

Code: 23EE4602A

III B.Tech - II Semester - Regular Examinations – APRIL 2026**ELECTRIC DRIVES
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.

2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.

3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.

4. All parts of Question paper must be answered in one place.

BL – Blooms Level

CO – Course Outcome

PART – A

		BL	CO
1.a)	List the components of an electric drive.	L1	CO1
b)	What is dynamic braking?	L1	CO1
c)	Write the expression for average output voltage of a 3-phase full converter.	L2	CO2
d)	What is a dual converter?	L1	CO2
e)	Draw four quadrant diagram of DC motor drive.	L2	CO4
f)	Define continuous current mode (CCM) of chopper fed DC drive.	L1	CO4
g)	What is a Static Scherbius drive?	L1	CO3
h)	Explain why V/f ratio is kept constant in speed control of induction motor.	L2	CO5
i)	Relate advantages of PMSM over conventional synchronous motor.	L2	CO5
j)	What is meant by separate control of synchronous motor?	L2	CO3

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Explain steady state stability of electric drive.	L2	CO1	5 M
	b)	Discuss fundamental torque equation for stable operation of drive.	L2	CO1	5 M
OR					
3	a)	Explain load equalization using hoist for four quadrant operation with suitable diagram.	L2	CO1	5 M
	b)	Compare dynamic braking, plugging and regenerative braking in terms of operation, advantages and applications.	L2	CO1	5 M
UNIT-II					
4	a)	Illustrate the operation of a three-phase fully controlled rectifier fed DC series motor for continuous conduction, also draw the voltage and current waveforms.	L3	CO2	5 M
	b)	Demonstrate circulating and non-circulating current modes in dual converter fed dc motor drive.	L3	CO2	5 M
OR					
5		A separately excited dc motor rated at 10 kW, 240 V, 1000 rpm is supplied from a fully controlled six pulse bridge converter. The converter is supplied at 250 V, 50 Hz supply. An extra inductance is connected in the load circuit to make the conduction continuous. Determine the speed, power factor and efficiency of operation	L4	CO4	10 M

	for thyristor firing angles of 0° and 60° , assuming the armature resistance of 0.40Ω and an efficiency of 87% at rated conditions. Assume constant torque load.			
UNIT-III				
6	a) Demonstrate with a neat block diagram explain closed loop operation of dc to dc converter fed dc motor drive.	L3	CO2	5 M
	b) Explain conditions required for continuous current operation and discuss one quadrant operation of DC drive.	L4	CO4	5 M
OR				
7	Discuss in detail four-quadrant operation of dc motor drive using four quadrant dc to dc converter with suitable diagrams.	L4	CO4	10 M
UNIT-IV				
8	A 440 V, 3 phase 50 Hz, 6-pole cage induction motor has the following equivalent circuit parameters: $R_s = 0.2 \Omega$, $X_s = 0.5 \Omega$, $R_r = 0.3 \Omega$, $X_r = 0.5 \Omega$ and $X_m = 20 \Omega$, all quantities referred to stator side. The motor is operating on full load slip of 0.04. If the two stator terminals are suddenly interchanged, calculate the primary current and the torque.	L4	CO5	10 M
OR				
9	Illustrate slip power recovery scheme in detail. Compare Static Scherbius and Static Kramer drives.	L3	CO3	10 M

UNIT-V

10	a)	Illustrate in detail about the self-control of synchronous motors.	L3	CO3	5 M
	b)	Interpret separate control of synchronous motors.	L3	CO3	5 M

OR

11	a)	Explain closed loop speed control of synchronous motor drive with block diagram.	L4	CO5	4 M
	b)	Explain PMSM for speed control operation.	L4	CO5	6 M