Total No. of Questions : 12]

SEAT No. :

P4624

[Total No. of Pages :15

[4759] - 22

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(2008 Course) (Elective - IV) (Semester - II)

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

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
2) *Answers to the two sections should be written in separate answer-books.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*
6) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) Develop a comprehensive traffic and transportation plan considering that you are the administrative authority responsible for implementation of this plan, for developing a smart city. [Flow charts to be prepared]. **[18]**

OR

Q2) Elaborate in detail various surveys which are necessary for the effectiveness of planning transportation systems in urban areas. **[18]**

Q3) With respect to urban Transport Technology explain the following:

a) Track guided bus **[6]**

b) Bus rapid transit **[6]**

c) Linear Induction Motor Technology **[4]**

OR

Q4) Detail out the 7 very important technologies used in the development and implementation of Intelligent Transport Systems (ITS). Discuss advantages and applications of ITS. **[10+3+3]**

Q5) Compare and Contrast between the traditional methods and the modern or discounted cash flow methods used for evaluating transportation options. [2 methods in each category to be considered]. **[16]**

OR

Q6) With any case study explain how Benefit Cost analysis is done by the consultants before deciding a choice of the transport options such as flyovers or road-widening or metros etc. **[16]**

SECTION - II

Q7) Explain with sketches:

a) Turning Movements. **[6]**

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

c) Parking lots on roads. **[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 flexible pavements. Explain how the pavement condition rating is done and how the pavement condition index is used in the management of pavement distresses? **[18]**

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

a) 2 way CVPD = 3000

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 = 8.4 kg/cm^2

h) Traffic growth rate = 5%

i) Design life = 15 years

j) Spacing of contraction joints = 4.2 m

k) Slab width = 3.8m

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

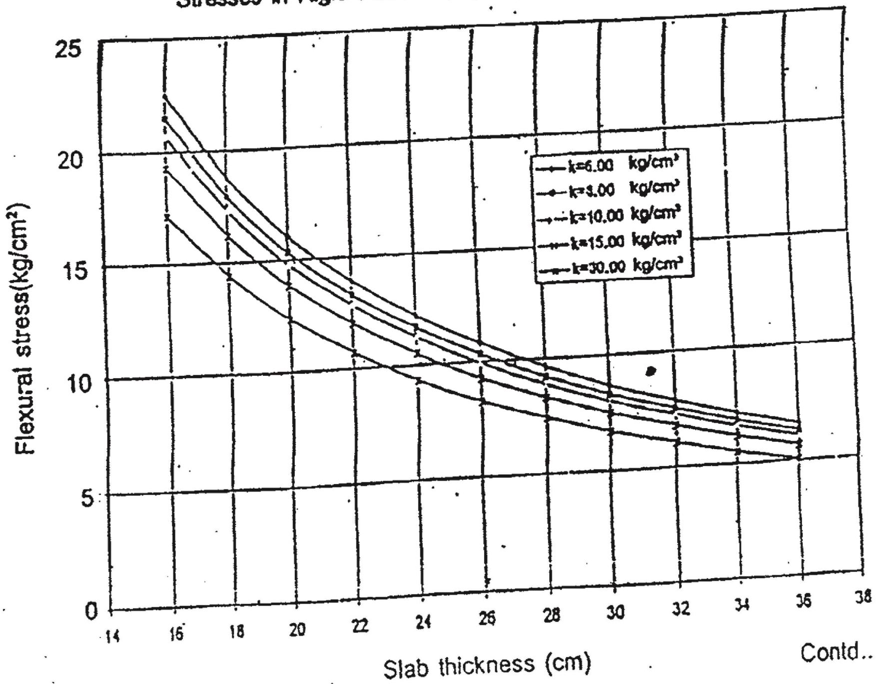
Design the pavement for withstanding all the other critical pavement conditions.

OR

Q12) Design the rigid pavement using the data mentioned in Q11, except for the fact that the CVPD (Two way) is increased by 15%. **[16]**

Appendix-1

Stresses in Rigid Pavement (Single Axle Load = 6 tons)



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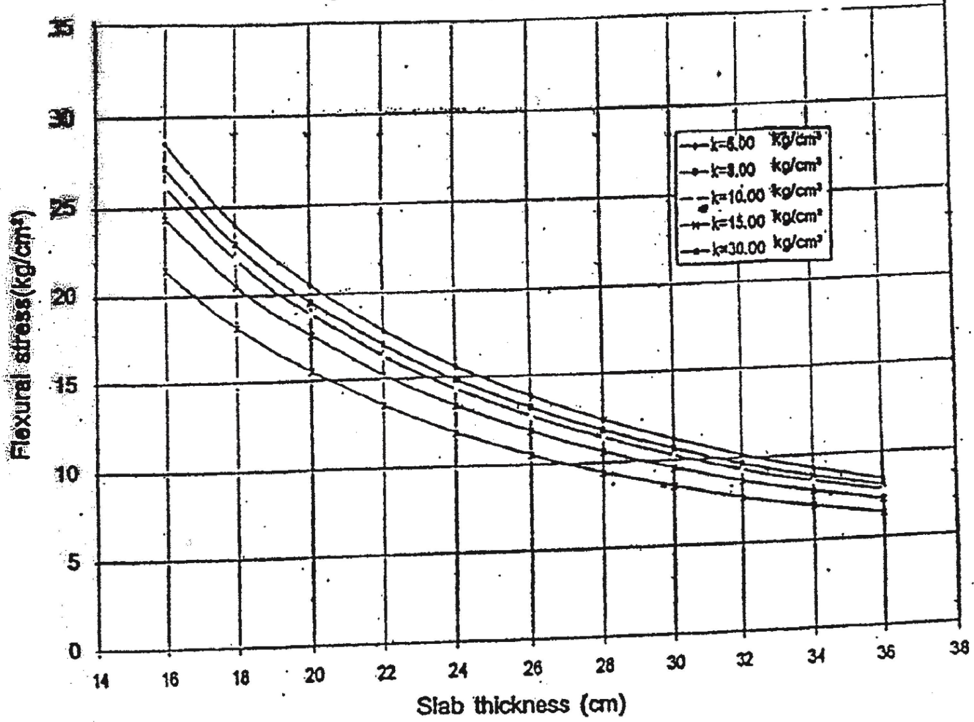
IR:C:58-2002

