	Reg. No.				
	Question Paper Code 21332				
M.E. / M.Tech DEGREE EXAMINATIONS, NOV/DEC 2022 First Semester M.E Power Electronics and Drives 20PPEPC102 - ANALYSIS OF ELECTRICAL MACHINES					
			(Regulations 2020)		
			Duration: 3 Hours Max. Marks: 100		
	$PART - A (10 \times 2 = 20 Marks)$				
	Answer ALL Questions	Manka			
		K-Level, CO			
1.	What do you mean by fringing effect?	2,K1,CO1			
2.	What is the relation between field energy and co-energy for a linear magnetic system?	2,K1,CO1			
3.	Write an expression for transfer function of DC motor.	2,K1,CO2			
4.	Draw the equivalent circuit of series connected DC machine.	2,K2,CO2			
5.	State the features of reference frame theory.	2,K2,CO3			
6.	Mention the applications of rotor reference frame.	2,K1,CO3			
7.	List the merits of 3-phase slip ring induction motor.	2,K2,CO4			
8.	What do you mean by free acceleration characteristics?	2,K1,CO4			
9.	Why in the analysis of synchronous machines the transformation is done only for stator variables?	2,K2,CO5			
10.	List various parameters of a synchronous machine.	2,K1,CO5			
	PART - B (5 × 13 = 65 Marks) Answer ALL Questions				
11.	a) With the help of necessary diagram obtain the expression for stored magnetic field energy in a doubly-excited system. OR	13,K2,CO1			
	b) Derive the expression for force and torque of singly excited magnetic field system.	13,K2,CO1			
12.	a) Explain in detail with necessary waveforms, the dynamic performance of PMDC motor during sudden changes in load torque. OR	13,K2,CO2			
	b) Explain and derive the time domain modeling equation for a DC shunt motor.	13,K2,CO2			

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create 21332 1

a.

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13. a) Transform the stationary circuit variables of 36 RL circuit to arbitrary 13,K2,CO3 reference frame.

OR

- Discuss briefly about static and rotating reference frame. **b**) 13 K2,CO3
- 14. Analyze the steady state operation of induction machine in detail. a) 13,K2,CO4

OR

- Explain the computer simulation of three phase induction machine in b) 13,K2,CO4 arbitrary reference frame.
- 15. For a 2-pole, 3-phase, Y-connected, salient-pole synchronous machine, a) 13 K2,CO5 derive the voltage equations in machine variables and in arbitrary reference- frame variables.

OR

b) Derive the expression for electromagnetic torque of a synchronous 13,K2,C05 machine in abc variables.

PART - C $(1 \times 15 = 15 \text{ Marks})$

Two coupled coils have self and mutual inductance of 16. a) $L_{11}=2+1/2x; L_{22}=1+1/2x; L_{12}=L_{21}=1/2x;$ Over a certain range of linear displacement. The first coil is excited by a constant current of 20A and the second by a constant current of -10 A. Find the mechanical work done and electrical energy supplied by each electrical source if x changes from 0.5m to 1m.

OR

b) A steel ring has a mean diameter of 20 cm, cross sectional area of 15,K3,CO1 25 cm² and a radial air-gap of 0.8 mm cut across it. When excited by a current of 1 A through a coil of 1000 turns wound on the ring core, it produces an air-gap flux of 1 mWb. Neglecting leakage and fringing, Calculate:

A) Relative permeability of steel

B) Total reluctance of the magnetic circuit

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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15,K3,CO1