GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER 6 – OLD PAPER – S22 TO S26 – QUESTION BANK

Subject Name & Code: Transportation Engineering - 3150611

Chapter 1: Introduction: Transportation, Modes and Organizations

Repeated Questions:

1. Modes of Transportation & Role in Development:

- **Q.** Compare the roadway and railway transportation. **(SUMMER 2022, 4 Marks; WINTER 2025, 4 Marks)**
- **Q.** Enlist advantages and disadvantages of rail transport with respect to road transport / Give merits and demerits of railway transportation. **(SUMMER 2024, 4 Marks; SUMMER 2026, 3 Marks)**

2. Transportation Organisations:

- **Q.** Explain in brief: IRC / Write short note on IRC / Enlist the functions of IRC. **(WINTER 2022; SUMMER 2024, 3 Marks; WINTER 2024, 4 Marks; SUMMER 2025, 3 Marks)**
- **Q.** Write a short note on ICAO / Write a short note on ICAO and CRRI. **(SUMMER 2022, 3 Marks; SUMMER 2023, 7 Marks - CRRI appears only in the S23 wording)**
- **Q.** Explain in brief: DGCA / Write a short note on Directorate General of Civil Aviation. **(WINTER 2024, 4 Marks; WINTER 2025, 3 Marks)**

Other Important Questions:

1. Modes of Transportation & Role in Development:

- **Q.** Write the importance of different modes in context to socio-economic development. **(SUMMER 2023, 4 Marks)**
- **Q.** Discuss Role of Transportation for National Development in detail. **(SUMMER 2024, 7 Marks)**
- **Q.** Discuss various modes of transportation. **(WINTER 2024, 3 Marks)**
- **Q.** Enlist and explain advantages and disadvantages of each modes of transportation. **(SUMMER 2025, 7 Marks)**

2. Transportation Organisations:

- **Q.** Write a short note on: Airport Authority of India. **(SUMMER 2026, 4 Marks)**

Chapter 2: Highway Transportation

Repeated Questions:

1. Highway Classification, Planning & Alignment:

- **Q.** Describe various factors controlling the highway alignment / Enlist Factors controlling road alignment and explain any one / Explain the factors controlling the alignment of roads. **(SUMMER 2023, 7 Marks OR; SUMMER 2024, 4 Marks; WINTER 2024, 7 Marks; WINTER 2025, 7 Marks OR)**
- **Q.** Briefly explain classification of urban roads / Classify urban roads. **(SUMMER 2023, 3 Marks; SUMMER 2025, 4 Marks)**
- **Q.** Describe various engineering surveys to be carried out for location of highway alignment. **(WINTER 2022)**
- **Q.** Explain rectangular road pattern with advantages of it. **(WINTER 2022)**
- **Q.** Differentiate between Nagpur and Bombay Road development plan. **(SUMMER 2023, 3 Marks)**
- **Q.** What are the recommendations of Jaykar committee? Explain which recommendations are accepted by government. **(WINTER 2023)**
- **Q.** Discuss Classification of Roads in detail. **(SUMMER 2024, 7 Marks)**

2. Geometric Design – Cross-section, Camber & Curves:

- **Q.** Draw the typical cross-section of a highway showing all the components of it / Draw a cross section of road structure showing its components and functions of each. [Diagram required – refer to the original question paper] **(WINTER 2022; SUMMER 2024, 3 Marks; WINTER 2025, 3 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Explain importance of super elevation in highway geometry design / Derive an equation to calculate super elevation on horizontal circular curve / Distinguish between superelevation and camber in cross section in highway / Define Super elevation. **(SUMMER 2023, 7 Marks OR; WINTER 2023; WINTER 2024, 3 Marks; SUMMER 2025, 3 Marks)**
- **Q.** Explain how the length of summit curve is designed. **(WINTER 2023, 7 Marks)**
- **Q.** What is camber? Sketch the types of camber. [Diagram required – refer to the original question paper] **(WINTER 2024, 3 Marks)**
- **Q.** Calculate extra widening required for a pavement having width of 7.5 meter on a horizontal curve of radius 250 m if longest wheel base of expected vehicle is 7.5 m. Consider design speed as 80 KMPH. **(WINTER 2024, 7 Marks)**