Appendix-1 (Contd.)

Stresses in Rigid Pavement (Single Axle Load = 8 tons)



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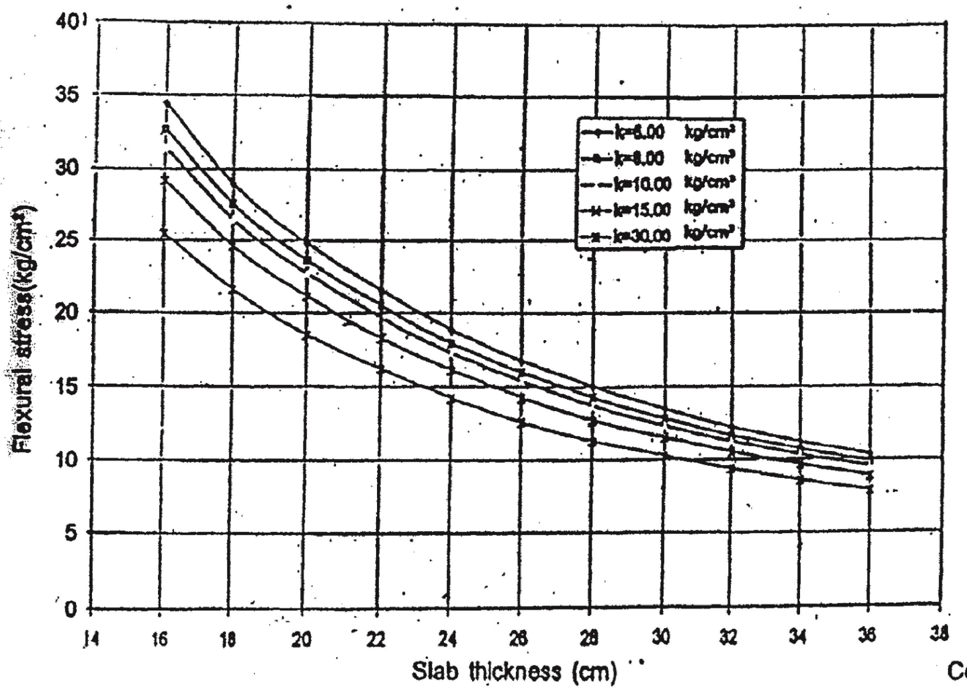
Appendix-1 (Contd.)

Stresses in Rigid Pavement (Single Axle Load = 10 tons)



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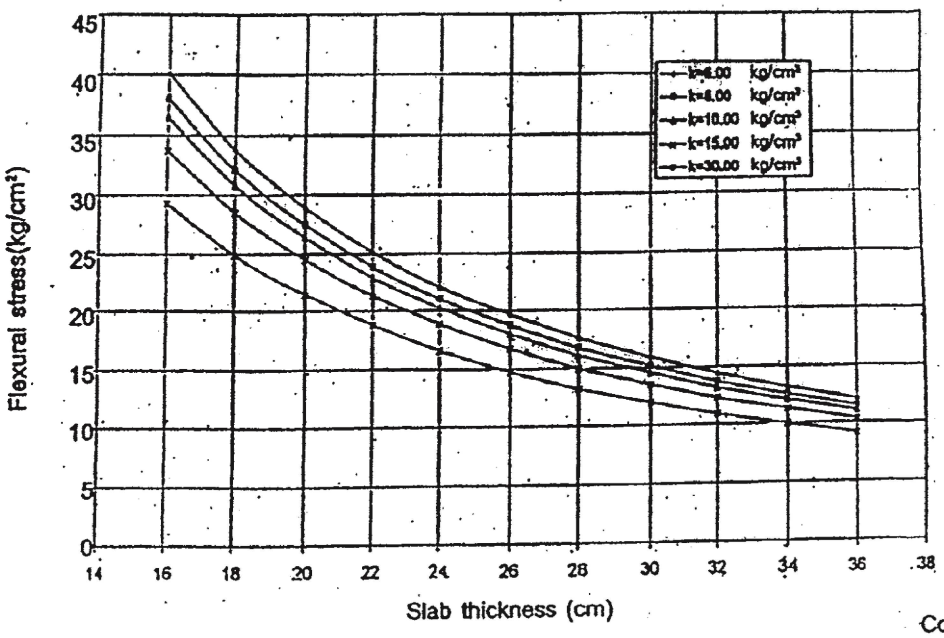
Stresses in Rigid Pavement (Single Axle Load = 12 tons)



