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(Revision - 2021)

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

DC MACHINES & TRACTION MOTORS

[Maximum marks: 75] [Time: 3 Hours]

PART A

I. Answer all the following questions in one word or one sentence. Each question carries 1 mark.

(9 x 1 = 9 Marks)

		Module outcome	Cognitive level
1	The voltage induced in the armature of a DC machine is DC. Is the statement true or false?	M1.02	U
2	List the two types of armature windings in a DC Machine.	M1.04	R
3	Compensating winding is used to reduce the …….. effect of armature reaction.	M2.01	R
4	Define critical resistance of a DC Generator.	M2.03	R
5	Name the rule used to find the direction of rotation of a DC Motor.	M3.01	R
6	Name a starter that can be used for a DC shunt motor.	M3.03	R
7	List any two factors affecting speed of a DC motor.	M4.01	R
8	DC ……. motor is commonly used for electric traction due to its high starting torque.	M4.02	R
9	List any two braking methods used in traction motors.	M4.04	R

PART B

II. Answer any eight questions from the following. Each question carries 3 marks.

(8 x 3 = 24 Marks)

		Module outcome	Cognitive level
1	Derive the EMF equation of a DC Generator.	M1.03	U
2	Identify the need for parallel operation of DC generators.	M2.04	R
3	List the conditions to be maintained for building up voltage in a DC Shunt Generator.	M2.03	R
4	Draw the external and internal characteristics of a DC shunt generator.	M2.03	R
5	Derive the condition for maximum power output in a DC motor.	M3.01	U
6	Identify the losses in a DC shunt motor.	M3.02	R
7	List any six general features of traction motor.	M4.03	R

8	A 220V DC shunt motor runs at a rated speed of 1500 rpm. Calculate the speed of the motor when a resistance is inserted in the field winding reducing the flux to 75% of its normal value with armature current remaining the same.	M4.01	A
9	Explain the voltage control method of speed control of DC shunt motor.	M4.01	U
10	Explain rheostatic braking in DC traction motor.	M4.04	U

PART C

Answer all questions. Each question carries seven marks.

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	Explain the constructional details of a practical DC generator with the help of a neat diagram.	M1.01	U
	OR		
IV	Describe the classification of DC generator based on excitation with help of circuit diagrams.	M1.02	U
V	A 4 pole DC shunt generator with 600 wave connected conductors running at a speed of 1500 rpm supplies a 2.2 kW load at 220V. The armature resistance is 0.2 ohm and the shunt field resistance is 220 ohm. Calculate the armature current, induced EMF and flux per pole assuming brush drop to be negligible.	M1.03	A
	OR		
VI	A 200V DC shunt generator has a full load current of 25A. The sum of iron losses and mechanical losses is 280W and the shunt field resistance is 200 ohm. If the full load efficiency is 80.25%, calculate the load current corresponding to maximum efficiency.	M1.03	A
VII	Explain the procedure for obtaining the open circuit characteristics of a separately excited DC generator with help of circuit diagram.	M2.03	U
	OR		
VIII	Explain the commutation process in a DC generator with the help of neat diagrams.	M2.02	U
IX	Explain the working of a three point starter with the help of a neat sketch.	M3.03	U

	OR		
X	Describe the electrical and mechanical characteristics of a DC series motor.	M3.02	U
XI	A 220V DC shunt motor draws a line current of 2.5A and is running at a speed of 1500 rpm. The shunt field resistance is 220 ohms and armature resistance is 0.8 ohms. Determine the speed of the motor when it is loaded and taking 10A from the supply.	M3.01	A
	OR		
XII	A 4 pole, 220V DC shunt motor has 540 lap wound conductors with flux per pole of 25mWb. The motor draws a line current of 15A and a shunt field current of 1A. The motor has an armature resistance of 1 ohms. Determine (i) Speed of motor in rpm (ii) Developed torque in Nm.	M3.01	A
XIII	Illustrate series parallel control by bridge transition method.	M4.03	U
	OR		
XIV	Explain the flux weakening method of speed control in DC shunt motor and DC series motor.	M4.01	U

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