O.P.Code: 25EE2114	R25	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
M.Tech I Year II Semester Regular Examinations August-2026
AC DRIVES

Time: 3 Hours **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

		UNIT-I			
1	a	Explain the principle of vector control (field-oriented control) of induction motors	CO1	L2	6M
	b	A 3-phase induction motor operates at 400 V, 50 Hz under rated condition. If the frequency is reduced to 20 Hz, calculate the stator voltage required to maintain constant air-gap flux under V/f control.	CO1	L3	6M
		OR			
2	a	Discuss the limitations of scalar control methods in induction motor drives.	CO1	L2	6M
	b	A 3-phase induction motor has the following rotor parameters, Rotor resistance R2 = 0.6Ω ; Rotor reactance X2 = 1.8Ω ; Slip S = 0.05. Calculate the electromagnetic torque assuming stator voltage and machine constants are unity	CO1	L3	6M
		UNIT-II			
3	a	Explain the direct vector control of an induction motor drive with a neat block diagram. Discuss its advantages and limitations.	CO2	L2	6M
	b	A 4-pole induction motor is controlled using vector control and supplied at 50 Hz. Calculate: (i) Synchronous speed, (ii) Rotor speed if slip = 2.5%, (iii) Rotor angular speed in rad/sec.	CO2	L3	6M
		OR			
4	a	Explain the indirect vector control of an induction motor drive with feedback using a block diagram.	CO2	L2	6M
	b	In a vector-controlled induction motor drive, the d-axis current component i_d is 4 A and the q-axis current component i_q is 7 A. Calculate: Magnitude of stator current vector.	CO2	L3	6M
		UNIT-III			
5	a	Explain the control of synchronous motor drives and discuss their advantages in variable speed applications.	CO3	L2	6M
	b	A 3-phase synchronous motor has 8 poles and is supplied with 50 Hz frequency. Calculate: (i) Synchronous speed, (ii) Mechanical angular speed in rad/s, (iii) Speed if the supply frequency is reduced to 30 Hz.	CO3	L3	6M
		OR			
6	a	Explain the cycloconverter-fed synchronous motor drive with a block diagram	CO3	L2	6M
	b	A synchronous motor operates at 415 V, 50 Hz and draws 30 A at 0.9 power factor lagging. Calculate: (i) Input power to the motor	CO3	L3	6M
		UNIT-IV			
7	a	Explain the dq-axis model of PMSM and its significance in motor control.	CO4	L2	6M
	b	A 4-pole PMSM is supplied from a variable frequency drive at 50 Hz. Calculate: Synchronous speed.	CO4	L3	6M
		OR			
8	a	Derive the expression for electromagnetic torque of a PMSM.	CO4	L2	6M
	b	A PMSM develops a torque of 40 Nm at a speed of 1500 rpm. Calculate	CO4	L3	6M