Total No. of Questions : 10]

SEAT No. :

**P3710**

[Total No. of Pages : 3

# [5461]-502
# B.E. (Civil)
# TRANSPORTATION ENGINEERING
# (2015 Pattern)

*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, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

***Q1)*** a) What are the characteristics of road transport in comparison with other systems. **[5]**

b) Calculate the minimum sight distance required to avoid a head-on-collision of two cars approaching from the opposite directions at a speed of 100 Kmph and 60 Kmph. Assume a reaction time of 2.5 sec, coefficient of friction of 0.7 and a brake efficiency of 75%. **[5]**

OR

***Q2)*** a) There are three alternate proposals of road plan, the details of which are given below. Suggest the order of priority for phasing the road construction work based on maximum utility approach. Assume utility points of 0.5, 1 and 2 for the three population ranges and utility unit of 2 per 1000 tonne of agricultural products served. **[5]**

| Proposal | Length km | Population <2000 | Population 2001-5000 | Population 5001-10000 | Agricultural Productivity in thousands tonnes |
|---|---|---|---|---|---|
| A | 500 | 100 | 60 | 20 | 100 |
| B | 600 | 150 | 70 | 30 | 150 |
| C | 700 | 200 | 80 | 40 | 200 |

b) Explain the 'PIEV' theory. **[5]**

***P.T.O.***

***Q3)*** a) Why extra widening is provided on horizontal curves? Calculate the extra widening required for a two-lane road on a horizontal curve of radius 150 m if the longest wheel base of a vehicle expected on the road is 6 m. Design speed is 60 Kmph. **[6]**

b) What are the objectives of carrying accident studies? How are the results of this study used? **[4]**

OR

***Q4)*** a) Define : **[6]**

i) Traffic Volume

ii) Spot Speed

iii) Running Speed

iv) Basic Capacity

b) Explain Origin and Destination study. What are the various uses of O & D studies? **[4]**

***Q5)*** a) Explain how Cutbacks are prepared. Also state their types. **[5]**

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

c) Why is viscosity-based gradation of bitumen done nowadays instead of penetration grade? List the recommended viscosity grade of bitumen for use in India. **[5]**

OR

***Q6)*** a) With respect to Marshall Stability Test define : **[5]**

i) Flow Value

ii) VMA

iii) VFB

iv) Theoretical Specific Gravity and

v) Marshall Stability Value

b) Explain with a neat sketch the procedure for conducting Impact test on aggregates. **[6]**

c) How is Crumb Rubber Modified Bitumen obtained? State the advantages over normal bitumen. **[5]**

*Q7)* a) Find the expected traffic with the following data. **[6]**

i) Type of road – Two Lane single carriageway

ii) Initial traffic in each direction in the year of completion of construction = 1500 CV/day

iii) Design life = 15 yr

iv) Traffic growth rate = 7.5%

v) Vehicle Damage factor = 2.5

vi) CBR of soil = 6%

vii) LDF = 0.5

b) What are othe critical stress conditions on a rigid pavement? **[6]**

c) Draw a typical cross section of flexible pavement and highlight the importance of each layer. **[6]**

OR

*Q8)* a) Enumerate the various types of joints in cement concrete pavement. Explain any one in brief. **[6]**

b) Describe any two factors governing the design of concrete pavements. **[6]**

c) Explain the concept of ESWL with a neat sketch. **[6]**

*Q9)* a) Explain the concept of Super pave Mix Design Technology. **[5]**

b) Write a note on : **[6]**

i) Dense Bituminous macadam and

ii) Dry Lean Concrete

c) Describe the construction procedure of WBM pavements. **[5]**

OR

*Q10)* a) What are the advantages of cold mix technology over hot mix asphalt technology? **[5]**

b) Write a note on : **[6]**

i) Pavement Quality Concrete and

ii) Built Up Spray Grout (BUSG)

c) Explain at what stages of pavement construction are prime coat, tack coat and seal coat used. **[5]**

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