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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL - 2025

DC MACHINES

[Maximum marks: 100] [Time: 3 Hours]

PART – A
Maximum marks: 10

I. (Answer ***all*** the questions in one or two sentences. Each question carries **2** marks)

1. List the two basic essential parts of a DC Generator.
2. Name the two effects of armature magnetic field in a DC Generator.
3. Write the Voltage Equation of DC motor.
4. List any two different types of Starters used in DC motors.
5. List any two applications of Permanent magnet DC Motor. (5 x 2 = 10)

PART – B
Maximum marks: 30

II. (Answer any ***five*** of the following questions. Each question carries **6** marks)

1. List the Main parts of a DC Generator and mention the functions of Each Part.
2. Derive the EMF equation of DC generator.
3. Explain the method used for improving commutation in a DC Generator.
4. Explain the working principle of DC series motor.
5. Draw the figure of 4 Point Starter and name the parts.
6. Explain the mechanical characteristics of DC Series Motors.
7. List the different losses in a DC motor. (5 x 6= 30)

PART – C
Maximum marks: 60

(Answer ***one full*** question from each unit**.** Each full question carries **15** marks)

UNIT – I

III. (a) List the important points regarding Simplest lap winding. (8)

(b) Calculate the EMF generated by a 4 Pole lap wound armature with 80 slots with 10 conductors per slot, when driven at 1000 rpm. The flux per pole is 0.03 Webber. (7)

OR

IV. (a) Describe the constructional details of DC generator. (8)

(b) An 8 pole DC Generators with 628 wave connected armature conductors running at 550 rpm supplies a load of 12.5 ohm resistance at terminal voltage of 50V. The armature and field resistances are 0.25 and 250 ohm respectively. Find the armature current, the induced emf and flux per pole. (7)

UNIT – II

V. (a) Explain cross magnetizing effect of armature reaction with figures. (8)

(b) Explain the Open Circuit Characteristics of Separately Excited DC Generator. (7)

OR

VI. (a) Explain about the compensating winding and its necessity of usage in DC Generator. (8)

(b) Explain why shunt generator failing to build up voltage. (7)

UNIT - III

VII. (a) Explain the necessity of starters in DC motor. (8)

(b) A 20 kw, 250V DC Machine has armature and field resistance of 0.1Ω and 125Ω. Find the Speed at which the motor runs at a line current of 25 A, assuming the flux at this current is 45% of the flux at 100A. (7)

OR

VIII. (a) Derive the equation for armature torque of a DC motor. (8)

(b) Determine Developed torque and shaft torque of 220 V, 4 Pole series motor with 800 Conductors, wave connected supplying a load of 8.2 kW by taking 45 A from mains. The Flux per pole is 25 mWb and its armature circuit resistance is 0.6 Ω. (7)

UNIT – IV

IX. (a) Draw the Characteristics of DC Series Motor. (8)

(b) Describe the direct loading method to determine the efficiency of a DC Shunt motor. (7)

OR

X. (a) List applications of DC Shunt, Series and Cumulative Compound Motors and compare them based on their characteristics. (8)

(b) List the advantages and disadvantages of Swinburn's Test. (7)
