Total No. of Questions : 12]

SEAT No. :

P5074

[Total No. of Pages :15

[4959] - 22

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(2008 Pattern) (Elective - IV)

Time :4. Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Q 1 or Q2, Q3 or Q 4, Q5 or Q6 and soon***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain the concept of "zoning"and how it is useful in traffic and transportation planning, with a neat labelled sketch. **[6]**

b) Explain "Household survey" and its importance in traffic characteristics forecasting. Explain detail procedure. **[12]**

OR

Q2) a) Explain " O - D " matrix and its atility with an example. **[6]**

b) Explain "Manual traffic counts survey" with an example considering PCU equivalences. Also elaborate on moving vehicle method. **[12]**

Q3) a) Elaborate on any 5 problems of the urban transportation systems, which are faced by planners. **[10]**

b) Discuss salient features of the proposed "Bullet train" project sanctioned by the Indian Government. **[6]**

OR

Q4) a) Highlight any 5 simple solutions to the existing problems of the pune city traffic movement, in detail. **[10]**

b) Discuss the salient features of the proposed "Mumbai - Nagpur superfast expressway project sanctioned by the Maharashtra Government. **[6]**

[redacted]

P.T.O.

Q5) a) Discuss the cost categories which are considered which working out the total cost of any transportation system option, based on examples. **[10]**

b) Explain benefits of public private partnerships (PPP) in transport planning. **[6]**

OR

Q6) a) Compare ARR method with IRR and suggest which method is suitable for evaluating the economic appraisal of a proposed new road designed for 20 years. Explain both methods. **[10]**

b) Discuss limitations of BOT types of financial mechanisms, with examples. **[6]**

SECTION - II

Q7) Explain with sketches:

a) OD surveys. **[6]**

b) Grade separated intersections design aspects. **[6]**

c) Parking surveys. **[4]**

OR

Q8) Discuss the various factors involved in:

a) Signal design including the synchronization aspects. **[8]**

b) Use of instrumentation systems for traffic monitoring and control. **[8]**

Q9) Explain the design philosophy of flexible pavements as well as the overlays on them, based on IRC-37, IRC-81 codes as well as the Benkelmen Beam Surveys. **[18]**

OR

Q10) With neat labelled sketches explain the various types of distresses which occur in the rigid pavements. Explain how the pavement condition rating is done and how the pavement condition index is used in the management of pavement distresses? Discuss advantages of rigid pevements over other types. **[18]**

Q11) Design a rigid pavement as per IRC-58 based on the following data: **[16]**

a) 2 way CVPD = 4000

b) Flexural strength of concrete = 45 kg/cm^2

c) Effective modulus of subgrade reaction = 13.5 $kg/cm^2/cm$ length

d) Elastic Modulus of concrete = 3.5×10^5 kg/cm^2

e) Poissons ratio = 0.18

f) Coefficient of Thermal expansion of concrete = 10×10^{-6} per ° centigrade

g) Tyre pressure = 9 kg/cm^2

h) Traffic growth rate = 7%

i) Design life = 20 years

j) Spacing of contraction joints = 4.0 m

k) Slab width = 3.5m

l) Load safety factor = 1.02

m) Maximum Temperature difference between the top and bottom of the slab = 24°C

n) Centre to centre distance between tyres = 36 cms

o) Axle Load spectrum is as follows:

Single Axle Loads		Tandem Axle Loads	
Load in Tons	%	Load in Tons	%
20	0.8	36	0.3
18	1.1	32	3.0
16	3.8	28	4.0
14	12.0	24	4.0
12	18.0	20	2.0
10	24.0	16	1.0
less	25.0	Less than 16	1.0

p) Trial thickness = 32 cms

q) Use following table if required:

L/*l* or B/*l*	C	L/*l* or B/*l*	C
1	0.000	7	1.035
2	0.042	8	1.075
3	0.178	9	1.085
4	0.445	10	1.080
5	0.725	11	1.060
6	0.925	12	1.000

Check whether the pavement is safe for

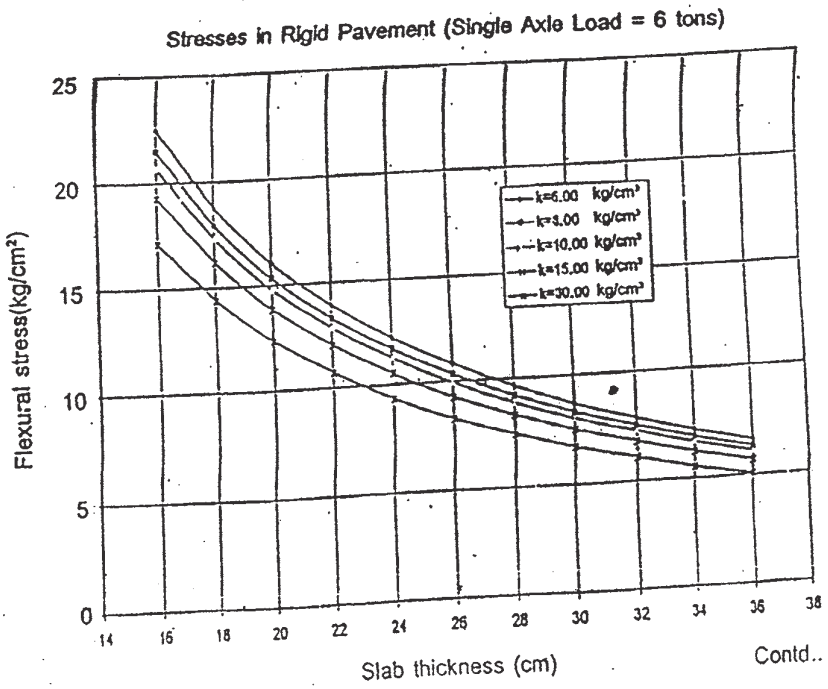
i) Critical condition with dowel bars and

