Total No. of Questions : 8]

SEAT No. :

P531

[Total No. of Pages : 2

[6004]-453
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) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain with neat sketch of cross section of road pavement in embankment showing different elements and write their functions. **[6]**

b) What is purpose of providing camber? Explain with sketches different shapes of cross slopes of road pavement? **[6]**

c) Calculate minimum sight distance required to aviod head-on collision of two cars approaching from opposite direction at 100 and 80 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.7 and a break efficiency of 50 percent, in either case. **[6]**

OR

Q2) a) Explain PIEV theory of stopping sight distance. **[6]**

b) What is ruling gradient, what are the limiting values of IRC recommendations of ruling gradient? When limiting gradient is used? **[6]**

c) Desing speed of a highway is 100 kmph. There is a horizontal curve of radius 300 m on a certain locality. Calculate superelevation needed to maintain this speed. If maximum superelevation of 0.07 is not to be exceeded, calculate the maximum allowable speed on this curve as it is not possible to increase the radius. Safe limit of transverse coefficient of friction is 0.15. **[6]**

Q3) a) Enlist desirable properties of road aggregate and explain any one in details. **[6]**

b) Explain the terms Cutback, Emulsions, flash and fire point. **[6]**

c) Enlist different tests on bitumen and explain any one in details. **[6]**

OR

P.T.O.

Q4) a) Explain how Impact Test on aggregates is done in the laboratory. How are the results of the test interpreted? **[6]**

b) Explain the requirement of bitumen mixes. **[6]**

c) State and explain desirable properties of the sub grade soil? **[6]**

Q5) a) State comparison between rigid pavement and flexible pavement. **[6]**

b) Why joints are necessary in concrete pavements? State the various types of joints. Explain any one in brief. **[6]**

c) Explain in brief the CBR test and its importance in design of Flexible pavement. **[5]**

OR

Q6) a) Write short note on surface drainage system of highway. **[6]**

b) Describe briefly the various factors influences the pavement design. **[6]**

c) State the Westergaards stress equations for wheel loads at all the three regions of cement concrete pavement with meanings of notations used. **[5]**

Q7) a) What is permanent way? Describe components permanent way with neat sketch. **[6]**

b) Find out maximum scour depth for a straight stream flow condition for a bridge sight if design discharge is 600 m^3 per second and mean diameter of soil bed particle is 0.6 mm. (Use constant for maximum scour depth R = 1.27). **[6]**

c) What is role and necessity of railway in development of country? **[5]**

OR

Q8) a) Draw a neat labeled sketch showing all the components of bridges and state purpose of each component. **[6]**

b) A bridge has linear waterway of 100 m constructed across a river whose natural waterway is 120 m. Calculate a height of afflux under the bridge if discharge during flood is 1200 m^3 per second and average floor depth is 3 m. Use Molesworth's formula. **[6]**

c) What are different types of gauges? Explain their suitability. **[5]**