2560

JANUARY 2026

509/6E(N)

ELECTRIC TRACTION

Time Allowed: 2.5 Hours *Full Marks: 60*

Answer to Question No. 1 of Group A must be written in the main answer script. In Question No. 1, out of 2 marks for each MCQ, 1 marks is allotted for right answer and 1 marks is allotted for correct explanation of the answer.

Answer any Five (05) Questions from Group-B.

GROUP-A

1. Choose the correct answer from the given alternatives and explain your answer (any ten): 2x10=20

i) The resistance encountered by a train in motion is on account of
(A) Resistance offered by air (B) Friction at the track (C) Friction at various parts of the rolling stock (D) All of the above.

ii)The return circuit for tramcars is through
(A) Neutral wire(B) Rails(C) Cables(D) Common earthing.

iii) Which of the following happens in Kando system?
(A) Three phase A.C. is converted into D.C. (B) Single phase A.C. is converted into D.C. (C) Single phase supply is converted into three phase system (D) None of the above.

iv) The normal value of adhesion friction is
(A) 0.12 (B) 0.25 (C) 0.40 (D) 0.75.

v) Specific energy consumption is affected by which of the following factors?
(A) Retardation and acceleration values (B) Gradient (C) Distance between stops (D) All of the above.

vi) Power for lighting in passenger coach, in a long distance electric train, is provided
(A) Directly through overhead electric line (B) Through individual generator of bogie and batteries
(C) Through rails (D) Through locomotive.

vii) Which of the following is an advantage of electric traction over other methods of traction?
(A) Faster acceleration (B) No pollution problems (C) Better braking action(D) All of the above.

viii) In locomotive which of the following motors is used?
(A) D.C. shunt motor (B) D.C. series motor (C) A.C. three phase motor (D) AC. single phase capacitor start motor.

ix) Specific energy consumption becomes
(A) More on steeper gradient (B) More with high train resistance (C) Less if distance between stops is more (D) All of the above.

x) In India diesel locomotives are manufactured at
(A) Ajmer (B) Varanasi (C) Bangalore (D) Jamalpur.

xi) Tractive effort is required to
(A) Overcome the gravity component of train mass (B) Overcome friction, windage and curve resistance
(C) Accelerate the train mass (D) Do all of the above.

xii) For 25 kV single phase system power supply frequency is
(A) 60 Hz (B) 50 Hz (C) 25 Hz (D) 16 Hz.

xiii) The current collector that can be employed with different speeds under all wind conditions and stiffness of OHE is known as the
(A) messenger collector. (B) pantograph collector. (C) trolley collector. (D) bow collector.

xiv) DC track circuit consists of
(A) amplitude modulation equipment.
(B) a negative booster, feeding points and signals.
(C) insulated joint and track, track bonding, regulating resistance, track battery to track relay.
(D) all of the above.

xv) Power requirements of a train lighting and air-conditioning is met by
(A) servo generators.
(B) chargeable batteries in each compartment.
(C) axle driven generators in conjunction with batteries.
(D) None.

GROUP-B
Answer any Five (05) questions.

2. a) Explain the advantages and disadvantages of electric traction over steam and diesel traction systems.
b)Differentiate between AC traction and DC traction systems in terms of supply voltage, applications. (5+3)

3.What is the specific energy consumption in electric traction? Explain the factors affecting it. (3+5)

4. Draw and explain the speed–time curve for main-line service. (8)

5.a) A train has an average acceleration of 1.5 km/h/s and a retardation of 2.5 km/h/s. The train runs between two stations 1.2 km apart with a maximum speed of 48 km/hr. Calculate the schedule speed if the station stop time is 30 seconds.
b)What is Tractive Effort. (6+2=8)

6. Draw the power circuit Diagram of a Electric Locomotive and Explain various components. (3+5)

7.Draw and explain the DC track circuit. (3+5)

8. Draw and explain the substation in electric traction. (4+4)

9. a) Why Dc series motor is preferred in traction motor?
b)Write down series parallel control of dc traction motor. (4+4)

10.Write the name of different types of Electrical braking method involved in Tractionmotor. Explain any one of them. (3+5)

11. Write short notes on-a) Bow collector b) Pantograph collector (4+4)