Question Paper Code | 12381

B.E. / B.Tech - DEGREE EXAMINATIONS, NOV / DEC 2023
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.	Distinguish between magnetic and electric circuits.	2,K1,CO1
2.	Give the expression for hysteresis loss and eddy current loss.	2,K1,CO1
3.	Illustrate Fleming's left hand thumb rule.	2,K1,CO2
4.	Define critical field resistance of dc shunt generator.	2,K1,CO2
5.	A 4 pole DC motor takes an armature current of 150A at 440V. If its armature circuit has a resistance of 0.15ohm, what will be the back emf at this load?	2,K1,CO3
6.	Infer why DC series motor should not be operated on no load Condition?	2,K1,CO3
7.	Outline the factors on which speed of a DC motor depends.	2,K1,CO4
8.	Summarize the advantages and disadvantages of the Ward Leonard system.	2,K2,CO4
9.	Infer why the transformer is rated in KVA?	2,K2,CO5
10.	Define all day efficiency.	2,K2,CO5

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

11. a) Derive the expression for field energy produced in a doubly excited magnetic field system.   13,K2,CO1

OR

b) (i) An iron ring as shown in the below figure of 400 cm mean circumference is made from round iron of cross-section 20cm^2. Its permeability is 500. If it is wound with 400 turns, what current would be required to produce a flux of 0·001 Wb?   7,K2,CO1

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12381**
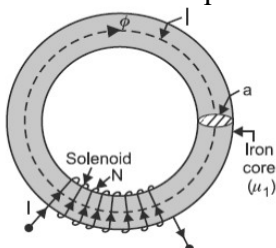
(ii) Explain in details the significance of Eddy current and Hysteresis loss.   *6,K2,CO1*

12. a) (i) What are the different types of dc generators according to the ways in which field are excited? Show the connection diagram of each type.   *8,K2,CO2*

(ii) A 4 pole lap wound DC shunt generator has a useful flux/pole of 0.6 Wb. The armature winding consists of 200 turns, each turn having a resistance of 0.003Ω, Calculate the terminal voltage when running at 1000 rpm if armature current is 45A.   *5,K2,CO2*

OR

b) With a neat diagram, explain the construction and working principle of DC generators.   *13,K2,CO2*

13. a) Explain the various characteristics of DC shunt, series and compound motors with suitable diagrams showing the connection of field coil to armature.   *13,K2,CO3*

OR

b) Draw the circuit model for two types of DC compound motors and state their voltage-current relations.   *13,K2,CO3*

14. a) What is the necessity of starters? Also explain the operation of a three point starter.   *13,K2,CO4*

OR

b) Summarize Hopkinson's test in detail with its advantages and disadvantages.   *13,K2,CO4*

15. a) (i) Discuss the working principle of the transformer.   *6,K2,CO5*

(ii) Derive the emf equation of the transformer.   *7,K2,CO5*

OR

b) Draw the approximate equivalent circuit of a single-phase transformer and identify the various parameters.   *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) (i) Explain the construction of a single-phase transformer.   *7,K2,CO5*

(ii) Describe the process of commutation in a DC generator. Explain the methods adopted for obtaining satisfactory commutation.   *8,K2,CO2*

OR

b) (i) Prove that the amount of copper saved in an auto transformer is (1-K) times that of an ordinary transformer.   *7,K2,CO5*

(ii) Explain the internal and external Characteristics of separately excited Shunt generator and mention its field of application.   *8,K2,CO2*