BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : V**
BRANCH: CIVIL ENGINEERING **SESSION : MO/2024**

SUBJECT: CE305 TRANSPORTATION ENGINEERING

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Calculate the length of transition curve by using the following data. • Design speed = 65 km/h • Radius of circular curve = 220 m • Allowable rate of introduction of superelevation if the pavement is rotated about the center line = 1 in 150 • Pavement width including extra widening = 7.5 m	[5]	1	3
Q.1(b)	A vertical summit curve is formed at the intersection of two gradients, +3.0 and -5.0 percent. Design the length of summit curve to provide a stopping sight distance for a design speed of 80 km/h. Assume suitable data.	[5]	1	3
Q.2(a)	The 15 minute traffic counts on cross roads 1 and 2 during peak hour are observed as 178 and 142 vehicles per lane respectively approaching the intersection in the direction of heavier traffic flow. If the amber times required are 3 and 2 seconds respectively for two roads based on approach speeds, design the signal timings by trial cycle method. Assume an average time headway of 2.5 seconds during green phase.	[5]	2	3
Q.2(b)	The following information was obtained from a transportation survey of a town:	[5]	2	3

Traffic zone number	Population in the zone (Thousands)	Total trips generated (In hundreds)
1	26	12
2	28	11
3	31	17
4	33	15
5	22	12
6	30	15
7	20	9
8	25	13

Develop a linear regression model for estimating the trips generated from a zone. If the population in a particular zone increases to 40,000, predict the expected trip generation from that zone.

PTO

Q.3(a)	Explain briefly the Marshall method of mix design to find the optimum bitumen content.	[5]	3	2
Q.3(b)	Determine the warping stresses at interior, edge and corner regions in a 25 cm 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 0.6^0 C per cm slab thickness. Assume radius of loaded area as 15 cm for computing warping stress at the corner. Additional data area given below: $e = 10 \times 10^{-6}$ per ^{0}C $E = 3 \times 10^5$ Kg/cm^2 $\mu = 0.15$ Cx = 1.03 CY = 0.55	[5]	3	3
Q.4(a)	Define creep of rail systems and also discuss possible causes of creep.	[5]	4	2
Q.4(b)	Discuss merits and demerits of different types of sleepers use on Indian Railways.	[5]	4	2
Q.5(a)	Calculate the equilibrium cant on a 2 degree curve on a broad gauge if 15 trains, 10 trains, 5 trains and 2 trains are running at speeds of 50 km/h, 60 km/h, 70 km/h and 80 km/h respectively.	[5]	5	3
Q.5(b)	If a 8 degree curve track diverges from a main curve of 5 degree in an opposite direction in the layout of the B.G. yard, calculate the superelevation and the speed on the branch line, if the maximum speed permitted on the main line is 45 km/h.	[5]	5	3

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