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 subgarde 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/cm^3, Young's Modulus of cement concrete = 3×10^5kg/cm^2, 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)**