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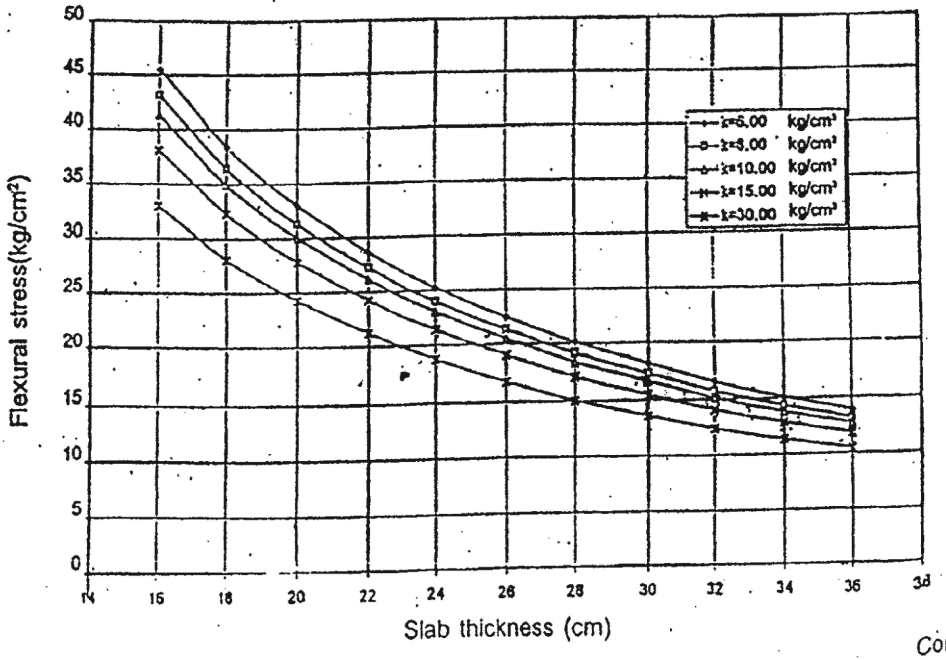
Stresses in Rigid Pavement (Single Axle Load = 14 tons)



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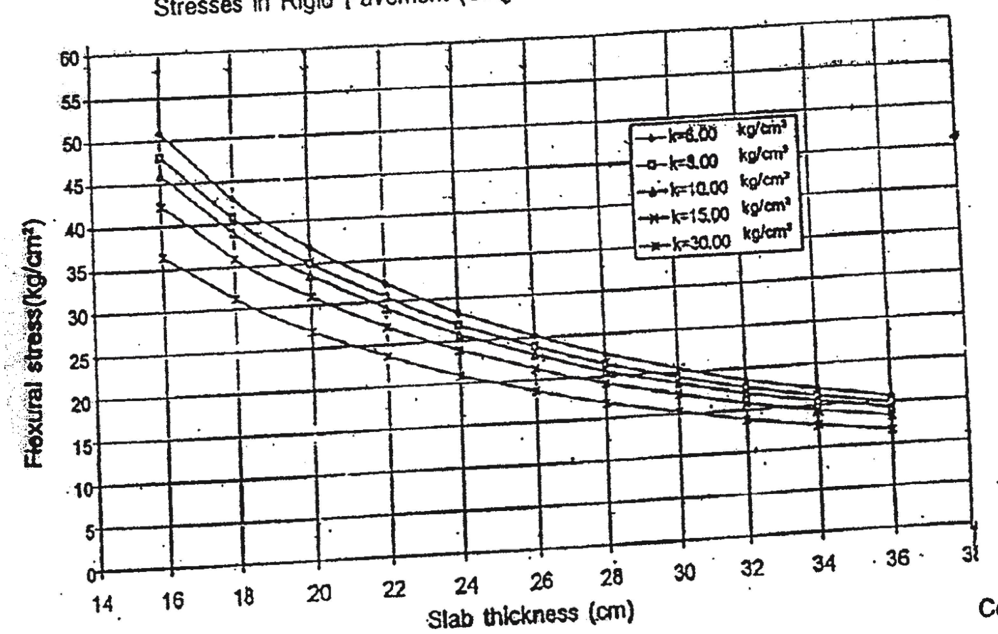
IRC:58-2002

Appendix-1 (Contd.)

