

GUJARAT TECHNOLOGICAL UNIVERSITY

DI -5 SEMESTER – OLD PAPER – W23 TO S25 – QUESTION BANK(English)

Subject Name & Code:

Highway Engineering- 4350606

Unit I: Highway Developments

Repeated Questions:

1. **Write down the scope of highway engineering.**
 - Appeared in: S24 (Q1a, 03 marks), S25 (Q2a, 03 marks)
2. **Describe role of various agencies for highway construction.**
 - Appeared in: S24 (Q1b, 04 marks), S25 (Q1a, 03 marks)
3. **Explain the salient features of Nagpur road plan.**
 - Appeared in: W23 (Q2c, 07 marks), S25 (Q2a, 03 marks)

Other Important Questions:

4. Write full form of IRC, NHAI & CRRI. (W24 Q1a, 03 marks)
5. Explain first 20-year road development plan for India. (W24 Q1b, 04 marks)
6. Discuss Importance of Highway in India. (W24 Q2a, 03 marks)
7. Explain the modified classification of road system in India as per the third twenty year road development plan (1981-2001). (W23 Q2c, 07 marks)
8. Explain the principle and uses of Benkelman Beam test. (W23 Q1a, 03 marks)
9. Discuss the importance of hill road drainage. Show the surface drainage system for effective drainage and disposal of water with neat sketch. (W23 Q1c, 04 marks)
10. Explain the classification and causes of Land slide. (W23 Q1d, 05 marks)
11. What is the difference between hot mix plant and batch mix plant? (W23 Q2a, 03 marks)
12. Write the different functions of concrete batching and mixing plant. (W23 Q2a, 04 marks)
13. Explain PIEV theory. (W23 Q2c, 07 marks)

Unit II: Highway Geometric Design

Repeated Questions:

1. **Define: Sight distance, Design speed, Cant, Transition curve.**
 - Appeared in: S25 (Q2b, 04 marks)
2. **Explain PIEV theory and Calculate the stopping sight distance on a road at a descending gradient of 3% for a design speed of 80 kmph. Take reaction time for driver as 2.0 sec and $f = 0.30$.**
 - Appeared in: W23 (Q2c, 07 marks), S25 (Q2c, 07 marks)
3. **Calculate the safe stopping sight distance for a design speed of 60 kmph for road having 3% down slope. Take reaction time is 2 sec. co-efficient of friction is 0.30.**
 - Appeared in: S24 (Q2a, 03 marks)

Other Important Questions:

4. State the purposes of providing Camber. Also state the value of camber for different type of road surface, as per IRC. (W24 Q2b, 04 marks)
5. Define Sight Distance. Explain Types of Sight distance in detail. (W24 Q2c, 07 marks)
6. Explain Widening on horizontal curve with figure. (W24 Q2a, 03 marks)
7. State factor affecting road alignment. (W24 Q2b, 04 marks)
8. Write the advantages of Super elevation. (W24 Q3a, 03 marks)
9. Enumerate the factor governing the width of carriage way. State IRC specification for various classes of road. (W23 Q3b, 04 marks)
10. The speed of overtaking and overtaken vehicle is 70 and 40 kmph, respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec^2 . (a) Calculate safe overtaking sight distance, (b) Mention the minimum length of overtaking zone and (c) Draw neat sketch of the overtaking zone and show the positions of the sign post. (W23 Q3c, 07 marks)
11. Explain overtaking sight distance with neat sketch. (W23 Q3a, 03 marks)
12. Define: Camber, Formation width, Carriage way and Right of way. (W23 Q3b, 04 marks)
13. Derive an expression for finding the stopping sight distance at level and at grades. (W23 Q3c, 07 marks)
14. Derive an equation for finding the super elevation required if the design coefficient of lateral friction is ' f '. (W23 Q5a, 03 marks)
15. Explain ruling, limiting and exceptional gradients. Specify the values recommended by IRC for plain terrain. (W23 Q5b, 04 marks)
16. Define Design Speed. State factors affecting design speed. (W23 Q5a, 03 marks)
17. Derive an expression for finding length of transition curve on horizontal alignment of highway. (W23 Q5b, 04 marks)

