2014

TRANSPORTATION ENGG-I

Paper : CE 502

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. (a) Explain group index and its significance in soil classification and pavement design.   6

   (b) Explain the construction procedure for water bound Macadam Road.   8

   (c) Find out the Influence of Modulus of subgrade reaction on radius of relative stiffness for a 20*cm* thick cement concrete slab. Assume $E = 200000 \, kg/cm^2$.

   Poisson's ratio for cement concrete = 0·15 $K = 1·0$ and $2·0 kg/cm^3$.   6

2. *(a)* Explain flexible and rigid pavements and bring out the points of differences. 8

(b) Explain the use of the different categories of road signs and sketch a typical sign of each category. 12

3. *(a)* Calculate the warping stress for a 20*cm* concrete pavement with 15*m* transverse joints. Assume lane width of the road as 3·8*m*. The modulus of subgrade reaction is $3\,kg/cm^3$. Temperature differential for day consideration may be assumed to be $1°C/cm$. Also assume *(i)* Radius of load area for computing warping stress at the corner as 15*cm* *(ii)* the thermal coefficient of concrete $= 7·5 \times 10^{-6}/°C$ *(iii)* modulus of elasticity of concrete $= 3 \times 10^5\,kg/cm^2$ *(iv)* Poisson's Ratio = 0·15. 10

(b) Mention the essential requirement of bitumen, suitable for road making. Describe briefly the prescribe laboratory test which will have to be carried out, in order to determine its suitability for road work. 8

(c) What are the 3E's of Traffic Engineering ? 2

4. (a) Derive an expression for spacing of expansion and contraction joint in rigid pavement. 8

   (b) Explain the objects of the following traffic studies : 4×3=12

       (i)   O and D studies

       (ii) Parking studies

       (iii) traffic accident studies

       (iv) Rotary Intersection.

5. (a) Describe Los Angeles abrasion test and impact test for Road aggregate. What test values are generally considered suitable for Road Stone to behave as good construction material ? 10

   (b) A vehicle moving at $45kmph$ speed was stopped by applying the brake and the length of skid mark was $14m$. If the average skid resistance of the pavement is known to be 70% determine the Brake efficiency of the test vehicle. 5

   (c) Determine the spacing between Contraction Joint for $3 \cdot 5m$ slab width having thickness of $20cm$ and $f = 0 \cdot 15$, for the plain cement concrete, allowable $S_C = 0 \cdot 8 kg/cm^2$. 5

6. *(a)* Explain how the sub surface drainage system is provided to lower the water table and canter seepage flow. 10

(b) Discuss the relationship between following traffic stream flow characteristic 10

(i) Speed *(ii)* Travel time *(iii)* Volume *(iv)* Density *(v)* Capacity.

7. *(a)* Explain ESWL and the concept in the determination of the equivalent wheel load. 8

(b) Discuss the design details of dowel bars. 8

(c) Briefly list the method of Construction of gravel roads. 4