

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Fall 2022
Program: B.Sc. in Civil Engineering

Course Title: Structural Engineering II
 Time: 1 hour

Credit Hour : 3.0

Course Code: CE 313
 Full Marks: 40

ANSWER ALL QUESTIONS.

Required information are shown in appendix. Any missing data can be assumed reasonably.

Part-A

1. Apply Virtual Work Method to calculate the vertical deflection of C of the Beam in Fig.1 (EI=constant).

P= 5 kN for Even student ID

Or P= 7 kN for Odd student ID

[08]

2. Apply Virtual Work Method to calculate the horizontal deflection at E of the frame in Fig.2 (EI=constant).

P= 6 kip for Even student ID

Or P= 9 kip for Odd student ID

[12]

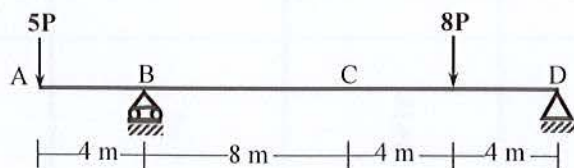


Fig.1

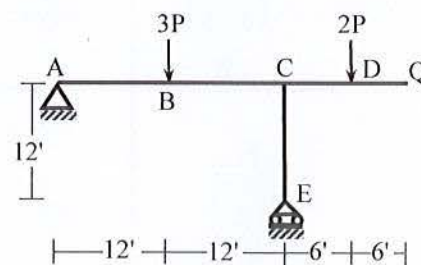


Fig.2

Part-B

3. Shear Forces Diagram of column of a two-storied frame is shown in Fig.3. Analyze the frame using the Portal Method to obtain the following:

(i) applied loads P_1 , P_2 and P_3

(ii) column bending moments and axial forces

(iii) beam shear forces and bending moments.

[13]

4. Analyze the statically indeterminate truss shown in Fig.4 to obtain member forces of FD, CD and BD (assume that diagonal members take an equal share of the sectional shear force). [07]

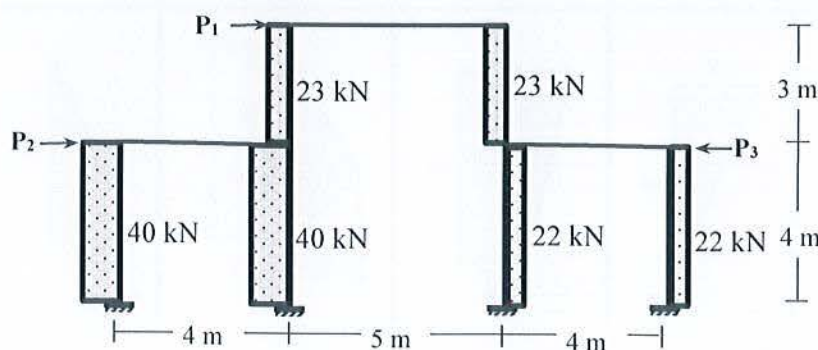


Fig.3

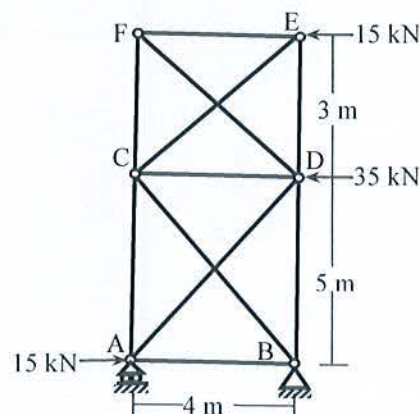
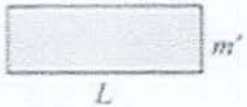
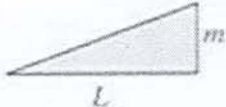
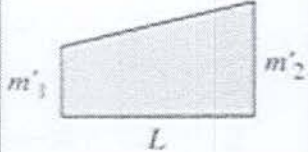
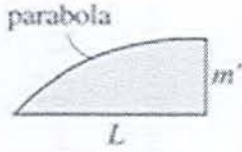
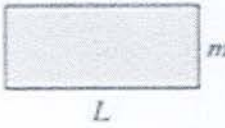
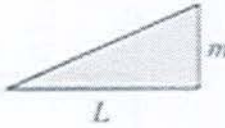
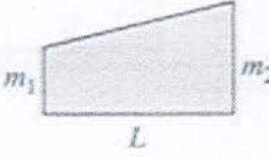
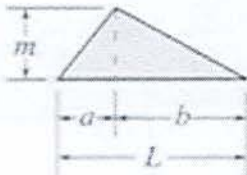
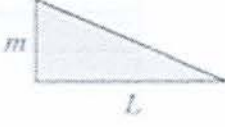


