

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

**CLASS: B.Tech  
BRANCH: Civil Engineering**

**SEMESTER : VII  
SESSION : MO/2025**

**SUBJECT: CE437 TRANSPORTATION PLANNING**

**TIME: 02 Hours**

**FULL MARKS: 25**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- |  |     | CO | BL |
|--|-----|----|----|
| Q.1(a) Discuss the need of freight transportation system.  | [2] | 1  | 2  |
| Q.1(b) Explain about Bus rapid transit system.   | [3] | 1  | 2  |
|  |     |    |    |
| Q.2(a) Discuss the hierarchical classification of urban streets.   | [2] | 1  | 2  |
| Q.2(b) Explain about the determination of urban activity system.   | [3] | 1  | 2  |
|  |     |    |    |
| Q.3(a) Mention the factors required for the forecast of urban goods movement.  | [2] | 2  | 2  |
| Q.3(b) A cement manufacturing unit must transport goods from a manufacturing unit to a regional distribution center. The total freight demand is $Q = 1000$ tons per week. The manufacturing unit can select between two modes of transportation i.e. Rail and Truck. The cost functions are as follows: | [3] | 2  | 3  |
| <ul style="list-style-type: none"> <li>Rail cost (<math>C_1</math>) per ton: <math>C_1(q_1) = 50 + 0.02q_1</math></li> <li>Truck cost (<math>C_2</math>) per ton: <math>C_2(q_2) = 60 + 0.01q_2</math></li> <li><math>q_1 + q_2 = 1000</math></li> </ul>   |     |    |    |
| Where $q_1$ = Tons transported by rail<br>$q_2$ = Tons transported by truck  |     |    |    |
| Find the optimal values of $q_1$ and $q_2$ that minimize total cost and calculate minimum transportation cost.   |     |    |    |
|  |     |    |    |
| Q.4(a) Explain the classification of urban goods movement.   | [2] | 2  | 2  |
| Q.4(b) Discuss about the characteristics of freight transportation demand.   | [3] | 2  | 2  |
|  |     |    |    |
| Q.5(a) Explain the 4 stages of transportation planning process.  | [2] | 3  | 2  |
| Q.5(b) The trip rate of a zone is explained by the household size done from the field survey. It was found that the household size are 1, 2, 3 and 4. The trip rates of the corresponding household is as shown in the table below. Fit a linear equation relating trip rate and household size.         | [3] | 3  | 3  |

Household size (X)				
	1	2	3	4
Trips per day (Y)	1	2	4	6
	2	4	5	7
	2	3	3	4