TE(CIVIL) \ SEM Ⅳ \ R-19 \ SH-22 \ 30-11-22

(3 Hours)   **[Total Marks: 80**

QP CODE : 10012671

Note: i. Q. No. 1 is **compulsory**
        ii. Attempt **any 3** out of remaining 5
       iii. Support all **theory and numerical** with neat sketch

1.   **Solve any four**   (20 M)
   A.   Compare various modes of transportation on basis of operating speed, initial cost, operating cost and suitability.
   B.   Explain the classification of highways.
   C.   Discuss on O&D study.
   D.   Compare rigid and flexible pavement on basis of material used, flexural strength, suitability and cross section.
   E.   Write note on use of Geosynthetics in highways.
   F.   Explain rigid pavement failures.

2. A.   Enlist factors affecting safe stopping distance. Also, on a highway, due to fog, only 20   (08 M) meters of road was visible. Find the speed to be permitted for the vehicles to avoid accidents if reaction time is 2 sec and f=0.13.
   B.   Discuss on Structural and Functional evaluation of pavements along with the list of   (06 M) equipment's used.
   C.   Explain conflict points and its types. Also enlist measures to reduce conflict points on   (06 M) roads.

3. A.   i.   Explain the function of sleepers.   (08 M)
        ii. What is equilibrium Cant value of 2^0 curve on a B.G track if 15, 10, 5 and 2 trains are running at 50, 60, 70 and 80 kmph respectively.
   B.   Explain the concept of PCU and also discuss the factors affecting PCU.   (06 M)
   C.   What is Vehicle damage factor? Also find msa for construction of new two-lane bypass   (06 M) having initial traffic 400 cvpd in both directions. Rate of growth is 7.5 %, VDF is 2.5, CBR is 4 %, construction period is 2 years & 'n' is 15 years.

4. A.   Design a rigid pavement for wheel load of 7000 kg, tyre pressure 7.5 kg/cm^2, spacing   (08 M) between longitudinal joints is 3.75 m & spacing between contraction joints is 4.2 m. Take $E = 3 \times 10^5$ kg/cm^2, $\mu = 0.15$, $e = 1 \times 10^{-5}$, $k = 30$ kg/cm^3, flexural strength = 45 kg/cm^2. Assume Cx = Cy = 1.1

Thickness (cm)	22	24	26	30
Temp. Difference	14.8	15.6	16.2	16.8

      FOS = 1.1 to 1.2.
   B.   If the ruling gradient on a stretch of road is 6 % & radius of curve is 60 m, find the grade   (06 M) compensation to be given & the compensated gradient.
   C.   Discuss procedure of construction of flexible pavement.   (06 M)

AB22FDF6FF764326E703F5E35DD8E392

5. A. Enlist desirable properties of pavement materials and discuss any 1 test on aggregate in detail. (08 M)

B. Draw a layout of an airport with all its components and also find the increase in runway length if the airport is shifted from a location of 150 meters R.L to 400 meters R.L. (06 M)

C. Compare different types of road signs and draw 3 examples of each. (06 M)

6. A. Find Median & Modal Speed for the following data. Also determine the design speed, upper limit & lower limit speed for the following: (08 M)

Speed Range	Frequency (qi)	Speed Range	Frequency (qi)
0-5	0	25-30	21
5-10	3	30-35	16
10-15	8	35-40	12
15-20	13	40-45	5
20-25	19	45-50	0

B. The radius of curve is 100 m & design speed is 50 kmph. Assume f = 0.15. Calculate superelevation, if full friction is assumed. Also find 'f' if no superelevation is provided. (06 M)

C. Deflection values are found on summer mid-day having test temperature as 42°C. find characteristic deflection for the following data. Also apply the corrections. Assume moisture correction factor as 1.1. (06 M)

Initial	Intermediate	Final	D (mm)
0	37	39	1.22
8	42	43	1.30
0	46	49	1.19

****