PAPER ID-410071

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B.TECH
(SEM-V) THEORY EXAMINATION 2021-22
TRANSPORTATION ENGINEERING-I

Time: 3 Hours   *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10 = 20**

   a.   Enlist the various types of road patterns with diagrams.
   b.   Write short notes on "IRC".
   c.   Write short notes on Macadam Roads with diagram.
   d.   Draw the cross-section of a Two-lane Road on an embankment and name all the cross-sectional elements in them.
   e.   Define traffic capacity.
   f.   What is PIEV theory?
   g.   Explain ESWL.
   h.   Define spot speed. Enlist the methods to determine spot speed.
   i.   What do you understand by prime coat and tack coat?
   j.   Determine the theoretical capacity of a traffic lane with one way traffic flow at a stream speed of 50 kmph. Assume the average length of vehicle as 6 m.

SECTION B

2.   **Attempt any *three* of the following:**   **10 x 3 = 30**

   a.   Enlist all the twenty-year plans and explain them along with their salient features.
   b.   Write short notes on (i) PMGSY (ii) Mumbai-Pune Expressway (iii)Yamuna Expressway
   c.   Calculate the length of transitional curve on a State Highway (SH) passing through rolling terrain. Width of road = 7 m and length of vehicle = 6 m. assume suitable data.
   d.   What are the factors controlling alignment?
   e.   What are the fundamental relations of traffic flow? Draw the fundamental diagrams of traffic flow and explain them with the help of combined diagrams.

SECTION C

3.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

   (a)   Calculate the stresses at the interior edge and corner of a Cement concrete pavement by Westergaard's stress equations.
       Modulus of elasticity of concrete = 3 x 105 kg/cm2
       Poisson's Ratio of concrete = 0.15
       Thickness of concrete pavement = 15 cm.
       Modulus of subgrade reaction = 8.5 kg/cm2
       Wheel Load = 4500 kg.
       Radius of loaded area = 15 cm.
   (b)   What are the significant recommendations of Jayakar Committee Report?

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4. **Attempt any *one* part of the following:** 10 x 1 = 10

(a) Calculate the length of transition curve for a state highway passing through plain terrain on a horizontal curve of radius 400m.

(b) A stale highway passing through a rolling terrain has a horizontal curve of radius equal to the ruling minimum radius, Design all the geometric features of this horizontal curve, assuming suitable data.

5. **Attempt any *one* part of the following:** 10 x 1 = 10

a) Explain the traffic volume study in detail.

a) Design a flexible pavement using IRC method for the construction of a new dual two-lane carriageway highway carrying a traffic of 250 CVPD and growth rate of 7.5 %. The construction is estimated to be completed in 4 years. The design life of pavement is 20 years. The CBR value of the sub-grade soil is 5 %. The road is estimated to carry an axle load of 100 kN.

6. **Attempt any *one* part of the following:** 10 x 1 = 10

(a) What is the theoretical capacity? The design speed of traffic lane is 80kmph. Estimate its theoretical capacity by assuming the average length of the vehicle as 6.0m

(b) What is the rigid pavement? What are the steps for design of CC pavements thickness as per IRC guidelines?

7. **Attempt any *one* part of the following:** 10 x 1 = 10

(a) Draw the structure of a typical flexible pavement and write short notes on all the layers in a flexible pavement.

(b) An ascending gradient of 1 in 40 meets a descending gradient of 1 in 30. Determine the type of curve and its length to provide the required OSD if the design speed is 70kmph.Assume acceleration= 0.7 m/sec2.