

**Question Paper Code : 20514**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023

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Fourth Semester

Civil Engineering

CE 3405 – HIGHWAY AND RAILWAY ENGINEERING

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Use IRC 37 : 2012 (Respective Charts only have to be provided)

Use of CBR Design Chart is permitted

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention different types of highways.
2. State the requirements of an ideal alignment.
3. State the factors influencing sight distance.
4. Write the need of Super elevation in roads.
5. List the factors to be considered for pavement design.
6. Classify flexible pavement from rigid pavement.
7. Write some defects that occurs in rail.
8. What is meant by a level crossing?
9. Explain track circuiting.
10. State the importance of track maintenance.

PART B — (5 × 13 = 65 marks)

11. (a) Demonstrate the procedure of various engineering surveys required for locating a new highway.

Or

- (b) Draw typical cross section of a highway in embankment and cutting and mark the cross-sectional elements.

12. (a) A new national highway is to be aligned along a rolling terrain with a ruling minimum radius. If the design speed is 80 kmph. Calculate absolute minimum sight distance, intermediate sight distance, super elevation, extra widening and length of transition curve. Assume necessary data suitably.

Or

- (b) Calculate the stopping sight distance on a highway whose design speed is 100 kmph. If the highway is on a 3% down grade. Assume any relevant data needed.
13. (a) Explain briefly the construction procedure of concrete road with material specifications.

Or

- (b) Draw neat sketches of components of flexible pavements and describe their functions.
14. (a) Illustrate various geometric design elements of railway track.

Or

- (b) If the wheel base of a vehicle moving on a B.G truck is 6m on  $4^\circ$  curves with diameter of wheel as 1.2 m and depth of flanges below the top of rail is 3.21cm. Determine the length of transition curve and extra width required to be provided on the gauge and also calculate the shift.
15. (a) Draw the sketch of a hump type of Marshalling yard and explain its operation.

Or

- (b) Distinguish between railway station and railway yard with neat sketch.

PART C — (1 × 15 = 15 marks)

16. (a) Illustrate the neat sketch of the turnout and explain their working principle.

Or

- (b) Describe the Role of Indian Railways in our National development.