

Total No. of Questions : 8]

SEAT No. :

PD4550

[Total No. of Pages : 2

[6404]-54

B.E. (Civil Engineering)
TRANSPORTATION ENGINEERING
(2019 Pattern) (Semester - VII) (401002)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data, if necessary.
- 5) Neat diagrams must be drawn wherever necessary.

- Q1) a)** Explain any two important pavement surface characteristics with respect to highway geometric design. **[6]**
- b)** Distinguish clearly between Camber and Super elevation. How super elevation is provided in the field. **[6]**
- c)** Calculate the absolute minimum and ruling minimum radius of horizontal curve for a design speed of 80 kmph. **[6]**

OR

- Q2) a)** State and explain the factors governing the stopping sight distance. **[6]**
- b)** Calculate safe stopping sight distance for a design speed of 100 kmph. Assume any other data suitability. **[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 the CBR and the test procedure for laboratory and field tests. How are the results of the test obtained and interpreted? **[6]**
- c)** Explain how Impact Test on aggregates is done in the laboratory. How are the results of the test interpreted? **[6]**

OR

- Q4) a)** What is Foamed Bitumen? How foamed bitumen is prepared and where it is used. **[6]**
- b)** Explain the Flash and Fire Point Test. **[6]**
- c)** Discuss the desirable properties of bitumen. Compare tar and bitumen. **[6]**

P.T.O.

- Q5) a)** Draw a neat cross section of flexible pavement. Explain in brief functions of various layers of flexible pavement. [5]
- b)** Explain different stresses in flexible pavements. [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 and corner 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)** Define Pier. Draw a neat sketch of the Hammer head shape pier and Multiple bent Pier. [6]

- b)** A bridge is proposed to be constructed across an alluvium stream carrying a discharge of $300 \text{ m}^3/\text{s}$. Assume silt factor, $f = 1.10$, determine the maximum scour depth when the bridge consists of 5 spans of 20 m each. [6]

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

OR

- Q8) a)** Define Abutment. State the various types of abutments. Also State the requirements of good Abutments. [6]

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

