JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech-V Semester (CE)

COURSE CODE (CREDITS): 18B11CE511(3) MAX. MARKS: 35

COURSE NAME: Highway Engineering

COURSE INSTRUCTORS: Dr. Amardeep MAX. TIME: 2 Hours

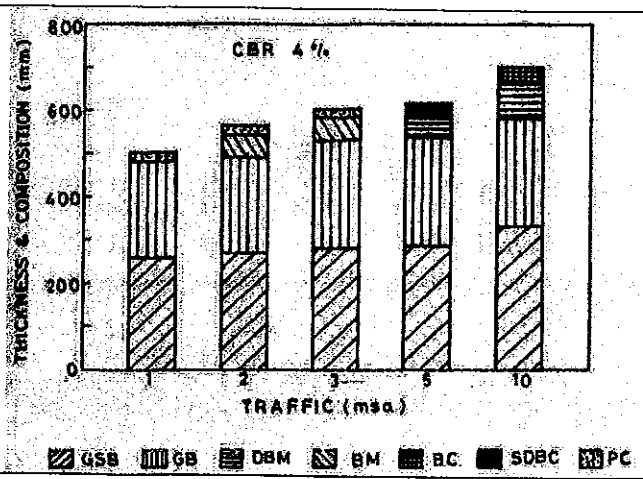
Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	What are the main differences between emulsions and cutbacks?	CO-4	2
Q2	Plot the pattern of various graphs obtained during Marshall design of bituminous mixes?	CO-3	3
Q3	Determine the warping stresses at interior, edge and corner regions in a 25cm thick concrete pavement with transverse joints at 11 m interval and longitudinal joints at 3.6 m intervals. The modulus of subgrade reaction (K) is 6.9 kg/cm^3. Assume temperature differential for day conditions to be 0.6°C per cm slab thickness. Assume radius of loaded area is 15cm for computing warping stress at the corner. Thermal coefficient of concrete =10*10^{-6} /^{0}C, E=3*10^{5}kg/cm^2. Poisons ratio =0.15. Use the table below.	CO-3	10

L_x/l or L_y/l	1	2	3	4	5	6	7	8	8.5	9	10	11	≥12
C_x or C_y	0.000	0.040	0.175	0.440	0.720	0.920	1.030	1.077	1.084	1.080	1.075	1.050	1.000

Q4	Explain the recommended design procedure for the design of rigid pavements by IRC		10
Q5	Design the pavement for construction of a new bypass with the following data and graph of IRC 37:2001: • Two lane carriage way • Initial traffic in the year of completion of construction = 400 CVPD (sum of both directions) • Traffic growth rate = 7.5 % • Design life = 15 years • Vehicle damage factor based on axle load survey = 2.5 standard axle per commercial vehicle • Design CBR of subgrade soil = 4%.	CO-3	5

			
Q6	A vertical summit curve is to be designed where two grades, +1/50 and −1/80 meet on a highway. The stopping sight distance and overtaking sight distance required are 180 m and 640 m respectively. But due to site conditions the length of vertical curve has to be restricted to a maximum value of 500 m if possible. Calculate the length of summit curve needed to fulfil the requirements of (a) Stopping sight distance (b) Overtaking sight distance or at least Intermediate sight distance and discuss the results.	CO-2	5