

M.E. ELECTRICAL ENGINEERING
FIRST YEAR SECOND SEMESTER EXAM 2025

(1st/ 2nd Semester/Repeat/Supplementary/Annual/Bi-Annual)

SUBJECT: - ADVANCED ELECTRIC DRIVES

Time: Three hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART I	Marks
	Answer any Two Questions	
Q1.	a) Explain with block diagrams the speed control technique of a three phase induction motor using scalar control method. (CO2) b) Explain basic concept of field oriented control (FOC) technique of three phase induction motors for high performance drive systems. Also sketch the basic block diagrams along with different transformations required for the same. (CO2) c) How the current sensing can be done for the above induction motor drive system? (CO3)	6 10+5 4
Q2.	a) Explain with the help of model equations and block diagrams, the rotor flux oriented speed control (RFOC) method of a three phase induction motor. (CO4) b) A 415V, 50 Hz, 1.2 kW, 1450 rpm, three phase, star connected induction motor is controlled with constant stator flux technique. Assuming motor slip speed is proportional to+ torque, calculate the applied voltage and frequency for the speed commands of (i) 200 rpm at rated torque and (ii) 900 rpm at half rated torque.(Assume no stator impedance drop) (CO4).	15 10
Q3.	a) Develop the block diagram of a direct stator field oriented control scheme and explain the same. (CO3) b) Explain with block diagrams the direct torque control (DTC) scheme of a three phase induction motor. From the basic principle, develop the switching table and the control block diagram for a three phase induction motor using DTC. (CO4).	12 9+4

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Ref. No. Ex PG/ELE/PE/T/123B/2025

M.E. Electrical Engineering 1st Year 2nd Semester
Master in Control System Engg 1st Year 2nd Semester

EXAMINATION, 20 25

(1st/2nd Semester/Repeat/Supplementary/Spl. Supplementary/Old/Annual/Bi-Annual)

SUBJECT Advanced Electric Drives

(Name in full)

PAPER

Full Marks 30/ 100

Time : ~~Two hours~~/Three hours/~~Four hours~~/Six hours

(15/50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part II Answer any three of the following. Each carrying 16 Marks. 02 marks for neatness	Marks
Q1 a) or b)	Explain in detail about the classification of various electric drives. With Block diagram explain the major components. Deduce the Expression $T = T_l + d/dt$ of ω_m in case of a drive system with neat diagram.	16
Q2 a) or b)	Explain the different types of Loads in case of industrial drive system and hence explain Torque-Speed of different types of loads. A weight W of (1500 kg) is to be lifted up with a velocity of (1.5 m/s) by means of a motor-hoist system shown in Fig.10.12. The winch has a diameter of (0.35 m) and driven by motor running at (1000 rpm). The inertia of the motor and the winch drum are (1.8 kg.) and (4.2 kg.) respectively. Calculate the total load torque of the system referred to the motor shaft .	16
Q3 a) or b)	Explain with details the working of a Multilevel Inverter with cascaded topologies? Explain Diode Clamped 3-level inverter. What are the advantages and disadvantages of Field control (or) Flux control method?	16