Reg. No.												

Question Paper Code	12332

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

First Semester

M.E. - Power Electronics and Drives

20PPEPC102 - ANALYSIS OF ELECTRICAL MACHINES

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Define Field energy and Co energy.	*2,K1,CO1*
2.	State the principles of Electromechanical energy conversion.	*2,K1,CO1*
3.	Define the function of static reference frame in D.C motor analysis.	*2,K1,CO2*
4.	Draw the electrical circuit which is equivalent to a separately excited D.C. motor.	*2,K1,CO2*
5.	Define reference frame theory.	*2,K1,CO3*
6.	What is the reason of using transformation in electrical machines?	*2,K1,CO3*
7.	What is Park's Equation?	*2,K1,CO4*
8.	Write the expression for torque of induction machine.	*2,K1,CO4*
9.	What is Kron's primitive machine?	*2,K1,CO5*
10.	Define equal area criterion.	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Explain the concept mapping of Electro mechanical system modelling.	*13,K2,CO1*
		OR	
	b)	Derive the general expression for torque in terms magnetic energy, co-energy and force of a doubly excited rotating electromagnetic system.	*13,K2,CO1*
12.	a)	With a neat flowchart explain the steps involved in the computation of D.C. motor analysis.	*13,K2,CO2*
		OR	
	b)	Explain the dynamic characteristics of permanent magnet and shunt D.C. motors.	*13,K2,CO2*
13.	a)	Derive the stator reference frame model of an induction machine.	*13,K2,CO3*
		OR	

b) Draw the equivalent circuits of a 2-phase unsymmetrical induction machine using voltage equations in stationary reference-frame variables. *13,K2,CO3*

14. a) How digital computer simulation is performed to analyses the induction machines? *13,K2,CO4*

OR

b) Derive the torque equations of a three phase symmetrical induction machine. *13,K2,CO4*

15. a) Explain about the three phase synchronous machine and analysis of steady state operation. *13,K2,CO5*

OR

b) Derive the equations of voltage equations using Park's equations for synchronous machine. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Two coupled coils have self and mutual inductance of

$$L_{11} = 2 + \frac{1}{2x} \quad L_{22} = 1 + \frac{1}{2x} \quad L_{12} = L_{21} = \frac{1}{2x}$$

Over a certain range of linear displacement x. The first coil is excited by a constant current of 20 A and the second by a constant current of -10 A.

Find:

(i) Mechanical work done if x changes from 0.5 to 1 meter *7,K3,CO1*

(ii) Energy supplied by each electrical source. *8,K3,CO1*

OR

b) Discuss the reference frame theory in a step-by step basis that how a three phase symmetrical induction machine model to transformed into two phase machine model. Draw also the equivalent circuit model of transformed two phase machine model with respect to synchronous reference frame. *15,K2,CO5*