Total No. of Questions : 10] **SEAT No. :**

P3036 **[Total No. of Pages : 6**

[5354]-522
B.E. (Civil Engg.) (End Semester) (Theory)
ADVANCED TRANSPORTATION ENGG.
(2012 Pattern) (Elective - IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) With reference to the origin and destination surveys, explain the following terms. **[5]**

i) Cordon Line

ii) Sampling size

b) Write a note on Modal Split. **[5]**

OR

Q2) a) Estimate the total number of trips using Modesto Model based on the following data. **[5]**

i) No. of dwelling unit = 5000

ii) No of cars owned per dwelling unit = 2

iii) Average number of persons per house = 4

iv) Social Rank Index = 2.5

v) Urbanization Index = 4

b) How has the National Highway Development Projects (NHDP) contributed to the overall growth of the country? **[5]**

Q3) Enhancing mobility while at the same time reducing congestion, accidents and pollution is a common challenge especially in India. What are the initiatives that you as transportation planner propose to achieve the balance between both? **[10]**

P.T.O.

OR

Q4) a) Explain the Benefit Cost Method of economic evaluation. What are the criteria for deciding the priority of projects based on B/C ratio? **[5]**

b) Write a note on the importance of Pavement Management System. **[5]**

Q5) a) With reference to moving vehicle survey, explain the objective, procedure. data obtained and advantage of the survey. **[10]**

b) State the advantages of mechanical methods of conducting traffic surveys over the manual methods. Give any two examples of mechanical counters or sensors used for surveys. **[6]**

OR

Q6) Write notes on the following

a) Level of Service (LOS) of a road. **[6]**

b) Passenger Car Unit **[5]**

c) Automated Signals **[5]**

Q7) a) Design a flexible pavement as per IRC 37-2001 using the following data. Also draw a typical cross section showing all the basic layers. **[10]**

i) Type of road = Four lane single carriageway

ii) CVPD in the year 2012 = 1000 (sum of both direction)

iii) Expected year of completion = 2016

iv) Traffic growth rate = 7.5%

v) Design Life = 10 years

vi) Vehicle Damage factor = 3.5

vii) Design CBR = 5%

b) With neat sketches explain any 3 types of distresses on flexible pavements. **[6]**

OR

Q8) a) The rebound deflection values for 5 spots on a stretch of National Highway with heavy traffic are given below. Find the mean, standard and characteristic deflection. **[5]**

Rebound deflection in mm: 1.5, 2.0. 1.25. 1.36. 1.45

b) State the differences between IRC 37, 2001 and the revised IRC 37-2011. **[5]**

c) With reference to Benkelman Beam Survey, explain the following: **[6]**

i) Correction for temperature

ii) Correction for seasonal variation in subgrade moisture content.

Q9) a) The design traffic for a major road with heavy traffic is found to be 77 msa. From the BBD survey, the mean value of deflection (D_m) = 1.28 mm and the standard deviation of deflection = 0.26 mm. The temperature of the pavement during study is 45°C. and the correction factor for seasonal variation in subgrade moisture content = 1.3. Determine the thickness of the overlay if DBM binder course and BC surface course is to be adopted. **[8]**

b) Explain the concept behind the design of rigid pavement in comparison to that of a flexible pavement. **[6]**

c) What are the critical combinations of stresses for a cement concrete pavement? **[4]**

OR

Q10)a) Design the tie bars considering plain bars for the following data: **[8]**