ii) Critical condition without dowel bars

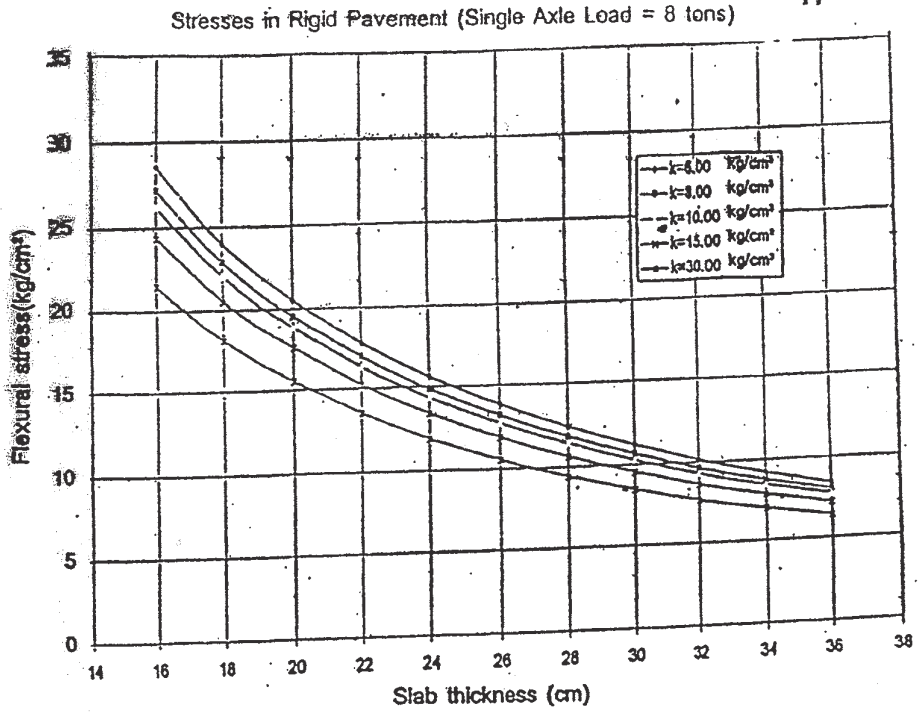
Design the pavement for withstanding all the other critical pavement conditions.

OR

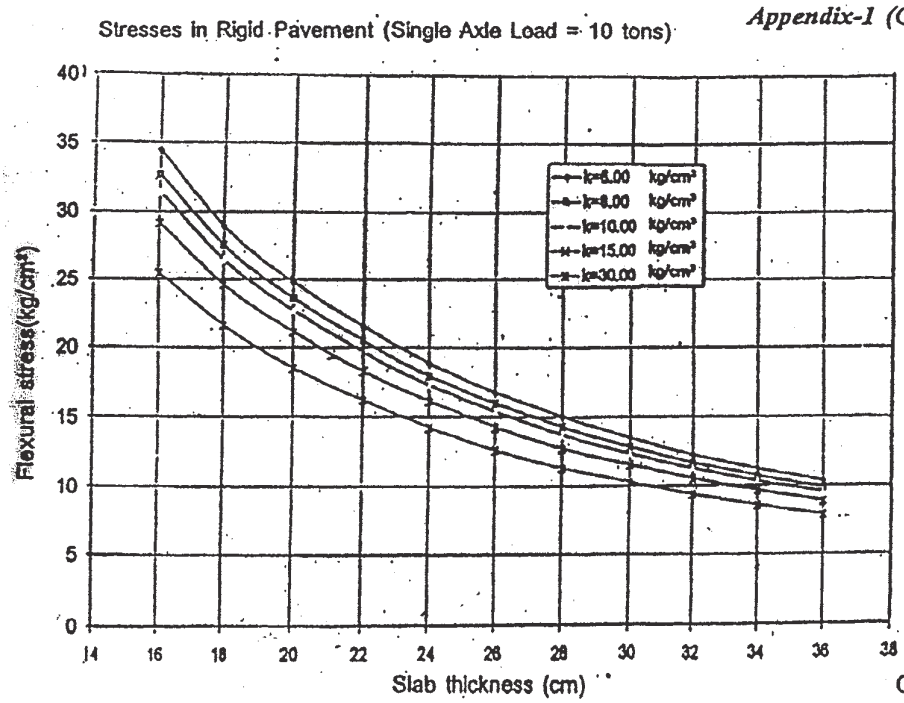
Q12) Design the rigid pavement using the data mentioned in Q11, except for the fact that the CVPD (Two way) is decreased by 25%. **[16]**


Stresses in Rigid Pavement (Single Axle Load = 6 tons)
Flexural stress(kg/cm²)
25
20
15
10
5
0
14
16
18
20
22
24
26
28
30
32
34
36
38
Slab thickness (cm)
k=6.00 kg/cm³
k=8.00 kg/cm³
k=10.00 kg/cm³
k=15.00 kg/cm³
k=30.00 kg/cm³

Contd..


