



- Notes :
1. All questions carry equal marks.
 2. Answer all questions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, steam tables, Mollier's Chart, Drawing Instruments, Thermodynamic tables for moist air, psychometric charts and refrigeration charts is permitted.

1. a) Clearly distinguish between Highway and Airfield Pavements. 8
- b) Discuss the effects of repeated application of loads on pavement. Explain equivalent wheel load factors for load repetitions. 8

OR

2. a) Estimate the ESWL for dual – in tendon wheel assembly for an aircraft Data : 8
 - i) Gear Load = 26800 kg
 - ii) Tyre Pressure = 10.6 kg/cm²
 - iii) Dual spacing = 225 mm clear
 - iv) Tendon spacing = 350 mm clear
 - v) Flexible crust thickness = 550, 750, 900 mm
- b) Clearly distinguish between flexible and rigid pavements. 8
3. a) A plate load test was conducted on a sub grade and also on 20cm thick base with 30cm dia. Plate, Pressure for 5mm deformation in both tests was recorded as 2.3 kg/cm² and 4.5kg/cm² respectively. For a flexible Pavement of 30 cm base course, find the pavement deformation and vertical & radial stress. Under the load of 5100kg of wheel acting with a Tyre pressure of 6.2kg /cm². Assume $\mu_s = 0.38$ 8

- b) i) % of soil passing through 75 micron = 65% 8
 - ii) Liquid limit = 55%
 - iii) Plastic limit = 20%
- Find GI of soil & classify soil. Also state the applications of group index.

OR

4. a) The following results were noted in a laboratory CBR tests conducted on subgrade soil: 16

Penetration (mm)	0	0.5	1.0	1.5	2	3	4	5	7	7.5	10	12.5
Load (kg)	0	6	18	32	50	60	65	75	80	90	95	100

It is desired to use the following materials for different pavement layers:

- i) Compacted soil subgrade having CBR = 10%
- ii) Poorly graded gravels having CBR = 22%
- iii) Well graded gravels having CBR = 90%

The traffic survey indicates present ADT of commercial vehicle as 1400 with construction period of 2 years. The design life is 10 years with the expected traffic growth rate of 10%. Suggest the suitable crust composition with neat sketch.

5. a) Explain AASHTO method of flexible pavement design. 8

- b) Explain P.C.A. method of design of rigid pavement with neat sketches of charts. 8

OR

6. Design a flexible pavement for design traffic volume of 3770 CVD, if the permissible deflection of 0.5 cm by Triaxial method. Data Given: 16
- i) Wheel load = 6200 kg.
 - ii) Tyre pressure = 6.6 kg/cm^2
 - iii) Annual Rainfall = 92 cm
 - iv) Modulus of elasticity of : subgrade = 80 kg/cm^2
Sub base = 415 kg/cm^2 Base = 1950 kg/cm^2
 - v) Bituminous surfacing = 4400 kg/cm^2
 - vi) Traffic coefficient = $8/6$
 - vii) Rainfall coefficient = 0.9
7. a) Write short note on LCN method of Airfield pavement design. 6
- b) Estimate the load factor at all the regions of runway concrete pavement of 275 mm thickness under ESWL = 26,000 kg at 10.5 kg/cm^2 tyre pressure. 10
Assume grade of concrete M : 300 and K for subgrade soil = 8.0 kg/cm^3
Also locate the position of failure and draw failure pattern

OR

8. Check the Adequacy of rigid pavement from IRC criteria. 16
- i) Slab thickness 150 mm
 - ii) 'E' for concrete = $3 \times 10^5 \text{ kg/cm}^2$
 - iii) Poisson's ration of concrete 0.15
 - iv) Thermal Expansion coeff. $10 \times 10^{-6} / ^\circ\text{C}$
 - v) MOR of concrete 48 kg/cm^2
 - vi) Anticipated thermal Gradient across slab $0.5 ^\circ\text{C/cm}$.
 - vii) 'K' for subgrade soil $6.5 \text{ kg/cm}^2/\text{cm}$
 - viii) Cx and Cy 0.82 and 0.45 respectively.
 - ix) Wheel load (ESWL) 5100 kg.
 - x) Tyre pressure = 6.0 kg/cm^2
- Assume any other data suitable if necessary.
9. Write short notes on **any three**. 16
- i) Profilometers.
 - ii) Present serviceability Index.
 - iii) Condition survey.
 - iv) Benkelman Beam deflection Test.

OR

10. a) What are the various ways for strengthening of pavements? 8
- b) Write short note on repair, maintenance and rehabilitation of pavements. 8