i) Slab thickness = 32 cm

ii) Lane width –3.5 m

iii) Coefficient of friction = 1 .5

iv) Density of concrete = 2500 kg/m^3

v) Allowable tensile stress in plain bars = 1200 kg/cm^2

vi) Allowable bond stress = 17 kg/cm^2

vii) Diameter of tie bar = 12 mm

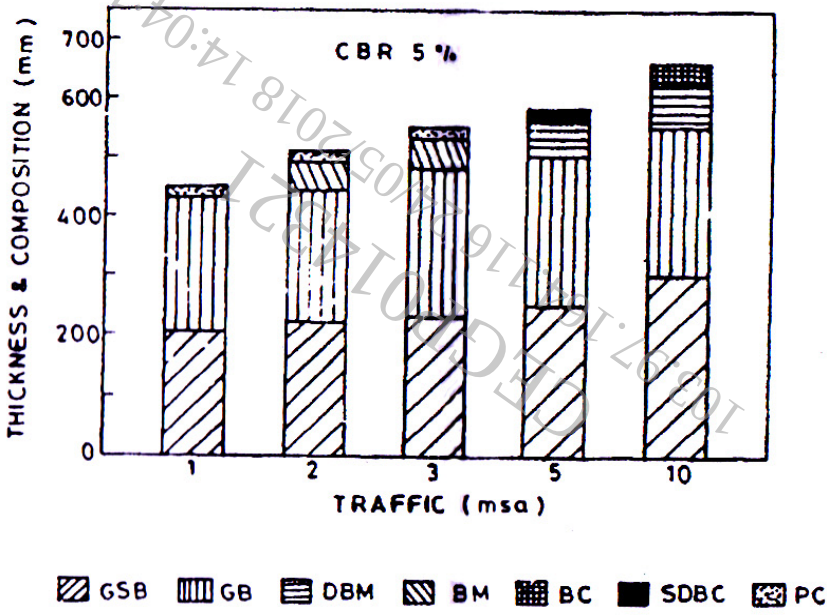
b) What are the objectives of providing tie bars and dowel bars? Illustrate with the help of a neat sketch. **[4]**

c) Explain the construction procedure of cement concrete pavement. **[6]**

PAVEMENT DESIGN CATALOGUE

PLATE 1 – RECOMMENDED DESIGNS FOR TRAFFIC RANGE 1-10 msa

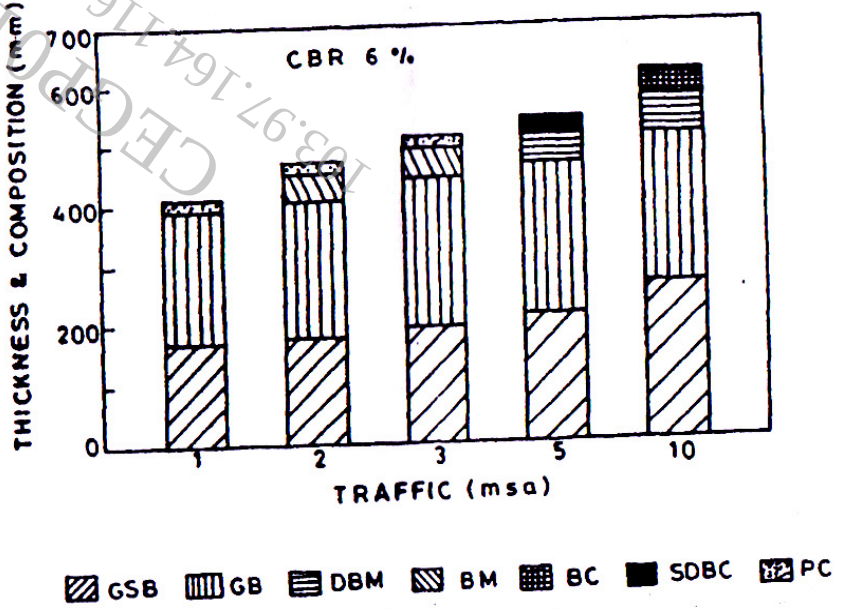
CBR 5%					
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION			
		Bituminous Surfacing		Granular Base (mm)	Granular Sub-base (mm)
		Wearing Course (mm)	Binder Course (mm)		
1	430	20 PC		225	205
2	490	20 PC	50 BM	225	215
3	530	20 PC	50 BM	250	230
5	580	25 SDBC	55 DBM	250	250
10	660	40 BC	70 DBM	250	300



