

3-2

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Midterm Examination, Fall-2021**  
**Program: B.Sc. Engineering (Civil)**

Course Title: Principles of Management  
Time: One hour

Credit Hour: Two

Course Code: IMG 301  
Full Marks: 20

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(Answer any two of the following questions.)

1. (a) "This means that the entire organization is viewed as an interdependent system operating in many countries. The relationship between headquarters and subsidiaries are collaborative, with communication flowing in both directions." Which orientation of multinational corporations is it? 0.5  
(b) What percentage of Mazda's share Ford Motor Company purchased? 0.5  
(c) What stands for ASEAN? 0.5  
(d) What fraction of labor force enjoys job security in Japan? 0.5  
(e) Explain the functions of management with examples. 8
  
2. (a) Write advantages of and challenges for multinational corporations. 6  
(b) Draw the diagram of the relationship of objectives and the organizational hierarchy. 4
  
3. (a) Explain policies and procedures (two types of plans). 4  
(b) What is whistle-blowing? 2  
(c) What is the use of whistle-blower website? 2  
(d) Which type of corporation views the whole world as one market? 0.5  
(e) Which countries are included in North American Free Trade Agreement (NAFTA)? 0.5  
(f) "However, it adds to the business costs because employees are kept on the payroll even when there is insufficient work." What adds to the business costs? 0.5  
(g) Still in major decisions, --- management retains its power. (In Japan). Fill up the blanks. 0.5

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Midterm Examination Fall 2021**  
**Program: B.Sc. Engineering (Civil)**

Course Title: Structural Engineering II  
 Time: 1 hour

Credit Hour : 3.0

Course Code: CE 313  
 Full Marks: 40

ANSWER ALL QUESTIONS. Any missing data can be assumed reasonably.

**Part-A**

1. Using Virtual Work (Unit Load) Method, find the horizontal and vertical deflection of joint D of the truss in Fig.1  
 [Given:  $EA = \text{Constant}$ ]

[10]

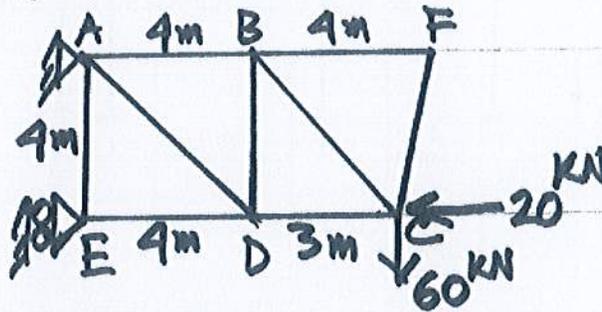


Fig.1

2. Using Virtual Work (Unit Load) method, calculate (i) the horizontal deflection at joint C and (ii) rotation of the free end D of the Frame in Fig.2  
 [Given:  $EA = \text{Constant}$ ]

[10]

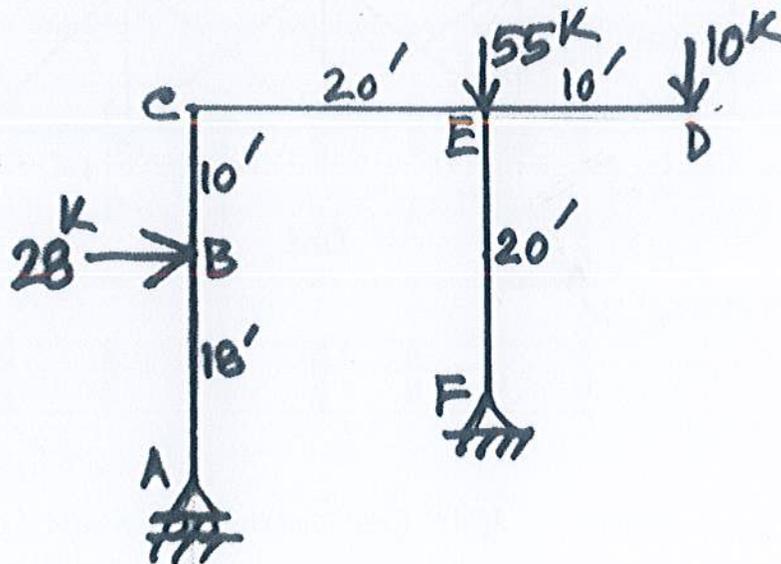
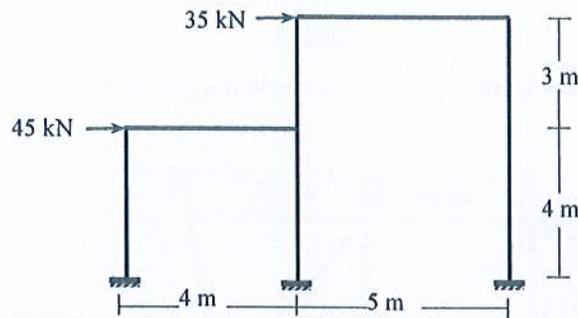