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



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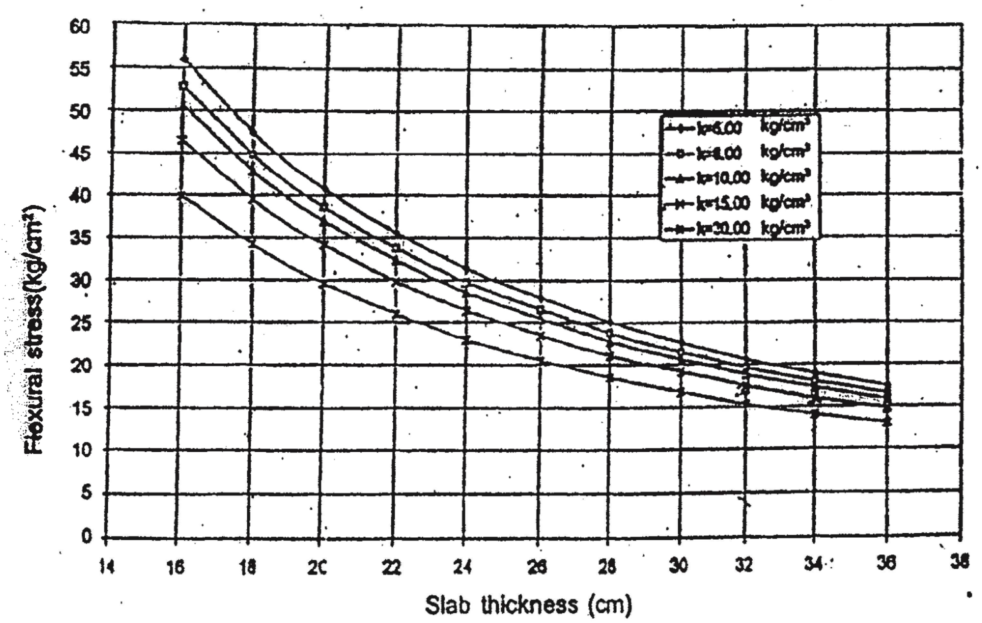
Appendix-1 (Contd.)

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



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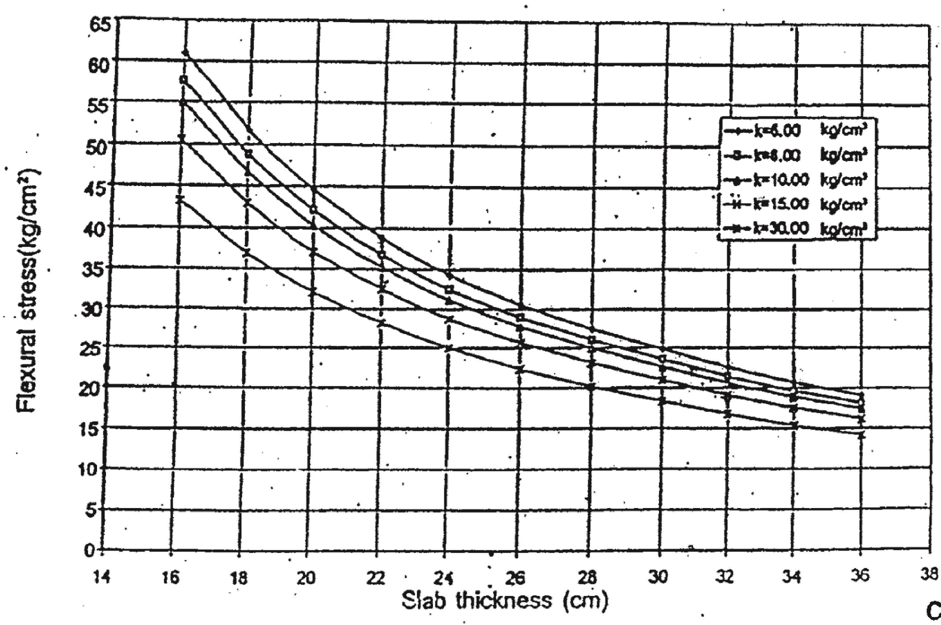
Appendix-1 (Contd.)

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



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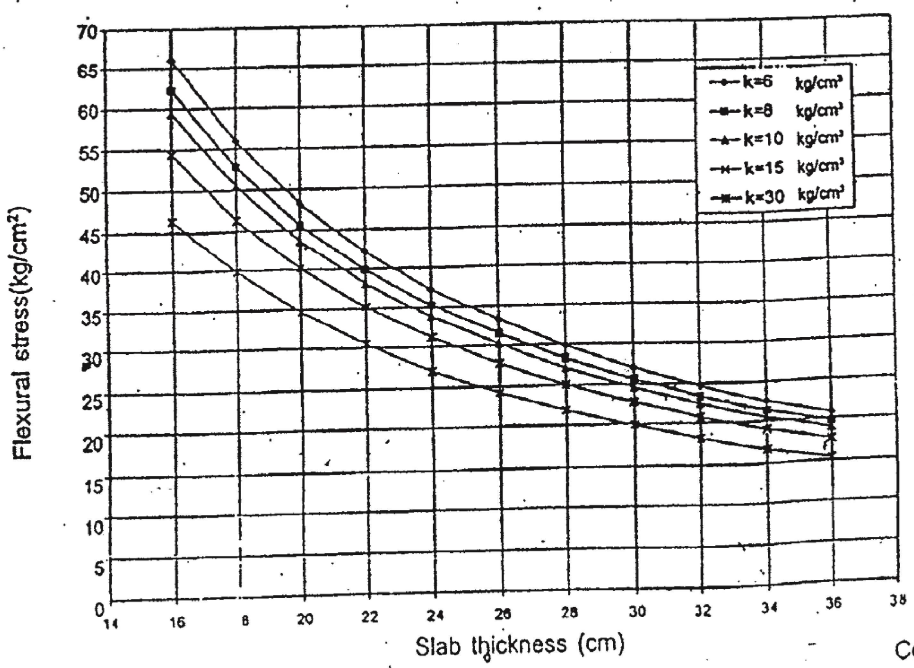
Appendix-1 (Contd.)