PAVEMENT DESIGN CATALOGUE

PLATE 1 – RECOMMENDED DESIGNS FOR TRAFFIC RANGE 1-10 msa

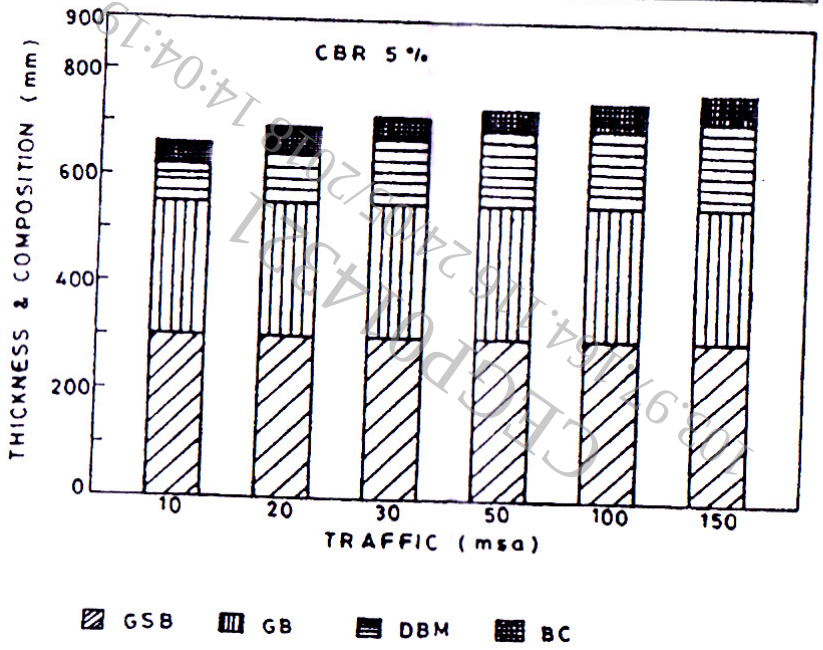
CBR 6%					
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION			
		Bituminous Surfacing		Granular Base (mm)	Granular Sub-base (mm)
		Wearing Course (mm)	Binder Course (mm)		
1	390	20 PC		225	165
2	450	20 PC	50 BM	225	175
3	490	20 PC	50 BM	250	190
5	535	25 SDBC	50 DBM	250	210
10	615	40 BC	65 DBM	250	260



PAVEMENT DESIGN CATALOGUE

PLATE 2 – RECOMMENDED DESIGNS FOR TRAFFIC RANGE 10-150 msa

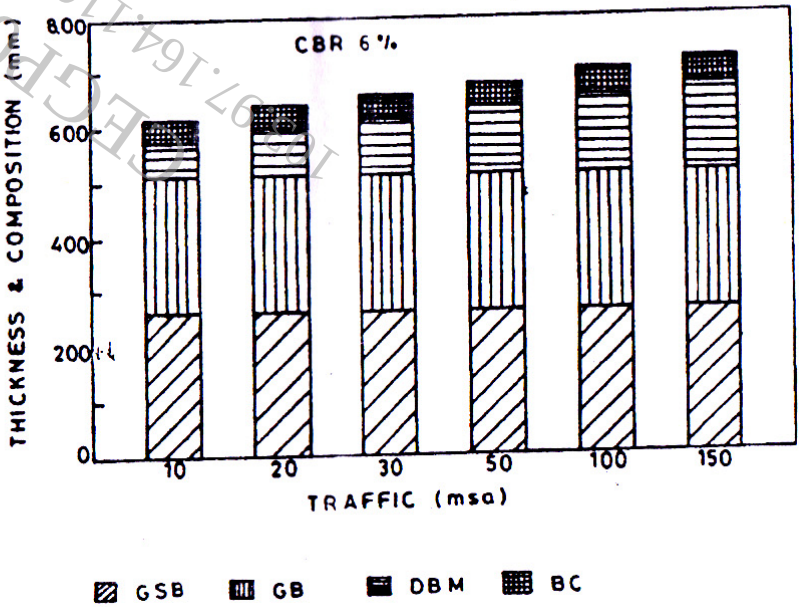
CBR 5%				
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base & Sub-base (mm)
		BC (mm)	DBM (mm)	
10	660	40	70	Base = 250 Sub-base = 300
20	690	40	100	
30	710	40	120	
50	730	40	140	
100	750	50	150	
150	770	50	170	



