

(3 Hours)

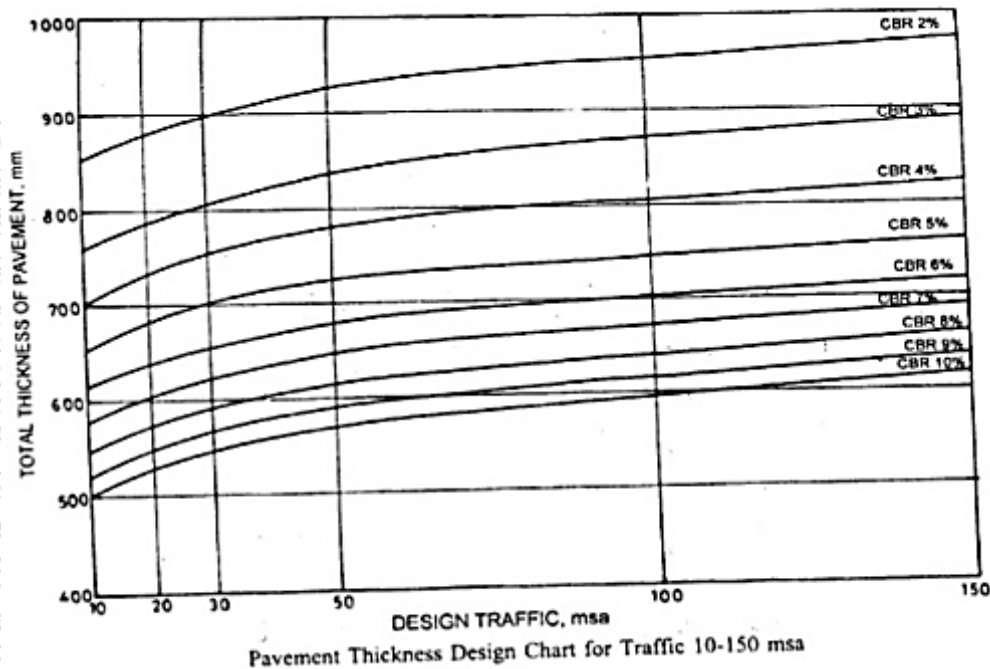
[Total Marks: 80

- 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. Explain the classification of Urban roads
 - B. What is Overlay? Discuss on its types.
 - C. Explain Cement Stabilization
 - D. Determine the percentage of reduction in SSD if the road having 10% gradient is replaced with a levelled road. Assume design speed as 60 KMPH and $f=0.15$.
 - E. Compare SMS and TMS. Also, if the spot speeds are 50, 40, 60, 54, & 45, then find out Space Mean Speed and Time Mean Speed

2. A. For a pavement thickness of 26 cm & 12 tons single axle load, M40 grade of concrete, Radius of relative stiffness = 62.2 cm, $E = 2 \times 10^5 \text{ kg/cm}^2$, $Mc = 41500 \text{ kg/cm}^3$, width of joint (z) = 1.8 cm, Design the Dowel bar. (08 M)
- B. Determine characteristic deflection for the following readings taken on a road having traffic 1800 cvpd. 1.48, 1.62, 1.40, 1.28, 1.32, 1.71, 1.63, 1.22, 1.13, 1.53. (06 M)
- C. Explain the desirable properties of aggregate and discuss any 1 test in detail (06 M)

3. A. Design a pavement for construction of new bypass for single lane having initial traffic 600 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. Use design chart provided below. (08 M)



- B. Discuss on types of conflict points and measures to reduce it. (06 M)
- C. What is grade compensation? Also, if the ruling gradient on stretch of road is 6 % and radius of road is 60 m, Find the grade compensation to be given and the compensated gradient. (06 M)
4. A. Derive equation for extra widening on curve. Also, for a 7 m wide road having curve of radius 200 m, if the length of wheel base is 6.5 m, find the extra widening required for the design speed of 65 kmph. (08 M)
- B. What are objectives of providing surface drainage? Also discuss modes used for it. (06 M)
- C. Discuss on (06 M)
- i. Radius of relative stiffness
 - ii. Modulus of subgrade reaction
 - iii. Contact pressure and tyre pressure
5. A. A cyclist while travelling on 3 km road observed that he took 6 mins 32 sec however he had a stop for water for 1min 10 sec. He also observed that 25 vehicles had overtaken him however he couldn't overtake any. Further he observed that 280 vehicles pass in opposite direction. Assuming that number of vehicles passing and stopping time in both directions was same, find the average Journey and running speed of the cyclist. (08 M)
- B. If the spacing between contraction joints is 4.2 m, Coefficient of friction between the interfaces is 1.1, Unit weight of cement concrete is 2400 kg/cm^3 , find the stress due to friction. (06 M)
- C. Compare Cement concrete, Bituminous concrete and WBM roads (06 M)
6. A. Write short note on any 3. (15 M)
- i. O&D Survey
 - ii. Benkelman beam
 - iii. 30th Highest Hourly Volume
 - iv. Cutback and emulsion
- B. Answer the following
- i. If the softening point of 2 samples are 32^0 and 60^0 , which sample will you use on site and why? (01 M)
 - ii. Determine Vehicle damage factor for an Autorickshaw with 3 passengers if the standard wheel load is 5100 Kg. (02 M)
 - iii. Discuss on BUC and TDC (02 M)