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



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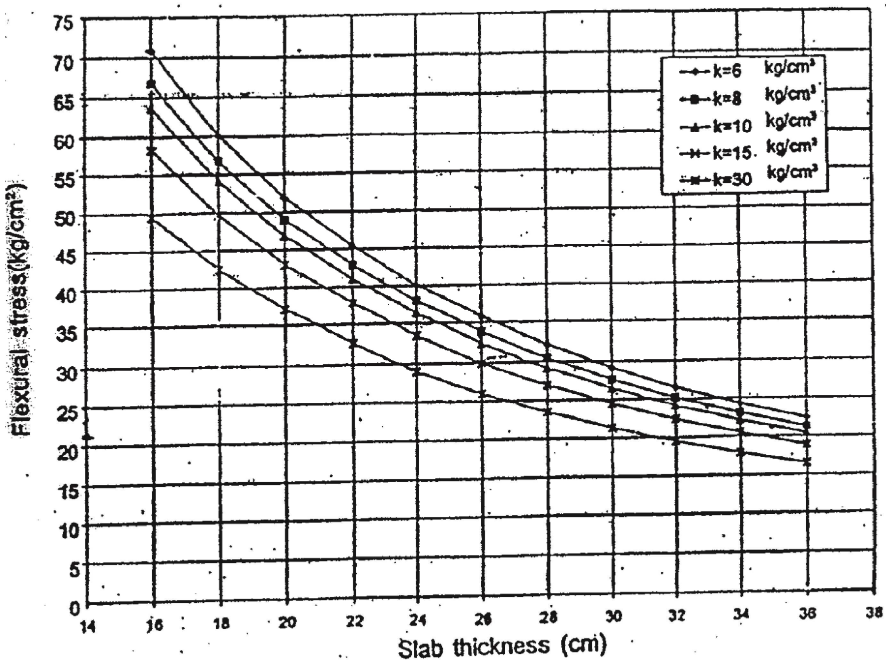
Stresses in Rigid Pavement (Single Axle Load = 24 tons)



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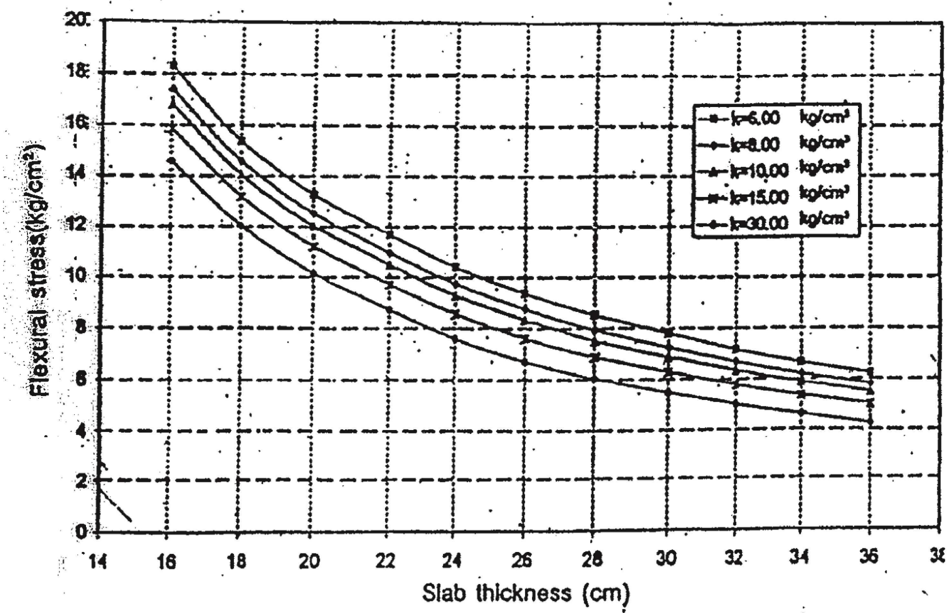
Appendix-1 (Contd.)

Stresses in Rigid Pavement (Tandem Axle Load 12 tons)



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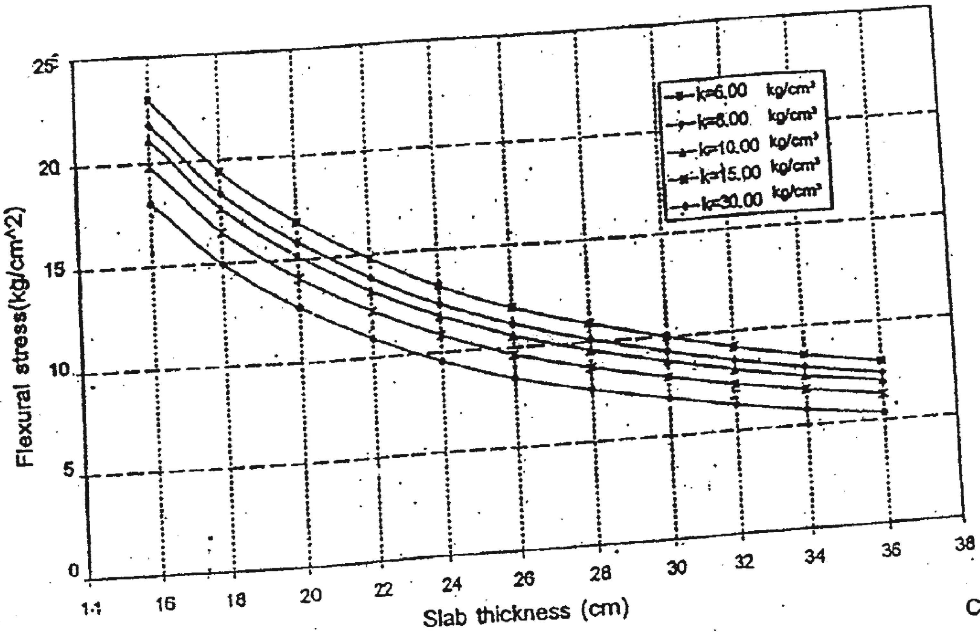
Stresses in Rigid Pavement (Tandem Axle Load 16 tons)