18. On a two lane, two way traffic roads the speed of overtaking and overtaken vehicles are 70 kmph and 40 kmph respectively. If the acceleration of overtaking vehicle is 0.99 m/sec^2 , calculate safe overtaking sight distance. (S24 Q2b, 04 marks)
19. Calculate the safe stopping sight distance for a design speed of 80 kmph for road having 4% ascending gradients. Take reaction time is 2.5 sec. co-efficient of friction is 0.37. (S24 Q2a, 03 marks)
20. On a two lane, two way traffic roads the speed of overtaking and overtaken vehicles are 60 kmph and 45 kmph respectively. The safe spacing between two vehicles is 12 m. overtaking time is 5 sec and reaction time is 2.5 sec. Calculate overtaking sight distance. (S24 Q2b, 04 marks)
21. Distinguish between stopping sight distance and overtaking sight distance. (S24 Q3b, 04 marks)
22. Define Sight distance. State its importance. (S24 Q3b, 04 marks)
23. Give the values of camber for the different types of road surfaces recommended by the IRC. (S25 Q4b, 04 marks)
24. Define: Formation width, Right of way, Building line, Control line. (S25 Q2b, 04 marks)
25. The speeds of overtaking and overtaken vehicles are 90 and 70 kmph respectively. If the acceleration of the overtaking vehicle is 2.5 kmph per second, calculate the safe passing sight distance for One way and Two way traffic. (S25 Q2c, 07 marks)
26. Give comparison of superelevation and extra widening on horizontal curve. (S24 Q1c, 07 marks)
27. Define camber and gradient. Give their values recommended by IRC for different roads. (S24 Q1c, 07 marks)

Unit III: Highway Construction

Repeated Questions:

1. **Describe the step by step the construction procedure of the WBM road.**
 - Appeared in: **W23 (Q4c, 07 marks), S25 (Q1c, 07 marks)**
2. **Describe the step by step the construction procedure of the WMM road.**
 - Appeared in: **S25 (Q1c, 07 marks)**
3. **Discuss step by step construction procedure of cement concrete pavement.**
 - Appeared in: **W23 (Q4c, 07 marks)**

Other Important Questions:

4. List out various highway construction materials also give their characteristics. (W24 Q1c, 07 marks)
5. Distinguish between Flexible and rigid pavement. (W24 Q2c, 07 marks)
6. Define prime coat, tack coat, seal coat & tar. (W24 Q3b, 04 marks)
7. Draw Cross sectional of road and show each component. (W24 Q3c, 07 marks)
8. Explain continuous bay method in Construction of rigid pavements. (W24 Q3a, 03 marks)
9. Write merits and demerits of bituminous road. (W24 Q3c, 07 marks)
10. Explain Construction of WMM roads in flexible pavements. (W24 Q3a, 03 marks)
11. Discuss Mixing plant work for Cement Concrete Road construction. (W24 Q3c, 07 marks)
12. Differentiate between Bitumen and Tar. (W23 Q4a, 03 marks)
13. Explain with sketches the requirements of joints filler and sealer. (W23 Q4b, 04 marks)
14. Define Prime coat, Tack coat and Seal coat. (W23 Q4a, 03 marks)
15. Explain the uses of emulsion. How are they prepared? (W23 Q4b, 04 marks)
16. Explain the characteristics of various materials used in highway construction. (W23 Q5c, 07 marks)
17. Draw the neat sketches of following types of joints and discuss the objectives of it: Expansion joints, Contraction joints, Warping joints, Construction joints, Longitudinal joints. (W23 Q5c, 07 marks)
18. State the construction procedure of WBM road with merits and demerits of WBM road. (S24 Q2c, 07 marks)
19. State the construction procedure of premixed bituminous carpet with merits and demerits of bituminous road. (S24 Q2c, 07 marks)
20. Describe construction method of cement concrete road. Explain any one method. (S24 Q3c, 07 marks)
21. Explain gravel roads. What are their advantages and disadvantages? (S24 Q3c, 07 marks)

22. Give the functions of prime coat and seal coat. (S25 Q3a, 03 marks)
23. Write the various functions of the pavement components. (S25 Q3b, 04 marks)
24. Discuss various joints provided in cement concrete road, with the object of providing each joint. (S25 Q3c, 07 marks)
25. Compare the Tar and Bitumen. (S25 Q3a, 03 marks)
26. Differentiate between Flexible pavement and Rigid pavement. (S25 Q3b, 04 marks)
27. Explain the desirable properties of aggregate to be used in different types of pavement construction. (S25 Q3c, 07 marks)

