QP Code: RJ23MTECH011 | Reg. No | | | | | | | | | | | AY 23

GIET UNIVERSITY, GUNUPUR – 765022

M. Tech (First Semester) Examinations, January – 2024

MPCPE1010 – Electrical Drives System

(Power Electronics)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 = 20 Marks)**

Q.1	Answer all questions	CO#	Blooms Level
a.	What is steady-state stability for an electric drive?	CO1	K1
b.	Differentiate between active load torque and passive load torque.	CO1	K1
c.	With a half-hour rating of a motor at 100 kW, a heating time constant of 80 minutes, and maximum efficiency occurring at 70% of full load, what is the overloading factor?	CO1	K2
d.	What are the advantages of AC traction using a semiconverter-fed DC motor over a load transformer tap changer-fed DC motor?	CO1	K2
e.	What are the different components of load torque?	CO2	K1
f.	What are the functions of a power modulator?	CO3	K2
g.	What is counter-torque braking?	CO2	K1
h.	What is the slip power recovery scheme for an induction motor?	CO1	K3
i.	What is true synchronous mode of control in a synchronous motor?	CO4	K1
j.	Why is the slip power recovery scheme mainly suitable for drives with a low speed range?	CO3	K3

PART – B **(10 x 5=50 Marks)**

Answer ***ANY FIVE*** questions

		Marks	CO#	Blooms Level
2. a.	How is the speed control of a DC drive achieved using a fully controlled rectifier?	5	CO1	K2
b.	Derive the expression for motor speed and armature current for a separately excited DC motor.	5	CO1	K3
3.a.	Explain the chopper-controlled separately excited DC motor drive for motoring.	5	CO2	K2
b.	Discuss a speed control scheme for a three-phase induction motor using an AC voltage controller.	5	CO2	K4
4. a.	Draw and explain the static rotor resistance control of an induction motor.	5	CO3	K2
b.	Explain in detail the various types of electric drives.	5	CO3	K2

5.a.	Explain the closed-loop speed control of an electrical drive with a suitable block diagram.	5	CO4	K1
b.	Explain the different methods of speed control used in three-phase induction motors.	5	CO4	K2
6. a.	Explain the four-quadrant operation of an electrical drive.	5	CO2	K3
b.	Plot and briefly explain the torque-speed characteristics of a DC shunt motor during regenerative braking.	5	CO3	K2
7.a.	Write a short note on the speed control of a DC motor by a DC Chopper.	5	CO2	K4
b.	What are the drawbacks of rectifier-fed DC drives?	5	CO2	K2
8. a.	With a diagram, explain the autotransformer starter control for a three-phase induction motor.	5	CO1	K3
b.	Derive the thermal modeling for heating and cooling curves.	5	CO2	K2

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