

TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
Examination Control Division  
2076 Ashwin

Exam.	Back		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

*Subject: - Transportation Planning and Engineering (Elective I) (CE72509)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ All questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. What are advantages and disadvantages of Simulation Techniques in Transportation Planning? Explain stepwise method of simulation modeling for studying traffic problem.
2. Write down difference between urban and regional transport planning. Explain method of tag on vehicle survey and post card survey to collect transport data.
3. A small town has been divided into three traffic zones. The number of trips produced and attracted in each zone is shown in the table below.

Zone	1	2	3
Trip Produced	710	890	340
Trip Attracted	670	770	500

Intra-zonal average trip distance is 5 km, distance between zone 1 and 2 is 10 km, zone 2 and 3 is 15 km and zone 1 and 3 is 15 km. Develop the trip distribution matrix by gravity model at least up to 2 iterations. Assume Socio-economic factor = 1, and friction factor ( $F_{ij}$ ) is related to travel distance ( $d_{ij}$ ) as  $F_{ij} = 120 - 4 d_{ij}$  Where,  $d_{ij}$  in km.

4. There are three alternative roads between two district A and B. Average travel time along these three roads are 21, 28 and 37 minutes. The Trip interchanges between these two districts are 4,636 veh/day. Assign traffic among three routes by using (i) All or Nothing method, and (ii) Multipath assignment method.
5. Define Evaluation of alternative, its purpose and its characteristics.
6. Explain about the factors affecting airport site selection. Explain the process of determining the orientation of runway using Wind rose diagram I.

7. Yearly temperature variation of the proposed airport area has been shown below. The basic length of runway to be constructed in a airport is 2500 m. The differences in elevation between two points along the runway will be 5 mm per meter. The airport is situated at the elevation of 1200 m from mean sea level. Find out actual runway length to be provided by applying necessary corrections.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Mean daily Temperature (°C)	10	15	17	18	19	16	15	14	14	12	10	10
Mean of Max. daily Temperature (°C)	26	27	26	26	32	31	23	20	19	19	20	22

8. Define switch and crossing. Explain about different parts of switch and crossing in the railway with neat sketch.
9. Calculate super elevation and maximum permissible speed for Railway with BG track. The minimum radius of the alignment is 580 m. the maximum sanctioned speed and booked speed of goods train is 110 kmph and 45 kmph respectively.
10. Write down advantage of gravity rope way in the context of Nepal. Explain in brief the operating mechanism of gravity ropeway.

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TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
**Examination Control Division**  
2075 Chaitra

Exam.	Regular / Back		
	Level	BE	Full Marks
Programme	BCE	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject:** - Transportation Planning and Engineering (Elective I) (CE72509)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Define model and model developing process in brief. List the responsible agencies for planning in Nepal. [4+4]
2. Distinguish urban and Regional Planning. Why origin and destination study is essential for the transport planning. [4+4]
3. Total trips produced and attracted to the 3 zones A, B, C of a survey area in the design year are:

Zones	Trips produced	Trips attracted
A	2500	2000
B	2500	3000
C	3000	2500

It is known that the trips between two zones are inversely proportion to the second power of the travel time between zones which are shown in table below. If the trip interchange between zones A and B is 900, calculate the interchange between zones A and C, B and C, B and A, C and A, C and B. [8]

Trip between	A and B	B and C	C and A
Travel time (min)	10	15	20

4. A mode choice model for a city includes following modes: Autos (A), Light rail (L), buses (B) and Rapid rail (R) with the utility function (U) as shown in tables.

Function:	Cost (C)	Time (T)
$U(A) = 3.2 - 0.3 * C - 0.03 * T$	5	30
$U(L) = 1 - 0.2 * C - 0.04 * T$	3	25
$U(B) = 0 - 0.1 * C - 0.01 * T$	2.5	40
$U(R) = 1.5 - 0.3 * C - 0.05 * T$	6	20

where C is cost in dollars and T is time in minute.