3. Sight Distance:

- **Q.** Explain PIEV theory. **(SUMMER 2022, 4 Marks; SUMMER 2023, 7 Marks; WINTER 2024, 4 Marks; WINTER 2025, 4 Marks)**
- **Q.** Derive an expression for calculating overtaking sight distance on a Highway. **(SUMMER 2022, 7 Marks; WINTER 2022 OR; WINTER 2024, 7 Marks)**
- **Q.** Derive an expression for finding stopping sight distance at level and at grades / Derive an expression for calculating the stopping sight distance on a roadway / Discuss Stopping Sight Distance in detail with sketch. **(SUMMER 2022, 7 Marks OR; SUMMER 2023, 4 Marks; SUMMER 2024, 7 Marks OR; WINTER 2025, 7 Marks)**
- **Q.** The speed of overtaking and the overtaken vehicle is 80 kmph and 65 kmph respectively on two-way traffic. The acceleration of the overtaking vehicle is 3.6 kmph. Calculate Safe overtaking sight distance. Assume reaction time of a driver 2 sec. **(SUMMER 2024, 7 Marks)**
- **Q.** Calculate the stopping sight distance for a design speed of 120 KMPH with ascending and descending gradient 1 in 35. Assume reaction time as 2.5 sec, coefficient of friction as 0.35. **(WINTER 2024, 7 Marks OR)**
- **Q.** Explain in brief 1. OSD 2. SSD. **(SUMMER 2025, 4 Marks)**

4. Bitumen & Bituminous Materials:

- **Q.** What are the various tests carried out on Bitumen? Explain Ductility Test. / Discuss desirable properties of bitumen. Explain ductility test of bitumen. **(SUMMER 2022, 7 Marks; WINTER 2022; WINTER 2025, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Enlist different tests on bitumen. **(SUMMER 2024, 3 Marks OR; SUMMER 2025, 3 Marks)**
- **Q.** Explain flash and fire point test on bitumen. **(WINTER 2023, 7 Marks OR; WINTER 2024, 3 Marks)**
- **Q.** Explain determination of penetration value of bitumen / Discuss desirable properties of bitumen. Explain the penetration test and its use. **(SUMMER 2025, 7 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** Explain function and classification of modified bituminous binder / Enlist functions of modified bituminous binders. **(SUMMER 2023, 3 Marks; SUMMER 2024, 4 Marks OR)**
- **Q.** Write a short note on Marshall Mix Design method / Discuss in detail Marshall Mix Design. **(SUMMER 2023, 7 Marks; SUMMER 2024, 7 Marks OR)**
- **Q.** Enlist different tests for bitumen and explain softening test briefly. **(SUMMER 2023, 3 Marks OR)**
- **Q.** Differentiate between bitumen and tar. **(WINTER 2024, 3 Marks OR)**
- **Q.** What are the advantages of bituminous roads? **(SUMMER 2026, 3 Marks)**

5. Aggregates & Soil Stabilization:

- **Q.** Explain Necessity of soil stabilization / Explain soil stabilization in pavement construction. **(SUMMER 2024, 4 Marks; SUMMER 2025, 7 Marks)**
- **Q.** Enlist Different test conducted on aggregates / Explain aggregate impact test / Explain aggregate impact test with IRC limits / Explain flakiness and elongation index of aggregates. **(WINTER 2022; WINTER 2023, 7 Marks; SUMMER 2024, 3 Marks; SUMMER 2025, 3 Marks OR; SUMMER 2025, 7 Marks OR; SUMMER 2026, 4 Marks)**

6. Pavement Types, Design & Components:

- **Q.** Distinguish between flexible pavement and rigid pavement. **(SUMMER 2022, 4 Marks; WINTER 2022; SUMMER 2023, 4 Marks; SUMMER 2024, 4 Marks; WINTER 2024, 4 Marks OR; WINTER 2025, 4 Marks OR; SUMMER 2026, 4 Marks)**
- **Q.** Describe the plate load test in detail. What is the limitation of plate load test? **(SUMMER 2022, 7 Marks OR; WINTER 2022 OR)**
- **Q.** Write short note on Equivalent Single Wheel Load (ESWL). **(WINTER 2022 OR; WINTER 2024, 4 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Explain various factors affecting subgrade soil strength. **(WINTER 2022)**
- **Q.** Explain steps for flexible pavement design as per IRC guidelines. **(WINTER 2022 OR)**
- **Q.** Discuss the various factors which are affecting a flexible pavement design. **(WINTER 2023)**
- **Q.** Draw the sketch of flexible pavement and rigid pavement with description of components. [Diagram required – refer to the original question paper] **(SUMMER 2025, 7 Marks OR)**

