III B.Tech - II Semester – Regular / Supplementary Examinations
APRIL 2024

ELECTRICAL DRIVES
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours   Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level   CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1		Explain the Multi Quadrant operation of Electric drive.	L1	CO2	14 M
		OR			
2		A drive has the following parameters $J = 10$(kg-m^2), $T=100-0.1N$(N-m).The passive load torque is $Tl=0.05N$(N-m), where N is the speed in rpm. Initially drive operates under steady state. Now it is reversed and for this motor characteristics $T=100-0.1N$(N-m). Calculate the speed in both the cases.	L4	CO5	14 M
		UNIT-II			
3		Explain the operation of a separately excited DC motor using single phase half controlled rectifier? Derive the relation between speed and torque and draw the corresponding characteristics.	L2	CO2	14 M

	OR			
4	A 230 V, 960 rpm, 20 A separately excited DC motor has an armature resistance of 1.2 Ω and inductance of 50 mH. Motor is controlled by a single-phase half controlled rectifier with source voltage of 230 V and 50 Hz. (i) Calculate the firing angle for half rated motor torque and 800 rpm (ii) Calculate the firing angle for rated motor torque and 500 rpm.	L3	CO4	14 M

UNIT-III

5	Discuss buck chopper control of DC series motor.	L3	CO2	14 M
	OR			
6	A 230V, 30A, 1000 rpm separately excited DC motor having an armature resistance of 0.7 Ω and inductance of 50 mH. Motor is controlled in regenerative braking by a chopper operating at 800 Hz from a dc source of 230 V. Assuming continuous conduction, (i) Calculate the duty ratio of the chopper for rated torque and the speed of 800 rpm. (ii) What will be the motor speed for duty ratio of 0.6 and rated motor torque.	L4	CO4	14 M

UNIT-IV

7	Briefly explain the principle of Variable frequency control of IM.	L2	CO3	14 M
	OR			

8	a)	A 2.8 kW, 400 V, 50 Hz, 4 Pole, 1370 rpm, delta connected SCIM has the following parameters referred to the stator: R_s = 2 Ω,R'_r =5 Ω, X_s=X'_r = 5 Ω, X_m= 80 Ω. Motor is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate the motor terminal voltage, current and torque at 1200 rpm.	L4	CO5	7 M
	b)	Draw the block diagram of a closed loop static Kramer drive and explain.	L2	CO3	7 M

UNIT-V

9	Discuss in detail solar powered pump drives.	L3	CO2	14 M

OR

10	Apply the principles of AC traction using converter-controlled DC motors to a specific industrial setting.	L3	CO2	14 M