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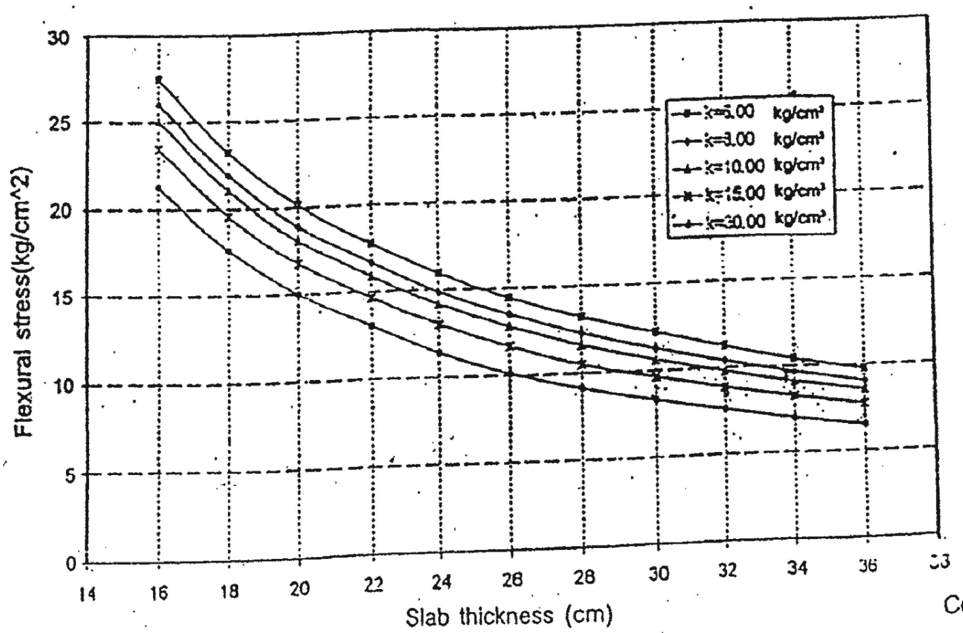
Stresses in Rigid Pavement (Tandem Axle Load 20 tons)



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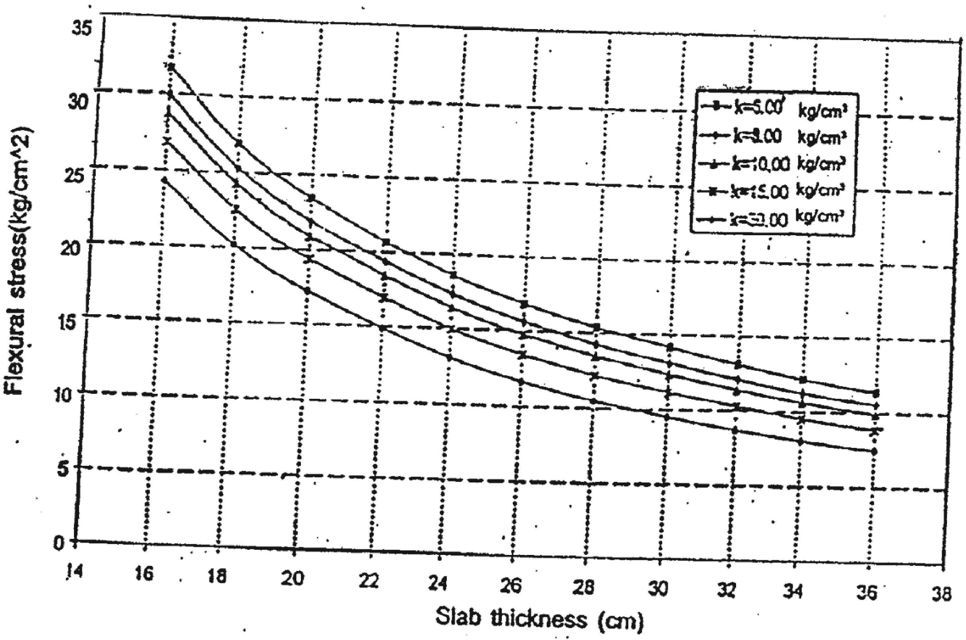
Appendix-1 (Contd.)

