Question Paper Code	12450

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023
Fourth Semester
Electronics and Instrumentation Engineering
(Common to Instrumentation and Control Engineering)
20EIPC401 - ELECTRICAL MACHINES
(Regulations 2020)

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

		Marks, K-Level, CO
1.	State the basic principle of a DC generator.	2,K1,CO1
2.	What are the Losses in Generator?	2,K1,CO1
3.	Define transformation ratio of transformer.	2,K1,CO2
4.	Express the condition for maximum efficiency of a transformer.	2,K2,CO2
5.	What are the two classifications of synchronous machines?	2,K1,CO3
6.	Define distribution factor.	2,K2,CO3
7.	Define the term slip.	2,K1,CO4
8.	State the condition for maximum starting torque.	2,K1,CO4
9.	State the principle of repulsion motor.	2,K1,CO5
10.	Compare SRM and Stepper motor.	2,K2,CO5

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11.	a)	(i). Derive the EMF equation of DC Generator.	7,K2,CO1
		(ii). Derive the torque equation of DC Motor.	6,K2,CO1

OR

	b)	Explain briefly about the construction of DC Machine with neat sketch.	13,K2,CO1

12.	a)	Discuss in detail about Shell and core type transformer.	13,K2,CO2

OR

	b)	(i)Derive the EMF equation of the transformer.	6,K2,CO2
		(ii)A Single-phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of the core is 60 cm². If the primary winding is connected to a 50-Hz supply at 520 V, Calculate (a) peak value of the flux density in the core (b) the voltage induced in the	7,K2,CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12450**

secondary winding.

13.	a)	Draw and explain the vector diagrams of a loaded alternator.	*13,K2,CO3*

OR

	b)	Discuss the V-Curves and Inverted V curves in detail.	*13,K2,CO3*

14.	a)	Enumerate various speed control methods for three-phase induction motor from stator side.	*13,K2,CO4*

OR

	b)	Derive the Torque equation and condition for maximum torque in an induction motor.	*13,K2,CO4*

15.	a)	Describe the construction and operation of a switched reluctance motor. Write the advantages of switched reluctance motor.	*13,K2,CO5*

OR

	b)	Explain the double field revolving theory with neat diagram.	*13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16.	a)	(i)An 8 pole D.C shunt generatorwith778 wave connected armature conductors and running at 500 RPM supplies a load of 12.5Ω resistance at terminal voltage of 50V.The armature resistance is 0.24Ω and the field resistance is 250Ω. Find the armature current, the induced e.m.f and the flux per pole.	*8,K3,CO1*
		(ii) A 150 KVA transformer has an iron loss of 1400 W and a full load copper loss of 1600 W. Find the efficiency of the transformer at 30% of full load for (a)UPF (b) 0.8 power factor lagging	*7,K2,CO2*

OR

	b)	(i) A DC motor takes an armature current of 110A at 480V. The armature circuit resistance is 0.2Ω. The machine has 6 poles and the armature is lap connected with 864 conductors. The flux per pole is 0.05wb. Calculate (a) the speed (b) the gross torque developed by the armature	*7,K3,CO1*
		(ii)Explain the phasor diagram of a single phase transformer with winding resistance and magnetic leakage reactance.	*8,K2,CO2*