Reg. No.																

Question Paper Code	14201

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Electrical and Electronics Engineering

20EEPC302 - DC MACHINES AND TRANSFORMERS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Laminated cores in electrical machines are used to reduce (a) Copper loss (b) Eddy current loss (c) Hysteresis loss (d) All of the above	1	K1	CO1
2.	ln order to minimize loss due to hysteresis, the magnetic material should have (a) High resistivity (b) Low hysteresis coefficient (c) Large B-H loop area (d) High retentivity	1	K1	CO1
3.	The voltage builds up process of a D.C. generator is (a) Difficult (b) Delayed (c) Cumulative (d) Infinite	1	K1	CO2
4.	The external characteristic of a shunt generator can be obtained directly from its ---------- characteristic Internal (b) Open circuit (c) Load saturation (d) Performance	1	K1	CO2
5.	A differentially compound dc motor is running at rated speed. If the series field winding of the motor gets short circuited, the speed of the motor will (a) Decreases (b) Increases (c) Remains constant (d) Becomes zero	1	K1	CO3
6.	The back e.m.f of a DC motor depends on _____ (a) field flux, (b) shape of conductors (c) type of slip rings, (d) brush material	1	K1	CO3
7.	Which test can be used to determine the no load losses of a shunt motor? (a)Retardation test (b) Hopkinson's test (c) Swinburne's test (d) Brake test	1	K1	CO4
8.	If the starter is not used with a large DC motor for starting, it will draw a starting current which ____. (a) Is many times its rated full load current (b) Will produce excessive voltage drop in line (c) May damage the armature and commutator (d) All of the above	1	K1	CO4
9.	If a transformer is connected to a direct current supply, what happened? (a) Damage the transformer (b) No effect (c) Operate with low frequency (d) Operate with high frequency	1	K1	CO5
10.	Which of the given winding of the transformer has less cross-sectional area? (a) Primary winding (b) Low voltage winding (c) High voltage winding (d) Secondary winding	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Explain Faraday's laws of electromagnetic induction.	2	K2	CO1
12.	List the analogy between electric circuit and magnetic circuit.	2	K1	CO1
13.	Define dynamically induced emf.	2	K1	CO1
14.	Outline the function of interpoles.	2	K2	CO2
15.	Compare between shunt and series field coil construction.	2	K2	CO2
16.	Why is the air gap between the pole pieces and the armature kept very small?	2	K1	CO2
17.	List the significance of back e.m.f.	2	K1	CO3
18.	Show the Torque-speed characteristics of d.c.shunt motor.	2	K2	CO3

19.	Summarize the protective devices in a starter.	2	K2	CO4
20.	Outline the factors on which speed of a DC motor depends.	2	K2	CO4
21.	What is the function of transformer oil in a transformer?	2	K1	CO5
22.	What are the typical uses of an auto transformer?	2	K1	CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	A toroidal core made of mild steel has a mean diameter of 16 cm and a cross - sectional area of 3 cm^2. Infer i) the m.m.f to produce a flux of $4x10^{-4}$ Wb and ii) the corresponding values of the reluctance of the core and the relative permeability.	11	K2	CO1
		OR			
	b)	Explain in detail singly excited magnetic system with the help of neat diagram and also derive the expression for torque equation.	11	K2	CO1
24.	a)	Explain with relevant diagrams, the different methods of excitation of DC Machines.	11	K2	CO2
		OR			
	b)	Illustrate clearly the process of commutation with a neat diagram, also explain the method of improvement.	11	K2	CO2
25.	a)	Illustrate in detail the construction and operation of D.C. motor with neat diagram.	11	K2	CO3
		OR			
	b)	A four pole 250 V series motor has a wave connected armature with 1254 conductors. The flux per pole is 22mwb. The motor takes an armature current of 50 A. Armature and field resistances are 0.2 ohms and 0.2 ohms respectively, calculate its speed.	11	K2	CO3
26.	a)	Summarize the procedure for obtaining the efficiency by using brake test on DC shunt machine.	11	K2	CO4
		OR			
	b)	Outline the armature voltage and field flux control methods for the Speed control of a DC Motor.	11	K2	CO4
27.	a)	A 40KVA transformer has a core loss of 450 W, and full-load copper loss of 850 W. If the power factor of the load is 0.8 lagging, Infer (i) the full-load efficiency; (ii) the maximum efficiency, and (iii) the load in kVA at which the maximum efficiency occurs.	11	K2	CO5
		OR			
	b)	Summarize the equivalent circuits of transformer with neat diagram.	11	K2	CO5
28.	a) (i)	Illustrate the braking of the DC motor.	6	K2	CO4
	(ii)	Explain the procedure to conduct the sumpner's test in detail.	5	K2	CO5
		OR			
	b) (i)	Explain the operation of a four-point starter for a DC motor with a neat diagram.	6	K2	CO4
	(ii)	Explain in detail transformer on ON load with phasor diagram.	5	K2	CO5