

University of Asia Pacific
Department of Civil Engineering
Final Examination, Spring 2013
Program: B.Sc. Engineering (Civil)

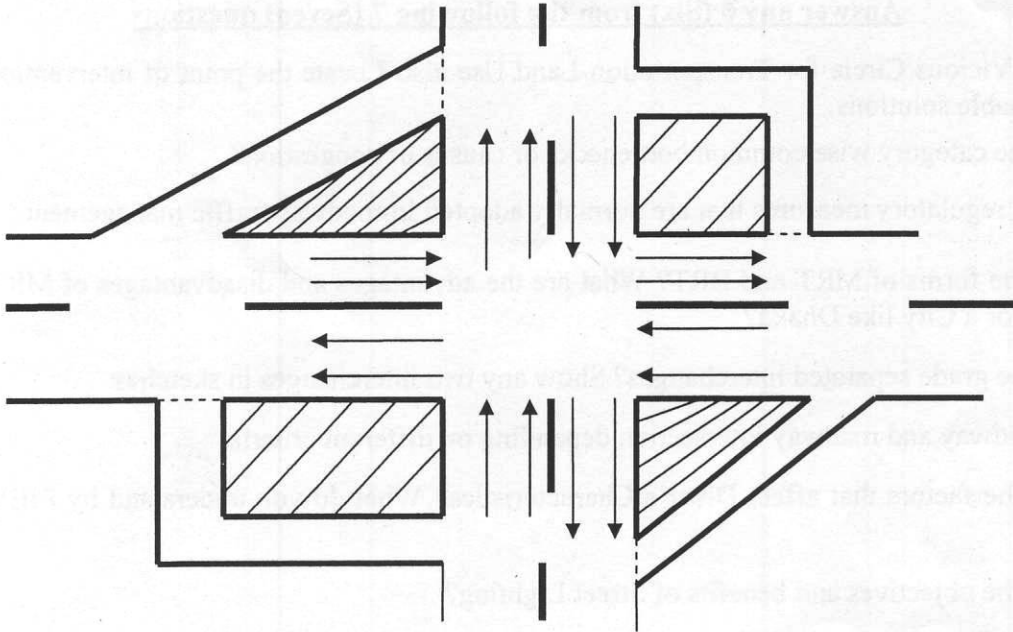
Course #: CE 107 (A)
Full Marks: 120

Course Title: Transportation Engineering I.
Time: 3 hours

Answer any 6 (Six) from the following 7 (Seven) questions

1. a) Draw the Vicious Circle for Transportation-Land Use also Locate the point of intervention for sustainable solutions. (7)
- b) What are the category wise common bottlenecks or causes of congestion? (7)
- c) Explain the regulatory measures that are normally adopted in roadway traffic management. (6)
2. a) What are the forms of MRT and BRT? What are the advantages and disadvantages of MRT and BRT for a City like Dhaka? (6)
- b) What are the grade separated interchanges? Show any two interchanges in sketches. (6)
- c) Classify roadway and roadway intersection depending on different criteria. (8)
3. a) What are the factors that affect Diver's Characteristics? What do you understand by PIEV Time? (6)
- b) What are the objectives and benefits of Street Lighting? (6)
- c) A main business street, with 50ft pavement width having a reflectance of 10%, carries a maximum of 1000 vph at night-time in both directions. Design lighting system of the road considering mercury light source with mounting height of 40ft and a maintenance factor of 0.8. Draw the lighting layout. (8)
4. a) What do you think about the present locations and regulation management of Bus Terminals in Dhaka? In your view, how can it be improved? (6)
- b) What are the factors that affect Traffic Volumes? Explain the types of Traffic Flow. (6)
- c) A traffic engineer urgently needs to determine AADT on a rural primary road that has the volume distribution characteristics shown in tables attached. The engineer collected data shown below on a Monday during the month of June. Determine the AADT of the road. (8)
5. a) What are the scope and objectives of Traffic Volume Study? Explain the methods of Counting. (6)
- b) What are the factors that affect Speeds? Explain different forms of speed. (6)
- c) Spot speed data were collected at a section of highway during a utility maintenance work. The mean speed before and after study are 35.5mph and 38.7mph, standard deviation for before and after study are 7.5mph and 7.4mph, and sample size before and after study are 250 and 280. Determine whether there was any significant difference between the average speeds at the 95% confidence level. (8)