Stresses in Rigid Pavement (Single Axle Load = 8 tons)
Flexural stress(kg/cm²)
Slab thickness (cm)
k=6.00 kg/cm³
k=8.00 kg/cm³
k=10.00 kg/cm³
k=15.00 kg/cm³
k=30.00 kg/cm³

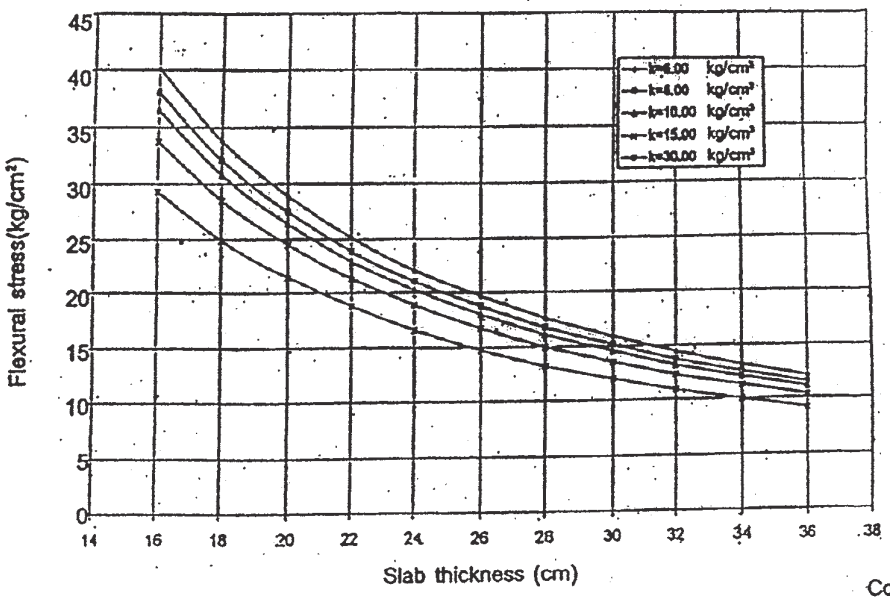
Contd..


Stresses in Rigid Pavement (Single Axle Load = 10 tons)
Flexural stress(kg/cm²)
Slab thickness (cm)
k=6.00 kg/cm³
k=8.00 kg/cm³
k=10.00 kg/cm³
k=15.00 kg/cm³
k=30.00 kg/cm³

Contd..

Appendix-1 (Contd.)

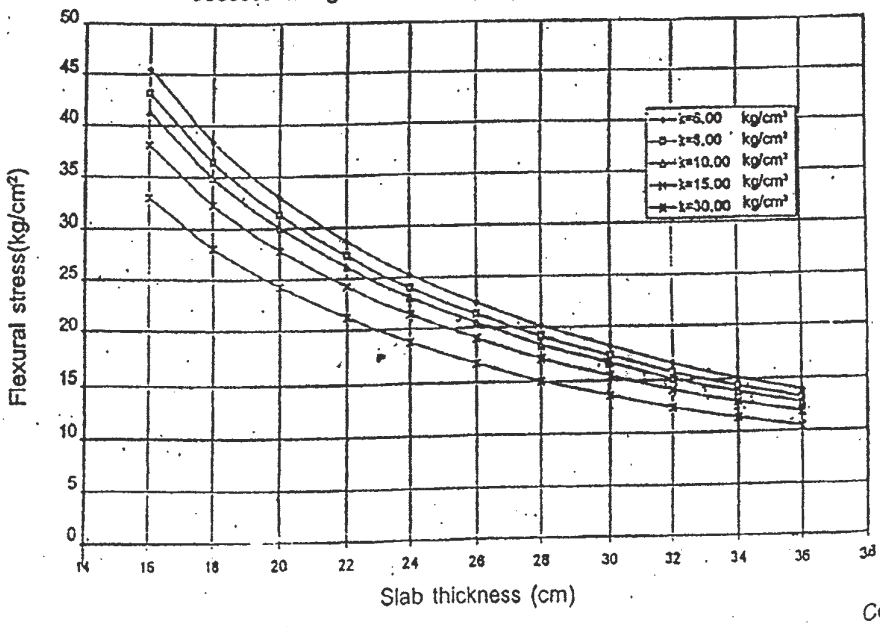
Stresses in Rigid Pavement (Single Axle Load = 12 tons)



Contd..

Appendix-1 (Contd.)

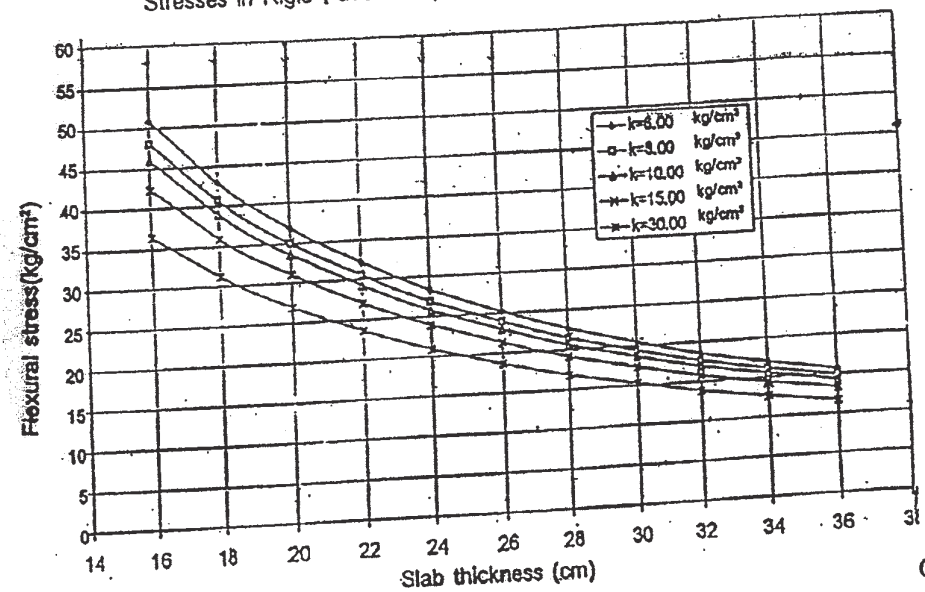
Stresses in Rigid Pavement (Single Axle Load = 14 tons)



Contd..

