

**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)**

M. Tech.(Second Semester Regular) Examinations, May - 2026

**24MPEPC12001 – Power Electronic Converters
(Power Electronics)**



Time: 3 hrs

Maximum: 60 Marks

**Answer ALL questions
(The figures in the right hand margin indicate marks)**

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

		CO #	Blooms Level
a	How does adjusting the firing (delay) angle affect the operation of a power converter?	CO2	K1
b	What is the function of an AC voltage controller and how does it regulate voltage?	CO4	K2
c	What are the key applications of DC choppers in power electronics?	CO1	K1
d	Can you draw and explain the commutation process in a power electronic circuit?	CO1	K2
e	Where are Cyclo-converters typically used in industrial applications?	CO3	K3

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

		Marks	CO #	Blooms Level
2.a	Explain the operating principle of a boost converter and sketch its key voltage and current waveforms.	5	CO3	K2
2.b	Compare different methods used to trigger SCRs and discuss their applications in power control.	5	CO2	K3
(OR)				
2.c	What are the differences between hard switching and soft switching in power electronic devices?	5	CO2	K2
2.d	Describe the operation and control of a forward converter used in SMPS applications.	5	CO3	K3
3.a	How does the duty cycle influence voltage and current output in buck and boost converters?	5	CO1	K2
3.b	Illustrate the working of a single-phase bridge inverter and describe its output waveform with resistive load.	5	CO4	K3
(OR)				
3.c	Explain the operation of a current commutated chopper and draw relevant waveforms.	5	CO4	K3
3.d	Discuss the role of filters in smoothing the output voltage of switched-mode converters.	5	CO1	K2
4.a	Explain how PWM control improves the performance of voltage source inverters.	5	CO2	K3
4.b	Compare phase angle control and integral cycle control in AC voltage regulators.	5	CO1	K3
(OR)				
4.c	What are the effects of harmonics in inverter output, and how can they be minimized?	5	CO2	K3
4.d	Explain the need for isolation in power electronic circuits and list common isolation techniques.	5	CO1	K2
5.a	Analyze how firing angle variation affects power transfer in an AC voltage controller with a resistive-inductive load.	5	CO3	K4

5.b	Explain the process of controlling fan speed using a TRIAC-based phase control technique.	5	CO4	K4
(OR)				
5.c	How does delayed firing of thyristors impact power factor in single-phase AC controllers?	5	CO3	K4
5.d	Discuss the effects of source inductance on the performance of AC voltage controllers.	5	CO4	K4
6.a	What is Zero-Voltage Switching (ZVS) and how does it enhance converter efficiency?	5	CO3	K4
6.b	Derive the expression for average output voltage of a single-phase fully controlled bridge rectifier with resistive load.	5	CO2	K4
(OR)				
6.c	Compare Zero-Current Switching (ZCS) and ZVS in terms of switching losses and circuit design.	5	CO3	K4
6.d	Derive the expression for RMS current in the output of a full-wave rectifier supplying a purely resistive load.	5	CO2	K3

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