GUJARAT TECHNOLOGICAL UNIVERSITY

BE-5 SEMESTER – OLD PAPER – S22 TO S25 – QUESTION BANK

Subject Name & Code:

Transportation Engineering- 3150611

Unit 1: Introduction to Transportation Systems

Repeated Questions:

- **Q.** Write a short note on **IRC (Indian Road Congress)**.
  - **Appeared in:** WIN 2024 (04 Marks), SUM 2024 (03 Marks), WIN 2023 (03 Marks), WIN 2022 (03 Marks).
- **Q.** Write a short note on **ICAO (International Civil Aviation Organization)**.
  - **Appeared in:** SUM 2023 (07 Marks), SUM 2022 (03 Marks).
- **Q.** Write a short note on **CRRI (Central Road Research Institute)**.
  - **Appeared in:** SUM 2023 (07 Marks).
- **Q.** Discuss the **role of transportation for national development**.
  - **Appeared in:** SUM 2024 (07 Marks), SUM 2025 (04 Marks - for Railways specifically).
- **Q. Compare/Enlist advantages and disadvantages** of different modes of transportation (e.g., Road vs. Rail).
  - **Appeared in:** SUM 2024 (04 Marks - Rail vs. Road), SUM 2022 (04 Marks - Roadway vs. Railway), SUM 2025 (07 Marks - All modes).

Other Important Questions:

- **Q.** Differentiate between **Nagpur and Bombay Road development plan**. (SUM 2023, 03 Marks)
- **Q.** What are the **recommendations of the Jaykar committee**? Explain which recommendations are accepted by the government. (WIN 2023, 03 Marks)
- **Q.** Write a short note on **PMGSY (Pradhan Mantri Gram Sadak Yojana)**. (WIN 2022, 04 Marks)
- **Q.** Write a short note on **Directorate General of Civil Aviation (DGCA)**. (WIN 2024, 04 Marks)

Unit 2: Highway Transportation (Planning, Geometry, Materials, Pavement Design & Construction)

This is the largest unit and will be broken down into sub-sections for clarity.

Sub-Unit 2.1: Highway Planning & Alignment

Repeated Questions

- **Q. Draw the typical cross-section** of a highway showing all components.
    - **Appeared in:** SUM 2024 (03 Marks), WIN 2022 (03 Marks).
- **Q.** Explain the **factors controlling road alignment**.
    - **Appeared in:** SUM 2024 (04 Marks - enlist and explain one), WIN 2024 (07 Marks).
- **Q.** Discuss the **classification of roads**.
    - **Appeared in:** SUM 2024 (07 Marks), SUM 2025 (04 Marks - Urban roads).

Other Important Questions from Sub-Unit 2.1

- **Q.** Explain **rectangular road pattern** with advantages. (WIN 2022, 03 Marks)
- **Q.** Describe various **engineering surveys** for highway alignment location. (WIN 2022, 07 Marks)

Sub-Unit 2.2: Highway Geometric Design

Repeated Questions

- **Q.** Explain **Sight Distance - SSD (Stopping Sight Distance)** and **OSD (Overtaking Sight Distance)**.
    - **SSD/OSD Appeared in:** SUM 2025 (04 Marks), WIN 2022 (07 Marks - Derive OSD), SUM 2022 (07 Marks - Derive OSD/SSD), WIN 2024 (07 Marks - Calculate SSD), SUM 2023 (07 Marks - Derive SSD).
- **Q.** Explain **Superelevation**.
    - **Appeared in:** SUM 2025 (03 Marks - Importance), WIN 2023 (04 Marks - Diff from camber), SUM 2023 (07 Marks - Derive equation), WIN 2024 (03 Marks - Definition).
- **Q.** What is **Camber**? Sketch its types.
    - **Appeared in:** WIN 2024 (03 Marks), WIN 2023 (04 Marks - Diff from superelevation).