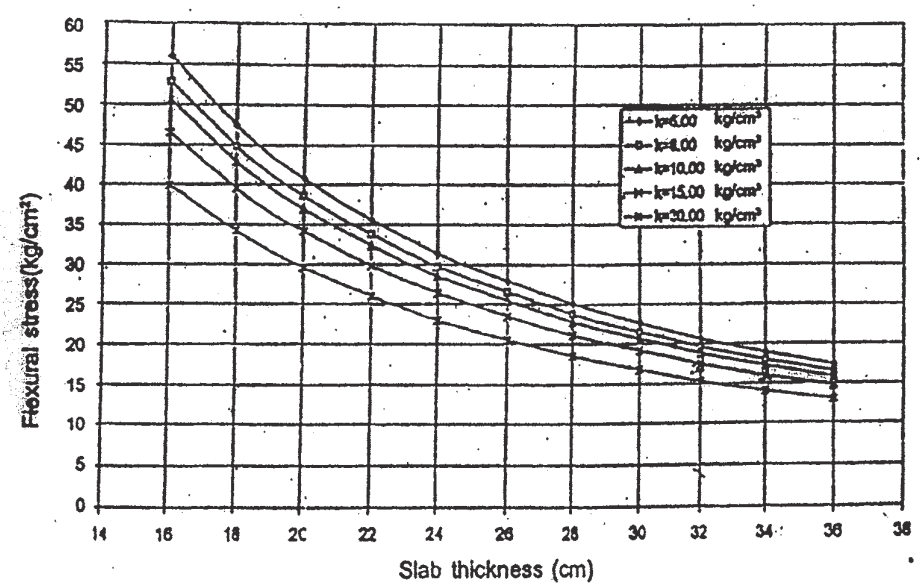
IRC:58-2002

Stresses in Rigid Pavement (Single Axle Load = 16 tons)



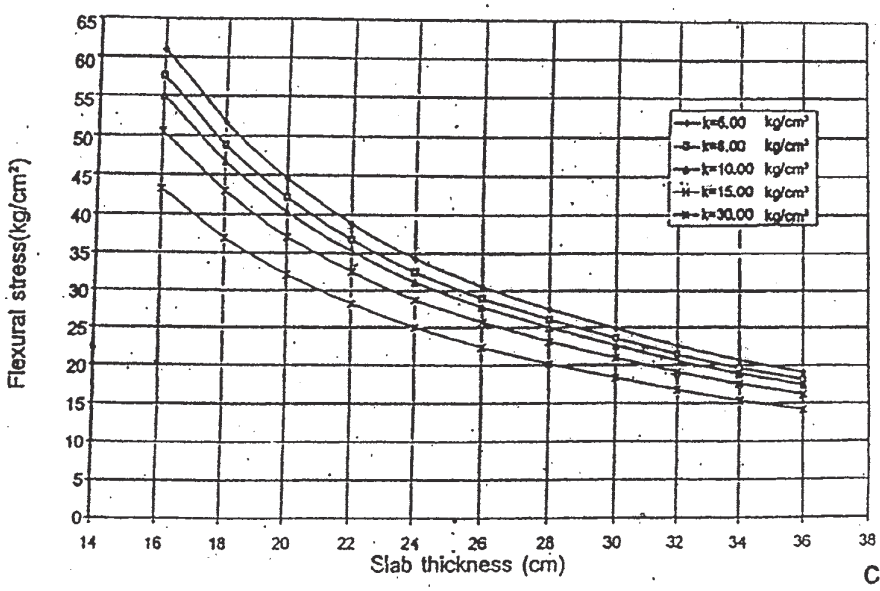
Contd..

Stresses in Rigid Pavement (Single Axle Load = 18 tons)



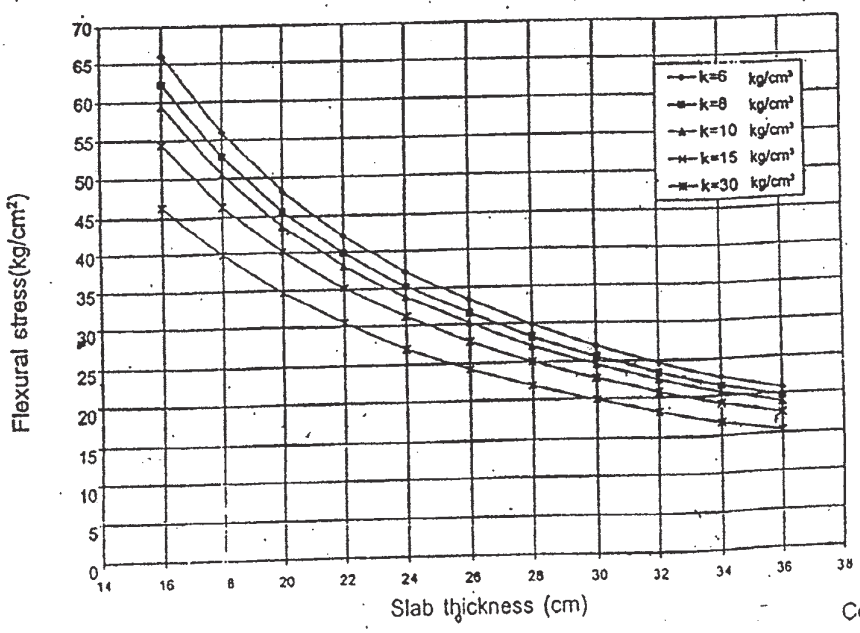
Contd..