Fig.4

Table for Evaluating $\int_0^L m m' dx$

$\int_0^L m m' dx$				
	$mm'L$	$\frac{1}{2}mm'L$	$\frac{1}{2}m(m'_1 + m'_2)L$	$\frac{2}{3}mm'L$
	$\frac{1}{2}mm'L$	$\frac{1}{3}mm'L$	$\frac{1}{6}m(m'_1 + 2m'_2)L$	$\frac{5}{12}mm'L$
	$\frac{1}{2}m'(m_1 + m_2)L$	$\frac{1}{6}m'(m_1 + 2m_2)L$	$\frac{1}{6}[m'_1(2m_1 + m_2) + m'_2(m_1 + 2m_2)]L$	$\frac{1}{12}[m'(3m_1 + 5m_2)]L$
	$\frac{1}{2}mm'L$	$\frac{1}{6}mm'(L + a)$	$\frac{1}{6}m[m'_1(L + b) + m'_2(L + a)]$	$\frac{1}{12}mm'\left(3 + \frac{3a}{L} - \frac{a^2}{L^2}\right)L$
	$\frac{1}{2}mm'L$	$\frac{1}{6}mm'L$	$\frac{1}{6}m(2m'_1 + m'_2)L$	$\frac{1}{4}mm'L$

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall 2022
Program: B.Sc. Engineering (Civil)

Course Title: Engineering Hydrology

Time: 1 hour

Credit Hour: 3.0

Course Code: CE 363

Full Marks: 40

(Answer all the questions. Figures in the right margin indicate marks)

1. a) Define infiltration. State the factors that affect infiltration. [5]
b) What are the methods of measuring precipitation? Briefly describe. [5]
2. a) Draw a typical hydrograph and discuss its elements. [5]
b) Discuss the elements of the hydrologic cycle. [5]
3. For the data given below, construct the Intensity-Duration-Frequency (IDF) curve [10]
for return periods of 5 years

No.	Year	1-hr	4-hr	12-hr
1	2007	1.7	2.4	2.9
2	2008	1.9	4.1	5.2
3	2009	1.8	3.8	3.9
4	2010	1.3	1.7	1.7
5	2011	1.7	3.2	4.2
6	2012	1.6	2.3	2.7
7	2013	1.9	2.8	2.9
8	2014	3.1	3.6	3.6
9	2015	1.5	2.1	3.6
10	2016	2.9	4	4.5
11	2017	1.4	2.8	2.8
12	2018	1.6	2.2	2.2
13	2019	2.2	4.5	7.7
14	2020	2.5	3.2	4.6
15	2021	2.1	3.1	3.1
16	2022	1.6	2.8	4.1

4. a) Bangladesh Meteorological department measured the weather condition of [5]
Narsingdi as follows:
The average air temperature: 80 °F
Wind Speed: 11 km/h
Relative humidity: 90%

Calculate the evaporation rate in mm/day using Harbeck and Meyers formula. The constant of the formula $b = 0.0119 \text{ cm-sec/m.mb-day}$. Why do you need to know the evaporation rate in order to irrigate a land? Justify your answer.

b) The daily streamflow and baseflow data at a site having a drainage area of 7250 km² are given in the Table below. Determine the runoff volume and equivalent depth of the direct runoff. Why measurement of runoff volume is necessary? Justify your answer. [5]

Time (Day)	Total Flow (m ³ /s)	Base flow (m ³ /s)
0	170	170
1	168	168
2	230	168
3	500	162
4	1055	161
5	970	160
6	760	157
7	600	155
8	480	150
9	400	148
10	320	147
11	200	145
12	150	141
13	140	140
14	140	140

University of Asia Pacific
Department of Civil Engineering
Midterm Examination, Fall 2022
Program: B.Sc. Engineering (Civil)

Course Title: Environmental Engineering II

Course Code: CE 333

Time: 1 hour

Credit hour: 3

Full Marks: 40

There are Four (4) questions. Answer all the questions.

