

Code : 011619

B.Tech 6th Semester Exam., 2014

TRANSPORTATION ENGINEERING—I

Time : 3 hours

Full Marks : 70

Instructions :

- (i) All questions carry equal marks.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct option (any seven) :

- ☒ (a) Nagpur Road Plan formulae were prepared by assuming
 - (i) rectangular or block road pattern
 - (ii) radial or star and block road pattern
 - (iii) radial or star and circular road pattern
 - ☒ (iv) radial or star and grid road pattern
- ☒ (b) The shape of the camber best suited for cement concrete pavements is
 - ☒ (i) straight
 - (ii) parabolic
 - (iii) elliptical
 - (iv) None of the above

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(Turn Over)

(2)

- (c) Stopping sight distance is always
 - ☒ (i) less than overtaking sight distance
 - (ii) equal to overtaking sight distance
 - (iii) more than overtaking sight distance
 - (iv) None of the above

- ☒ (d) Enoscope is used to find
 - (i) average speed
 - ☒ (ii) spot speed
 - (iii) space mean speed
 - (iv) time mean speed

- (e) Dead slow is a/an
 - (i) regulatory sign
 - (ii) warning sign
 - (iii) informative sign
 - (iv) None of the above

- (f) Los Angeles testing machine is used to conduct
 - ☒ (i) abrasion test
 - (ii) impact test
 - (iii) attrition test
 - (iv) crushing strength test

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(Continued)

(3)

- (g) Bottommost layer of pavement is known as
- (i) wearing course
 - (ii) base course
 - (iii) subbase course
 - (iv) subgrade
- (h) The maximum thickness of expansion joint in rigid pavement is
- (i) 0
 - (ii) 25 mm
 - (iii) 50 mm
 - (iv) 100 mm
- (i) Reflection cracking is observed in
- (i) flexible pavement
 - (ii) rigid pavement
 - (iii) bituminous overlay over cement concrete surface
 - (iv) rigid overlay over flexible pavement
- (j) In highway construction on superelevated curves, the rolling shall proceed from
- (i) sides towards the centre
 - (ii) centre towards the sides
 - (iii) lower edge towards the upper edge
 - (iv) upper edge towards the lower edge

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(Turn Over)

(4)

2. (a) Write down the importance of highways in India.
- (b) Discuss the classification of highways as per Nagpur Road Plan.
3. (a) What is meant by superelevation and why is it considered essential for modern traffic?
- (b) Derive an expression for superelevation to be provided on circular curve, if the coefficient of friction taken for design is f .
4. (a) What are the objects of camber? Discuss the factors on which the amount of camber to be provided depends.
- (b) Calculate the passing sight distance for a two-way traffic highway for which the design speed is 60 kmph. The rate of acceleration of the fast-moving vehicle may be assumed as 3.6 kmph/sec and the difference in speed between the overtaking vehicle and overtaken vehicle as 20 kmph. What will be the passing sight distance if only one-way traffic is allowed?
5. A national highway passing through a built-up area has a horizontal curve of radius 400 m. If the design speed of the highway is 80 kmph and the length of the wheelbase of the largest truck is 6.1 m, design all geometric features of this curve. Pavement width may be assumed as 10.5 m.

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(Continued)

(5)

6. (a) What are different layers generally provided in the flexible pavement? Explain their functions.

(b) Calculate stresses by Westergaard theory at the corner, edge and interior location of a concrete slab conforming to the following specification.

Wheel load = 4080 kg

Modulus of elasticity of concrete
 $= 2 \times 10^5 \text{ kg/cm}^2$

Pavement thickness = 20 cm

Poisson's ratio of concrete = 0.15

Modulus of subgrade reaction
 $= 2 \text{ kg/cm}^3$

Radius of contact area = 20 cm

7. (a) What do you understand by the following terms?

(i) Traffic volume

(ii) Traffic density

(iii) Basic capacity

(iv) Practical capacity

(b) Discuss the advantages and disadvantages of traffic rotaries.

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(Turn Over)

(6)

8. (a) Name the usual test employed for evaluating the road aggregates. What test values are generally considered suitable for road stones to behave as good construction materials?

(b) What do you understand by 80/100 bitumen? Distinguish between bitumen and tar.

9. (a) What are the functions of (i) prime coat, (ii) tack coat and (iii) seal coat in bituminous construction?

(b) What are the causes of failure of bituminous pavement?

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