Bihar Engineering University, Patna

B.Tech 5th Semester Examination, 2024

Course: B.Tech | *Time: 03 Hours*
Code: 101507 | *Subject: Transportation Engineering* | *Full Marks: 70*

Instructions:-

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
*(iv) Question No. **1** is compulsory.*

Q.1 ***Choose the correct answer the following (Any seven question only):-*** **[2 x 7 = 14]**

(a) The particular places where pedestrians are to cross the pavement are properly marked by the pavement marking known as
(i) stop lines (ii) crosswalk lines
(iii) turn markings (iv) lane lines

(b) As per the Nagpur plan, the un-surfaced roads were meant for _____
(i) ODR and village roads (ii) Major district road
(iii) State highway (iv) National highway

(c) MORTH stands for
(i) Ministry of Rail Transport and Highways (ii) Ministry of Road Transport and Highways
(iii) Ministry of Road Traffic and Highways (iv) Ministry of Road, Terrain and Highways

(d) Highway facilities are designed for
(i) annual average hourly volume (ii) annual average daily traffic
(iii) thirtieth highest hourly volume (iv) peak hourly volume of the year

(e) In CBR test the value of CBR is calculated at
(i) 2.5 mm penetration only (ii) 7.5 mm penetration only
(iii) 5.0 mm penetration only (iv) Both 2.5mm and 5.0mm penetration

(f) If aggregate impact value is 20-30 percent, then it is classified as
(i) exceptionally strong (ii) Strong
(iii) satisfactory for road surfacing (iv) unsuitable for road surfacing

(g) Tie bars in cement concrete pavements are at
(i) expansion joints (ii) contraction joints
(iii) warping joints (iv) longitudinal joints

(h) As per IRC recommendations, the maximum limit of superelevation for mixed traffic in plain terrain is
(i) 1 in 15 (ii) 1 in 12.5
(iii) 1 in 10 (iv) Equal to camber

(i) Rigidity factor for a tyre pressure greater than 7 kg/cm^2 is
(i) Equal to 1 (ii) Less than 1
(iii) Greater than 1 (iv) Zero

(j) Desire Lines are plotted in
(i) traffic volume studies (ii) speed studies
(iii) accident studies (iv) origin and destination studies

Q.2 (a) Define highway alignment. What are the factors affecting highway alignment? [7]
(b) Briefly outline the various road patterns commonly in use. [7]

Q.3 (a) What is camber and why it is to be provided for a road surface? Explain different types of camber in pavement with suitability of each as per traffic type. [7]
(b) Calculate the length of transition curve using the following data: Design speed = 70 kmph, Radius of circular curve = 200m, Pavement width including extra widening = 7.5m, Allowable rate of introduction of superelevation (pavement rotated about the centre line) = 1 in 150 [7]

Q.4 (a) Explain briefly about various factors which affect the: [7]
(i) Road User Characteristics (ii) Vehicular Characteristics
(b) What is traffic volume? Enumerate the different methods of carrying out traffic volume studies. [7]

Q.5 (a) Calculate the length of stopping sight distance for two way traffic in a single lane road. The design speed is 80 kmph. Coefficient of friction is 0.6. for sloping road with (i) Ascending slope of 2% (ii) Descending slope of 3% [7]
(b) Describe briefly about PIEV theory. [7]

Q.6 (a) The radius of a horizontal circular curve is 100m. The design speed is 50 kmph and the design Coefficient of lateral friction is 0.15. Calculate the superelevation required if full lateral friction is assumed to develop. [7]
(b) Explain briefly about different types of transition curves commonly adopted. [7]

Q.7 Define the following terms: [2 x 7 = 14]
(i) Space-mean speed
(ii) Time-mean speed
(iii) Traffic Island
(iv) Passenger car unit (PCU)
(v) Traffic capacity
(vi) 30th highest hourly volume
(vii) Jam Density

Q.8 (a) What are the different types of bituminous materials used in road construction? Under what circumstances each of these materials are preferred? [7]
(b) Differentiate between flexible pavements and rigid pavements clearly outlining the advantages and disadvantages of both. [7]

Q.9 Write short notes on ***any two*** of the following:- [7 x 2 = 14]
(a) Joints in Cement Concrete pavements
(b) Prime Coat and Tack Coat
(c) Extra Widening in Horizontal Curves
(d) Floating Car Method of Speed Dealy Study