1. Indicate the disease transmission routes from the environment to humans, and the intervention approaches to prevent such transmission with a schematic diagram. [10]
2. Describe the factors that influence corrosion in a sewer pipe. [10]
3. Calculate the volume of the equalization tank of a treatment plant subjected to variable inflow rates (with time) as illustrated below. [10]

Time Interval	Flow (m ³ /h)
6.00 A.M-10.00 A.M	300
10.00 A.M -14.00 P.M	410
14.00 P.M -18.00 P.M	190
18.00 P.M -22.00 P.M	210
22.00 P.M -2.00 A.M	120
2.00A.M-6.00 A.M	70

4. Describe the discrete (type 1) and flocculent (type 2) settling processes contributing to pollutant removal in primary sedimentation tanks. [10]

University of Asia Pacific
Department of Civil Engineering
Midterm Examination, Fall-2022
Program: B.Sc. Engineering (Civil)

Course Title: Principles of Management
Time: One hour

Credit Hour: Two

Course Code: IMG 301
Full Marks: 20

(Answer any two of the following questions.)

1. (a) “--- --- is based on the notion that it is best to give foreign subsidiaries, staffed by local nationals, a great deal of managerial freedom. It is assumed that local nationals understand the local environment best.” Which orientation of multinational corporation is it? 0.5
(b) “It requires developing products with the whole world in mind, especially the markets in North America, Asia, and Western Europe. Similarly, strategic decisions must take into account the whole world, but tactics must be adapted to the national and local environments.” For which type of company the above aspects may be required? 0.5
(c) Write any two objectives of NAFTA (North American Free Trade Agreement). 1
(d) Describe Managerial Roles Approach with its limitations. 8
2. (a) Write advantages of and challenges for multinational corporations. 6
(b) What is whistle-blowing? 2
(c) What is the use of whistle-blower website? 2
3. (a) Explain strategies, policies, procedures, rules, and programs (five types of plans). 8
(b) How many countries formed ASEAN (Association of South East Asian Nations)? Mention names of any three countries. 1
(c) A law was passed “--- which requires labor membership in the supervisory board and the executive committee of certain large corporation. Furthermore, a labor director is elected as a member of the executive committee.” What term is used for such labor participation? 0.5
(d) Japanese management, then, uses decision making by ___ to deal with everyday problems. Fill up the blank. 0.5

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2022
Program: BSc in Civil Engineering

Course Title: Design of Concrete Structures II

Time: 1 hour

Credit Hour: 3.00

Course Code: CE 317

Full Marks: 60

QUESTION 1 [30 MARKS]

The floor slab layout plan of an 8 storeyed academic building (live load 2.4 kN/m^2) is shown in Figure 1. The floor will be constructed with **flat plate slab system** and it carries 3 kN/m^2 dead load due to random wall and floor finishes. The thickness of all slabs could be assumed as 225 mm . Apply the concept to design the slab (interior span) for **column strip of slab panel "A"**. The column size could be assumed as $600 \text{ mm} \times 600 \text{ mm}$. The concrete strength of 24 N/mm^2 and 420 N/mm^2 grade of steel could be used in design. Assumed required data for design. [30 Marks]

