

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE – NOVEMBER - 2022**

**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.**

**(9x1=9 marks)**

|   |   | Module Outcome | Cognitive level |
|---|---|----------------|-----------------|
| 1 | State the function of brush in DC generator.  | M 1.01         | R               |
| 2 | The direction of induced emf in a generator is given by .....rule.  | M 1.02         | R               |
| 3 | List any two methods to reduce the effect of armature reaction.   | M2.01          | R               |
| 4 | Voltage developed in an armature of the generator when the field current is zero is due to.....                             | M2.03          | R               |
| 5 | .....generators are used as boosters to compensate the voltage drop in the feeder in various types of distribution systems. | M2.04          | U               |
| 6 | Name the no load test to find the constant loss of a DC shunt machine.  | M3.04          | U               |
| 7 | Type of starter used in DC shunt motors is.....   | M3.03          | R               |
| 8 | List any two methods of speed controlling in DC motor.  | M4.01          | R               |
| 9 | Field flux is.....proportional to the speed of the motor.   | M4.01          | R               |

**PART - B**

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

**(8x3=24marks)**

|   |   | Module Outcome | Cognitive level |
|---|---|----------------|-----------------|
| 1 | List the major parts of a DC generator.   | M 1.01         | R               |
| 2 | State the operation of single loop generator.   | M 1.02         | R               |
| 3 | A 4 pole DC generator runs at 750 rpm and generates an e.m.f. of 240 V. The armature is wave wound and has 792 conductors. Calculate the flux per pole.                     | M1.03          | A               |
| 4 | Distinguish between lap winding and wave winding with their applications.   | M1.04          | U               |
| 5 | Explain the open circuit characteristics of a separately excited DC generator.  | M2.03          | U               |
| 6 | Define critical speed and critical resistance of DC generator.  | M2.03          | R               |
| 7 | List the advantages in parallel operation of DC generators.   | M2.04          | R               |
| 8 | A DC series motor takes 40A at 220 V and runs at 800 r.p.m. If the armature and field resistance are 0.2Ω and 0.1Ω respectively. Find the torque developed in the armature. | M3.01          | A               |

|    |  |       |   |
|----|--|-------|---|
| 9  | List any two applications of each series, shunt and compound motors. | M3.02 | A |
| 10 | Explain regenerative braking mechanism in DC motor.                  | M4.04 | U |

**PART - C**

Answer **all** questions from the following. Each question carries 7 marks.

**(6x7=42marks)**

|      |  | Module<br>Outcome | Cognitive<br>level |
|------|--|-------------------|--------------------|
| III  | Classify different type of DC generator with neat sketch.<br><br><b>OR</b>   | M1.02             | R                  |
| IV   | Draw the construction of DC generator and detail any 2 parts.  | M1.01             | R                  |
| V    | Explain different methods for improving commutation.<br><br><b>OR</b>  | M2.02             | U                  |
| VI   | Explain the parallel operation of DC shunt generator with neat sketch.   | M2.04             | U                  |
| VII  | Derive the condition of maximum power output obtained in a DC motor.<br><br><b>OR</b>  | M3.01             | U                  |
| VIII | Explain the electrical and mechanical characteristics of DC shunt motor.   | M3.02             | U                  |
| IX   | Derive the condition of maximum efficiency in a DC motor.<br><br><b>OR</b>   | M3.01             | U                  |
| X    | Explain the working of a 4 point starter with neat sketch.   | M3.03             | U                  |
| XI   | A 200V DC shunt motor having an armature resistance of $0.25\Omega$ carries an armature current of 50A and runs at 600 r.p.m. If the flux is reduced by 10% by field regulator, find the speed assuming load torque remains the same.<br><br><b>OR</b> | M4.01             | A                  |
| XII  | 250V shunt motor on no load runs at 100 r.p.m. and takes 5 A. Armature and shunt field resistances are 0.2 and 250 ohms respectively. Calculate the speed when loaded taking a current of 50 A. The armature reaction weakens the flux by 3%.          | M4.01             | A                  |
| XIII | Explain the speed control of DC shunt motor by flux control method with the neat sketch.<br><br><b>OR</b>  | M4.01             | U                  |
| XIV  | Explain rheostatic braking with the help of neat sketch.   | M4.04             | U                  |

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