Stresses in Rigid Pavement (Single Axle Load = 20 tons)



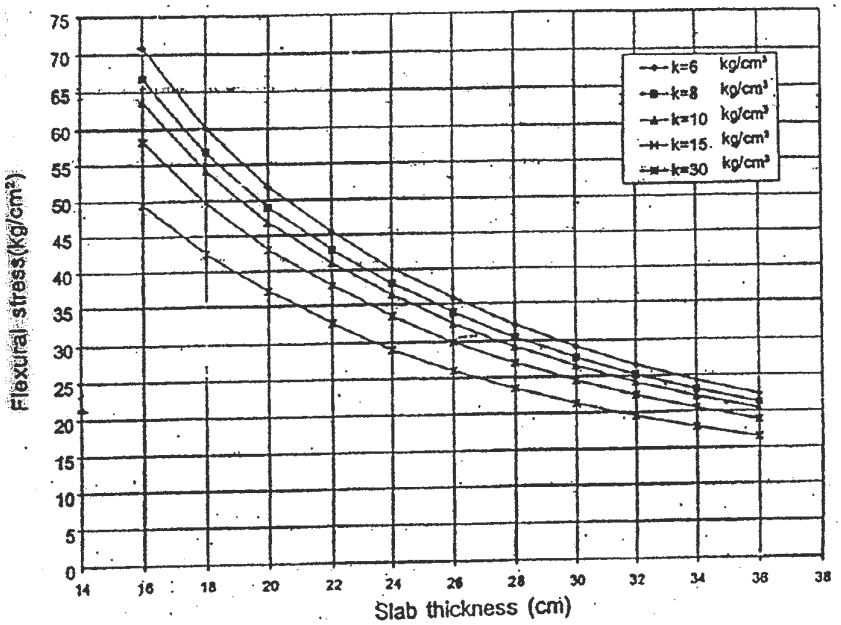
Contd..

Stresses in Rigid Pavement (Single Axle Load = 22 tons)



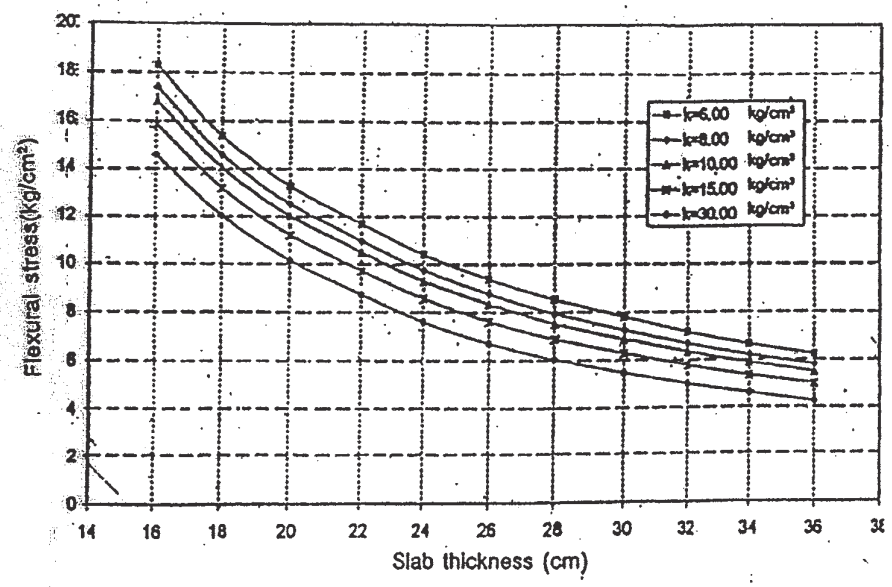
Contd..

Stresses in Rigid Pavement (Single Axle Load = 24 tons)



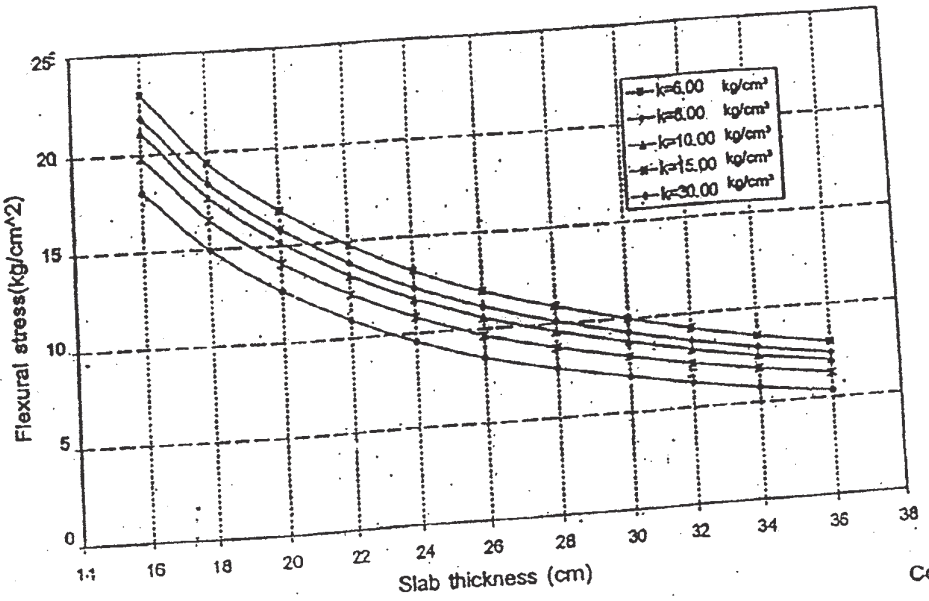
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 12 tons)