Fig.2

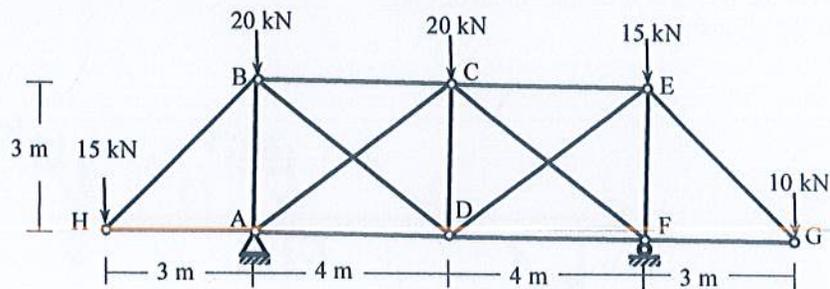
**Part-B**

3. Analyze the structure as shown in Use Portal Method to draw the shear force and bending moment diagrams of the structure shown in **Fig.3** [13]



**Fig.3**

4. Analyze the structure to determine member forces AC, BD, CF, DE of a statically indeterminate truss shown in **Fig.4** assuming  
(i) Diagonal members take equal share of the sectional shear force for members AC, BD  
(ii) Diagonal members can take tension only for members CF, DE. [7]



**Fig.4**

**University of Asia Pacific**  
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**Mid Term Examination Fall 2021**  
**Program: BSc in Civil Engineering**

Course Title: Design of Concrete Structures II

Time: 1 hour

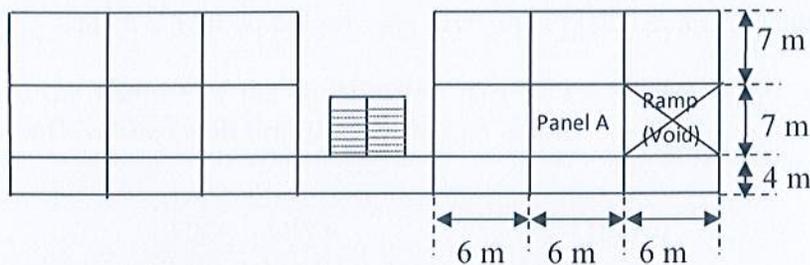
Credit Hour: 3.00

Course Code: CE 317

Full Marks: 60

**QUESTION 1 [30 MARKS]**

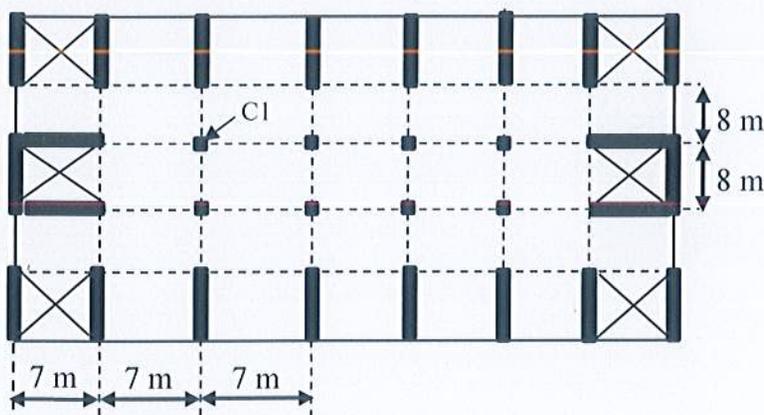
The slab layout plan of a residential building (live load  $2 \text{ kN/m}^2$ ) is shown in Figure 1. The floor will be constructed with beam supported slab and it carries  $3 \text{ kN/m}^2$  dead load due to random wall and floor finishes. Apply the concept to design the slab panel "A" for **short span support moment**. Assume required data for the design, concrete strength ( $f_c'$ ) is 24 MPa. [30 Marks]



**Figure 1.** Slab floor plan of residential building

**QUESTION 2 [12 MARKS]**

The floor slab layout plan of 8 storeyed warehouse (live load  $6 \text{ kN/m}^2$ ) is shown in Figure 2. The floor will be constructed with **flat slab system** and it carries  $3 \text{ kN/m}^2$  dead load due to random wall and floor finishes. Provide a solution for the maximum **optimization of the thickness of slab** considering the requirements of deflection and punching shear of the codes (BNBC 2020 or ACI 318). The reasonable column size could be considered, assume required data for the solution. [12 Marks]



**Figure 2.** Structural model (floor plan) of high-rise building

**QUESTION 3 [18 MARKS]**

**Design the column "C1"** at first floor of the structure of Question 2 (Figure 2) as tie column for gravity load only. Assume required data for the design. [18 Marks]