- i) Based on estimate that 10,000 workers will head for downtown each morning, how many workers will choose to take a particular mode?
- ii) If government subsidies light rail by 40%, buses by 30%, and Rapid rail by 20% and the same time increases automobile cost by 25%, what will be the new modal distribution? [4+4]
5. Mention the principle facilities that should be considered in an airport plan with neat sketch. Write down the procedure of demand analysis in airport planning. [4+4]
6. Basic Length of runway is 1500m. The airport site has elevation of 1000m. Its reference temperature is 30 degree celcius. The maximum RL difference between highest and lowest point in the runway is 5m. Find the corrected runway length. Assume standard temperature at 1000m is 15 degree celcius. [8]

7. Calculate the super elevation, maximum permissible speed, and transition length for a  $3^\circ$  curve on a BG section with a maximum sanctioned speed of 120 km/h. Assume the equilibrium speed to be 80 km/h and the booked speed of the goods train to be 50 km/h. [8]
8. Explain the components of railway track with neat sketch. Mention the types of railway station with their functions. [4+4]
9. "Gravity goods ropeways are the indispensable for the economic development of Nepal, especially for hill terrain" elaborate the statement. Explain the features of gravity ropeway. [4+4]
10. Write short notes on: (Any two) [4+4]
- a) Intelligent Transportation System
  - b) Rolling Stock of railway
  - c) Wind Rose Diagram
  - d) Principle of developing set of Alternative

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Exam.	Back		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject:** - Transportation Planning and Engineering (*Elective I*) (CE72509)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ All questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. List the various agencies involved in the planning stage in context of Nepal. Describe the decision making process in transportation planning.
2. Why the identification of freight transport and NMT demand is very important in planning. List the various types of transportation surveys.
3. Total trips produced and attracted to the 3 zones A,B,C of survey area in the design year is shown in table below. It is known that the trips between two zones are inversely proportion to the second power of the travel time between zones, which is uniformly 20 min. If the trip interchange between zones B and C is 850, calculate the interchange between zones A and B, A and C, B and A, C and B.

Zones	Trips Produced	Trips attracted
A	3500	2000
B	2000	2500
C	1500	2500

4. Trip rate corresponding to Household (HH) size are as shown in given table. Develop the trip generation model and compute the trip rate corresponding to household size of 3.25. Also check for statistical significance based on goodness of fit.

HH-size	Trips per day		
1	1	3	3
2	3	4	5
3	4	5	7
4	5	8	8

5. Define stop way and clear way. Explain the aircraft characteristics that affect the runway length.
6. At an airport site at sea-level with standard atmospheric conditions, the runway length requires for take-off and landing are 2000 m and 2400 m respectively. The proposed airport is situated at an altitude of 150 m. If the airport reference temperature is 25°C and if the effective runway gradient is 0.35 percent, calculate the length of runway to be provided.
7. Discuss the components of railway track with neat sketch. make a neat sketch of left hand turn-out.
8. Calculate the superelevation and maximum permissible speed for 3 degree curve on high speed BG track with the following data:
  - i) Maximum sanctioned speed = 130 Kmph
  - ii) Equilibrium speed = 85 Kmph
  - iii) Booked speed for goods train = 50 Kmph
9. Write down the steps in transport system analysis. What are the principles of developing a set of alternatives?
10. Why gravity goods ropeway is considered to be a viable option in context of rural areas of Nepal. Explain about the pros and cons of the gravity good ropeway.

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject:** - Transportation Planning and Engineering (*Elective I*) (CE72509)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ **All** questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. "Transportation planning is a continuous process, elaborate this statement". Explain land-use transportation cycle.
2. Enlist the types of transportation surveys. Mention difference between the planning for movement of people and goods.
3. Discuss about the Four Step modeling and mention the drawback of growth factor method of trip distribution.
4. A study represents the following characteristics:

Average HH size	2	3	4	5	6
Average total trips per day	5	7	8	10	10

Derive the trip generation equation and Calculate  $R^2$  value (coefficient of determination)

