B.E.(with Credits)-Regular-Semester 2012 - Civil Engineering Sem. VIII

CE806 - Elective-III : Pavement design

P. Pages : 4 **GUG/W/16/7022**

Time : Three Hours * 4 8 1 0 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Answer **all** questions.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Diagrams and Chemical equation should be given wherever necessary.
6. Illustrate your answers wherever necessary with the help of neat sketches.
7. Non programmable calculator is permitted.

1. a) Compare Flexible payment with Rigid pavements. **8**

b) Estimate "ESWL" for Dual wheel assembly having total load of 5100kg at 5.6 kg/cm^2 tyre pressure clear spacing of double is 12cm. Assume pavement thickness = 55 cm and 95cm. **8**

OR

2. a) From a traffic volume data for highway, compute total fatigue in terms of standard axle in 18 yrs period. Assume traffic growth rate of 7.5% per annum and delay to opening of traffic as 2 years. **8**

Axle load (kg)	ADT	Eq. Factors
1100	92	0.002
2100	131	0.003
4100	56	0.025
6100	121	0.33
8100	147	1.00
10,100	32	1.70
14,100	27	4.25
714100	20	7.46

b) Draw a neat c/s of flexible pavement ? Explain the function of each component layer of flexible pavement. **8**

3. a) Explain with a neat sketch North Dacota Cone test and discuss its utility. **8**

b) Explain briefly the steps in Marshall's method of Bituminous mix design. **8**

OR

4. a) Estimate the group index of subgrade soil from the following data and discuss the rating as subgrade. **10**

i) Passing 425m sieve =75%

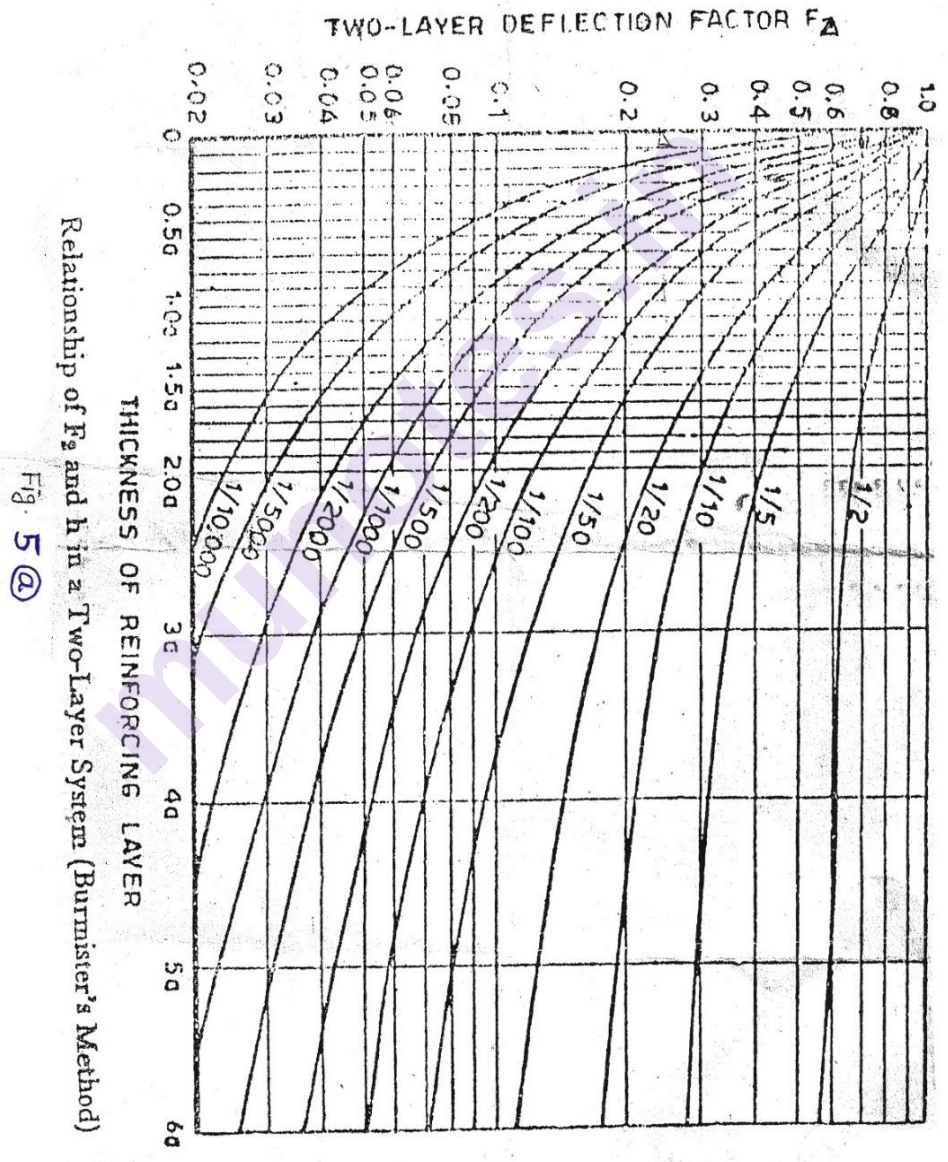
ii) Passing 75m sieve =60%

iii) Liquid Limit =51%

iv) Plastic limit =28%

b) Define Modulus of subgrade reaction ? Discuss its utility in the design of pavement ? **6**

5. a) Plate bearing test conducted with 30cm diameter plate on subgrade sustained a load of 1250 kg at 0.25cm deflection. The test when carried out on a base course of thickness 18cm sustained a load of 5500 kg at 0.25cm deflection. Design the pavement section for wheel load of 5100kg with tyre pressure of 7.2 kg/cm^2 using Burmister's approach for an allowable deflection of 0.5cm **10**
(Refer chart given in fig. 5 a)



