

Total No. of Questions : 8]

SEAT No. :

PB-2217

[Total No. of Pages : 3

[6263]-54

B.E. (Civil Engineering)

TRANSPORTATION ENGINEERING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer 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 indicates 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

P.T.O.

- 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]

- 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 190 m. 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]