PAVEMENT DESIGN CATALOGUE

PLATE 2 – RECOMMENDED DESIGNS FOR TRAFFIC RANGE 10-150 msa

CBR 6%				
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base & Sub-base (mm)
		BC (mm)	DBM (mm)	
10	615	40	65	Base = 250 Sub-base = 260
20	640	40	90	
30	655	40	105	
50	675	40	125	
100	700	50	140	
150	720	50	160	



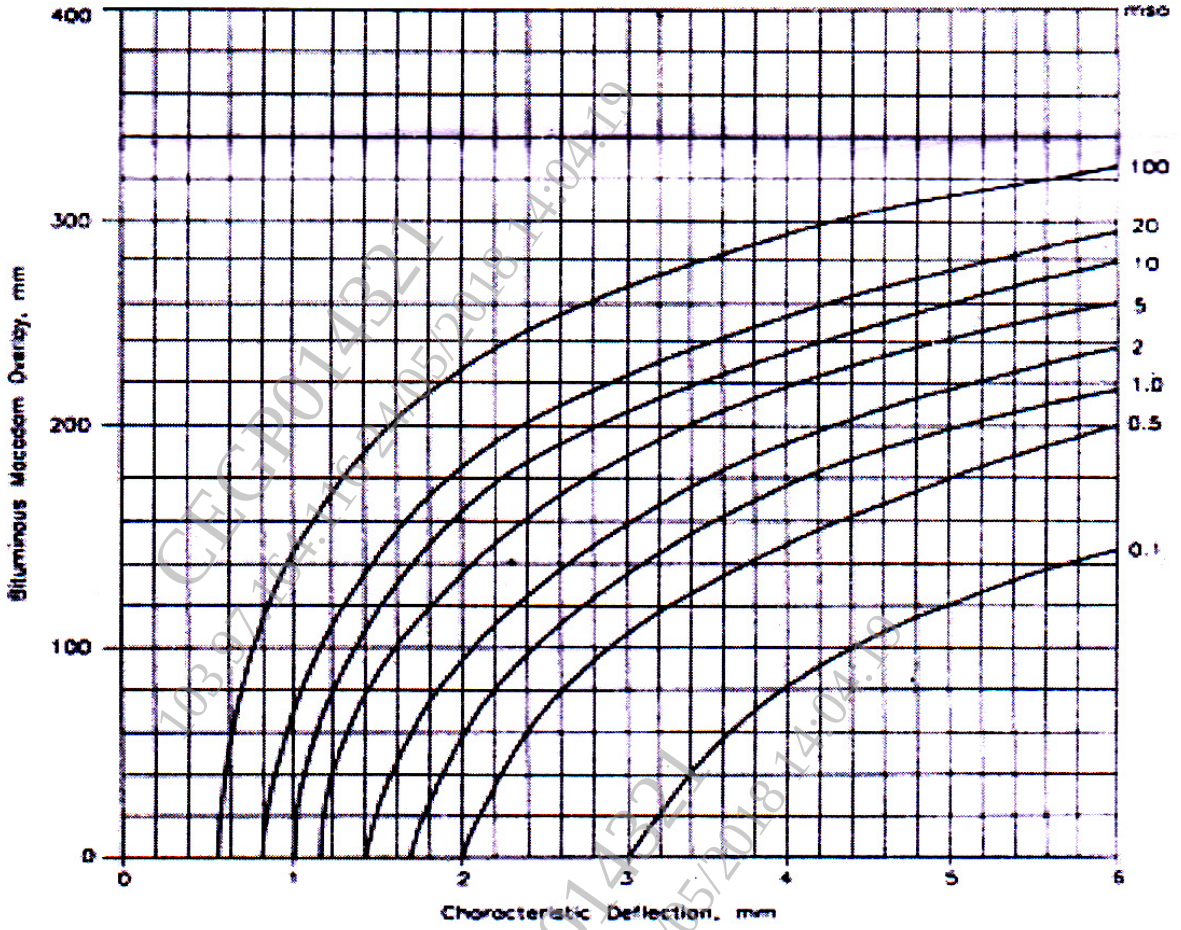


Fig. 9. Overlay Thickness Design Curves