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Total Number of Pages : 02

B.Tech
PCI4I102

4th Semester Regular / Back Examination 2018-19

HIGHWAY & TRAFFIC ENGINEERING

BRANCH : CIVIL

Max Marks : 100

Time : 3 Hours

Q.CODE : F263

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- a) Compare different modes of transportation and specify their limitation.
- b) State the fundamental principle of highway alignment.
- c) Define rigidity factor in design of highway pavement.
- d) Specify the type of force is acting on a vehicle moving on a curved path, subjected to an outward force and give its importance.
- e) Give a neat sketch of a typical transition curve and divide the curve into different zones.
- f) Differentiate between attrition and abrasion in context to Los angeles abrasion test of aggregate.
- g) With a neat sketch compare prime coat, seal coat and tack coat of a typical flexible pavement.
- h) Find ESWL factor at depth of 20cm using following data :
 - i. Dual wheel carrying 2024 kg each
 - ii. Center to center tyre spacing = 20cm
 - iii. Clear distance between two wheels = 10cm
- i) Differentiate between running and journey speed.
- j) Give the reason of occurring joint spalling.

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- a) Illustrate the salient features of highway cross sectional element.
- b) Write short note on
 - i. Indian Road Congress
 - ii. Central Road Research Institute
 - iii. Highway Research Board
- c) With a neat sketch develop an expression for braking distance when a vehicle maneuvering through an ascending gradient of highway and give all the standards.
- d) Calculate the length of transition curve with the following data,
Design speed = 70 km/hr, Radius of circular curve = 250 m., Allowable rate of introduction of super elevation = 1 in 150, Pavement width including extra width = 7.5 m.
- e) Elaborate the factors affecting the geometric design of highway.
- f) The speeds of overtaking and overtaken vehicles are 80 and 50 km/h respectively on a two way traffic highway. If the acceleration of overtaking vehicle is 0.9 m/s^2 . Calculate safe overtaking sight distance and mention minimum length of overtaking zone. Also with a neat sketch show the overtaking zone and position of sign post.
- g) Design the pavement for construction of a new bypass with the following data :
Two lane carriage way, Initial traffic in the year of completion of construction = 400 CVPD (Sum of both direction), Traffic growth rate = 7.5%, Design life = 15 years, VDF based on axle load survey = 2.5 standard axle per commercial vehicle and Design CBR of subgrade soil = 4%.

- h) Discuss briefly the importance of highway maintenance. What are the general causes of pavement failures ?
- i) Calculate the stresses at interior, edge and corner region of cement concrete pavement using westergaard's equation. Use the following data.
Wheel Load = 5200 kg, Pavement thickness = 20 cm., Poisson's ratio of concrete = 0.15, Subgrade modulus = 6 kg/cm³, Young's Modulus of cement concrete = 3×10^5 kg/cm², Radius of contact area = 15 cm.
- j) Discuss the requirements of good highway drainage system.
- k) Explain in detail any two causes of road accidents and corresponding preventive measures.
- l) Explain in detail about the Crushing test, Abrasion and Soundness test on the aggregate used for highway construction.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3 Explain the procedural steps of designing a flexible pavement by IRC method. Support your design assumption with appropriate values of various elements of pavement design. (16)
- Q4 Give a detailed note on Traffic stream parameters and state their interdependency. (16)
- Q5 Explain the construction procedure of cement concrete roads and bituminous bound macadam road. (16)
- Q6 Describe the flexible pavement failure with neat sketches. (16)