Relationship of F_2 and h in a Two-Layer System (Burmister's Method)

Fig. 5 @

b) Explain "AASHTO" method for Rigid pavement. **6**

OR

6. The CBR test carried out on a subgrade soil gave the following readings. **16**

Penetration (mm)	0.0	0.5	1.0	1.5	2.0	2.5
Load (kg)	0.0	4.0	14.0	30.0	41.0	50.0
Penetration (mm)	3.0	4.0	5.0	7.5	10	12.5
Load (Kg)	58	70	77.5	93.2	102.5	110.8

The different pavement materials available near the construction site are as follows.

i) Sand soil of CBR = 15%

ii) Soil Kankar Mix of CBR = 25%

iii) Crushed Gravel of CBR = 90%

Design a flexible pavement if initial traffic is 320 CVD traffic growth rate is 7.2% and design life of pavement 20 yrs. Minimum bituminous surfacing be 5cm.

(Refer chart given in fig 6)

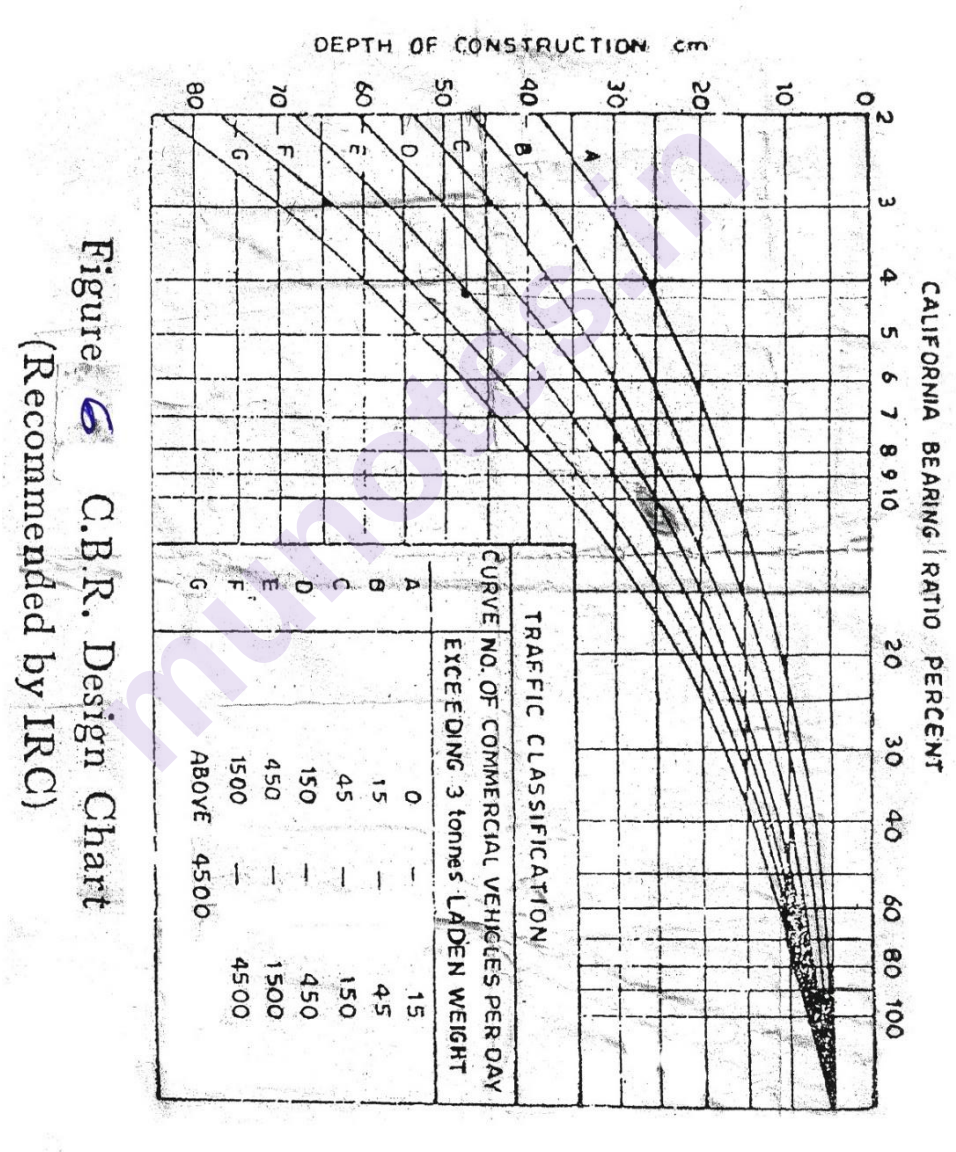


Figure 6 C.B.R. Design Chart (Recommended by IRC)

7. a) Explain "Mcleod" method of design for air field pavement. **8**

b) Explain "FAA" method of pavement design. **8**

OR

8. a) Explain "PCA" method of Rigid pavement design. **8**

b) From yield line theory, what maximum Aircraft Gear load a rigid pavement of 350mm thickness can carry at critical areas of tyre contact radious of 220mm ? Grade of concrete is M300 and "K" of subgrade soil is 7.8 $kg/cm^2/cm$. Assume any other data if required and clearly mention the same. **8**

9. a) Explain in detail "overlay" and their pavement design. **10**

b) Write a note on "Profilometers". **6**

OR

10. a) What are the various types of failure in flexible pavements ? **8**

b) Write a brief note on "maintenance of Highway pavements". **8**

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