7. Rigid Pavement – Joints & Failures:

- **Q.** Explain various types of joints used in the construction of cement concrete pavement / Discuss various joints provided in cement concrete road, with the object of providing each joint / Enlist different types of Joints in Rigid Pavements, Explain any one. **(SUMMER 2023, 7 Marks; WINTER 2023; SUMMER 2024, 3 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** Explain various types of failures in Cement concrete pavements in details / Explain various typical failures in rigid pavement with the help of neat sketches. **(WINTER 2022; WINTER 2024, 7 Marks OR; WINTER 2025, 7 Marks)**

8. Construction & Maintenance of Highways:

- **Q.** Write the objectives of highway maintenance works. **(SUMMER 2022, 3 Marks OR; WINTER 2025, 3 Marks)**
- **Q.** Explain construction steps for WBM / Describe Construction procedure of Granular Base Course-WBM. **(SUMMER 2022, 4 Marks OR; SUMMER 2023, 4 Marks; WINTER 2025, 4 Marks; SUMMER 2026, 3 Marks OR)**
- **Q.** Write in detail the reason of failure and suggestion for improvement of following distresses in pavement (i) Potholes, (ii) Alligator cracking. **(SUMMER 2023, 7 Marks OR; WINTER 2025, 7 Marks OR)**
- **Q.** What is routine maintenance of highway? State the item included under it. **(SUMMER 2026, 4 Marks OR)**
- **Q.** Describe the maintenance of bituminous roads. **(SUMMER 2022 OR)**
- **Q.** Give the classification of highway maintenance work. **(SUMMER 2025, 4 Marks OR)**

9. Highway Drainage, Lighting & Arboriculture:

- **Q.** Write Short note on: Street Lighting. **(SUMMER 2022, 3 Marks; WINTER 2025, 3 Marks OR)**
- **Q.** Explain importance of Highway Drainage / What are the importance of highway drainage? **(SUMMER 2022, 4 Marks; WINTER 2024, 3 Marks OR)**
- **Q.** Explain the objects of road side arboriculture? What are its disadvantages? **(WINTER 2022 OR - part of: Define: arboriculture; SUMMER 2026, 3 Marks)**
- **Q.** Explain various design factors in road lighting. **(WINTER 2022)**

10. Traffic Engineering – Surveys, Parking, Accidents & Speed:

- **Q.** Explain various methods of On-street Parking / Explain various types of Parking / Discuss various types of Parking in details. **(SUMMER 2022, 7 Marks; SUMMER 2023, 4 Marks OR; SUMMER 2024, 7 Marks; WINTER 2024, 7 Marks OR; SUMMER 2025, 4 Marks OR; WINTER 2025, 7 Marks OR)**
- **Q.** State the concept of PCU value and the factors affecting PCU values / Write a note on passenger car unit. **(WINTER 2022 OR - part of: Define: PCU, O-D Study, arboriculture; SUMMER 2023, 7 Marks OR; WINTER 2023)**
- **Q.** Explain O & D survey in detail / Enlist Methods of O and D Survey. **(WINTER 2022 OR - part of: Define: PCU, O-D Study, arboriculture; WINTER 2023; SUMMER 2025, 3 Marks)**
- **Q.** Enlist different types of traffic surveys. What is the significance of Delay studies? **(SUMMER 2023, 4 Marks; WINTER 2025, 4 Marks OR)**
- **Q.** Write causes of accident. Also explain the condition and collision diagram / Discuss briefly the different causes of traffic accidents. Also explain the collision diagram and condition diagram / Discuss safety measures to avoid accidents / Explain various measures for the reduction in accident at curvature on highway. **(WINTER 2023 OR; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks OR; SUMMER 2026, 7 Marks)**
- **Q.** Define Running Speed, Journey Speed / Define (i) Journey Speed (ii) Super elevation (iii) spot speed. **(WINTER 2024, 3 Marks; SUMMER 2025, 4 Marks)**
- **Q.** Define the terms: a. Traffic rotary b. Collision Diagram c. Cloverleaf interchange. **(WINTER 2022)**
- **Q.** Define traffic density and traffic volume. **(WINTER 2023 OR)**
- **Q.** Explain different road user characteristics in traffic engineering. **(SUMMER 2025, 7 Marks)**
- **Q.** Explain the term: (i) Skid (ii) Slip. **(SUMMER 2026, 3 Marks)**
- **Q.** What is the purpose of parking studies? Explain various parking studies. **(SUMMER 2026, 4 Marks)**

Other Important Questions:

None identified.

