

(3 Hours)

[Total Marks: 80]

- N. B.** 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.** Draw cross section of rigid pavement and explain the function of each layer  
**B.** Explain AADT and ADT.  
**C.** Explain types of highway maintenance  
**D.** Discuss on surveys for highway alignment  
**E.** Explain various types of gradients.
- 2 A.** Write note on (08 M)  
 i. Modulus of subgrade reaction  
 ii. ESWL  
**B.** Discuss on Mandatory signs (06 M)  
**C.** A bridge is proposed above a river having discharge of  $250 \text{ m}^3/\text{sec}$ , Lacey's Silt factor is 1.00 find the scour depth when: a) 4 span of 20 m each and b) 3Span of 20 m each is used. (06 M)
- 3 A.** Derive formula for Stopping Sight Distance. Also calculate SSD for 1way road having design speed of 80 kmph. Reaction time is 2.5 sec (08 M)  
**B.** What is VDF? Give its value for different road widths. (06 M)  
**C.** What are the assumptions for economical span? Write steps for calculating economical span (06 M)
- 4 A.** Compare the following (09 M)  
 i. Running and Journey speed  
 ii. On-street and off-street parking  
 iii. At-grade and grade separated intersections  
**B.** Explain the following: (06 M)  
 i. Seal coat and tack coat  
 ii. Subgrade  
 iii. Tyre pressure  
**C.** What is Camber? Explain its types. (05 M)
- 5 A.** Find out the warping stress of 25 cm thick CC pavement with transverse joint at 5 m & longitudinal joint at 3.6 m interval. Take  $k = 6.9 \text{ kg/cm}^3$ ,  $a = 15 \text{ cm}$ , temperature difference is  $0.6^\circ\text{C}/\text{cm}$  slab thickness in day, temperature difference is  $0.4^\circ\text{C}/\text{cm}$  slab thickness in night. Take  $E = 3 \times 10^5 \text{ kg/cm}^2$ ,  $e = 10 \times 10^{-6}/^\circ\text{C}$ ,  $l = 87.2 \text{ cm}$ . (10 M)  
**B.** What is the objective of providing drainage? (05 M)  
**C.** Explain various types of bearings. (05 M)
- 6 A.** Write a detail note on Benkelman beam (10 M)  
**B.** Explain 30<sup>th</sup> HHV (05 M)  
**C.** Explain penetration test on bitumen (05 M)