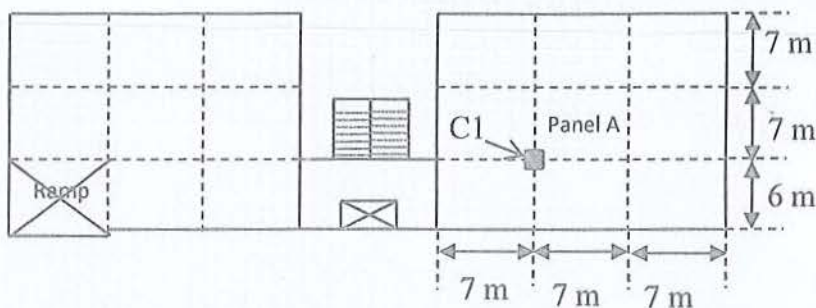


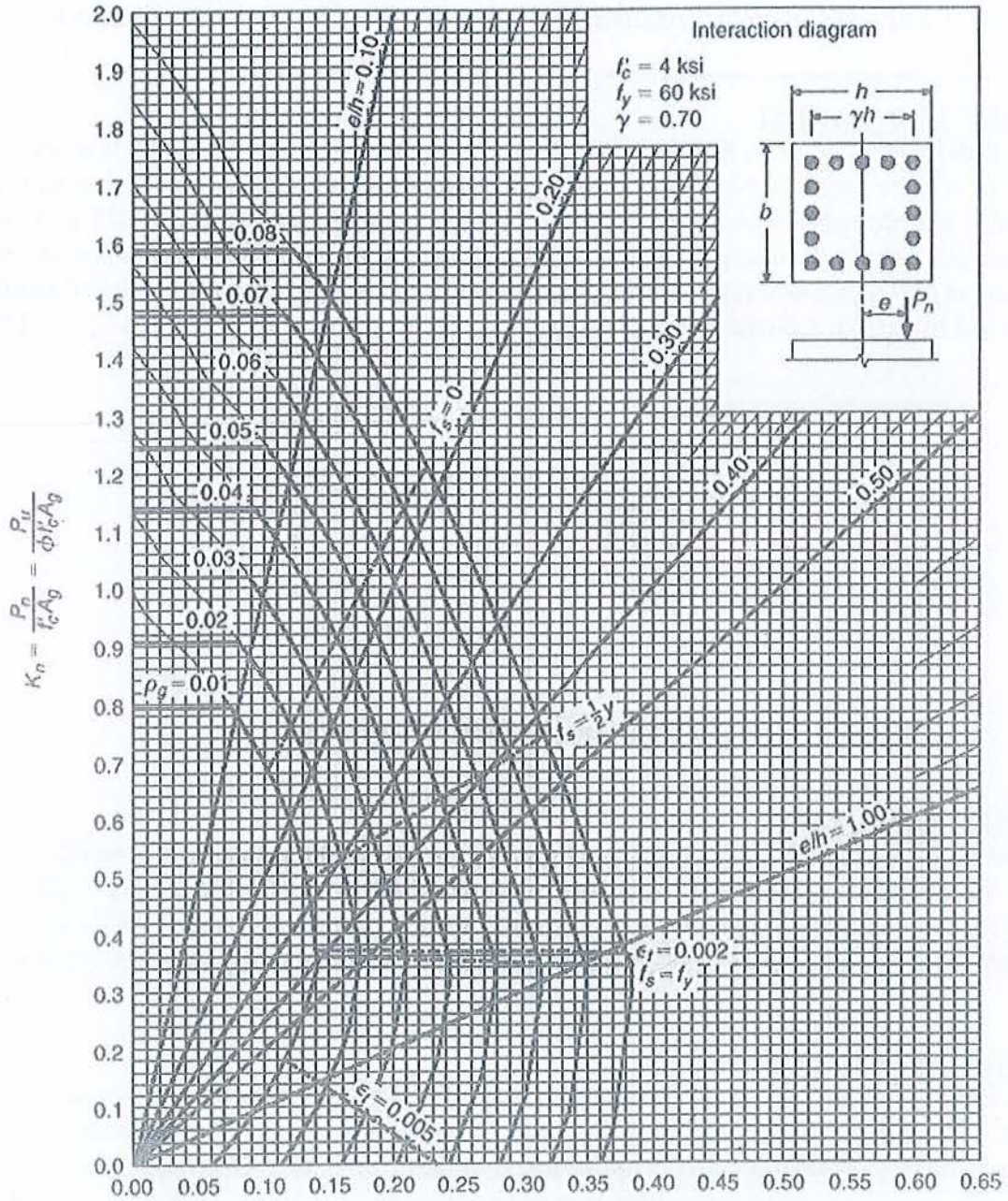
Figure 1. Flat slab floor plan of residential building

QUESTION 2 [18 MARKS]

The ground floor column of C1 (as shown in Figure 1) for the building stated in Question 1 has to be designed. The column is subjected to compressive force along with 300 kN.m equivalent uni-axial bending moment. Design the column with an **optimal solution** (as tie column) considering all possible ways to reduce the size of column. The column design chart as shown in Appendix could be used for design. [18 Marks]

