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Question Paper Code : 27126

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Civil Engineering

CE 6504 — HIGHWAY ENGINEERING

(Regulations 2013)

Time : Three hours   Maximum : 100 marks

(Relevant IRC codes are allowed)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the different modes of Transportation and their respective limitations.

2. List four parameters enumerated in Traffic Surveys for the Alignment and Design of Highways.

3. List any four types of Medians adopted for Highways (with sketches).

4. Draw a typical Transition Curve and mark all its zones.

5. Differentiate between Prime Coat, Seal Coat and Tack Coat with sketch of the other layers in a typical Flexible Pavement.

6. What are the effects of Temperature on Rigid Pavements?

7. How Geotextiles improve Safety and Stability of Highway Embankments.

8. How adding up the waste plastics help in the improvement of bituminous pavements.

9. What is Alligator Crack?

10. What is FWD and state its use?

PART B — (5 × 16 = 80 marks)

11. (a) (i) List out all the types of Highways as classified in the Indian Context starting from the Expressways upto Village/ Rural Roads; for each type, briefly state its specifications. (10)

    (ii) List the effects on Environment and Ecology of the Surroundings due to a highway project. (6)

Or

    (b) (i) For a highway alignment, to cross a river, what are the various Obligatory and other technical and economical considerations in aligning the highway across the river. (8)

    (ii) Compare the two modes of Transportation — Railways and Highways. (8)

12. (a) (i) Calculate the Super-elevation to be provided for a horizontal curve with a radius of 400 m for a design speed 100 kmph in plain terrain. If super-elevation is restricted to 0.07, calculate the coefficient of lateral friction mobilised. (8)

    (ii) Calculate the Safe Stopping Distance while travelling at a speed of 100 kmph on a level road. Assume all other data as required. (4)

    (iii) Draw the various components of Overtaking Sight Distance on a straight stretch of a highway and explain each zone. (4)

Or

    (b) (i) List and Draw the various Vertical Curves adopted in Highways. (6)

    (ii) Explain the controls and guidelines for safe, comfortable travel in Highway Vertical Curves. (5)

    (iii) List the various technical guidelines recommended for safety and comfort in case of Horizontal Curves in highways. (5)

13. (a) (i) A two — lane carriageway carries a traffic of 1,500 cv/ day. Rate of traffic growth is 5% pa. Pavement Design Life is 15 years. VDF = 2.5. Soil CBR is 6%. Calculate Cumulative Number of Standard Axles to be catered for, in the pavement design. (5)

    (ii) For the above data, determine the total pavement thickness based on the IRC method and the thickness of the different layers forming the total composition. (6)

    (iii) What's PMB? How it improves the quality of pavement? (5)

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(b) (i) List the various factors influencing the design of Rigid Pavements and describe the design procedure as per IRC 58. (10)

(ii) Design the reinforcement of a cement concrete slab 200 mm thick, assuming the following : (6)

(1) Concrete density 2400 kg/m³

(2) Transerve Joint spacing 15 m

(3) Working stress in steel 140 MPa

(4) Friction coefficient 1.5

(5) Pavement Width 3.75 m

14. (a) Describe any four laboratory tests on Aggregates. (16)

Or

(b) (i) Describe the construction procedure of a Flexible pavement. Explain the equipment required for various layers while constructing the flexible pavement. (8)

(ii) Describe the CBR test procedure in lab. (8)

15. (a) List any Eight cracks and defects in flexible pavements and describe their respective symptoms, possible causes and the treatment/ repair for each defect. (16)

Or

(b) Define Overlay and the procedure for design and construction of overlays. (16)

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