6. a) What are the causes and types of delay that normally roadway traffic faces? (6)
- b) Parking of vehicle should be prohibited in which locations? Explain common method of parking. (6)
- c) Find out the best option, in your opinion, to effectively manage the traffic flow through the following intersection. (8)



7. a) What are the functional classes of traffic signs? What are the flaws in use of traffic signs in Bangladesh? (5)
- b) What are the terminologies of isolated Traffic Signal design? Explain the problems of traffic signaling system in Dhaka. (5)
- c) Design a two-phase signal of an isolated cross-junction for the following data: (10)

Amber in Sec	3			
Red-Amber in Sec	2			
Inter green, (i) in Sec	9 (N-S)	6 (E-W)		
Lost time, (l) in Sec	3 (N-S)	2 (E-W)		
Arrival Flow (pcu/hr)	550 (N)	650 (S)	900 (E)	800 (W)
Sat. flow (pcu/hr)	2200 (N)	2300 (S)	2800 (E)	3000 (W)

Equations:

$$Z = \frac{|u_1 - u_2|}{S_d}$$

$$S_d = \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

$$C_0 = \frac{1.5L + 5}{1 - Y}$$

$$E_{NS} = \frac{Y_{NS} * (C_0 - L)}{Y}$$

$$E_{BW} = \frac{Y_{BW} * (C_0 - L)}{Y}$$

Where the symbols have their usual meanings.

Table 1 Hourly Expansion Factors for a Rural Primary Road

Hour	Vol.	HEF	Hour	Vol.	HEF
6:00-7:00 a.m.	294	42.01	6:00-7:00 p.m.	743	16.6
7:00-8:00 a.m.	426	28.99	7:00-8:00 p.m.	706	17.5
8:00-9:00 a.m.	560	22.05	8:00-9:00 p.m.	606	20.4
9:00-10:00 a.m.	657	18.8	9:00-10:00 p.m.	489	25.3
10:00-11:00 a.m.	722	17.11	10:00-11:00 p.m.	396	31.2
11:00-12:00 p.m.	667	18.52	11:00-12:00 a.m.	360	34.3
12:00-1:00 p.m.	660	18.71	12:00-1:00 a.m.	241	51.2
1:00-2:00 p.m.	739	16.71	1:00-2:00 a.m.	150	82.3
2:00-3:00 p.m.	832	14.84	2:00-3:00 a.m.	100	124
3:00-4:00 p.m.	836	14.77	3:00-4:00 a.m.	90	137
4:00-5:00 p.m.	961	12.85	4:00-5:00 a.m.	86	144
5:00-6:00 p.m.	892	13.85	5:00-6:00 a.m.	137	90.2
Total daily volume = 12350					

Table 2 Daily Expansion Factors for a Rural Primary Road

Day of Week	Volume	DEF
Sunday	7,895	9.515
Monday	10,714	7.012
Tuesday	9,722	7.727
Wednesday	11,413	6.582
Thursday	10,714	7.012
Friday	13,125	5.724
Saturday	11,539	6.51
Total weekly volume = 75,122		

Table 3 Monthly Expansion Factors for a Rural Primary Road

Day of Week	ADT	MEF
January	1350	1.756
February	1200	1.976
March	1450	1.635
April	1600	1.482
May	1700	1.395
June	2500	0.948
July	4100	0.578
August	4550	0.521
September	3750	0.632
October	2500	0.948
November	2000	1.186
December	1750	1.355
Total yearly ADT volume =		28450
AADT =		2371

TABLE 1 RECOMMENDED AVERAGE ILLUMINATION (LUMENS/FT²)

