Reg. No.															

Question Paper Code	13461

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 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.	MMF in a magnetic circuit corresponds to_____ in an electric circuit. (a) Voltage Drop (b) Potential Difference (c) Electric Intensity (d) emf	1	K1	CO1
2.	The shape and size of hysteresis loop depends on_____. (a) Nature of Material (b) Max flux density (c) Initial state of material (d) All of the above	1	K1	CO1
3.	The armature winding of a DC machines are placed on the rotor to_____ (a) Save iron (b) Reduce losses (c) Facilitate communication (d) Reduce armature reaction	1	K1	CO2
4.	Which of the following D.C generators cannot build up on an open circuit? (a) Shunt (b) Series (c) Short shunt (d) Long shunt	1	K1	CO2
5.	Carbon brushes are preferable to copper brushes because_____. (a) It have longer life (b) It reduce armature reaction (c) It have lower resistance (d) It reduce sparking	1	K1	CO3
6.	In a vacuum cleaner, we generally use _____ motor. (a) Series (b) Shunt (c) Cumulatively compounded (d) Differentially compounded	1	K1	CO3
7.	The speed of a DC motor can be controlled by changing _____. (a) Its flux (b) Armature circuit resistance (c) Applied voltage (d) All of the given	1	K1	CO4
8.	Motor starters are essential for_____. (a) Accelerating the motor (b) Starting the motor (c) Avoiding excessive starting current (d) Preventing fuse blowing.	1	K1	CO4
9.	A transformer does not possess _____ changing property. (a) Impedance (b) Voltage (c) Current (d) Power	1	K1	CO5
10.	Transformer core are laminated in order to (a) Reduce copper loss (b) Minimize eddy current loss (c) Reduce eddy current and hysteresis loss (d) Reduce hysteresis loss	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

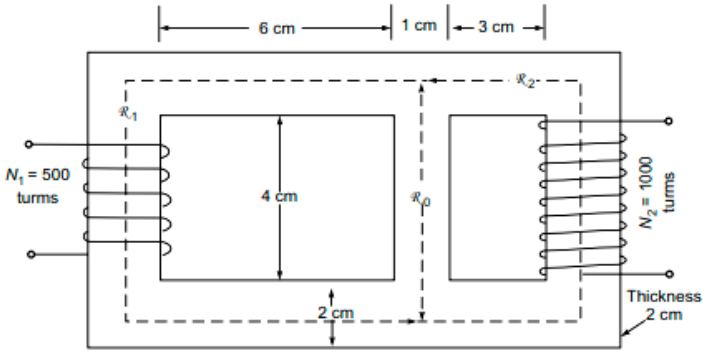
Answer ALL Questions

		Marks	K – Level	CO
11.	Write down the expressions for reluctance. What's its unit?	2	K1	CO1
12.	What is co energy? What is its use?	2	K1	CO1
13.	A coil of 1500 turns carrying a current of 5A produces a flux of 2.5mWb. Calculate the self-inductance of the coil.	2	K2	CO1
14.	Draw the OC characteristics of shunt generator.	2	K1	CO2
15.	Why inter poles are needed for DC Machines?	2	K2	CO2
16.	Define Critical resistance.	2	K1	CO2
17.	Write the significance of Armature Reaction.	2	K1	CO3
18.	A 220V DC series motor is taking a current of 40A. Armature resistance is 0.5Ω and field resistance is 0.25 Ω. Calculate the voltage at the brushes.	2	K2	CO3
19.	Which method is preferred for controlling the speed of DC shunt motor above the rated speed? Justify.	2	K2	CO4
20.	What is the function of a No-Voltage Release coil provided in a dc motor starter?	2	K1	CO4
21.	Identify the condition for maximum efficiency in DC machines.	2	K2	CO5
22.	Define all day efficiency.	2	K1	CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	For the magnetic circuit given below, find the self and mutual inductances between the two coils. Coils permeability = 1600.	*11*	*K2*	*CO1*



OR

	b)	Derive the expression for field energy produced in a doubly excited magnetic field system.	*11*	*K2*	*CO1*
24.	a)	Explain the constructional details and working principle of DC Generator.	*11*	*K2*	*CO2*

OR

	b)	A four-pole lap wounded shunt generator supplies 60 lamps of 100W, 240V each; the field and armature resistances are 55ohm and 0.18ohm respectively. If the brush drop is 1volt for each brush formulate i) Armature current. ii) Current per path. iii) Generated emf. iv) Power output of dc machine	*11*	*K2*	*CO2*
25.	a)	With neat diagram explain the principle, construction and working of DC shunt Motor and its characteristics.	*11*	*K2*	*CO3*

OR

	b)	A 230volts DC Shunt motor on no-load runs at a speed of 1200rpm and draw a current of 4.5Amperes. The armature and shunt field resistances are 0.3ohm and 230ohms respectively. Calculate the back EMF induced and speed, when loaded and drawing a current of 36 Amperes.	*11*	*K2*	*CO3*
26.	a)	With neat sketch explain the dynamic braking and regenerative breaking mechanisms applied in DC shunt motor.	*11*	*K2*	*CO4*

OR

	b)	Identify which type of starter is most suitable to start the DC shunt motor. Also explain the construction and working of the same starter.	*11*	*K2*	*CO4*
27.	a)	Develop the equivalent circuit of a single phase transformer with the required parameters by assuming primary referred to secondary winding.	*11*	*K2*	*CO5*

OR

	b)	Identify and narrate the method of testing adopted in transformer which is conducted by back-to-back test on two identical single-phase transformers.	*11*	*K2*	*CO5*
28.	a) (i)	Explain the methods of speed control in DC series motor.	*6*	*K2*	*CO4*

(ii) A 20KVA, 2000/200V single phase transformer has the following parameters H.V winding: R1=3Ω, X1=5.3Ω, L.V winding: R2=0.05Ω, X2=0.1Ω. Find the Voltage Regulation at
i) PF of 0.8 lagging
ii) UPF
iii) 0.707 PF leading

5 *K2* *CO5*

OR

b) (i) Explain Swinburne's test for finding efficiency of a dc machine. *6* *K2* *CO4*

(ii) Derive the emf equation of single-phase transformer. 5 *K2* *CO5*