



## BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – Dip.CE-2022

Course Name – Transportation Engineering

Course Code - DCEPC404

( Semester IV )

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 the mode of transportation with the highest scope and importance in India:

- |             |            |
|-------------|------------|
| a) Waterway | b) Airway  |
| c) Roadway  | d) Railway |

(ii) Identify a characteristic of roads in India:

- |                             |                              |
|-----------------------------|------------------------------|
| a) Limited connectivity     | b) High maintenance cost     |
| c) Heavy traffic congestion | d) Vital for economic growth |

(iii) Identify the purpose of camber in highway design:

- |                                 |                                  |
|---------------------------------|----------------------------------|
| a) To provide drainage          | b) To increase pavement strength |
| c) To enhance driver visibility | d) To control traffic speed      |

(iv) Select the type of camber recommended by IRC:

- |                    |                     |
|--------------------|---------------------|
| a) Straight camber | b) Parabolic camber |
| c) Crowned camber  | d) Sloped camber    |

(v) Identify the recommended type of sight distance for highway design:

- |                              |                                |
|------------------------------|--------------------------------|
| a) Continuous sight distance | b) Unobstructed sight distance |
| c) Obstructed sight distance | d) Limited sight distance      |

(vi) Identify the term used for the clear visibility of objects along the road:

- |                        |                  |
|------------------------|------------------|
| a) Line of sight       | b) Angularity    |
| c) Perception distance | d) Reaction time |

(vii) Identify the test used to evaluate the Flakiness and Elongation Index of aggregates.

- |                     |  |
|---------------------|--|
| a) Penetration test | b) Flakiness and Elongation Index test |
| c) Ductility test   | d) Angularity Number test              |

(viii) Select the test used to assess the penetration of bitumen.

- |  |                           |
|--|---------------------------|
| a) Flakiness and Elongation Index test | b) Angularity Number test |
| c) Penetration test                    | d) Softening point test   |

(ix) Identify the test used to determine the ductility of bitumen.

- a) Penetration test  
 c) Flash and Fire point test
- (x) Select the type of rail fixture used to connect two rails.  
 a) Fish plate  
 c) Bolt
- (xi) Select the type of rail fixture used for fastening rails to concrete sleepers.  
 a) Chair  
 c) Spike
- (xii) Identify the type of sleeper known for its durability and resistance to rotting.  
 a) Wooden sleeper  
 c) Concrete sleeper
- (xiii) Identify the type of rail gauge commonly used worldwide.  
 a) Broad gauge  
 c) Meter gauge
- (xiv) Choose the correct definition of permanent way:  
 a) A continuous path for trains  
 c) The ballast and sleepers
- (xv) Choose the factors affecting the types of curves:  
 a) Terrain  
 c) Curvature
- b) Ductility test  
 d) Softening point test
- b) Spike  
 d) Key
- b) Fish plate  
 d) Bolt
- b) Steel sleeper  
 d) Composite sleeper
- b) Standard gauge  
 d) Narrow gauge
- b) The formation and track together  
 d) The rails and sleepers
- b) Train speed  
 d) All of these

### Group-B

(Short Answer Type Questions)

3 x 5=15

2. Define the classification of Indian Railways. (3)
3. Define the ideal requirements of the Permanent way. (3)
4. Select the limits of super elevation on curves and explain how they are determined based on (3) track design parameters.
5. Explain the concept of sight distance (SSD & OSD) in highway engineering. (3)
6. Illustrate the concept of side drains and their significance in maintaining track integrity. (3)

OR

Select and discuss two key factors influencing the design of railway alignment over others. (3)

### Group-C

(Long Answer Type Questions)

5 x 6=30

7. Describe the role of technology in modern highway engineering, particularly in the planning and design phases. Then, list and explain specific technological advancements that have improved road construction and transportation efficiency. (5)
8. Write an explanation of sight distance (SSD & OSD) in highway design, detailing the types recommended by IRC and including a simple numerical example to demonstrate its calculation. (5)
9. Illustrate the significance of conducting tests such as Flakiness and Elongation Index tests, Angularity Number test, and tests on Bitumen penetration, Ductility, Flash, Fire point, and Softening point) in ensuring the quality and durability of road materials. (5)
10. Design a flexible pavement considering the types of bitumen available and their properties. Discuss the implications of selecting different types of bitumen on the pavement's performance and durability. (5)
11. Compare and contrast the concepts of cant deficiency and negative cant in railway track geometry. (5)
12. Analyze the factors governing rail alignment in the design of railway track geometry. (5)

OR

Classify the important terms related to railway track cross sections, such as permanent land, formation width, and side drains. Explain the significance of each term in the construction and maintenance of railway tracks. (5)

\*\*\*\*\*