- e. Ton and Toff

Question No. 3

- 3 a) The single phase full wave controller supplies an RL load. The input rms voltage is 230V, 50 Hz. The load is such that $L = 100\text{mH}$ and $R = 20\ \Omega$. The delay angles of thyristor is 120° . Calculate: (7) CO2

- a. Average output voltage (V_0_{avg})
- b. RMS output voltage (V_0_{rms})
- c. RMS output current (I_0_{rms})
- d. Input power factor (PF)
- e. Determine whether the mode of operation is rectifying or inverting.

Question No. 4

- 4 a) With the help of a neat circuit diagram and waveforms, explain the operation of a single-phase full-converter with an RL-load. Derive the formula for average output voltage (8) CO2

OR

- 4 b) With the help of a neat circuit diagram and waveforms, explain the operation of a Three-phase semi-converter with an R-load. Draw waveforms for firing angle of $\alpha > 60$ and $\alpha < 60$ degrees. (8) CO2

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