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B.E. (Part-Time) DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Fifth Semester

Civil Engineering

CE 1255 — HIGHWAY ENGINEERING

(Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. State the objectives of Highway Research Board.

2. Mention the functions of medians in urban roads.

3. What are the factors on which the stopping sight distance depends on?

4. State the objectives of providing transition curves in highways.

5. Draw the cross sections of flexible and rigid pavements.

6. How change in temperature produce frictional stresses in rigid pavements?

7. What is called toughness of stone aggregate? Mention the name of the test used to determine the same in laboratory.

8. What are called surface drainage and sub surface drainage of roads?

9. Mention the reasons for the development of edge cracks in flexible pavements.

10. What is called "Spalling" in rigid pavements?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the activities of National Highway Authority of India. (8)

(ii) Describe the development of roads in India during British period. (8)

Or

(b) (i) How renaissance survey may be carried out? (6)

(ii) Describe the classification of rural roads in India. (10)

12. (a) (i) Explain the PIEV theory. (5)

(ii) Calculate the stopping sight distance for ascending and descending gradient for a road with a gradient of 1 in 45. Take the design speed as 70 kmph, the reaction time of the driver as 2.5 seconds and the design coefficient of friction between the tyre and road surface as 0.40. (7)

(iii) State the factors influencing the overtaking sight distance. (4)

Or

(b) (i) Define "Superelevation". Derive the formula for the same. (3 + 7)

(ii) Explain the reasons for the widening of pavements on horizontal curves. (6)

13. (a) (i) Differentiate between rigid and flexible pavements. (8)

(ii) Explain the concept of Equivalent Single Wheel Load. (8)

Or

(b) (i) Design a flexible pavement using CBR curves given the following data :

Sub grade soil (soaked) CBR	= 6%
Design life	= 15 years
Annual rate of increase in the heavy vehicles	= 8 %
No. of heavy vehicles per day during last count	= 200

Laterite sub base (soaked) CBR = 17 %

Water Bound Macadam base CBR = 90 %

No. of years between the year of completion and the year of last count = 7 (11)

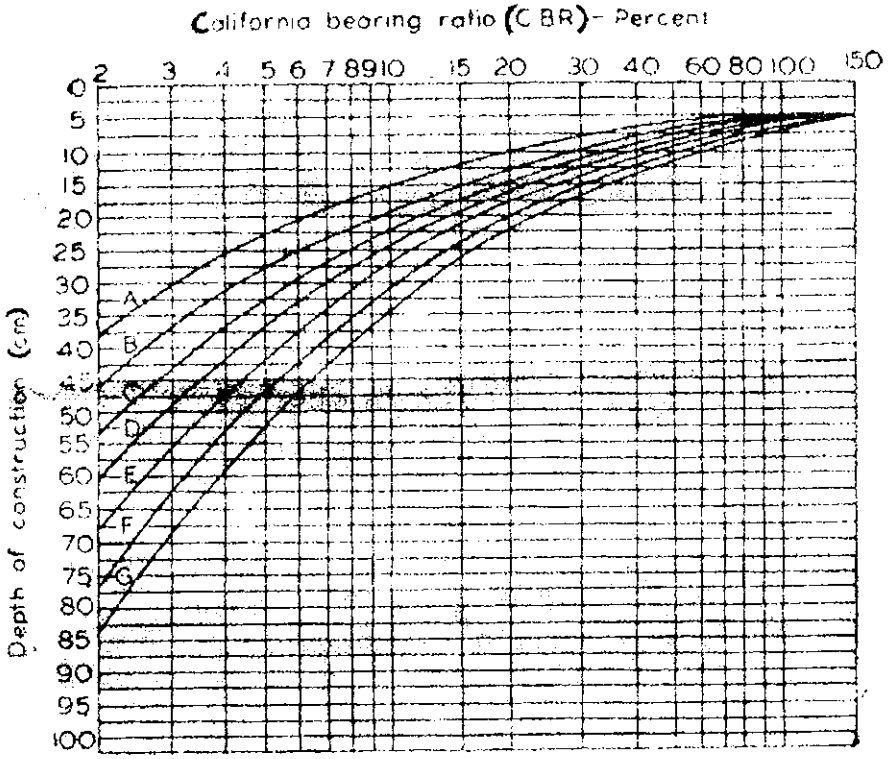

Fig. 1 CBR Curves for Flexible Pavement Design

Table 1

Classification of traffic for design

Traffic (heavy vehicles per day of laden weight exceeding 3 tonnes)	CBR design curve applicable
0–15	A
15–45	B
45–150	C
150–450	D
450–1500	E
1500–4500	F
Exceeding 4500 and all expressways	G

(ii) State the drawbacks of CBR method. (5)

14. (a) Explain how the following tests are carried out on aggregates in laboratory.

(i) Water absorption. (8)

(ii) Los Angeles abrasion. (8)

Or

(b) Explain the construction procedure of the following type of roads.

(i) Dense Bituminous Macadam. (8)

(ii) Bituminous Concrete. (8)

15. (a) (i) Explain the various surface defects in flexible pavements. Also mention their causes. (12)

(ii) What is called weathering of flexible pavements? (4)

Or

(b) (i) Explain how the condition of pavement surface may be evaluated? (9)

(ii) What are the various sources of revenue for the development and maintenance of highways in India? Explain. (7)

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