

B.TECH.
(SEM VI) THEORY EXAMINATION 2022-23
TRANSPORTATION ENGINEERING

Time: 3 Hours

Total Marks: 100

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

SECTION A

1. Attempt *all* questions in brief.

2 x 10 = 20

- (a) Which are alignments controlling factors?
- (b) Write the modes of transportation their utilize medium.
- (c) Which features affect the geometrics of highway?
- (d) Draw neat sketch of shapes of camber
- (e) Write the modified definition of 'Traffic Engineering'.
- (f) Why traffic surveys are taken to help of geometric design?
- (g) Which type stresses developed in concrete pavements?
- (h) Why in India give the preference of design of flexible pavement?
- (i) What is the difference between Bitumen and road tar?
- (j) Where is prime coat provided?

SECTION B

2. Attempt any *three* of the following:

10x3=30

- (a) Explain the essential requirements which are considered as guiding principles for an ideal highway alignment.
- (b) For ruling design speed and minimum design speed values of 100 km/hr. and 80 km/hr. respectively. Calculate the values of ruling minimum and absolute maximum radius of a horizontal curve of a NH in plain terrain.
- (c) There are two vehicles A and B of weighs 4 tonne and 5 tonne respectively, approaching each other collide at right angles, A from South. After the collision A skids in the direction N 40° W and B in the direction N 60° E. The skid distances of A and B before collision are 36 m and 22 m, respectively, and after collision 16 m and 35m, respectively. If the average skid resistance of the pavement is 0.52, calculate the original speeds of the vehicle.
- (d) Define the specific gravity of bitumen and discuss the two methods of its determination.
- (e) What are the methods of construction of cement concrete roads? Which one is the most popular and why?

SECTION C

3. Attempt any *one* part of the following:

10x1=10

- (a) Briefly outline the main features of various road pattern in common use. Explain with neat sketch block pattern.
- (b) What are the objects of re-alignment? Write the general principles of re-alignment.

4. Attempt any *one* part of the following:

10x1=10

- (a) Give the sketches of the following
 - (i) Cross section of road cutting
 - (ii) Cross-section of divided highway in urban area
- (b) A descending grade of 1 in 30 meets an ascending grade of 1 in 35. Identify the vertical curve and design length of the curve for head light sight distance and comfort requirements. Take the design speed as 80 km/hr. and the allowable rate of change of centrifugal acceleration is 0.65 m/sec^3 .

5. Attempt any *one* part of the following:

10x1=10

- (a) Calculate the spacing between the lighting units from the following data to produce average lux of 5.5. Street width= 16 m , Mounting height =8 m , Lamp size 5000 lumen, Luminaire type =H, Maintenance factor =80 % , $C_u = 0.44$
- (b) What are the factors which are considered to determine the PCU value for a particular class of vehicles?

6. Attempt any *one* part of the following:

10x1=10

- (a) A highway concrete pavements 25 cm thick with transverse joints at 12 m interval and longitudinal joints at 3.6m interval. The modulus of subgrade reaction is 2.8 kg/cm^3 . Determine the warping stress at interior, edge and corner regions taking the following data: Temperature differential for day conditions = 0.5° C/cm slab thickness, Radius of loaded area =15 cm, Thermal coefficient of concrete = $10 \times 10^{-6} / ^\circ \text{ C}$, Modulus of elasticity of concrete = $3 \times 10^5 \text{ kg/cm}^2$, Poisson's Ratio=0.15.
- (b) Briefly describe the three tests which are carried out in Hveem method. How the Hveem method of bituminous mix design is different from the Marshall method?

7. Attempt any *one* part of the following:

10x1=10

- (a) Differentiate between joint filler and sealing compound. Name the few sealing compounds and their characteristics.
- (b) How will you conduct the arrangement of transverse joint? Explain with neat sketch.