Unit IV: Highway Construction Equipments

Repeated Questions:

1. **Draw the sketch of vibratory roller.**
 - Appeared in: **W24 (Q4a, 03 marks), S24 (Q4a, 03 marks)**
2. **Draw the sketch of sheep foot roller.**
 - Appeared in: **W23 (Q2b, 04 marks), S24 (Q4a, 03 marks)**
3. **Explain working procedure of bituminous hot mix plant.**
 - Appeared in: **S24 (Q4b, 04 marks)**

Other Important Questions:

4. Draw with each component of Pneumatic Tyred Roller. (W24 Q1c, 07 marks)
5. Write Function of Vibratory Roller. (W24 Q3b, 04 marks)
6. Write short note on “Sheep footed roller”. (W23 Q2b, 04 marks)
7. Show the different components of bituminous hot mix plant with neat line diagram. (W23 Q2b, 04 marks)
8. Write the different functions of concrete batching and mixing plant. (W23 Q2a, 04 marks)
9. Explain working procedure of bituminous cold mix plant. (S24 Q4b, 04 marks)
10. List the Mechanical Equipment used for Excavation. (S25 Q4a, 03 marks)
11. Enlist different compaction equipment used in road construction and explain any two in brief. (S25 Q4c, 07 marks)
12. Write the different functions of concrete batching and mixing plant. (S25 Q4a, 03 marks)
13. Draw the line diagram of bituminous hot mix plant showing its different components. (S25 Q4c, 07 marks)

Unit V: Hill Road

Repeated Questions:

1. **Explain the classification and causes of Land slide.**
 - Appeared in: **W23 (Q1d, 05 marks), S25 (Q5e, 04 marks)**
2. **Discuss the importance of hill road drainage. Show the surface drainage system for effective drainage and disposal of water with neat sketch.**
 - Appeared in: **W23 (Q1c, 04 marks), S25 (Q5c, 07 marks)**

Other Important Questions:

3. Classify hill roads & explain in detail. (W24 Q3a, 03 marks)
4. Explain components of hill road. (W24 Q3b, 04 marks)
5. Explain in detail about Causes and prevention of Landslide. (W24 Q3c, 07 marks)
6. Define landslides. Express the measures of prevent landslides. (S24 Q4c, 07 marks)
7. Explain various measures required for drainage of hill roads with sketches. (S24 Q4c, 07 marks)
8. Explain the importance of hill road. (S25 Q5d, 03 marks)

Unit VI: Advances In Highway Engineering

Repeated Questions:

1. Explain briefly the Marshall method of design of flexible pavement.
 - Appeared in: W23 (Q1b, 03 marks), S25 (Q5b, 04 marks)

Other Important Questions:

2. Express the needs of highway drainage maintenance. (W24 Q3b, 04 marks)
3. Discuss in detail on innovative materials in pavement construction. (W24 Q3c, 07 marks)
4. Define Kerb & also write Types of kerbs. (W24 Q3a, 03 marks)
5. Write Uses of various Recycled materials in pavement Construction. (W24 Q3b, 04 marks)
6. Explain in detail marshal stability test. (W24 Q3c, 07 marks)
7. Distinguish between WBM & WMM. (W24 Q3a, 03 marks)
8. Define Road Gradient & Vertical curves. (W24 Q3b, 04 marks)
9. Explain in detail what features feel forward through. (W24 Q3c, 07 marks)
10. List out various recycled materials utilize in road construction. Give their advantages. (S24 Q5a, 03 marks)
11. State pavement evaluation machineries. (S24 Q5b, 04 marks)
12. Write down requirements of joints in cement concrete road. Explain any one type of joints with sketch. (S24 Q5c, 07 marks)
13. Write the process for bituminous mix design. (S24 Q5a, 03 marks)
14. Discuss about pavement evaluation. (S24 Q5b, 04 marks)
15. Explain the requirements of joint filler and sealer with help of sketches. (S24 Q5c, 07 marks)
16. Explain different highway engineering design software. (S25 Q5a, 03 marks)
17. Explain for measuring the surface deflection of the pavement by Benkelman beam test with neat diagram. (S25 Q5c, 07 marks)
