Total No. of Questions : 8]

SEAT No. : [ ]

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B.E. (Civil Engineering)

TRANSPORTATION ENGINEERING

(2019 Pattern) (Semester - VII) (401002)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of electonic pocket calculator is allowed.***
4) ***Assume Suitable data, if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What do you mean by formation width and carriageway width. Draw the typical cross section of road in hilly area. **[6]**

b) Explain in brief how the superelevation is provided in the field. **[6]**

c) A vertical summit curve is formed at the intersection of two gradients + 3% and – 5%. Design the length of the summit curve to provide a stopping sight distance for a design speed of 80 kmph. Assume any other data suitably. **[6]**

OR

Q2) a) Explain any two important pavement surface characteristics with respect to highway geometric design. **[6]**

b) Design the rate of superelevation for a horizontal highway curve of radius 500m and speed 100 kmph. **[6]**

c) What are the various vehicular characteristics which affects the road design? Briefly explain. **[6]**

Q3) a) What are the desirable properties of the sub grade soil? **[6]**

b) Explain cutbacks and its types. What are its advantages over conventional bitumen? **[6]**

c) Explain how Impact Test on aggregates is done in the laboratory. How are the results of the test interpreted? **[6]**

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OR

Q4) a) What is Foamed Bitumen? How foamed bitumen is prepared and where it is used. **[6]**

b) Define 'flaky' aggregates. Explain the procedure for finding flakiness index in the laboratory. **[6]**

c) Write a note on Crumbed Rubber Modified Bitumen. **[6]**

Q5) a) Draw a neat cross section of flexible pavement. Explain in brief functions of various layers of flexible pavement. **[5]**

b) Explain maximum wheel load and contact pressure. **[6]**

c) Compute the radius of relative stiffness of 15cm thick cement concrete slab from the following data : **[6]**

Modulus of elasticity of cement concrete = 210000 kg/cm^2

Poisson's ratio for concrete = 0.13

Modulus of subgrade reaction,

K = i) 3.0 kg/cm^3 ii) 7.5 kg/cm^3

OR

Q6) a) Explain with sketch equivalent single wheel load ESWL. **[5]**

b) Calculate the stresses at interior regions of cement concrete pavement using Westergaard's stress equations. Use the following data : **[6]**

Modulus of elasticity of cement concrete = 300000 kg/cm^2

Wheel load = 5100 kg

Pavement thickness = 18 cm

Poisson's ratio for concrete = 0.15

Modulus of subgrade reaction = 6.0 kg/cm^3

Radius of contact area = 15 cm

c) Explain the importance of dowel and tie bars in rigid pavements. **[6]**

Q7) a) Explain afflux. List and explain the different formulae used for estimation of afflux. **[6]**

b) A bridge is proposed to be constructed across an alluvial stream carrying a discharge of 200 m^3/sec. Assume Lacey's slit factor equal to 1.0. Find the maximum depth of scour when the bridge consists of 2 spans of 40 m each. **[6]**

c) Explain the function of ballast. **[5]**

OR

Q8) a) Explain the following with a neat sketch : **[6]**

i) Box Culvert.

ii) Swing bridge.

iii) Suspension bridge.

b) A bridge has a linear waterway of 110m constructed across a stream, whose natural waterway is 190m. If the flood flow is 950 Cumecs and the mean depth of flow is 2.75m, Calculate the Afflux under the bridge. **[6]**

c) Define Rail Guage and explain its types. **[5]**

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