

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2026

B.Tech-IVth Semester (CE)

COURSE CODE (CREDITS): 24B11CE413(3)

MAX. MARKS: 35

COURSE NAME: Highway Engineering

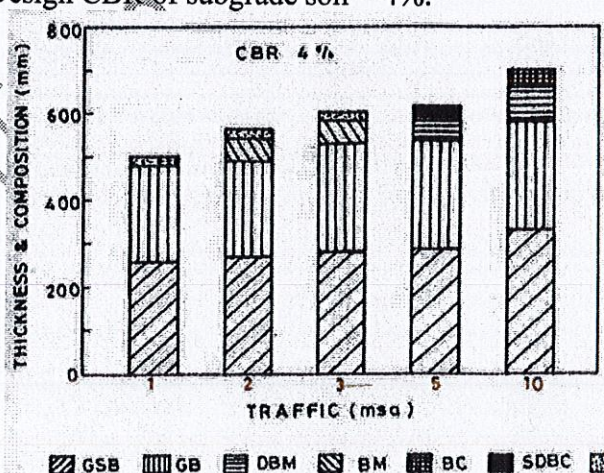
COURSE INSTRUCTORS: Dr. Amardeep

MAX. TIME: 2 Hour

Note: (a) All questions are compulsory.

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

(c) Use of calculator is not allowed

Q.No	Question	CO	Marks
Q1	An isolated two-phase traffic signal is designed by Webster's method. Determine the optimum signal cycle, if the sum of all critical flow ratios is 0.50 and the all-red time required for pedestrian crossing is 13 seconds.	CO5	3
Q2	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%. 	CO3	5
Q3	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.	CO2	5

	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.		
Q4	Discuss in detail about the marshall stability test procedure along with the different specifications required with the help of the graphs.	CO3	3
Q5	A summit curve is formed by +3% and -2% grades. Length of curve = 300 m. Design speed = 80 km/h. Assume other data (if required). Check if the available Stopping Sight Distance (SSD) criterion is satisfied. (A) Satisfied, available sight = 170 m (B) Not satisfied, available sight = 170 m (C) Not satisfied, available sight = 250 m (D) Satisfied, available sight = 470 m		3
Q6	Discuss in detail about the different stresses occurred in rigid and flexible pavement along with their specifications and fig.	CO4	3
Q7	In the Marshall mix design, the specific gravities are: coarse aggregate = 2.60, fine aggregate = 2.70, filler = 2.65, bitumen = 1.01. Proportions by weight are: 55%, 35.8%, 3.7%, 5.5%. Compute the theoretical specific gravity of mix (G_t), rounded to 2 decimals.	CO3	3
Q8	Discuss step by step IRC method of signal design with the help of an example.	CO5	5
Q9	Discuss in detail step by step about the Highway development in India? Please specify the role of each committee for the same in detail.	CO1	5