TED (15) 4031

(Revision-2015)

A20-00401

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL-2020

DC MACHINES

[Maximum marks: 75]   (Time: 2.15 Hours)

PART – A

(Answer any *three* questions in one or two sentences. Each question carries 2 marks)

I. (1). State the function of yoke in a DC machine.

(2). Write the voltage equation of a DC motor.

(3). List the application of wave winding in DC generator.

(4). State the function of commutator in a DC machine.

(5). List the advantage of PMDC motor.   (3 x 2 = 6)

PART – B

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

II.   (1). Derive the emf equation of a DC generator.

(2). Explain the necessity of compensatory winding in a DC generator.

(3). State three differences between lap and wave winding in a DC machine.

(4). Describe the necessity of starter in a DC motor.

(5). State any four conditions for parallel operation in a DC generator.

(6). Name two advantages and disadvantages of Swinburn's Test.

(7). Name any six factors affecting the speed control of DC motor.   (4 x 6= 24)

PART – C

(Answer *any of the three units* from the following. Each question carries 15 marks)

UNIT –I

III. (a). Explain the classification of DC generator according to excitation.   (8)

(b). A long shunt compound generator delivers a load current of 50 A at 500V and has armature,

series field and shunt field resistance are 0.05Ω, 0.03 Ω and 250 Ω respectively. Calculate

the generated voltage and armature current. Allow 1 volt per brush for contact drop.   (7)

OR

IV. (a). State four difference between shunt generator and series generator. (8)

(b). A 4 pole generator having an armature winding has 51 slots each containing 20 conductors. What will be the voltage generated in the machine at 1500 rpm when the winding (1). Wave wound (2). Lap wound assuming flux per pole to be 7 mwb. (7)

UNIT-II

V. (a).Describe various methods to improve commutation. (7)

(b). A 22.38 kw 440 pole wave wound DC shunt motor has 840 armature conductor and 140 commutation segment. Its full load efficiency is 88% and shunt yield current is 1.8A. If brushes are shifted backward through 1.5 segment from the geometrical neutral axis. Find the demagnetizing and cross magnetizing ampere turn per pole. (8)

OR

VI. (a).Draw open circuited characteristic of a DC shunt generator and explain the method of obtaining critical resistance. (8)

(b). State the procedure for parallel operation of a DC generator. (7)

UNIT-III

VII. (a). Derive the equation for armature torque of a DC motor. (7)

(b). With a neat sketch, explain the speed control method used in a DC series motor. (8)

OR

VIII. (a). With a neat sketch, explain the working of a 3 point starter. (8)

(b). A DC motor takes an armature current of 110A at 480V. The armature resistance is 0.2Ω The machine has 6 pole and the armature is lap connected with 864 conductors. The flux per pole is 0.05 wb, Calculate (1).The speed (2). Gross torque developed by the armature. (7)

UNIT-IV

IX. (a). Draw the different performance characteristic of a DC shunt motor and briefly explain. (9)

(b). State any six applications of PMDC motor. (6)

OR

X. (a). Explain with diagram the break test (direct loading) on a given DC shunt motor. (8)

(b). Explain various losses in a DC machine. (7)