



- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.

1. a) Compare Highways with Airways Pavements. **8**
 b) Estimate “ESWL” for dual wheel assembly having total Load of 5100 kg at 5.6 kg/cm^2 tyre Pressure. Clear spacing of rubble is 12cm. Assume pavement thickness=55cm & 95cm. **8**

OR

2. a) State and explain in brief various factors affecting design of pavements. **8**
 b) From the traffic volume data for a highway. Compute total fatigue in terms of standard axle is 18 year Period. Assume growth rate of traffic as 7.8% Per annual and delay in opening to traffic 2 years. **8**

Axle load group (kg)	Present ADT	Load Eq. Factor
<1000	165	0.0025
1000-3000	210	0.03
3000-5000	178	0.35
5000-7000	156	0.6
7000-9000	193	1.00
9000-11000	105	2.32
11000-13000	87	4.5
13000-15000	62	7.6
>15000	08	12.8

3. a) Explain CBR test with its advantages and limitations. **8**
 b) Calculate cone bearing value from following data and hence design the pavement thickness. **8**

Load (Kg)	Penetration (mm)	Half Angle of cone
4.5	15.2	
9.0	31.7	7°45'
18.0	51.3	
36.0	68.3	

OR

4. a) Estimate the group index of sub-grade soil from following data: **8**
 Passing 425 micron=90%
 Passing 75 micron = 70%
 Liquid limit = 45%. Plastic limit = 20% also discuss its significance in the classification of subgrade material.
 b) Write short notes on Marshall method of mix design. **8**

5. a) A plate load test was conducted with 30cm diameter plate on a subgrade which records 5mm deflection with type pressure of 3.6kg/cm^2 . The test when conducted on 20cm thick base course constructed over the subgrade with tyre pressure of 6.8kg/cm^2 undergoes same deflection. Find out the deflection of pavement system for a wheel load of 5200kg with tyre pressure of 6.5kg/cm^2 with 30cm thick base Course $\mu_s = 0.35$. 12
- b) Write a short note on Burmister's method. 4
- OR**
6. a) Explain in detail design of expansion joints and longitudinal tie bar joint for rigid pavement. 6
- b) Design a rigid pavement for two lane highway from the given data: 10
- i) Wheel load = 5100kg
 - ii) Tyre pressure = 5.6kg/cm^2
 - iii) Grade of concrete = M30
 - iv) Modulus of subgrade reaction = kg/cm^3 .
 - v) $C_x = 0.92$, $C_y = 0.72$.
 - vi) Temperature gradient = 0.55°C/cm
 - vii) Projected traffic = 3700 CVD
- Assume any other required data suitable.
7. a) Explain LCN system of rigid pavement design. 6
- b) From yield line theory, what is maximum aircraft gear load a rigid pavement of 350mm thickness can carry at critical areas of tyre contact radius of 220mm? Grade of concrete is M30 and 'k' of subgrade soil is 7.8kg/cm^3 . 10
- Assume any other data if required and clearly mention the same.
- OR**
8. a) Explain the federal aviation administration method for airfield pavement. 8
- b) Write short note on 8
- i) FAA method
 - ii) IRC Method for flexible pavement design.
9. a) With a neat sketch explain Benkelman beam deflection method. 6
- b) Explain the term overlays for flexible & rigid pavement. 5
- c) Explain field density. 5
- OR**
10. a) Write short notes on rehabilitation of pavement. 6
- b) Write down the general cause of pavement failure. 5
- c) Write a short note on profilometers. 5