5. Define Effective Gradient. Find corrected runway length for Dang Airport, laying at 200 m elevation and having basic runway length of 1200 m. The Aerodrome reference temperature is 28 degree and Standard temperature at given elevation being 13.5 degree. Take the difference between Maximum elevation and minimum elevation as 20m.
6. What is Wind Rose diagram? Discuss its importance. What are the factors to be considered while selecting the airport sites?
7. Calculate the super elevation, maximum permissible speed and transition length for a  $3^\circ$  curve on a high-speed BG section with a maximum sanctioned speed of 100 km/h. Assume the equilibrium speed to be 80 km/h and the booked speed of the goods train to be 50 km/h.
8. What are the superior aspects of Railway over Roadway? Discuss about various component of railway track with neat diagram.
9. What are the principles for developing a set of alternatives in transportation system analysis?
10. Explain operating mechanism of Gravity goods Ropeway. Discuss the characteristics features of gravity goods ropeway.

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Exam.	Back		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject:** - Transportation Planning and Engineering (*Elective I*) (CE72509)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Transportation planning is necessary at national, regional and urban level. Give reasons why such level wise planning is required. Describe in detail elements of urban transport planning process. [8]
2. Discuss the need of identification of NMT demand. List the various types of transportation survey. Explain about Household Questionnaire Survey in brief. [2+3+3]
3. Why is project evaluation necessary? Discuss various aspects of evaluation of alternatives. [8]
4. Describe the factors that are to be considered for selecting suitable airport site. What is stop way? [8]
5. What are the superior aspect of Railway over Roadway? Discuss about various component of railway track with neat diagram. [2+6]
6. A 2 degree BG transitioned curve on a high speed route has a maximum sanctioned speed of 100 kmph. For computing the equilibrium super elevation the speed has been given as 75 kmph and the booked speed for goods traffic is 50 kmph. Determine the field super elevation and maximum speed that can be allowed. [8]
7. Calculate the modal split based on the calibrated cost function for one of the city of India as:

Mode	Auto	Micro	Bus
A	0.3	0.35	0.4
Y	20	32	40
X	26	18	15

$$C = A + 0.01 * X + 0.04 * Y$$

Where, A = Constant, X = travel cost (Rs.) and Y = travel time (min)

In order to reduce congestion, government tries to increase the patronage of public transportation by reducing fare of bus. What would be the changed modal split, if the travel cost (fare) of bus is subsidized to 60% of initial? [5+3]

8. Define effective gradient. Calculate corrected runway length for: Aerodrome elevation 1250m, mean of maximum and average temperature of hottest month of the year as 42°C and 20°C, maximum elevation difference 20m and basic runway length 1500m. [8]
9. What do you understand by trip production and trip attraction? What are the advantages and disadvantages of Growth factors trip distribution models. [3+5]
10. Describe the operations of gravity goods ropeways and mention why such rope-ways are beneficial. [8]

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject:** - Transportation Planning and Engineering (CE72509) (Elective I)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ All questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. Describe the basic elements in the transportation planning process. State, why this process is not intended to furnish a single result.
2. What are the key factors which make planning for movement of people different from planning of goods movement? Highlight some indicators used.
3. Define trip production and attraction. Discuss the characteristics of urban travel.
4. Clearly state the objectives of conducting project evaluation. List the basic criteria for evaluating transportation projects.
5. Discuss the characteristics of aircraft which have influence on aerodrome planning design and operation.
6. What are the components of railway track structure? Identify the functions of each component.
7. What are the specific advantages of gravity goods ropeway as compared to other modes of transportation? Include relevant variables to support your answer in the Nepalese context.
8. Distribute the total 500 work trip productions from zone 1 to zones 1, 2, 3, 4, 5. The details are given in table. Assume socio-economic factor as unity.

