TRANSPORTATION ENGINEERING – I (SEMESTER - 6)

CS/B.TECH (CE-N)/SEM-6/CE-602/09

1. .....
Signature of Invigilator

2. .....
Signature of the Officer-in-Charge

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/B.TECH (CE-N)/SEM-6/CE-602/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

TRANSPORTATION ENGINEERING – I (SEMESTER - 6)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question.**
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

	Group – A										Group – B			Group – C				
Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

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Head-Examiner/Co-Ordinator/Scrutineer

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TRANSPORTATION ENGINEERING – I

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GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Nagpur road plan formulae were prepared by assuming

a) rectangular or block road pattern

b) radial or star and block road pattern

c) radial or star and circular road pattern

d) radial or star and grid road pattern. ☐

ii) Camber in the road is provided for

a) effective drainage b) counteracting the centrifugal force

c) having proper sight distance d) none of these. ☐

iii) Scientific planning of transportation system and mass transit facilities in cities should be based on

a) spot speed data b) origin and destination data

c) traffic volume data d) accident data. ☐

iv) As per IRC recommendations, the maximum limit of superelevation for mixed traffic in plain terrain is

a) 1 in 15 b) 1 in 12·5

c) 1 in 10 d) equal to camber. ☐

v) Which one of the following gives intermediate sight distance as per IRC Standards ? (SSD : Stopping Sight Distance ; ODD : Overtaking Sight Distance ;)

a) 2 SSD b) (SSD + OSD) / 2

c) (OSD – SSD) / 2 d) 2 OSD.

vi) For circular curve of radius 200 m, the co-efficient of lateral friction is 0·15 and the design speed is 40 kmph. The equilibrium superelevation (for equal pressure on inner and outer wheels) would be

a) 21·3 b) 7

c) 6·3 d) 4·6.

vii) If a descending gradient of 1 in 25 meets an ascending gradient of 1 in 40, then the length of valley curve required for a head light distance of 100 m will be

a) 30 m b) 130 m

c) 310 m d) 630 m.

viii) Which one of the following binders is recommended for a wet and cold climate ?

a) 80/100 penetration asphalt b) tar

c) cutback d) emulsion.

ix) The general requirement in constructing a reinforced concrete road is to place a single layer of reinforcement

a) near the bottom of the slab

b) near the top of the slab

c) at the middle

d) equally distributed at the top and bottom.

x) If the CBR value obtained at 5 mm penetration is higher than that at 2·5 mm, then the test is repeated for checking; and if the check test reveals a similar trend, then the CBR value is to be reported as the

a) mean of the values for 5 mm & 2·5 mm penetration

b) higher value minus the lower value

c) lower value corresponding to 2·5 mm penetration

d) higher value obtained at 5 mm penetration. ☐

xi) Expansion joints in cement concrete pavement are provided at an interval of single layer of reinforcemnt

a) 10 m b) 15 m

c) 18 m to 21 m d) 25 m to 30 m. ☐

xii) The thickness of bituminous carpet varies from

a) 20 to 25 mm b) 50 to 75 mm

c) 75 to 100 mm d) 100 to 125 mm. ☐

xiii) The method of design of flexible pavement as recommended by IRC is

a) Group index method b) CBR method

c) Water guard method d) Benkelman beam method. ☐

xiv) The maximum limit of water absorption for aggregate suitable for road construction is

a) 0·4% b) 0·6%

c) 0·8% d) 1·0%. ☐

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following questions. 3 × 5 = 15

2. a) What is valley curve ?

   b) Design with neat sketches the factors on which length of a valley curve depends. 2 + 3

3. Write short notes on highway planning survey. 5

4. What is WBM ? Discuss the construction procedure of WBM. 2 + 3

5. Discuss the various factors affecting sight distance of a road. 5

6. A valley curve is found at the junction of descending gradient of 1 in 25 and an ascending gradient of 1 in 30. Calculate the length of the curve from night travel (head light) consideration only with a design speed of 35 kmph. 5

7. What is serviceability of pavement ? Define PSI and TSI. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

8. a) What is Camber ?

   b) Discuss the factors on which Camber depends.

   c) Calculate the minimum sight distance required avoiding a head on collision of two cars approaching from opposite directions at 80 & 50 kmph. Assume a reaction time of 2·0 seconds, co-efficient of traction of 0·70 and a brake efficiency of 50 per cent. 3 + 4 + 8

9. a) What do you mean by "Classification of Road" ?

   b) Mention different types of Urban Roads.

   c) Discuss the various road patterns with neat sketches. 5 + 3 + 7

10. A state highway passing through a rolling terrain has a horizontal curve of radius equal to ruling minimum radius. Design the superelevation, transition curve and extra-indexing for the curve. Data given :

    Ruling design speed = 80 kmph

    Number of lanes = 2

    Assume pavement to be rotated about the centre.

    Assume reasonable values of data not given. 6 + 5 + 4

11. While designing a horizontal road curve of radius 200 m through a built-up area it is found that available set bank distance for the road is 25 m.

    Width of the road 7·5 m

    Length of the road curve 300 m

    Estimate design of speed for the road. Design superelevation, transition curve and over taking site distance for the road.

    Assume reasonable values of data not given. 5 + 4 + 3 + 3

12. a) Name the four major strength related tests of road aggregates. What is the basic difference among them in context to the type of load ? 2 + 2

    b) For a soil sample with 60% finer than 75 μ, L_1 = 46% and PI = 15, find the group index. 3

c) The following results have been obtained in a laboratory CBR test. Draw the load-penetration curve and find the CBR value. 5 + 3

Penetration (mm)	0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0	12.0
Load (kg)	0	2.3	12.8	30.0	41	50	58	70	77.7	93.2	102.5	110.8

13. a) What is grade separated interchange ? Explain what weaving angle and weaving length mean. For what type of intersection are these important and how ? 1 + 3 + 3

b) Name and define the types of pavement. Draw a neat labelled diagram of the cross-section of the flexible pavement. What is the function of the topmost layer ? 1 + 3 + 2 + 2

14. Discuss various factors, which are to be considered for pavement design. 15

END