Stresses in Rigid Pavement (Tandem Axle Load 24 tons)



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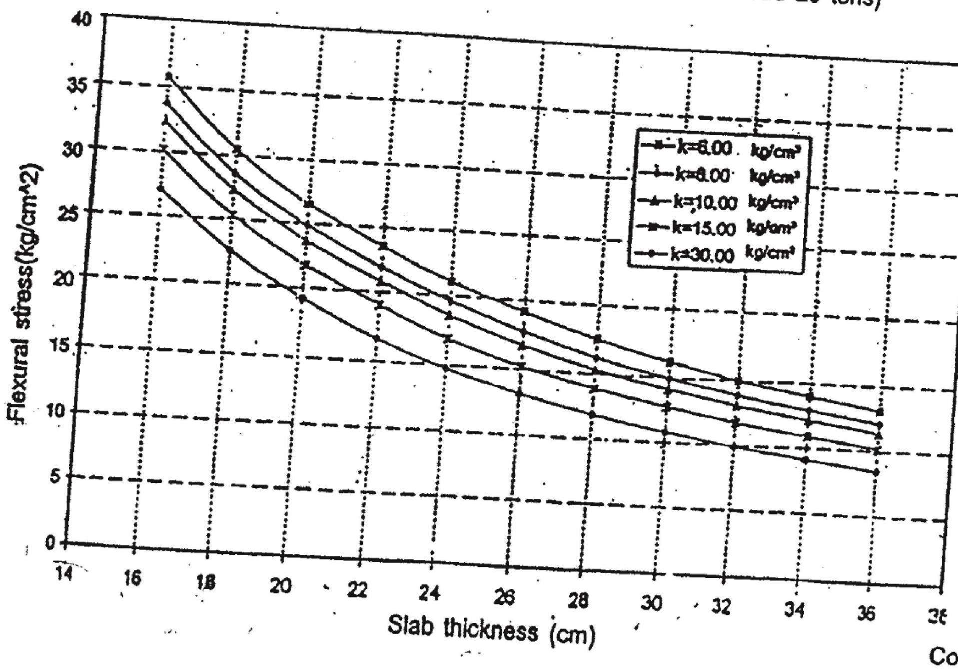
Appendix-1 (Contd.)

Stresses in Rigid Pavement (Tandem Axle Load 28 tons)



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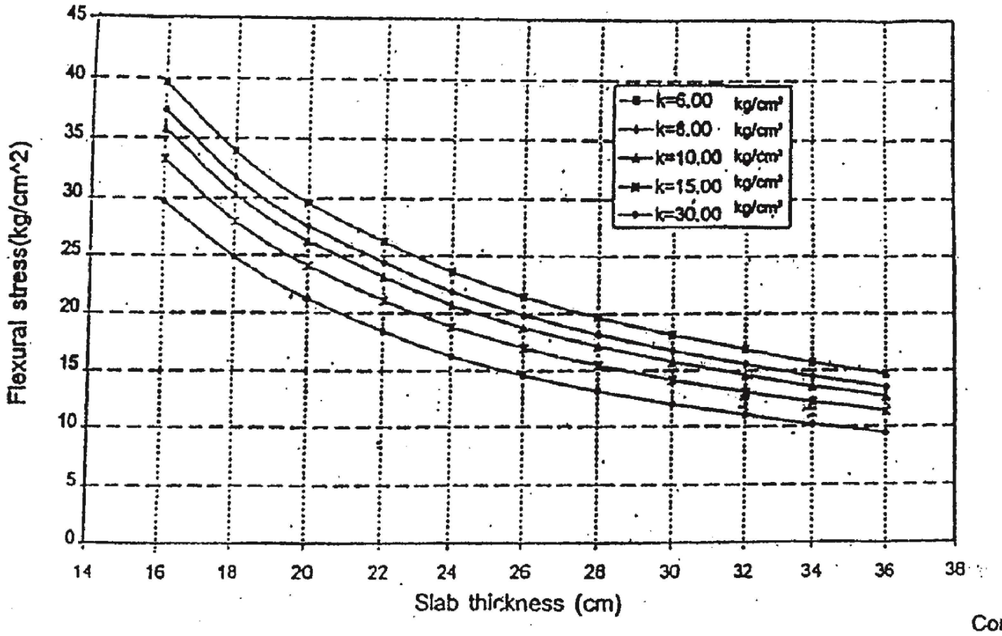
Stresses in Rigid Pavement (Tandem Axle Load 32 tons)



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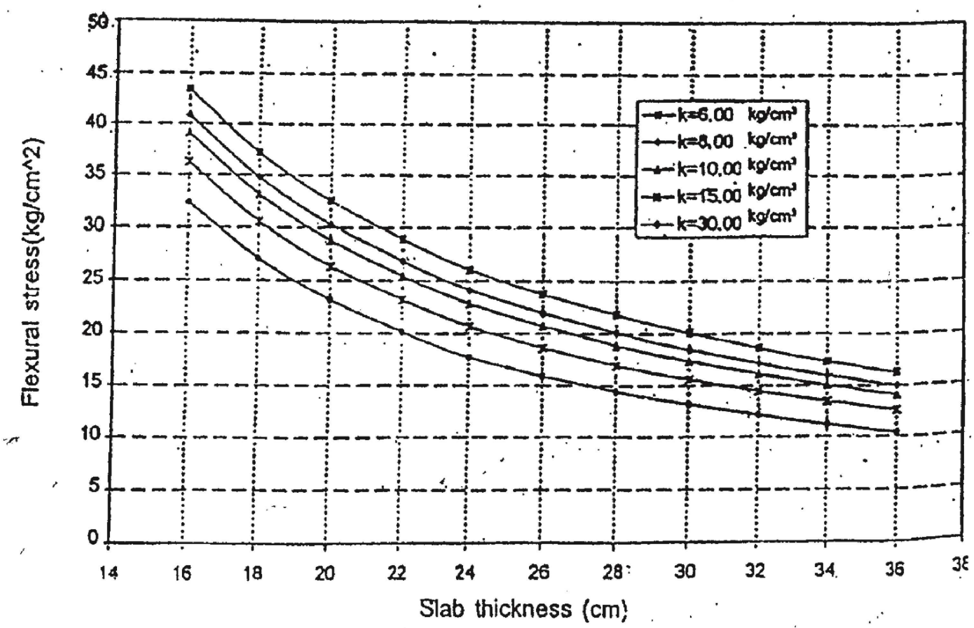
Appendix-1 (Contd.)

