

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING
TELANGANA
DIPLOMA EXAMINATION (C-18) , C-18-REGULAR-FEB-2021
SEMESTER III , SEMESTER END EXAM



18EE-303C
DC Machines & Batteries

6337

Exam Date: 23-02-2021

Session: FN

Duration: 3 Hours [09:30 AM To 12:30 PM]

[Total Marks: 60]

PART-A

- Instructions:**
1. Answer any **TWELVE** questions 12 X 1 = 12
 2. Each question carries **ONE** mark

1. List the two types of armature windings in a DC Generator.
2. Mention the method of excitation to the field windings of DC Generator.
3. List two methods of improving commutation in DC Generator.
4. List any 2 applications of D.C Compound Generator.
5. Define Torque in D.C Motor.
6. Draw the Schematic diagram of Separately Excited D.C.Motor.
7. List the terminals existing in a 3- point starter.
8. What is mechanical characteristic of the DC motor.
9. What is the condition for maximum efficiency in a DC Generator.
10. State the suitable DC motors used for following applications.
a) Fans b) Punches
11. Write any two disadvantages of Voltage control method.
12. What is a Battery?
13. Write any two advantages of Ward leonard system.
14. Write any two methods of Motor testing.
15. State the constant current method of charging the batteries.
16. Mention any two applications of Lead acid cell.

PART-B

- Instructions.** 1. Answer any **SIX** questions
2. Each question carries **THREE** marks

6 X 3 = 18

17(a). Classify the Losses incurred in a DC Machines.

----- OR -----

17(b). Write the functions of Commutator in DC Generator.

18(a). A 250 V, 25 KW, 4 pole D.C generator has 328 wave connected armature conductors. When the machine is delivering full load, the brushes are given a lead of 7.2 electrical degrees. Calculate the Cross-magnetising ampere turns per pole.

----- OR -----

18(b). Define Commutation in D.C Generators. What is meant by ideal Commutation?

~~19(a).~~ Draw the power flow diagram of D.C Motor.

----- OR -----

~~19(b).~~ A 230V DC shunt motor takes a current of 40A and runs at 1100 rpm. If armature and shunt field resistances are 0.25ohm and 230ohm respectively. Find the torque developed by the armature.

~~20(a).~~ Draw the Electrical characteristics of DC shunt motor.

----- OR -----

~~20(b).~~ List any 3 disadvantages of 3 point starter.

~~21(a).~~ A 4 pole DC Generator having a wave wound armature conductors has 51 slots with each slot containing 20 conductors. Find the emf generated when the machine is driven at 1500 rpm, assuming flux per pole to be 7.0 mWb.

----- OR -----

~~21(b).~~ What is the necessity of speed control of DC Motors? How the speed of DC Motor can be varied?

~~22(a).~~ Write any three main parts of a 4 point starter.

----- OR -----

~~22(b).~~ Describe the construction of Lithium-ion cell briefly.

23(a). Draw the schematic diagram of Ward leonard system of speed control method.

----- OR -----

23(b). List the advantages and disadvantages of Swinburne's test.

24(a) A discharged battery is charged at 8 Amperes for 2 hours after which it is discharged through a resistor of R ohms. If discharge period is 6 hours and the terminal voltage is remains fixed at 12 Volts, Find the value of R, assuming the AH efficiency of the battery as 80 %.

---- OR ----

24(b) Compare flat plate and tubular battery in any three aspects.

PART-C

Instructions: 1. Answer any **SIX** questions 6 X 5 = 30
2. Each question carries **FIVE** marks

25(a) (a) Draw the power-flow diagram of a DC Generator.

(b) Mention three types of efficiencies that can be determined for a DC Generator.

---- OR ----

25(b) A DC Shunt generator delivers 195 A at a terminal voltage of 250 V. The armature resistance and shunt field resistance are 0.02Ω and 50Ω respectively. The iron and friction losses equal to 950W. Find,

- (i) EMF generated (ii) Copper losses
(iii) Output of prime movers (iv) Electrical efficiency.

26(a) Explain the necessity of parallel operation of D.C generators stating any five reasons.

---- OR ----

26(b) Describe the working of Welding generator with a legible sketch.

27(a) A D.C Series motor takes 40 A at 220 V and runs at 800 rpm if the armature and field resistances are 0.2 ohm and 0.1 ohm respectively, and the iron and friction losses are 0.5 KW. Find the torque developed in the armature. What will be the output of the motor ?

---- OR ----

27(b) A 250V D.C shunt machine has an armature and field resistances of 0.1ohm and 125ohm respectively. Find the induced e.m.f when the machine acts as

- (a) Generator delivering 20KW output input. (b) Motor taking 20KW input.

~~28(a)~~ Explain the functions of No volt release coil and overload release coil.

--- OR ---

~~28(b)~~ Draw the neat sketch of internal wiring diagram of a 4 point starter.

~~29(a)~~ Draw the schematic diagram of a DC Shunt Generator and write its voltage-current equations.

--- OR ---

~~29(b)~~ Explain the method of conducting brake test on DC Series motor with neat sketch.

~~30(a)~~ Derive the condition for maximum mechanical power developed in D.C.Motor.

--- OR ---

~~30(b)~~ State the important features of Super capacitor and write its applications.

~~31(a)~~ Explain the speed control of DC Shunt motor by armature control method.

--- OR ---

~~31(b)~~ In a brake test, the effective load on the branch pulley was 38.1 kg, the effective diameter of the pulley 63.5 cm and speed 12 r.p.s. The motor took 49A at 220V. Calculate the output power and the efficiency at this load.

32(a.) A lead acid cell is charged at the rate of 18 Amperes for 10 hours at an average voltage of 2.26 volts .It is discharged in the same time at the rate of 17.2 Amperes. The average voltage during discharging being 1.98 volts. Calculate (i) Ampere-hour efficiency (ii) watt-hour efficiency.

--- OR ---

32(b.) Describe the working of Metal Air electrochemical cell. List its applications.