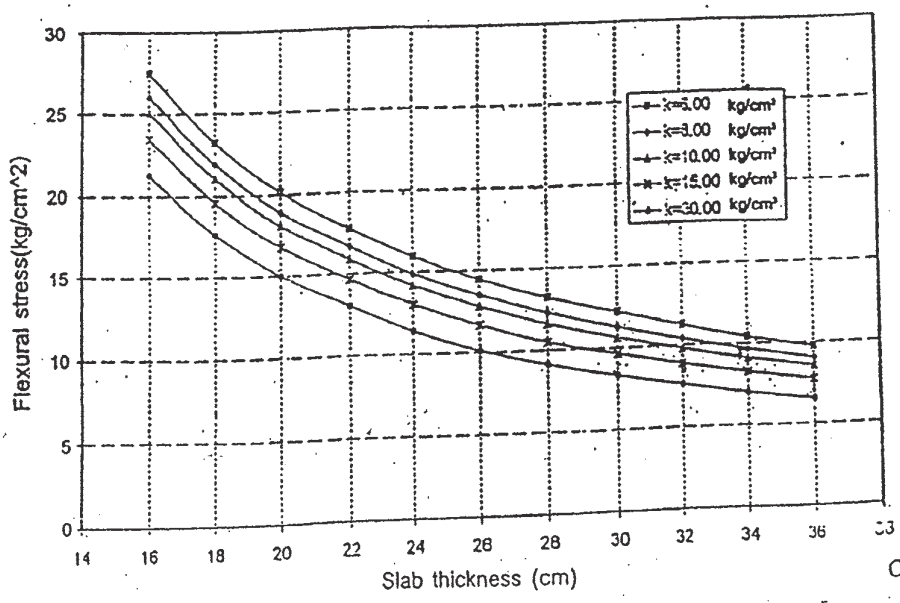
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 16 tons)



Contd..

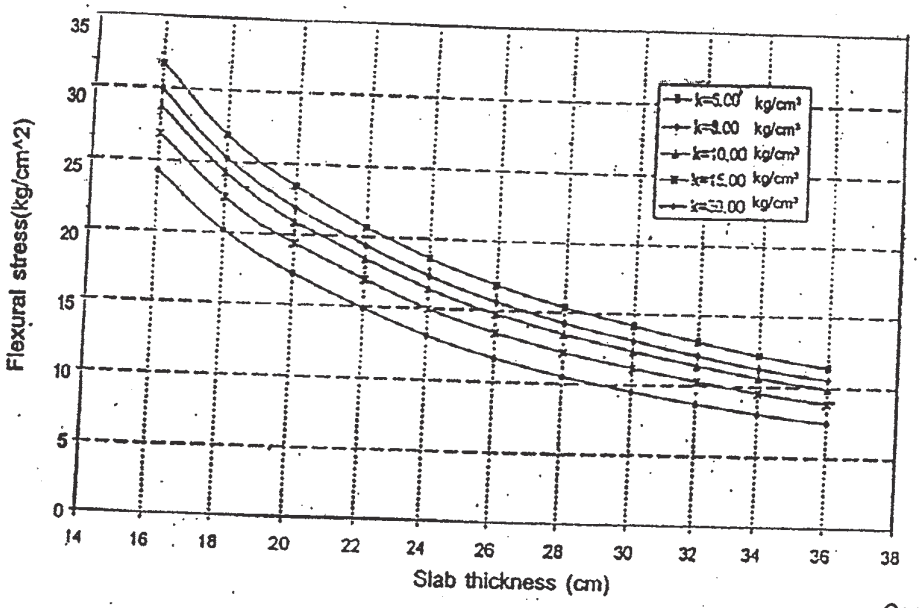
Stresses In Rigid Pavement (Tandem Axle Load 20 tons)



Contd..

Appendix-1 (Contd.)

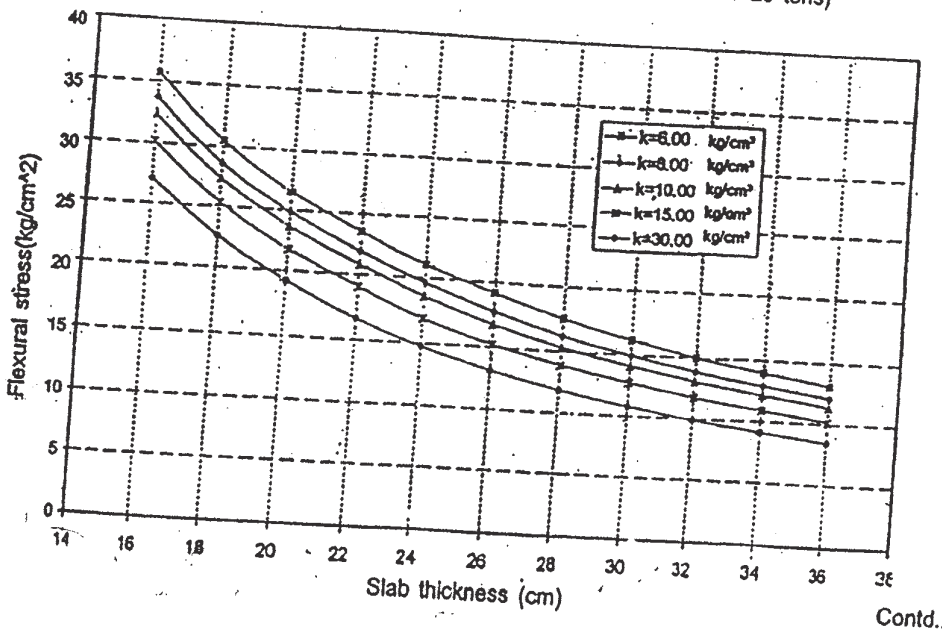
Stresses in Rigid Pavement (Tandem Axle Load 24 tons)



