Reg. No.															

Question Paper Code	12871

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Third Semester

Electrical and Electronics Engineering

20EEPC302 - DC MACHINES AND TRANSFORMERS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Compare the statically and dynamically induced EMF.	2	K2	CO1
2.	Define Co-Energy.	2	K1	CO1
3.	Give the EMF equation of Lap wound D.C Generator.	2	K1	CO2
4.	List the methods of improving commutation.	2	K1	CO2
5.	Interpret the significance of back EMF.	2	K2	CO3
6.	Label the N-T characteristics of series motor.	2	K2	CO3
7.	State regenerative braking.	2	K1	CO4
8.	Name three necessities of starters.	2	K1	CO4
9.	Justify why transformer rating is in kVA ?	2	K2	CO5
10.	Define Voltage regulation.	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	An iron rod 1.8 cm diameter is bent to form a ring of mean diameter 28 cm and wound with 200 turns of wire. A gap of 1mm exists in between the end faces. Calculate the current required to produce a flux of 0.8 mWb. Take relative permeability of iron as 1200.	13	K3	CO1
		OR			
	b)	Draw and explain the typical magnetic circuit with air-gap and its equivalent electric circuit. Hence derive the expression for air gap flux.	13	K3	CO1
12.	a)	Outline the construction of D.C Generator and explain the working principle and operation for the same.	13	K2	CO2
		OR			
	b) i)	Derive the expression for wave wound D.C Generator EMF equation.	5	K2	CO2
	ii)	Draw and explain the characteristics of DC series and DC Shunt Generators.	8	K2	CO2

13.	a) i)	Deduce the equation for the electromagnetic torque developed in a D.CMachine.	8	K2	CO3
	ii)	Draw and explain the electrical and mechanical characteristics of D.C Shunt motors.	5	K2	CO3
		OR			
	b)	Illustrate the construction, working principle and operation of D.C Motor with its neat sketch.	13	K2	CO3
14.	a)	Outline the connection diagram of swinburne's test in DC shunt motor and also explain the procedural way to do it in laboratory.	13	K2	CO4
		OR			
	b)	Explain the constructive parts of 4-Point starter and discuss its operation in detail.	13	K2	CO4
15.	a)	Draw the general schematic of a single-phase transformer. Describe its working principle and deduce the expression for the e.m.f. in secondary winding.	13	K2	CO5
		OR			
	b)	Obtain the equivalent circuit of a 200/400V 50 Hz single phase transformer from the following test data. O.C.test: 200V, 0.7A, 70W – on L.V Side S.C. test: 15V, 10A, 85W – on H.V side Calculate the secondary voltage when delivering 5 kW at 0.8 p.f. lagging. The primary voltage being 200V.	13	K2	CO5

PART - C (1 × 15 = 15 Marks)

16.	a)	In an autotransformer, how the current flows in different parts of its windings? Derive an expression for the saving of the copper in an autotransformer as compared to an equivalent two winding transformer.	15	K4	CO5
		OR			
	b)	Explain Ward-Leonard system of speed control of a dc motor.	15	K5	CO4