Chapter 3: Rail Transportation

Repeated Questions:

1. Track Components & Elements:

- **Q.** Explain the coning of wheels with neat sketch / Explain 'Coning of wheel' with neat sketch / Explain coning of wheel and Super-elevation for Railway / Significance of Coning of wheel in Railway. [Diagram required – refer to the original question paper] **(SUMMER 2022, 3 Marks; WINTER 2022 OR; SUMMER 2023, 4 Marks OR; SUMMER 2024, 7 Marks OR; WINTER 2024, 4 Marks OR; SUMMER 2025, 3 Marks OR; WINTER 2025, 4 Marks; SUMMER 2026, 4 Marks OR)**

2. Points, Crossings & Turnouts:

- **Q.** Give functions of points and crossings / Draw the diagram of Points & Crossing showing all components / Explain Points & Crossing with neat sketch / Explain purpose of providing Points and crossings in rail. [Diagram required – refer to the original question paper] **(SUMMER 2022 OR; WINTER 2022; SUMMER 2023, 3 Marks; SUMMER 2023, 7 Marks OR; SUMMER 2024, 4 Marks OR; WINTER 2024, 7 Marks; WINTER 2025, 3 Marks)**

3. Railway Gauges:

- **Q.** Define Railway gauge with a sketch and enlist various gauges prevalent on Indian Railways / Define gauge of railway track. Enumerate different gauges used in India. [Diagram required – refer to the original question paper] **(WINTER 2023, 7 Marks; WINTER 2025, 3 Marks OR)**
- **Q.** Write the advantages of uniformity of gauge throughout the nation / Write a note on uniformity of Gauges. **(WINTER 2022 OR; WINTER 2023, 7 Marks OR)**

4. Junctions, Terminals & Yards:

- **Q.** Write a note on "Junction and terminal" / Write note on Junction and Terminal. **(SUMMER 2022, 7 Marks OR; SUMMER 2023, 3 Marks OR; WINTER 2025, 7 Marks)**

Other Important Questions:

1. Track Components & Elements:

- **Q.** Define Creep in rail. Write the theory behind it. **(SUMMER 2022, 3 Marks)**
- **Q.** Give the functions of railway sleepers. **(WINTER 2023)**
- **Q.** State the requirements of a good ballast materials. **(WINTER 2023 OR)**
- **Q.** Write a short note on types of rail section. **(WINTER 2024, 3 Marks)**
- **Q.** Draw neat sketch showing Cross-sectional Elements of Rail-Road. [Diagram required – refer to the original question paper] **(SUMMER 2024, 3 Marks OR)**
- **Q.** Give the requirements of an ideal permanent way. **(SUMMER 2026, 3 Marks OR)**
- **Q.** List various types of sleeper used on Indian railway. Which one would you consider to be best for modern track? **(SUMMER 2026, 7 Marks)**

2. Points, Crossings & Turnouts:

- **Q.** Draw a neat sketch of simple left hand turnout and show its various components. [Diagram required – refer to the original question paper] **(SUMMER 2026, 7 Marks OR)**

3. Junctions, Terminals & Yards:

- **Q.** Write short note on: Marshalling yard. **(SUMMER 2026, 3 Marks)**

4. Role of Railways:

- **Q.** Explain Role of Indian Railways in National Development. **(SUMMER 2025, 4 Marks)**

5. Railway Curves (Numerical):

- **Q.** A 5° curve diverges from a main curve of 4° in an opposite direction in the layout of a broad gauge yard. If the speed on the main curve is restricted to 54.33 kmph, determine the speed

restriction on the branch line. Assume permissible cant deficiency as 7.5 cm. **(SUMMER 2022, 7 Marks)**

Chapter 4: Water Transportation

Repeated Questions:

1. Harbours & Ports:

- **Q.** Distinguish between harbor and Port / Define Harbor and Port. **(SUMMER 2022, 4 Marks; WINTER 2023; SUMMER 2024, 3 Marks; WINTER 2024, 4 Marks OR; SUMMER 2025, 3 Marks OR; WINTER 2025, 4 Marks OR)**
- **Q.** Explain classification of Harbour / Write a note on classification of harbour / Explain the classification of harbor in detail. **(WINTER 2023, 7 Marks; SUMMER 2024, 4 Marks; SUMMER 2025, 7 Marks OR)**

