Subject Code - TCE 604

Roll No. to be filled in your Answer Book

Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

PAPER ID-

B.Tech.
Transporation Engineering I
TCE 604

Time- 3 Hours   Max marks: 100

NOTE:
  i.   All questions are compulsory.
  ii.   Draw diagrams wherever necessary.
  iii.   All questions carry equal marks. .

1. Attempt any **FOUR** parts of the following.   5 X 4

    (A)   Explain the term "Traffic Volume". Enumerate the types of automatic devices used in vehicle volume count and classification.

    (B)   What is Bitumen Grade? Explain the test (with sketch) you will perform to find out the bitumen grade.

    (C)   What id Highway Capacity? Define Basic, Possible and Practical Capacity.

    (D)   Discuss in detail the Cumulative Frequency Curve and its usages.

    (E)   Discuss the three basic diagrams of traffic flow in detail.

    (F)   What are the significant recommendations of Jaykar Committee? How it helped in road development in India?

2. Attempt any **FOUR** parts of the following   5 X 4

    (A)   Draw the diagram showing the typical cross-section of Roman and French Roads.

    (B)   Discuss the modified classification of roads by third Road Development Plan.

    (C)   A vehicle is travelling at an average speed of 100 km/h under the following conditions: (i) level surface, (ii) upward gradient of 1.98% and (iii) downward gradient of 2%. Assume perception and break reaction time = 2.5 seconds and coefficient of longitudinal friction between vehicle tyres and road surface = 0.35. Determine safe stopping sight distance.

    (D)   Explain the laboratory experiment to test the hardness of aggregates as highway material.

    (E)   What are Time Headway and Space Headway?

    (F)   Discuss the cumulative speed curve and how can you find the design speed, speed for law enforcement and minimum allowable speed from this curve?

3. Attempt any **TWO** parts of the following 10X2

(A) Explain the spot speed, running speed, space mean speed, time mean speed and average speed. How is spot speed studies carried out?

(B) A national highway (NH) is passing through plain, rolling and hilly areas. According to IRC guidelines, design a super elevation for the give conditions:

     i. For plain terrain: Ruling design speed = 80 kmph and horizontal curve radius = 215m.

     ii. For rolling terrain: Ruling design speed = 80 kmph and horizontal curve radius = 300m.

For hilly area: Ruling design speed = 100 kmph and horizontal curve radius = 137m.

(C) What are the functions of the road pavements? Draw a neat and clean sketch showing the structural function of a pavement..

4. Attempt any **TWO** parts of the following 10X2

(A) A horizontal curve of 270 m radius is to be designed for 65 kmph speed. The road is a two lane road (7 m) and the super elevation is provided by rotating the pavement surface about its crown. The rate of introduction of super elevation is 1 in 150. If the maximum wheel base length is 6 m, calculate the required minimum length of the transition curve.

(B) Discuss the various types of failures in pavements, its evaluation and remedial measures.

(C) Discuss the traffic volume study and speed study. Also explain the usage of these studies in pavement design and traffic management.

5. Attempt any **TWO** parts of the following 10 X 2

(A) What is Pavement? What are the functional requirements of the pavement? Discuss three modes of flexible pavement failure as per IRC 37 2012, also draw the stress distribution in pavement due to wheel load showing critical locations of strains in pavement.

(B) Discuss the desirable properties of soil as Highway Material. Explain the California Bearing Ratio (CBR) Test with neat and clean sketches.

(C) State the assumption and formula used for determination of Equivalent Single Wheel Load (ESWL). Also state the limitations of using ESWL for design of pavements.

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