Other Important Questions from Sub-Unit 2.2

- **Q.** Explain how the **length of a summit curve** is designed. (WIN 2023, 07 Marks)
- **Q.** Calculate the **extra widening** required for a pavement on a horizontal curve. **(Numerical)** (WIN 2024, 07 Marks)

- **Q.** Explain the **PIEV theory**. (SUM 2023, 07 Marks), (SUM 2022, 04 Marks), (WIN 2024, 04 Marks)

Sub-Unit 2.3: Highway Materials (Soil, Aggregate, Bitumen)

Repeated Questions

- **Q.** Enlist/Explain different **tests on Bitumen**.
    - **Appeared in:** SUM 2023 (03 Marks), SUM 2024 (03 Marks), SUM 2022 (07 Marks), SUM 2025 (03 Marks).
- **Q.** Enlist/Explain different **tests on Aggregates**.
    - **Appeared in:** SUM 2024 (03 Marks), SUM 2025 (03 Marks).
- **Q.** Explain the **Aggregate Impact Test**.
    - **Appeared in:** WIN 2022 (07 Marks), SUM 2025 (07 Marks).
- **Q.** Explain the **Ductility Test** on bitumen.
    - **Appeared in:** WIN 2022 (07 Marks), SUM 2022 (07 Marks).

Other Important Questions from Sub-Unit 2.3

- **Q.** Explain the **Flash and Fire point test** on bitumen. (WIN 2023, 07 Marks), (WIN 2024, 03 Marks)
- **Q.** Explain the **Penetration value** test of bitumen. (SUM 2025, 07 Marks)
- **Q.** Explain the **Softening point test** on bitumen. (SUM 2023, 03 Marks)
- **Q.** Discuss factors affecting **subgrade soil strength**. (WIN 2022, 04 Marks)
- **Q.** Explain the **necessity of soil stabilization**. (SUM 2024, 04 Marks)
- **Q.** Explain the **Plate Load Test** and its limitations. (WIN 2022, 07 Marks), (WIN 2022 OR, 07 Marks)

Sub-Unit 2.4: Pavement Design, Construction & Maintenance

Repeated Questions

- **Q. Differentiate between Flexible and Rigid Pavement**.
    - **Appeared in:** SUM 2023 (04 Marks), SUM 2024 (04 Marks), WIN 2022 (04 Marks), SUM 2022 (04 Marks), WIN 2024 (04 Marks), SUM 2025 (07 Marks - with sketch).
- **Q.** Explain the **Marshall Mix Design** method.
    - **Appeared in:** SUM 2023 (07 Marks), SUM 2024 (07 Marks).
- **Q.** Explain **various types of joints** in cement concrete pavement.
    - **Appeared in:** SUM 2023 (07 Marks), SUM 2024 (03 Marks), WIN 2023 (04 Marks).
- **Q.** Explain the **construction procedure of WBM (Water Bound Macadam)** road.
    - **Appeared in:** SUM 2023 (04 Marks), SUM 2022 (04 Marks).

Other Important Questions from Sub-Unit 2.4

- **Q.** Discuss factors affecting **flexible pavement design**. (WIN 2023, 03 Marks)
- **Q.** Explain **various types of failures** in flexible/rigid pavements (e.g., Potholes, Cracking). (SUM 2023, 07 Marks), (WIN 2024, 07 Marks - Rigid failures)
- **Q.** Write the **objective of highway maintenance** works. (SUM 2022, 03 Marks)
- **Q.** Give the **classification of highway maintenance** work. (SUM 2025, 04 Marks)
- **Q.** Explain the **importance of highway drainage**. (SUM 2022, 04 Marks), (WIN 2024, 03 Marks)

Unit 3: Rail Transportation

Repeated Questions:

- **Q.** Explain **Coning of Wheels**.
  - **Appeared in:** SUM 2025 (03 Marks), SUM 2023 (04 Marks), WIN 2022 (04 Marks), WIN 2024 (04 Marks).
- **Q.** Explain **Points and Crossings** (with sketch/function).
  - **Appeared in:** SUM 2023 (03 Marks - Diagram), SUM 2022 (03 Marks - Diagram), SUM 2023 (07 Marks - Explain with sketch), WIN 2024 (07 Marks - Functions with sketch).
- **Q.** Explain **Superelevation (Cant) in Railways**.
  - **Appeared in:** SUM 2024 (07 Marks), SUM 2023 (07 Marks - Derive equation).
- **Q.** Write a note on **Junction and Terminal**.
  - **Appeared in:** SUM 2022 (07 Marks), SUM 2023 (03 Marks).

