15983

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – Dip.EE-2023
Course Name – Electric Traction
Course Code - DEEPE503C
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select what is the primary function of a pantograph.
a) Provide lighting b) Collect current from OHE
c) Convert DC to AC d) None of these

(ii) Tell which type of collector is used in trolley buses.
a) Bow collector b) Pole collector
c) Faiveley type d) None of these

(iii) Select the "Neutral Section" in OHE.
a) Insulated section without power b) Power-boosting point
c) Mechanical joint d) None of these

(iv) Choose the typical location for substations.
a) At every kilometer b) At uniform spacing along track
c) Near driver cabins d) Near guard cabins

(v) Interpret the role of automatic weight tension system.
a) Reduce speed b) Maintain tension in OHE
c) Power conversion d) None of these

(vi) Choose the correct meaning of "unidirectional polarity" in train lighting.
a) Positive-negative alternation b) One-way current flow
c) Voltage doubling d) Alternating power phases

(vii) Select why Linear Induction Motors (LIMs) are used in metro systems.
a) Cheap materials b) Compact and low noise
c) High friction d) Smooth and efficient acceleration

(viii) Select the advantage of double battery parallel block system.
a) Increases current only b) Gives constant voltage
c) Improves weight balance d) Reduces battery charging time

(ix) Select which traction system is optimal for levitated trains.
a) LIM-based b) Traditional wheel-rail

c) Steam drive
d) Diesel-electric traction

(x) Select the correct function of a Sectioning and Paralleling Post (SP Post).

a) Stores backup energy
b) Divides and joins OHE
c) Increases speed
d) Isolates faulty sections during maintenance

(xi) Select which method is used to supply 3-phase power in auxiliary circuits.

a) Blowers
b) Transformer
c) Arno converter
d) Tap changer

(xii) Apply your understanding of traction mechanics to select a known limitation of LIM.

a) Higher noise
b) High efficiency
c) Low adhesion force
d) Heavy axle load

(xiii) Choose the most critical safety device in a power circuit.

a) Headlight
b) Inverter
c) Rectifier
d) Circuit breaker

(xiv) Identify a drawback of third rail system.

a) Exposed conductor
b) Safe at all speeds
c) High weight
d) Requires pantograph

(xv) Choose if levitation schemes are the future of rail traction.

a) Yes, eliminates friction
b) No, too costly
c) Both possible
d) Not technically feasible

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Describe the role of a circuit breaker in the power circuit of electric locomotive. (3)
3. Identify the function of exhausters in electric traction. (3)
4. Describe how the third rail system works. (3)
5. Define Overhead Equipment (OHE). (3)
6. Analyze why auxiliary systems (blowers, compressors, Arno converters) are essential in electric locomotives. (3)

OR

Differentiate between Blowers and Exhausters. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Analyze causes of poor performance in traction motors. (5)
8. Draw the power system layout principles to optimize sectioning posts. (5)
9. Justify location choices for substations in hilly vs. plain area. (5)
10. List and explain any five auxiliary circuit components in AC locomotives. (5)

11. Describe the factors on which train resistance depends upon. (5)
12. Evaluate the effectiveness of AC systems over DC in modern traction. (5)

OR

Justify the placement of smoothing reactor after the rectifier. (5)

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