QUESTION 3 [12 MARKS]

The roof slab of the academic building (Question 1) is subjected to heavy load of research materials (12 kN/m^2). Propose a solution to obtain minimal thickness of roof slab and justify your proposal through considering punching effects, deflection, column size and other requirements of codes (ACI/BNBC). [12 Marks]



$$R_n = \frac{P_n e}{f'_c A_g h} = \frac{P_u e}{\phi f'_c A_g h}$$

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall – 2022
Program: B.Sc. Engineering (Civil)

Course Title: Transportation Engineering I
 Time: 1 hour

Credit Hour: 03

Course Code: CE 351
 Full Marks: 60

There are Four Questions. Answer All the Questions

[Assume reasonable data if any]

1. a) State the advantages and disadvantages of a rotary intersection [11]
- b) Explain the three basic attributes by which a transportation system can be evaluated. [10]
2. a) A calibration study resulted in the following utility equation for different modes in Dhaka

$$U_k = A_k - 0.25X_1 - 0.032X_2 - 0.015X_3 - 0.002X_4 \text{ where}$$

A_k = mode specific constant

X_1 = access plan egress time in minutes

X_2 = waiting time in minutes

X_3 = line haul time in minutes

X_4 = out-of-pocket-costs in Taka

	A_k	X_1	X_2	X_3	X_4
Bus	-0.22	10	15	40	50
Bike	-0.08	3	5	15	135

From the above table, calculate the share of two modes for a forecasted trips of 2500 using a logit model. [10]

- b) Explain diagrammatically the basic movement to categorize travel pattern in planning area. [7]
3. Develop a two-phase signal of an isolated cross junction and also show the bar diagram for the data given below:

Amber	3 sec
Red-Amber	2 sec

	N-S	E-W
Inter-Green	8	6
Lost time	2	3

	North	South	East	West
Flow, veh/hr	620	790	875	710
Saturation flow, veh/hr	1910	2380	2700	2130

[12]

4. Calculate the AADT for the following data. Data was collected on Friday in January. MEF for January is 1.756. Necessary table is provided enclosed

Hour	Volume
8:00 a.m. – 9:00 a.m.	1200
10:00 a.m. – 11:00 a.m.	840
11:00 a.m. – 12:00 p.m.	1320
1:00 p.m. – 2:00 p.m.	1678
2:00 p.m. – 3:00 p.m.	926

[10]

Data given for Question No 4

Table 4.5 Hourly Expansion Factors for a Rural Primary Road

Hour	Volume	HEF	Hour	Volume	HEF
6:00–7:00 a.m.	294	42.00	6:00–7:00 p.m.	743	16.62
7:00–8:00 a.m.	426	29.00	7:00–8:00 p.m.	706	17.49
8:00–9:00 a.m.	560	22.05	8:00–9:00 p.m.	606	20.38
9:00–10:00 a.m.	657	18.80	9:00–10:00 p.m.	489	25.26
10:00–11:00 a.m.	722	17.10	10:00–11:00 p.m.	396	31.19
11:00–12:00 p.m.	667	18.52	11:00–12:00 a.m.	360	34.31
12:00–1:00 p.m.	660	18.71	12:00–1:00 a.m.	241	51.24
1:00–2:00 p.m.	739	16.71	1:00–2:00 a.m.	150	82.33
2:00–3:00 p.m.	832	14.84	2:00–3:00 a.m.	100	123.50
3:00–4:00 p.m.	836	14.77	3:00–4:00 a.m.	90	137.22
4:00–5:00 p.m.	961	12.85	4:00–5:00 a.m.	86	143.60
5:00–6:00 p.m.	892	13.85	5:00–6:00 a.m.	137	90.14
Total daily volume = 12,350.					

Table 4.6 Daily Expansion Factors for a Rural Primary Road

Day of Week	Volume	DEF
Sunday	7895	9.515
Monday	10,714	7.012
Tuesday	9722	7.727
Wednesday	11,413	6.582
Thursday	10,714	7.012
Friday	13,125	5.724
Saturday	11,539	6.510
Total weekly volume = 75,122.		