Contd..

Appendix-1 (Contd.)

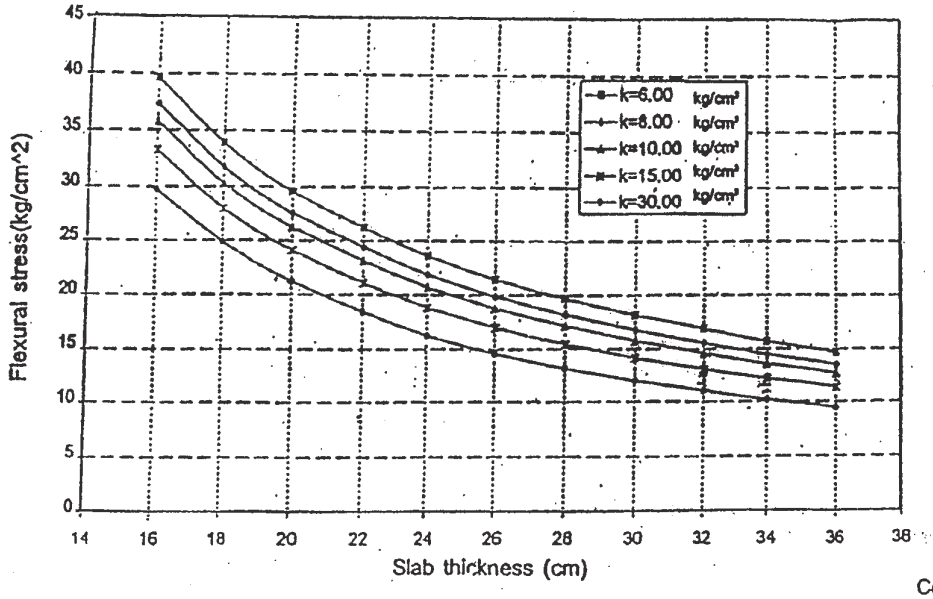
Stresses in Rigid Pavement (Tandem Axle Load 28 tons)



Contd..

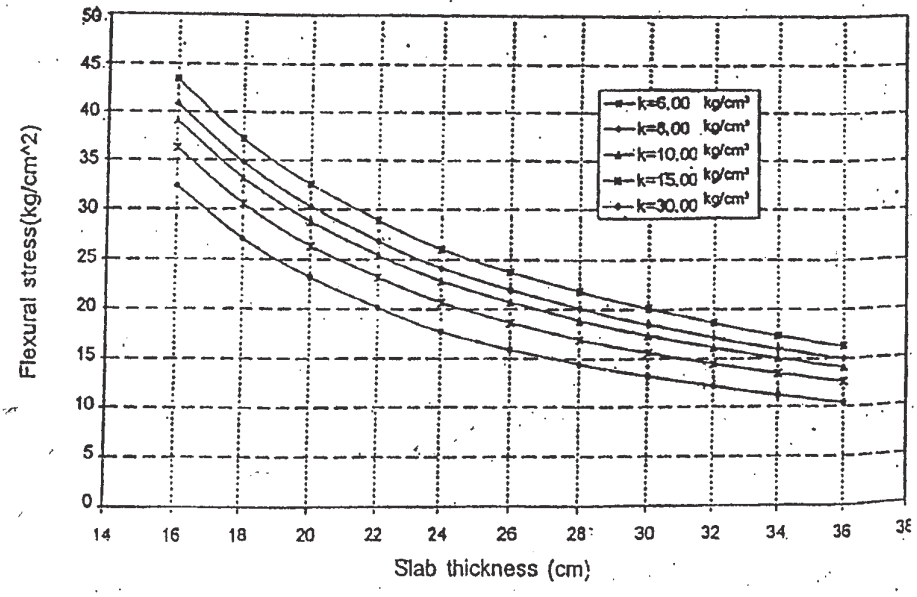
IRC:58-2002

Stresses in Rigid Pavement (Tandem Axle Load 32 tons)



Contd..