Pedestrian traffic ⁽¹⁾	Vehicular traffic ⁽²⁾ (vph)			
	Very light (<150 vph)	Light (150 - 500 vph)	Medium (500 - 1,200 vph)	Heavy (>1,200 vph)
Heavy	-	0.8	1.0	1.2
Medium	-	0.6	0.8	1.0
Light	0.2	0.4	0.6	0.8

Notes: (1) Heavy: As on main business street
 Medium: As on secondary business streets
 Light: As on local streets
 (2) Night hour flow in both directions

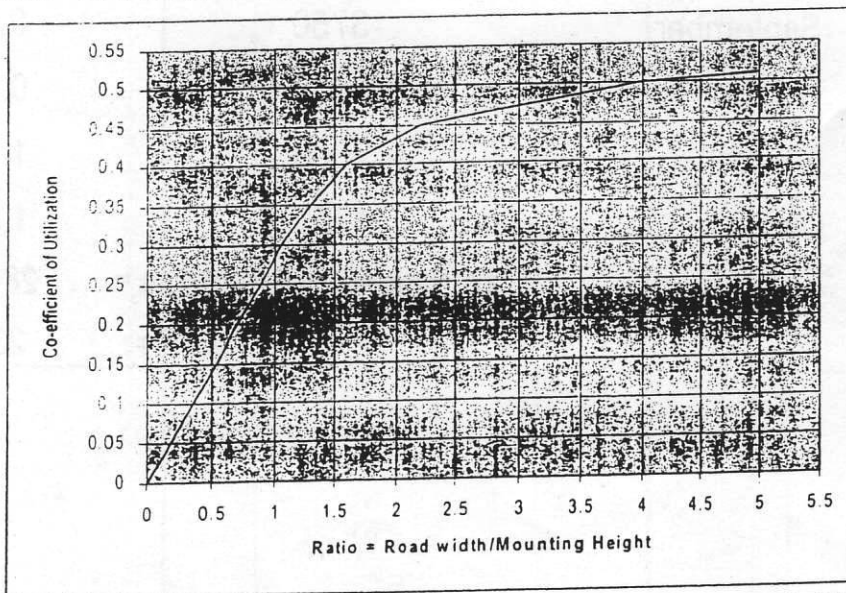
TABLE 2 ADJUSTMENT FACTORS FOR RECOMMENDED AVERAGE ILLUMINATION VALUES

Surface Reflectance	Adjustment Factors
3 % or less	1.5
10%	1.0
20% or more	0.75

TABLE 3 LIGHTING SOURCE CHARACTERISTICS

Source Types	Expected Life (hrs)	Lighting Efficiency (Lumens/Watt)	Wattage (Watt)
Tungsten	1000	8 - 14	Up to 1000
Fluorescent	6000	50 - 75	Up to 250
Sodium	6000	100 - 120	Up to 160
Mercury	7500	20 - 60	Up to 400

FIGURE 1 CO-EFFICIENT OF UTILIZATION CURVES (FOR LIGHT DISTRIBUTION TYPE III)



Note: Due to poor maintenance, the actual co-efficient of utilization is reduced by a factor usually 0.8 (i.e. taken as 80%).

TABLE 4 RECOMMENDED ARRANGEMENT OF STREET LIGHTING

Type of Arrangement	Pavement Width
One side	Width ≤ 30ft
Both sides - Staggered	30ft > Width ≤ 60ft
Both sides - Opposite	Width > 60ft

University of Asia Pacific
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Final Examination, Spring 2013
Program: B.Sc. Engineering (Civil)

Course #: **CE 107 (A)**

Course Title: Introduction to Civil and Environmental Engg.