Other Important Questions:

- **Q.** Define **Gauge of railway track**. Enumerate different gauges used in India. (WIN 2023, 07 Marks)
- **Q.** Write a note on **uniformity of gauges**. (WIN 2023, 07 Marks)
- **Q.** Give the **functions of railway sleepers**. (WIN 2023, 03 Marks)
- **Q.** State the **requirements of a good ballast material**. (WIN 2023, 03 Marks)
- **Q.** Define **Creep in rail** and write the theory behind it. (SUM 2022, 03 Marks)
- **Numerical Q.** A 5° curve diverges from a main curve of 4°... determine the **speed restriction**. (SUM 2022, 07 Marks)

Unit 4: Water Transportation (Harbours & Ports)

Repeated Questions:

- **Q. Define/Distinguish between Harbour and Port**.
  - **Appeared in:** SUM 2025 (03 Marks), SUM 2024 (03 Marks), SUM 2022 (04 Marks), WIN 2023 (04 Marks), WIN 2024 (04 Marks).
- **Q.** Explain the **classification of Harbour**.
  - **Appeared in:** SUM 2025 (07 Marks), SUM 2024 (04 Marks), WIN 2023 (07 Marks).

Other Important Questions:

- **Q.** Explain **Jetty and Breakwater**. (SUM 2025, 04 Marks), (WIN 2023, 07 Marks - Breakwater)
- **Q.** Write a note on **Breakwater**. (WIN 2023, 07 Marks)
- **Q.** Explain different types of **Buoys**. (WIN 2023, 04 Marks)
- **Q.** Explain the following terms: **Moles, Wharf, Jetty, Lighthouse**. (WIN 2022, 04 Marks)
- **Q.** Differentiate between **Dry dock and Wet dock**. (WIN 2024, 04 Marks)
- **Q.** Draw the schematic diagram of a **harbour layout** showing all components. (WIN 2022, 07 Marks)
- **Q.** Discuss **navigational aids**. (SUM 2024, 07 Marks)

Unit 5: Air Transportation (Airports)

Repeated Questions:

- **Q.** Explain the **classification of Airports** (as per ICAO).
  - **Appeared in:** SUM 2025 (07 Marks), SUM 2024 (04 Marks).
- **Q. Define/Compare Runway and Taxiway**.
  - **Appeared in:** SUM 2025 (03 Marks), SUM 2024 (03 Marks), SUM 2022 (03 Marks - Importance of Taxiway).
- **Q.** Explain the importance of **Wind Rose Diagram** for runway orientation.
  - **Appeared in:** SUM 2023 (03 Marks), WIN 2022 (03 Marks), WIN 2024 (07 Marks).
- **Q.** What is a **Terminal Building**? Explain its components/facilities.
  - **Appeared in:** SUM 2025 (07 Marks), SUM 2022 (07 Marks).

Other Important Questions:

- **Q.** Explain the **airport master planning** process. (WIN 2022, 07 Marks), (WIN 2023, 07 Marks)
- **Q.** Enlist the different **components of an aircraft** (with a sketch). (SUM 2024, 07 Marks), (SUM 2025, 04 Marks)
- **Q.** Enlist the different **components of an airport** (with a sketch). (SUM 2022, 03 Marks), (SUM 2023, 03 Marks), (WIN 2024, 03 Marks)
- **Q.** Define: **Taxiway, Apron**. (SUM 2025, 03 Marks)
- **Q.** Compare **holding apron with loading/unloading aprons**. (WIN 2023, 04 Marks)
- **Q.** Explain **three controls of an aircraft**. (WIN 2023, 03 Marks)
- **Q.** What are the factors affecting **runway orientation**? (SUM 2022, 04 Marks), (WIN 2024, 07 Marks)
- **Q.** What is the purpose of **navigational aids**? Explain any one (e.g., ILS). (SUM 2022, 07 Marks)

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