Ref No. :Ex/PG/ EE/T/129A/2024

M.E. Electrical Engineering 1st Year 2nd Semester Examination,2024

SUBJECT: ADVANCED ELECTRIC DRIVES

Time: Three Hours | Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part.

Question No.	PART - I	Marks

Answer any three Questions

Two marks are reserved for neat and well organized answer.

1. From the modelling of D.C. motor derive and draw the armature transfer function and field transfer function block diagram of a separately excited D.C. motor. **16**

2. Sketch and explain the principle of closed loop control of a D.C. motor For above and below the rated speed. **16**

3. Explain the principle of operation of a VSI fed three phase induction motor drive. What are the main drawbacks of this drives. **16**

4. Derive the harmonic equivalent circuit of three phase induction motor. **16**

5. Prove that in general, the slip of the three phase induction motor at mth harmonic is
   $S_n = 1 + N/mN_s$. The symbol bears their usual meaning. **16**

[Turn over

Ref No: Ex/PG/EE/T/129A/2024

M.E. ELECTRICAL ENGINEERING FIRST YEAR SECOND SEMESTER EXAM 2024
(1st / 2nd Semester/~~Repeat/Supplementary/Annual/Bi-Annual~~)

SUBJECT: - ADVANCED ELECTRIC DRIVES(MC)

Full Marks 100
Time: Three hours (50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
	Answer any Two Questions	
Q1.	a) Explain the relative advantage and disadvantages for the speed control of a three phase induction motor using scalar control with respect to a dc separately excited motor. (CO2)	6
	b) Explain the necessity of field oriented speed control technique of induction motors for high performance drive systems. Also sketch the basic block diagrams along with different transformations required for the same. (CO2)	10+5
	c) How the speed sensing can be done for the above induction motor drive system? (CO3)	4
Q2.	a) For a three phase induction motor, explain with the help of model equations how field orientation can be obtained from the stator voltage and current information in case of a stator flux oriented control scheme. Develop the block diagram for the same. (CO4)	5+12
	b) Explain how the voltage and current sensing can be done for the above induction motor drive system. (CO1)	8
Q3.	a) Develop the block diagram of an indirect rotor field oriented control scheme and explain the same. (CO3)	9+4
	b) What is direct torque control (DTC) scheme of a three phase induction motor drive system? From the basic principle, develop the switching table and the control block diagram for a three phase induction motor using DTC. (CO4)	12