Stresses in Rigid Pavement (Tandem Axle Load 36 tons)



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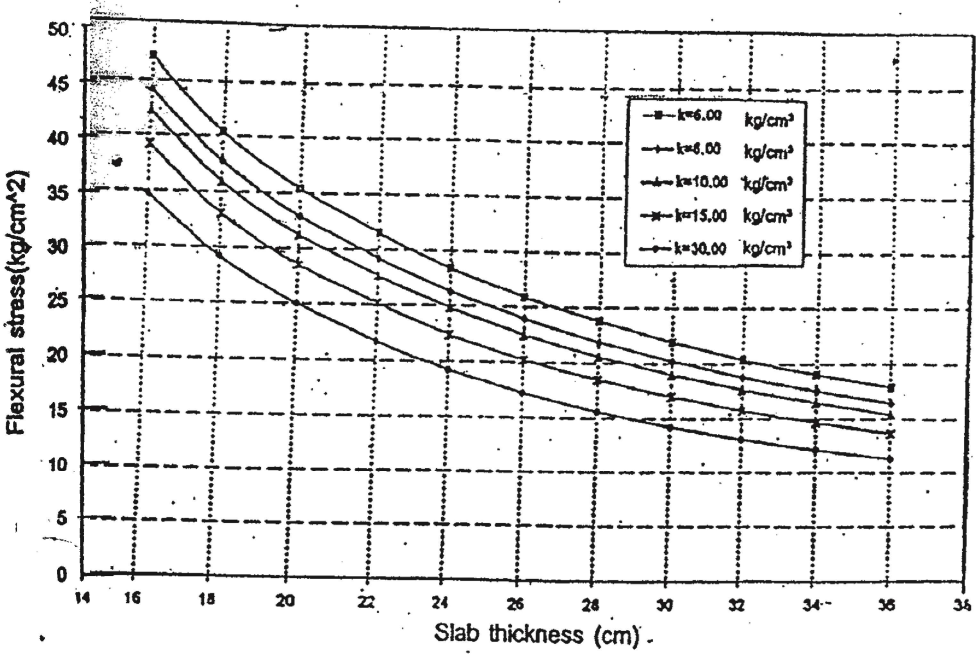
Appendix-1 (Contd.)

Stresses in Rigid Pavement (Tandem Axle Load 40 tons)



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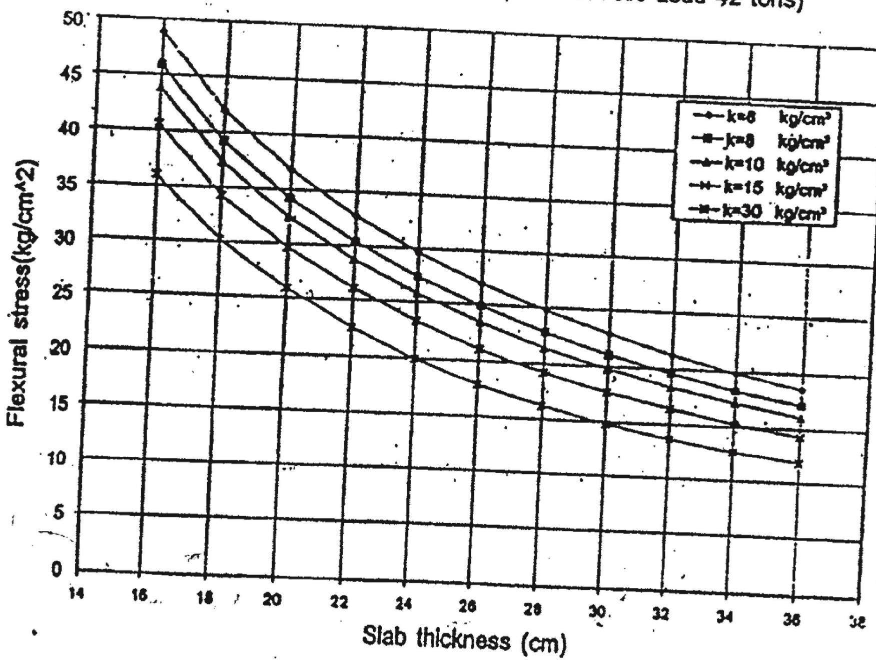
Appendix-1 (Contd.)

Stresses in Rigid Pavement (Tandem Axle Load 42 tons)



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Stresses in Rigid Pavement (Tandem Axle Load 44 tons)