

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK

Subject Name & Code:

TRAFFIC ENGINEERING AND MANAGEMENT- 3160615

Unit 1: Introduction

Repeated Questions:

1. **Discuss the scope of traffic engineering.**
(W25 - Q1a, 03 marks; S25 - Q1b, 04 marks; S24 - Q1b, 04 marks)
2. **Explain PIEV Theory.**
(W23 - Q2b, 04 marks; W24 - Q1a, 03 marks [defines perception, intellect, volition time]; W22 - Q2b, 04 marks)
3. **Explain road user characteristics.**
(W25 - Q2c, 07 marks [permanent physical factors]; W23 - Q3c OR, 07 marks; S25 - Q2b, 04 marks [psychological factors]; W24 - Q1a, 03 marks [perception, intellect, volition time] and Q1b, 04 marks [vehicular characteristics]; S24 - Q1c, 07 marks; S23 - Q3c, 07 marks [physical factors])
4. **Explain vehicular characteristics.**
(W24 - Q1b, 04 marks; W22 - Q3a OR, 03 marks [static vehicular characteristics]; W25 - Q2c OR, 07 marks [vehicle resistances and power requirements])

Other Important Questions:

1. **Enlist the function of traffic engineer.**
(W24 - Q2a, 03 marks)
2. **Draw any three regulatory sign.**
(W24 - Q4a, 03 marks)
3. **Explain various pavement surface characteristics.**
(S23 - Q1a(4), 04 marks)
4. **As per IRC, mention the weight and maximum dimensions allowed in India.**
(S22 - Q1a, 03 marks)

Unit 2: Basic Traffic Flow Parameters and Traffic Surveys

Repeated Questions:

- Define: Time mean speed, Space mean speed, Traffic Density, Time headway, etc.**
(W25 - Q1c, 07 marks [defines 7 terms]; S25 - Q1a, 03 marks [defines PCU, space mean speed, traffic flow]; S24 - Q1a, 03 marks [defines spot, running, journey speed]; S23 - Q1a, 03 marks [defines speed, volume, density]; W22 - Q1a, 03 marks [defines flow, AADT, journey speed]; W24 - Q3b, 04 marks [calculate TMS & SMS])
- Explain relationship between traffic flow parameters (speed, flow, density).**
(W23 - Q3c, 07 marks; S24 - Q2c, 07 marks; S25 - Q2c OR, 07 marks [shock wave theory for bottlenecks]; W22 - Q2c OR, 07 marks [draw fundamental diagram])
- Explain methods of travel time and delay study.**
(W25 - Q3a, 03 marks; S25 - Q2c, 07 marks [purposes and methods]; W24 - Q3c, 07 marks; S23 - Q4c, 07 marks; S25 - Q5a OR, 03 marks [purposes])
- Explain classified traffic volume / traffic volume studies.**
(W23 - Q2c, 07 marks; S25 - Q1c, 07 marks [automatic counters]; S24 - Q2c OR, 07 marks; S23 - Q4b, 04 marks [automatic counters]; W22 - Q2c, 07 marks; S22 - Q3c, 07 marks [parking studies aspects])
- Calculate Time mean speed and Space mean speed (numerical).**
(W25 - Q3b OR, 03 marks [1km in 1,2,3 min]; W24 - Q3b, 04 marks [given 10 spot speeds]; S24 - Q3a OR, 03 marks [given 10 spot speeds]; W22 - Q3b, 04 marks [1km in 1,2,3 min])
- Explain spot speed study methods / Enoscope.**
(W25 - Q2b, 04 marks; S25 - Q3b, 04 marks; W24 - Q3a OR, 03 marks [cumulative frequency curve])
- Explain Origin and Destination (O & D) study/survey.**
(W25 - Q4c, 07 marks; W24 - Q2c, 07 marks; S24 - Q3c, 07 marks; S22 - Q2c OR, 07 marks)

Other Important Questions:

