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**Question Paper Code : 30101**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023

Fourth Semester

Civil Engineering

CE 3405 – HIGHWAY AND RAILWAY ENGINEERING

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

(Permitted : IRC37:2012 (Respective Charts alone has to be Provided))

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Enumerate the factors that influence highway alignment.
2. List down the conventional and modern methods of engineering surveys for highway alignment?
3. Define 'super elevation' in curves.
4. Define 'sight distance'.
5. State the testing methods used for highway construction materials?
6. List the evaluation process for pavements.
7. Define 'stress' in a railway track.
8. Why coning of wheel is done in a railway track?
9. What is track circuiting?
10. Recall the design principle of turnouts.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the classification of highways based on the function they serve.

Or

- (b) Discuss the differences between flexible and rigid pavements and explain the design practices for each.

12. (a) Discuss the design principles of horizontal curves, including super elevation and transition curves.

Or

- (b) Describe the pavement components and their role in pavement design.

13. (a) Explain the construction practice of concrete pavements.

Or

- (b) Enumerate the different methods of pavement maintenance and explain their importance in pavement performance. (5+8)

14. (a) Discuss the various defects that can occur in rails and how they can be detected and prevented.

Or

- (b) Explain the role of signalling in railway operation and safety.

15. (a) Paraphrase the construction and maintenance of railway tracks, including conventional and modern methods and materials.

Or

- (b) Discuss the lay out of a terminal railway stations with a neat sketch.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the design principles for vertical curves, including gradients. Calculate the length of a vertical curve for a highway that has a change in grade from +2% to -2%. (10+5)

Or

- (b) Assuming that the highway is constructed as per the design parameters described as per IRC, how would you evaluate the pavement condition after 10 years of operation? What maintenance practices would you recommend to ensure the longevity of the pavement? (10+5)