

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

CLASS: BTECH
BRANCH: CIVIL ENGINEERING

SEMESTER : V/ADD
SESSION : MO/2025

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.
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|--------|---|-----|-----|
| Q.1(a) | The speed of overtaking and overtaken vehicles are 70 km/h and 40 km/h respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec^2 . <ul style="list-style-type: none">• Calculate safe overtaking sight distance.• Mention the minimum length of overtaking zone.• Draw a neat-sketch of the overtaking zone and show the positions of the sign posts. | [5] | 1 2 |
| Q.1(b) | Calculate the length of transition curve by using the following data: <ul style="list-style-type: none">• Design speed = 65 km/h• Radius of circular curve = 220 m• Allowable rate of introduction of superelevation (Pavement rotated about the centre line) = 1 in 150• Pavement width including extra widening = 7.5 m | [5] | 1 2 |
| Q.2(a) | Explain about capacity and Level of Service analysis of transportation infrastructure. | [5] | 2 2 |
| Q.2(b) | The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour. The saturation flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 secs. Design the two phase traffic signal by webster's method. | [5] | 2 3 |
| Q.3(a) | Discuss the Marshall method of bituminous mix design to find the optimum bitumen content. | [5] | 3 2 |
| Q.3(b) | Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equation. The provided data are: Wheel load (P) = 5100 kg, Modulus of elasticity of cement concrete (E) = $3.0 \times 10^5 \text{ kg/cm}^2$, Pavement thickness (h) = 18 cm, Poisson's ratio of concrete (μ) = 0.15, Modulus of subgrade reaction (K) = 6.0 kg/cm^3 , Radius of contact area (a) = 15 cm | [5] | 3 2 |
| Q.4(a) | Explain the functions and requirements of a good sleeper. | [5] | 4 2 |
| Q.4(b) | Compare the different ballast materials with respect to merits and demerits. | [5] | 4 2 |
| Q.5(a) | Discuss about negative superelevation at railway track. | [5] | 5 2 |
| Q.5(b) | A 5 degree curve diverges from a 3 degree main curve in reverse direction in the layout of a B.G. track. If the speed on the branch line is restricted to 35 km/h, Determine the restricted speed on the main line. | [5] | 5 2 |