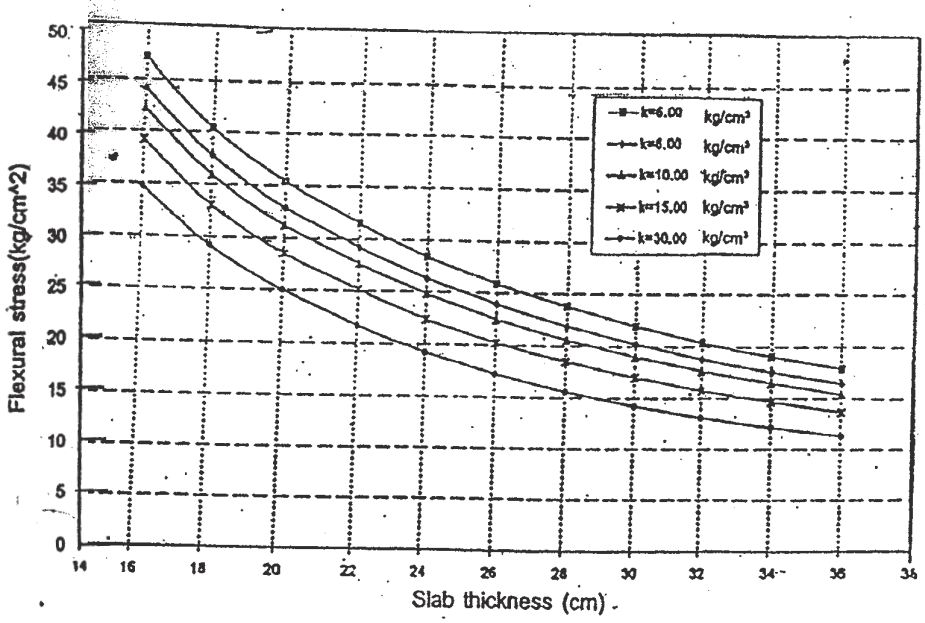
Stresses in Rigid Pavement (Tandem Axle Load 36 tons)



Contd..

Appendix-1 (Contd.)

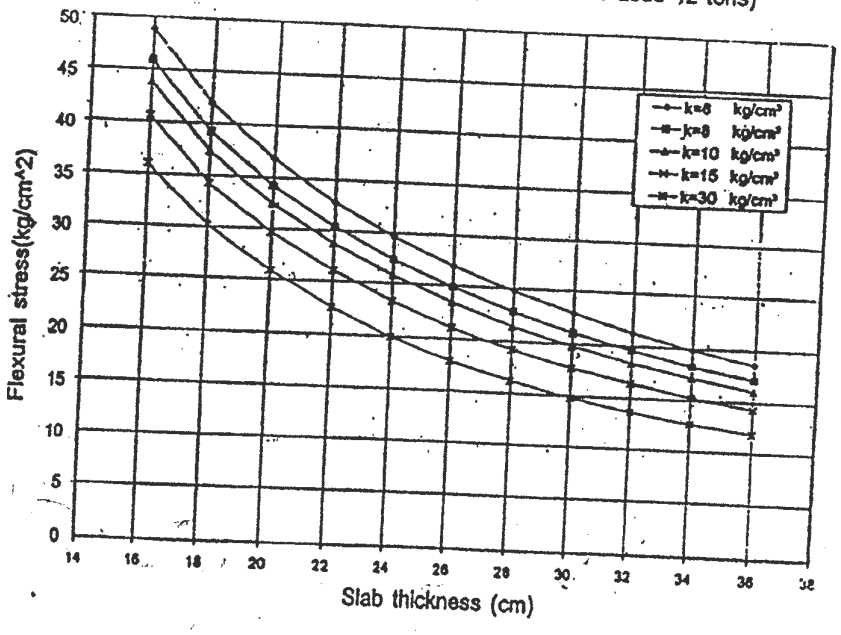
Stresses in Rigid Pavement (Tandem Axle Load 40 tons)



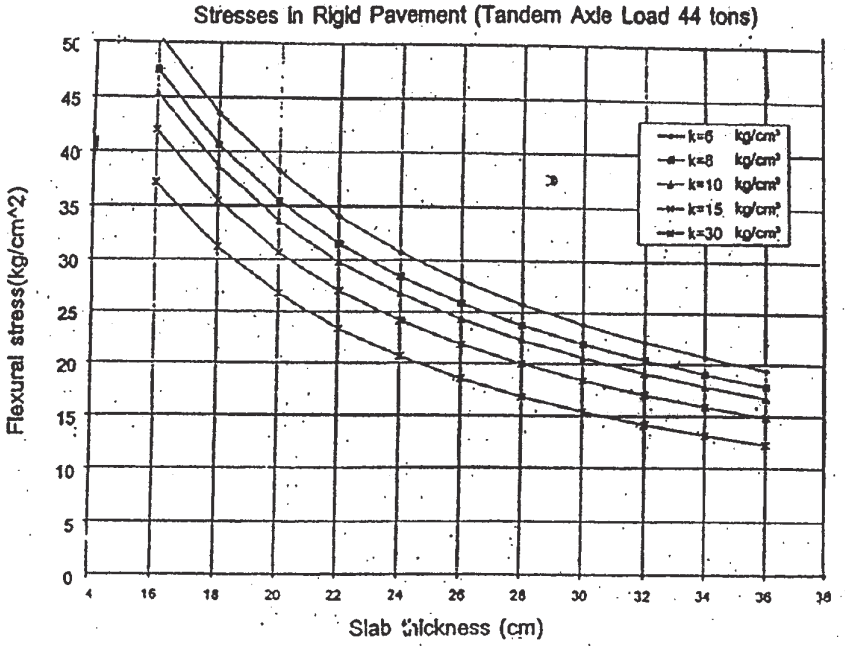
Contd..

Appendix-1 (Contd.)

Stresses in Rigid Pavement (Tandem Axle Load 42 tons)



Contd..


Stresses in Rigid Pavement (Tandem Axle Load 44 tons)
Flexural stress(kg/cm^2)
Slab thickness (cm)
k=6 kg/cm³
k=8 kg/cm³
k=10 kg/cm³
k=15 kg/cm³
k=30 kg/cm³
0
5
10
15
20
25
30
35
40
45
50
16
18
20
22
24
26
28
30
32
34
36