Reg. No | | | | | | | | | | |

AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.Tech. (First Semester) Regular/Supplementary Examinations, January – 2026

24MPEPC11001 – Electric Drive System

(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 regenerative braking work, and why is it important in electric drive applications?	CO1	K2
b. Compare AC traction systems using semi converter-fed DC motors with those using load transformer tap changer-fed DC motors.	CO2	K2
c. Explain the concept of steady-state stability in an electric drive and its significance.	CO3	K1
d. Differentiate between active load torque and passive load torque with examples.	CO4	K2
e. What is the role of power modulators in electric drive systems?	CO2	K1

PART – B **(10 x 5 = 50 Marks)**

Answer *ALL* the questions	Marks	CO #	Blooms Level
2. a. Explain the different methods used for speed control in three-phase induction motors.	5	CO1	K4
b. Describe the four-quadrant operation of an electrical drive and its significance	5	CO1	K3
(OR)			
c. How is the speed control of a DC drive achieved using a fully controlled rectifier? Explain with a neat diagram.	5	CO1	K2
d. Derive the fundamental torque equation for an electric drive.	5	CO1	K3
3.a. Explain the concept of braking in electric drives. Discuss different types of electrical braking.	5	CO2	K2
b. With a neat diagram, explain the method of speed control of DC drives using rectifiers.	5	CO2	K3
(OR)			
c. Discuss a speed control scheme for a three-phase induction motor using an AC voltage controller.	5	CO2	K3
d. Explain the chopper-controlled separately excited DC motor drive in motoring mode.	5	CO2	K3
4.a. Derive the expression for motor speed and armature current for a separately excited DC motor.	5	CO3	K4
b. Explain with a diagram the working of an auto-transformer starter used for controlling a three-phase induction motor.	5	CO3	K3
(OR)			
c. Draw and explain the static rotor resistance control method used in induction motors.	5	CO3	K3
d. What are the drawbacks of rectifier-fed DC drives?	5	CO3	K3
5.a. Explain the closed-loop speed control of an electrical drive with a suitable block diagram.	5	CO4	K4

b.	Write a short note on the speed control of a DC motor using a DC chopper	5	CO4	K2
	(OR)			
c.	Derive the thermal modeling equations for the heating and cooling curves of a motor.	5	CO4	K2
d.	Plot and briefly explain the torque-speed characteristics of a DC shunt motor during regenerative braking.	5	CO4	K3
6.a.	Explain the different types of electric drives and their applications.	5	CO2	K3
b.	Describe the basic elements of an electric drive system with a block diagram.	5	CO1	K3
	(OR)			
c.	Explain the various types of load torques encountered in electric drives.	5	CO1	K2
d.	Derive the expression for the rise in temperature from the thermal model of a motor during heating and cooling.	5	CO3	K3

--- End of Paper ---