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Midterm Examination Fall 2021**  
**Program: B.Sc. Engineering (Civil)**

Course Title: Environmental Engineering II  
Time: 1 hour

Credit Hour: 3.00

Course Code: CE 333  
Full Marks: 40

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

1. "Poverty reduction is not linked with ecological sanitation"-justify the statement. [10]
2. How could shock loading influence the treatment performance of a septic tank? [10]
3. What will happen if you do not provide horizontal plates in drop manholes? [10]
4. Calculate the volume of the equalization tank of a treatment plant, subjected to variable inflow rate (with time), as illustrated below. [10]

Time Interval	Flow (m <sup>3</sup> /h)
6.00 A.M-10.00 A.M	440
10.00 A.M -14.00P.M	200
14.00 P.M -18.00 P.M	500
18.00 P.M -22.00 P.M	50
22.00 P.M -2.00A.M	110
2.00A.M-6.00 A.M	160

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Midterm Examination**  
**Fall 2021**  
**Program: B.Sc Engineering (Civil)**

**Course Title: Transportation Engineering 1**  
**Full Marks: 60**

**Course Code: CE 351**  
**Time: 1hour**

There are Two questions. Answer all of them

1. a) Compare on-street and off-street method of parking method. 6  
 b) Calculate the AADT for the following data. Data collection was conducted on Wednesday in March. MEF for March is 1.635. 12

Hour	Volume
7:00-8:00 a.m.	1527
8:00-9:00 a.m.	1447
9:00-10:00 a.m.	1337
10:00-11:00 a.m.	1767
11:00-12:00 p.m.	1447
12:00-1:00 p.m.	1627
1:00-2:00 p.m.	1410

- c) Compute the time-mean speed and space-mean speed of 8 vehicles traversing a 1600 meter segment of a highway presented in following table: 12

Vehicle no.	Distance (meter)	Travel time (sec)
1	1600	68
2	1600	79
3	1600	85
4	1600	93
5	1600	81
6	1600	77
7	1600	88
8	1600	75

2. a) Differentiate between simple trip chain and complex trip chain. 6  
 b) Design a two-phase signal of an, isolated cross-junction for the data given below: 15

Amber	3 sec			
Red-amber	2 sec			
	N-S	E-W		
Inter green	7	8		
Lost time	6	5		
		Approaches		
	North	South	East	West
Flow, pcu/hr	1550	1080	850	1330
Saturation flow pcu/hr	4770	3140	2520	3970

Draw the **phase diagram**.

- c) Define (any three): 9
- |                              |                    |
|------------------------------|--------------------|
| (i) Recurrent delay          | (ii) Stable flow   |
| (iii) Mandatory traffic sign | (iv) Park and ride |

Table for Question 1 b)

**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

**University of Asia Pacific**  
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**Mid Term Examination Fall 2021**  
**Program: B.Sc. Engineering (Civil)**

Course Title: Engineering Hydrology  
Time: 1 hour

Credit Hour: 3

Course Code: CE 363  
Full Marks: 40

**Answer all the following questions. Assume any reasonable values, if not given.**

1. (a) Define hydrology. What are the subsystems of hydrology? [2.5+2.5]  
(b) How can we find out the adequacy of a rain gauge station? [5]  
(c) What is evaporation? What are the factors affecting evaporation? [2.5+2.5]  
(d) Define runoff. What are the classifications of streams for runoff characteristics? [2.5+2.5]

2. Develop a regression equation between R and P. Given below are the monthly rainfall (P) and the corresponding runoff (R) values covering a period of 20 months for a catchment. [6]

Month	P (cm)	R(cm)	Month	P(cm)	R(cm)
1	6	0.25	11	9	1.2
2	30	5	12	47	22
3	15	0.15	13	3	0
4	40	12	14	8	2.3
5	10	8.2	15	35	8.5
6	9	0.12	16	31	7
7	7	0.3	17	8	2.9
8	45	12	18	2	0
9	9	3	19	5	0.19
10	25	6	20	16	3.1

3. Calculate the total runoff for the storm having  $\phi$  index value 0.9 cm/hr. Given the time distribution of the rainfall for the storm. Also draw hyetograph for the above problem. [7]

Time (min)	20	40	60	80	100
Accumulated rainfall	0.5	1.2	2.6	3.3	3.5

4. Calculate the potential evapotranspiration from an area in the month of October using Penman's Equation. Use the tables given below for necessary values. [7]

The following data are available:

Latitude = 44° North

Elevation = 120 m above sea level

Mean temperature = 22.5° C

Mean relative humidity = 80%

Mean observed sunshine hours = 5 hours

Wind velocity at 2m height = 70 Km/day

Nature of surface cover: Water surface

Usual ranges of values of rare given below

*Close ground corps* = 0.15 - 0.25

*Bare lands* = .05 - 0.45

*Water surface* = 0.05

*Snow* = 0.45 - 0.95