2. Breakwaters, Port Structures & Navigational Aids:

- **Q.** Explain various factors determining selection of Breakwater / Write a note on break water / Explain Jetty and Breakwater / Enlist different type of breakwater and describe wall type breakwater. **(SUMMER 2022, 3 Marks; WINTER 2023, 7 Marks OR; SUMMER 2025, 4 Marks OR; WINTER 2025, 3 Marks OR; SUMMER 2026, 7 Marks OR)**
- **Q.** Explain the following terms: Moles, Wharf, Jetty, Light house / Explain the terms: (1) Jetty (2) Dolphin (3) Dredging (4) Wharf. **(WINTER 2022; SUMMER 2025, 4 Marks OR - related terms: Jetty and Breakwater; WINTER 2025, 4 Marks)**

Other Important Questions:

1. Harbours & Ports:

- **Q.** Draw the schematic diagram of harbour layout showing all components. [Diagram required – refer to the original question paper] **(WINTER 2022 OR)**

2. Breakwaters, Port Structures & Navigational Aids:

- **Q.** Explain different types of buoys. **(WINTER 2023 OR)**
- **Q.** Differentiate between Dry dock and Wet dock. **(WINTER 2024, 4 Marks)**
- **Q.** Discuss in detail about navigational aids. **(SUMMER 2024, 7 Marks)**

Chapter 5: Air Transportation

Repeated Questions:

1. Airport Planning, Site Selection & Classification:

- **Q.** Describe airport master planning process as per ICAO Recommendations / Discuss the airport master planning process in detail. **(WINTER 2022; WINTER 2023, 7 Marks)**
- **Q.** What are the different points to be taken care while selecting the site for airport? / Write short note on Site selection for an airport. **(SUMMER 2023, 7 Marks; WINTER 2025, 7 Marks OR)**
- **Q.** Explain classification of Airport / Give the classification of airport as per ICAO / Explain the classification of Airport in detail. **(WINTER 2023 OR; SUMMER 2024, 4 Marks OR; SUMMER 2025, 7 Marks)**

2. Runway Orientation & Wind Rose:

- **Q.** Explain the wind rose diagram concept for runway orientation / What is the importance of wind rose diagram in runway orientation? / What is wind rose diagram? What are its uses? / What are the factors affecting runway orientation? Briefly explain wind rose diagram. **(WINTER 2022 OR; SUMMER 2023, 3 Marks; WINTER 2024, 7 Marks OR; WINTER 2025, 3 Marks; SUMMER 2026, 3 Marks OR)**

3. Airport Components & Terms:

- **Q.** Describe main components of terminal building with sketch and what facilities are provided in the terminal building / What is terminal building? What are the facilities provided in the terminal building? [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; WINTER 2023, 7 Marks OR; WINTER 2025, 7 Marks; SUMMER 2026, 4 Marks OR)**
- **Q.** Enlist the different components of Airport. Explain the importance of Taxiway / Enlist different components of Airport and show it in a sketch. [Diagram required – refer to the original question paper] **(SUMMER 2022 OR; SUMMER 2023, 3 Marks OR; WINTER 2024, 3 Marks OR)**

4. Aircraft & Navigational Aids:

- **Q.** Enlist different components of an aircraft and draw neat sketch of Aircraft showing different components / Enlist Aircraft Component parts with sketch / Describe aircraft component parts drawing sketch. [Diagram required – refer to the original question paper] **(SUMMER 2024, 7 Marks OR; SUMMER 2025, 4 Marks; SUMMER 2026, 4 Marks)**

Other Important Questions:

1. Airport Components & Terms:

- **Q.** Write a short note on marking and lighting on runway. **(SUMMER 2023, 4 Marks OR)**
- **Q.** Compare holding apron with loading and unloading aprons. **(WINTER 2023)**
- **Q.** Compare runway with taxiway. **(WINTER 2023 OR)**
- **Q.** Define 1. Runway 2. Taxiway. **(SUMMER 2024, 3 Marks OR)**
- **Q.** Define 1. Taxiway. 2. Apron. **(SUMMER 2025, 3 Marks)**

2. Aircraft & Navigational Aids:

- **Q.** What is the purpose of navigational aids? Explain any one aid. **(SUMMER 2022, 7 Marks OR)**
- **Q.** Explain the following terms: a. Taxiway b. Propeller c. Rudder d. ILS. **(WINTER 2022 OR)**
- **Q.** Explain three controls of aircraft. **(WINTER 2023)**

****