From	To	Attraction	Friction
1	1	80	45
1	2	500	30
1	3	1000	8
1	4	40	15
1	5	90	5

9. Determine the length of a runway using general correction factor, for the data given. Runway length required for landing at sea level in standard atmospheric conditions 2200 m, runway length required for take-off at a level site at sea level in standard atmospheric conditions 1800 m, aerodrome elevation 200 m, aerodrome reference temperature 25°C, temperature in the standard atmosphere for 200 m 14.5°C, runway slope 0.7%
10. Calculate the super elevation and maximum permissible speed for a 2° BG track with the maximum sanctioned speed = 130 kmph, equilibrium speed = 80 kmph and booked speed for goods train = 50 kmph.

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Exam	NEW BACK (2066 & LATER BATCH)		
Level	BE	Full Marks	80
Program	BCE	Pass Marks	32
Year/Part	IV/I	Time	3hrs

**Subject : Transportation Planning and Engineering (Elective I)(CE 72509)**

- Candidates are required to give answers in their own words as far as practicable
- All questions carry equal marks.
- Assume suitable data if necessary.
- Attempt all questions.

1. What are the purpose of planning? Give an example of impact trade-off decision making. Explain land use transportation cycle.
2. What are the types of transportation survey? Why origin and destination study is essential for planning the transportation network?
3. The trip rate and corresponding household size for a sample are given below. Compute the trip rate if average household size is 3.5.

Trips per day	Household size			
	1	2	3	4
	2	4	5	6
	4	5	6	9
	4	6	8	9

4. Classify the trips. Explain the four step modeling process of urban transportation planning.
5. Define cross wind component and wind coverage Discuss the importance of wind rose diagram.
6. The basic runway length of an airport is 2200 m and the elevation of the site is 200m. The airport reference temperature is 25°C and effective gradient is 0.38%. Find the corrected runway length.
7. Explain the functions of component parts of railway track.
8. Find out the superelevation to be provided and the maximum speed for a 3° BG transition curve on a high speed route having a maximum sanctioned speed of 120 kmph. The equilibrium speed is 80 kmph and booked speed for goods traffic is 55 kmph
9. Justify the statement 'Gravity goods ropeway can be the promising alternative to address remote life'. Discuss the limitations of such ropeway.
10. What is an evaluation? Discuss the principles for generating a set of alternatives.

Exam	Regular		
Level	BE	Full Marks	80
Program	BCE	Pass Marks	32
Year/Part	IV/I	Time	3hrs

**Subject : Transportation Planning and Engineering (Elective I)**

- Candidates are required to give answers in their own words as far as practicable
- All questions carry equal marks.
- Assume suitable data if necessary.
- Attempt all questions.

4. Describe the decision making process in transportation planning.
5. What are the methods of transport survey? Why origin and destination study is essential for transportation planning.
6. Total trips produced in and attracted to the three zones A,B,C of a survey area in the design year tabulated as:

Zones	Trips produced	Trips attracted
A	1200	1500
B	1800	2000
C	3000	2500

It is known that the trips between two zones are inversely proportion to the second power of the travel time between zones which is uniformly 30 minutes. If the trip interchange between zones B and C is known to be 330, calculate the trip interchange between zones A and B, A and C, B and A and C and B.

4. Write down the steps for urban transportation planning process. Where logit model is used in urban transport modeling.
5. What are the characteristics of an ideal airport layout? Discuss the importance of wind rose diagram.
6. Basic runway length is 1280 m. The airport site has an elevation of 1200 m. Its reference temperature is 18°C. If the runway is to be constructed with an effective gradient of 0.5%, determine the corrected runway length.  
List out the methods of transport survey. Explain the home interview method.
7. Explain the components of railway track. Why grade compensation is done on curves of railway track?
8. Calculate the super elevation and maximum permissible speed for a 2° curve on a high speed BG track with the maximum sanctioned speed = 120 kmph, equilibrium speed = 85 kmph and booked speed for goods train = 50 kmph
9. What are the principles of developing set of alternatives?
10. What is ropeway? Explain briefly the components of gravity goods ropeway.

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Level	BE	Full Marks	80
Programm	BCE	Pass Marks	32
Year/Part	IV/I	Time	3hrs

**Subject : Transportation Planning and Engineering (Elective I)**

- Candidates are required to give answers in their own words as far as practicable
- The figures in the margin indicate **Full marks**.
- Assume missing data if necessary. Necessary charts and tables attached.
- Attempt any five questions.

