

(3 Hours)

[ Total Marks: 80

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

- Solve any four** (20 M)
  - Discuss on the Role of IRC, MORTH and CRRI
  - Compare Bitumen, Tar and Asphalt
  - What is L.O.S? explain various L.O.S.
  - The value of characteristic deflection is 2.35 mm, find the corrected Characteristic value if temperature of pavement during test was 29°C and Moisture correction factor is 1.2.
  - Find vehicle damage factor for:
    - Bike with 2 Occupants
    - Car with 4 Occupants
    - LCV with rear axle load of 2 tons
    - HCV with rear axle load of 15 tons
- A. Determine Median & Modal Speed for the following data. Also determine the design speed, upper limit & lower limit speed. (08 M)

Speed Range (KMPH)	Frequency (qi)
0-8	0
8-16	8
16-24	12
24 – 30	21
30 – 36	29
36 – 42	35
42 – 48	28
48 – 54	11
54 – 60	0

- Discuss in detail on desirable properties of pavement materials (06 M)
- Compare the following (06 M)
  - AADT and ADT
  - Journey Speed and Running Speed
  - Space headway and Time headway
- A. What is Lane distribution factor? Give its value. Also determine Million Standard Axle for divided road having 3 lanes with initial traffic 600 cvpd during start of construction. Rate of growth is 7.5 %, VDF is 2.5, CBR is 4 %, construction period is 2 years & design life is 15 years. (08 M)

- B. Two cars are travelling at 35 kmph on a road with coefficient of friction 0.2. Driver of car 1 has reaction time 2.5 sec and driver of car 2 has 2.0 sec. If in case both cars stop at same distance from first seeing obstacle, determine break efficiency of car 1, if that of car 2 is 0.3. (06 M)
- C. Explain Construction procedure of Cement concrete pavement in detail (06 M)
4. A. Derive the equation for Overtaking Sight Distance. Also draw sketch of overtaking zone if the speed of vehicle is 65 KMPH. (08 M)
- B. Compare rigid, flexible and WBM pavement on the basis of suitability, Binding material used, load distribution, value of camber and maintenance required (06 M)
- C. Design a tie bar for pavement width 3.5 m & thickness of pavement 26 cm. Assume value of  $f = 1.2$  (06 M)
5. A. Design Super-elevation for a curve having radius 500 m & speed is 100 kmph. Also find the amount of super-elevation to be given if it is a 2-lane road. (08 M)
- B. Find out the warping stress of 25 cm thick CC pavement with transverse joint at 5 m & longitudinal joints at 3.6 m interval. Take  $k = 6.9 \text{ kg/cm}^3$ ,  $a = 15 \text{ cm}$ , temperature difference is  $0.6^\circ\text{C/cm}$  slab thickness in day. Take  $E = 3 \times 10^5 \text{ kg/cm}^2$ ,  $e = 10 \times 10^{-6}/^\circ\text{C}$ , Radius of relative stiffness = 87.2 cm. (06 M)
- C. Discuss on various rigid pavement failures. (06 M)
6. A. **Write short note on any 3.** (15 M)
- i. Setback distance
  - ii. Highway drainage
  - iii. Rotary Island
  - iv. Bitumen stabilization
- B. **Answer the following**
- i. What is meant by Abrasion Charges? (01 M)
  - ii. Discuss on Golden Quadrangle project. (02 M)
  - iii. Define Flaky and Elongated Aggregates. (02 M)