Full Marks: 100

Time: 2 hours

SECTION-I

Answer any **FIVE** questions from the following questions (5x14) =70

1. a) What is acid rain? Show in an idealized diagram some selected aspects of acid rain formation and paths. (6)
b) What are the effects of acid rain? (4)
c) Describe Meteorological and hydrological drought.(4)
2. a) Describe the sources of Air Pollution.(5)
b)What are the types of air pollutants? Write short note about any one pollutant. (5)
c) What are the general effects of air pollution? (4)
3. a) Briefly discuss the important urban environmental issues in Bangladesh. (6)
b) Define renewable and non-renewable energy with examples. (4)
c) Discuss values, knowledge and social justice as an environmental issue.(4)
4. a) What is Global Warming and how it occurs? Show with sketches. (5)
b) How photochemical and sulfurous smog may be developed. (5)
c) Describe possible effects of sea level rise in Bangladesh.(4)
5. a) Define water pollution? Write any four different categories of water pollutant along with their sources and impact. (10)
b) Describe Ecosystem and Bio-diversity. (4)
6. a) Assume that a population follows a simple logistic growth curve. Find the maximum sustainable yield as a function of carrying capacity, the current population size and current growth rate. (10)
b) Define age structure with sketch. (4)
7. Discuss different uses **OR** issues of water. (14)

SECTION-II

Assume any reasonable value, if at all required.

Answer any 3 (three) from the following questions.

3 x 10 = 30

1. Discuss roadway classifications. What are the steps for procurement of works for a road construction project? (10)
2. Explain stress and strain. Show the stress strain behavior of a road surface and compare this with Hook's law. (10)
3. Briefly explain the specialties of civil engineering. What are the procedures to complete a building construction from start to finish? (10)
4. Write short note on any 4(four) of the following: (10)
 - a) Traffic Management,
 - b) Geotechnical Investigation,
 - c) Shear Stress,
 - d) Roadway Embankment,
 - e) Dams and Levies.

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Course #: **CE 107 (B)**

Course Title: Introduction to Civil and Environmental Engg.

Full Marks: 100

Time: 2 hours

SECTION-I

Answer any **THREE** questions: (3x10=30)

1. a) What is acid rain? Show in an idealized diagram some selected aspects of acid rain formation and paths.
b) What are the effects of acid rain?
2. a) Describe the sources of Air Pollution.
b) What are the types of air pollutants? Write short note about any one pollutant.
3. Briefly discuss the important urban environmental issues in Bangladesh. Define renewable and non-renewable energy with examples.
4. What is Global Warming and how it occurs? Show with sketches, how photochemical and sulfurous smog may be developed.

SECTION-II

Assume any reasonable value, if at all required.

Answer any 5 (Five) from the following 6 (sets) of questions (14x5=70)

1. a) Draw a typical R.C.C Frame Structure and a Load Bearing Wall Structure. (5)
b) What are the infrastructures that Civil Engineering mainly focuses on? (5)
c) What are the disciplines of Civil Engineering? (4)

2. a) What is procurement? What are the 3 types of procurements? Discuss the process of (5)

engaging Consultants for a Bridge Construction Project.

- b) Define transportation. What are the modes of transportation? What are the designs normally required for construction of a road connecting two places? (5)
- c) A rubber is pulled at a stress of 4 MPa to elongate at a strain of 2 in/in and the rubber comes back to its original position after releasing. Find out the Modulus of Elasticity of the rubber using Hook's Law. (4)
3. a) Draw a complete Road Section showing layers and materials. (4)
- b) Draw a flow chart showing the details of building construction starting from land survey. (5)
- c) What do you understand by Traffic Engineering? Who should be responsible for managing traffic in a large city? (5)
4. a) What are the structures Transportation Engineers normally design and construct? (5)
- b) What are the differences between the role of an architect and a civil engineer? (5)
- c) Define civil engineering processes. (4)
5. a) Discuss the role of Geotechnical Engineers. (4)
- b) Why do we need to construct piles for foundation? What are the other types of foundations for buildings? (5)
- c) List construction materials normally used for construction of roads, bridges and buildings. (5)
6. Write short note on any 4(four) of the following: (14)
- a) Global warming,
 - b) Soil classification,
 - c) Land survey,
 - d) Construction management,
 - e) Roof truss
 - f) Road materials