8. a) What is the scope of transportation planning? Define accessibility and mobility. [8]
- b) Basic length of runway is 1200 m. The airport site has an elevation of 700 m. Its reference temperature is 18°C. If the runway is to be constructed with an effective gradient of 0.15%, determine the corrected length of runway. [8]
2. a) What is the travel demand? Describe the steps of travel demand forecasting model for urban transportation planning. [8]
- b) What is the importance of O-D survey? Describe the use of O-D data in the transportation planning. Describe the data to be collected by home interview method [8]
3. a) What is evaluation of alternatives? Mention the principles for generating alternatives during transportation planning. [8]
- b) What are the organizations involved in planning in Nepal? Describe the role of department of roads as an implementing agency. [8]
4. a) What are the factors to be considered during site selection of an airport? [8]
- b) Total trips produced in and attracted to the 3 zones A,B,C of a survey area in the design year is tabulated as: [8]

Zones	Trips produced	Trips attracted
A	1200	1400
B	1500	1200
C	1400	1500

It is known that the trips between two zones are inversely proportion to the second power of the travel time between zones which is uniformly 15 minutes. If the trips interchange between zones B and C is known to be 900, calculate the trip interchange between zones A and B, A and C, B and A and C and B. [8]

5. a) Calculate the superelevation and maximum permissible speed for a 3° curve on a high speed BG track: [8]
- maximum sanctioned speed = 130 kmph
  - equilibrium speed = 85 kmph
  - booked speed for goods train = 50 kmph
- b) What are the component parts of rolling stock of railway? Calculate the material requirement for one km of BG railway track. [8]
6. Write short notes on: (any four) [4x4]
- a) Right hand turn out
  - b) Railway stations: functions and types
  - c) Advantages of air transportation
  - d) Jet Engine
  - e) Gravity model

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**Subject : Transportation Planning and Engineering (Elective I)**

- > Candidates are required to give answers in their own words as far as practicable
- > The figures in the margin indicate **Full marks**.
- > Assume missing data if necessary. Necessary charts and tables attached.
- > Attempt any five questions.

7. a) List out the responsible agencies for planning in Nepal and mention their roles for planning. [2+6]  
 b) Describe the scope of transportation planning in brief. [2+6]
2. a) What is difference between urban and regional planning? Describe the economic location theory and factors affecting the relative desirability of a location. [2+6]  
 b) List out the methods of transport survey. Explain the home interview method. [2+6]
3. a) Total trips produced in and attracted to the three zones A,B,C of a survey area in the design year tabulated as: [8]

Zones	Trips produced	Trips attracted
A	4000	2000
B	3000	4000
C	2000	3000

It is known that the trips between two zones are inversely proportion to the second power of the travel time between zones which is uniformly 20 minutes. If the trips interchange between zones B and C is known to be 900, calculate the trip interchange between zones A and B, A and C, B and A and C and B.

- b) Make a flow chart of urban transportation planning process. Describe the application of logit model in urban transport modeling system. [4+4]
4. a) What are the components of an aircraft? Make a neat sketch of an aircraft. [8]  
 b) make a layout plan of an airport. Calculate the corrected length of runway for the given conditions:[8]
- reference temperature for the airport site is 20°C
  - basic length of runway is 1280 m
  - altitude above mean sea level is 900 m
  - runway gradient is 0.25%
5. a) what are the components of rolling stock of railway? Make a sketch of right hand turn out of railway track. [4+4]  
 b) Calculate the superelevation and maximum permissible speed for a 2° curve on a high speed BG track with the following data: [8]
- -maximum sanctioned speed = 150 kmph
  - equilibrium speed = 80 kmph
  - booked speed for goods train = 55 kmph
6. Write short notes on: (any four) [4x4]
- a) Factors affecting trip generation
  - b) Cross wind component, wind coverage and wind rose
  - c) Equivalent criteria of transportation projects
  - d) Types of railway stations
  - e) Transportation systems in Nepal