- Explain permanent physical factors of road user.**
(W25 - Q2c, 07 marks)
- Explain: histogram, frequency distribution curve and cumulative frequency curve with the help of sketch.**
(W25 - Q3a OR, 03 marks)
- Explain Green shield model / Greenshield's speed density model.**
(W25 - Q3c, 07 marks; W23 - Q3a OR, 03 marks)
- The average length of vehicle is 7m and average distance is 3m between cars. Average time headway at max flow is 3.0 sec. Calculate jam density, max flow, optimum density, optimum speed.**
(W25 - Q3b, 04 marks)
- Draw fundamental diagram of traffic flow parameter.**
(W24 - Q3a, 03 marks)
- Explain vehicle resistances and power requirements.**
(W25 - Q2c OR, 07 marks)
- Define: Spot speed, running speed, journey speed.**
(S24 - Q1a, 03 marks)
- Define: flow, AADT, journey speed.**
(W22 - Q1a, 03 marks)
- Explain the classified traffic volume. What are the purposes of carrying out the classified traffic volume studies?**
(W23 - Q2c, 07 marks)
- Explain the procedure of finding Highway Capacity.**
(W23 - Q2c OR, 07 marks)
- Define: Traffic island, Traffic intersection, Traffic signal.**
(S25 - Q2a, 03 marks)
- Write the uses of origin and destination survey.**

(W22 - Q3b, 04 marks)

13. **Explain Lighthill and Witham's theory / bottleneck.**

(S22 - Q1b, 03 marks; S23 - Q4b OR, 04 marks [average length 6m, distance 3.5m, headway 2 sec])

14. **A test car was used on a north-south road 0.75km long... (table data given). Calculate traffic volume, average travel time and space mean speeds in both directions.**

(W22 - Q5c OR, 07 marks) [Table given - refer Question paper of W22]

Unit 3: Lighthill and Witham's Theory

Repeated Questions:

1. **What is bottleneck? Discuss its causes and mitigation / Lighthill and Witham's theory.**
(W23 - Q4a, 03 marks & Q4b, 04 marks; S22 - Q1b, 03 marks; W24 - Q3c, 07 marks; W22 - Q3c, 07 marks)
2. **Explain Car following theory.**
(W23 - Q4b OR, 04 marks; S25 - Q3c OR, 07 marks [shock wave applied to bottleneck])
3. **Explain Queuing theory concept.**
(S25 - Q4c, 07 marks; W24 - Q5c OR, 07 marks [traffic management measures])

Other Important Questions:

1. **Discuss the assumptions in Lighthill and Witham's theory.**
(S22 - Q1b, 03 marks)
2. **Explain shock wave theory can be applied in solving bottleneck Problems.**
(S25 - Q2c OR, 07 marks)

Unit 4: Traffic Forecasting

Repeated Questions:

1. **What is the need for traffic forecasting? / Why traffic forecasting is necessary?**
(S22 - Q2a, 03 marks; S24 - Q2b, 04 marks; S25 - Q3a, 03 marks; W23 - Q5a OR, 03 marks; S23 - Q2b, 04 marks)
2. **Explain traffic forecasting based on past trends and extrapolation.**
(S22 - Q2c, 07 marks; W24 - Q2c OR, 07 marks; S25 - Q3c OR, 07 marks; S23 - Q2c, 07 marks; S23 - Q2c OR, 07 marks)

Other Important Questions:

1. **Describe types of traffic. How the period traffic forecasting affect the transportation facility?**
(S22 - Q2b, 04 marks)
2. **Explain the methods of traffic forecasting and describe any one in detail.**
(W23 - Q5a OR, 03 marks)

Unit 5: Parking Studies

Repeated Questions:

1. **Explain on-street parking / off-street parking / parking systems.**
(W25 - Q1b, 04 marks [on-street]; W23 - Q3b, 04 marks [off-street]; W23 - Q3b OR, 04 marks [on-street]; S25 - Q4b OR, 04 marks [on-street methods]; W24 - Q3b, 04 marks [on-street]; S23 - Q3b, 04 marks [peripheral]; S23 - Q3c OR, 07 marks [kerb & off-street types])
2. **Explain parking surveys / design standards for parking facilities.**
(W25 - Q4c OR, 07 marks; S22 - Q3c, 07 marks; S22 - Q3c OR, 07 marks [aspects investigated])
3. **What are the adverse effects / ill effects of parking?**
(S23 - Q4a, 03 marks; S24 - Q3b, 04 marks)
4. **Define: Parking index, Parking turn-over.**
(W25 - Q1c(5,6), 07 marks)

Other Important Questions:

1. **Explain various types of parking surveys.**
(W25 - Q4c OR, 07 marks)
2. **What are the methods of controlling on street parking?**
(W23 - Q1b, 04 marks)
3. **Explain about various on street parking with layout.**
(W22 - Q1c, 07 marks)
4. **Differentiate between Off-street parking and Peripheral parking.**
(S25 - Q3b, 04 marks)
5. **Write short note on peripheral parking system.**
(S23 - Q3b, 04 marks)

Unit 6: Design of Intersection

Repeated Questions:

- 1. Explain rotary intersection / roundabout – advantages, disadvantages, design elements, capacity.**
(W25 - Q4a, 03 marks [advantages/disadvantages]; W24 - Q4b, 04 marks [short note]; S24 - Q4c, 07 marks [differentiate rotary & roundabout]; S25 - Q4a, 03 marks [draw rotary]; W23 - Q4c OR, 07 marks [advantages/disadvantages]; W22 - Q4c, 07 marks [advantages/disadvantages]; S22 - Q4a, 03 marks [advantages/limitations for Indian conditions])
- 2. Explain traffic signals – types, design, Webster's method, signal timing, warrants, coordination.**
(W25 - Q4b, 04 marks [phase diagram]; S25 - Q3c, 07 marks [objective, principles, Webster's]; W24 - Q4c, 07 marks [methods & Webster's]; S23 - Q4c, 07 marks [types & design]; W22 - Q4c, 07 marks [types & timing]; W23 - Q4a, 03 marks [warrants]; S25 - Q4b, 04 marks [signal coordination objectives]; S24 - Q4c, 07 marks [signal coordination]; W25 - Q3a Page 2, 04 marks [conflict points] & Q3b Page 2, 07 marks [signal coordination] & Q3c Page 2, 07 marks [rotary design elements]; W23 - Q1a, 03 marks [functions of traffic signal])
- 3. Draw/differentiate grade separated and at-grade intersections.**
(S22 - Q4b, 04 marks; W24 - Q4b, 04 marks)
- 4. Draw clover leaf interchange / diamond interchange.**
(W23 - Q4c, 07 marks; W24 - Q4a OR, 03 marks; W22 - Q4a, 03 marks; S23 - Q4c, 07 marks [diamond interchange])
- 5. Design an isolated fixed time 2-phase traffic signal using Webster's formula (numerical).**
(S22 - Q4c OR, 07 marks) [Table given - refer Question paper of S22]
(W24 - Q4c, 07 marks) [Table given - refer Question paper of W24]

Other Important Questions:

- 1. Discuss various elements of rotary design.**
(W25 - Q3c Page 2, 07 marks)
- 2. Explain various types of traffic signals. How the signal timings are decided?**
(S22 - Q4c, 07 marks)
- 3. Explain various design factors considered in rotary intersection design.**
(S22 - Q4b OR, 04 marks)
- 4. Enlist various geometric design elements of rotary with neat sketch.**
(S24 - Q4b OR, 04 marks)
- 5. Draw the phase diagram for two phase and three phase system of traffic signal.**
(W25 - Q4b, 04 marks)
- 6. Draw the conflict points for (i) cross roads (both two ways) and (ii) cross roads (one two way and other one way).**
(W25 - Q3a Page 2, 04 marks)
- 7. Show conflict point diagram for one way and two way traffic system.**
(S22 - Q3b Page 2, 04 marks)
- 8. Draw various conflict point diagram for roads.**
(S23 - Q5b OR, 04 marks)
- 9. What are benefits of channelized intersection?**
(S23 - Q2a, 03 marks)
- 10. Differentiate between channelised and unchannelised intersections.**
(S25 - Q5a OR, 03 marks)
- 11. Give requirements of intersections at grade.**
(S25 - Q5a, 03 marks)
- 12. Classify intersection in detail based in various aspects.**
(S24 - Q4a, 03 marks)
- 13. Explain about tidal flow operations.**
(W22 - Q4a OR, 03 marks; S24 - Q5b, 04 marks)

14. **Write a short note on Traffic Island.**
(S24 - Q4a OR, 03 marks; S25 - Q2a, 03 marks [definition])
15. **Define: cycle time, lost time, offset.**
(S24 - Q4b, 04 marks)
16. **Explain about traffic actuated signals.**
(W22 - Q4b OR, 04 marks)
17. **State the advantages and disadvantages of full cloverleaf interchange.**
(S24 - Q5a, 03 marks)

Unit 7: Traffic Accidents – Causes and Prevention

Repeated Questions:

1. **Describe various causes and preventive measures for road accidents / Explain preventive measures to decrease accident rates.**
(W25 - Q3c Page 2, 07 marks; W24 - Q1c, 07 marks; S25 - Q5c, 07 marks; S24 - Q5c, 07 marks; S23 - Q1c, 07 marks; W23 - Q5b, 04 marks; W22 - Q3c, 07 marks)
2. **Explain condition diagram and collision diagram.**
(W25 - Q4b OR, 04 marks; W24 - Q2b, 04 marks; S25 - Q5b OR, 04 marks; S22 - Q3b, 04 marks)
3. **Explain statistical methods for analysis of accident data / Collection of accident data / E's for accident prevention.**
(S22 - Q3a OR, 03 marks; S22 - Q3b OR, 04 marks; S22 - Q3a, 03 marks)

Other Important Questions:

1. **Discuss accident situation in Indian context.**
(S22 - Q3a, 03 marks)
2. **Discuss Road and it's effect on accidents, Skidding, Speed in relation of safety.**
(From Syllabus Unit 7)
3. **Explain legislative measures may be adopted to reduce accidents.**
(S23 - Q3b OR, 04 marks)
4. **How accident reporting is carried out?**
(W22 - Q5b OR, 04 marks)

Unit 8: Traffic System Management

Repeated Questions:

1. **Explain Intelligent Transport System (ITS).**
(W25 - Q3b Page 2, 04 marks; S25 - Q5b, 04 marks; W24 - Q5b OR, 04 marks; S22 - Q3b Page 2, 03 marks; W22 - Q5b, 04 marks)
2. **What are objectives of traffic demand management? List techniques.**
(W24 - Q5b, 04 marks; S23 - Q5b, 04 marks)
3. **Describe various traffic management measures adopted to control traffic.**
(W24 - Q5c, 07 marks; S23 - Q5c, 07 marks)

Other Important Questions:

1. **What are the objectives of Traffic System Management?**
(W23 - Q1c, 07 marks)
2. **Explain travel demand management, traffic management measures, restrictions, one-way streets, tidal flow, traffic segregation, traffic calming, exclusive bus lanes.**
(From Syllabus Unit 8)
3. **Explain shared ride as a tool of TSM.**
(W23 - Q5c, 07 marks)
4. **Discuss bus bay lanes.**
(W23 - Q5a, 03 marks)
5. **What are purposes of traffic management?**
(S23 - Q3a, 03 marks)
6. **Describe strategic management solution for traffic problems.**
(S25 - Q5c OR, 07 marks)

Unit 9: Highway Capacity

Repeated Questions:

1. **Define/Explain: Highway Capacity, Basic capacity, Practical capacity, Possible capacity.**
(W25 - Q1c(7), 07 marks; W23 - Q3a, 03 marks; S25 - Q3a OR, 03 marks; S22 - Q3c Page 2, 07 marks)
2. **Define/Explain Level of Service (LOS) – factors, six levels, importance.**
(W25 - Q3a Page 2, 03 marks; W23 - Q2a, 03 marks; S25 - Q4c OR, 07 marks; W24 - Q5a, 03 marks; S22 - Q3a Page 2, 03 marks; S23 - Q5c, 07 marks)
3. **Explain PCU (Passenger Car Unit) / factors affecting PCU.**
(W25 - Q2a, 03 marks; S24 - Q5b Page 2, 04 marks; W24 - Q5c OR, 07 marks; S22 - Q3c Page 2, 07 marks; W22 - Q1b, 04 marks)
4. **Discuss factors affecting highway capacity and level of service.**
(W24 - Q5a, 03 marks; S22 - Q3a Page 2 OR, 03 marks)

Other Important Questions:

1. **Explain uninterrupted flow conditions as per HCM.**
(S25 - Q4a OR, 03 marks)
2. **How theoretical capacity of highway is determined?**
(S22 - Q3b Page 2, 04 marks; W22 - Q4b, 04 marks)
3. **Give importance of highway capacity in highway transportation studies.**
(S23 - Q5a, 03 marks)
4. **Enlist ideal conditions for uninterrupted flow as per highway capacity manual.**
(S23 - Q5a OR, 03 marks)
5. **Explain the concept of capacity and level of service with neat sketch.**
(S24 - Q5c Page 2, 07 marks)
6. **Explain about various level of service with neat sketch.**
(W22 - Q5c, 07 marks)
