3-2

University of Asia Pacific(UAP)
B.Sc. in Civil Engineering Program
Mid Term Examination Spring 2023 Semester
Principles of Management (IMG 301)

Course Title: Principles of Management. Course Code : IMG 301. Credit : 2

Time : 60 Minutes   Marks : 20

☐ **Answer any 02(Two) questions. All questions carry equal marks.**

1. a) What is Diagnostic skills ? Give example.   3

    b) Delineate the functions of Management.   7

2. a) Draw the MBO process with diagram.   3

    b) Critically explain the types of plans.   7

3. a) Distinguish Theory X and Theory Y.   3

    b) Describe the Maslow's Theory of Motivation.   7

Best of Luck

Course Title: Structural Engineering II	Course Code: CE 313
Time: 1 hour Credit Hour: 3.00	Full Marks: 60

QUESTION 1 [36 MARKS]

a. A frame of 10-storeyed student hostel structure is subjected to lateral (wind) load as shown in **Figure 1**. **Analyze** the structure for lateral load using portal and cantilever methods to obtain axial force of columns, and shear force, bending moment of columns (C1, C2 and C3) and beams (B1 and B2) of **8th floor** only shown in **Figure 1**.   [24 Marks]

b. **Analyze the truss** of billboard (shown in **Figure 2**) for lateral load due to wind using approximate method to obtain member forces of the portion **"abde"** of the truss. The diagonal members of the truss could be considered as thin elements. [12 Marks]
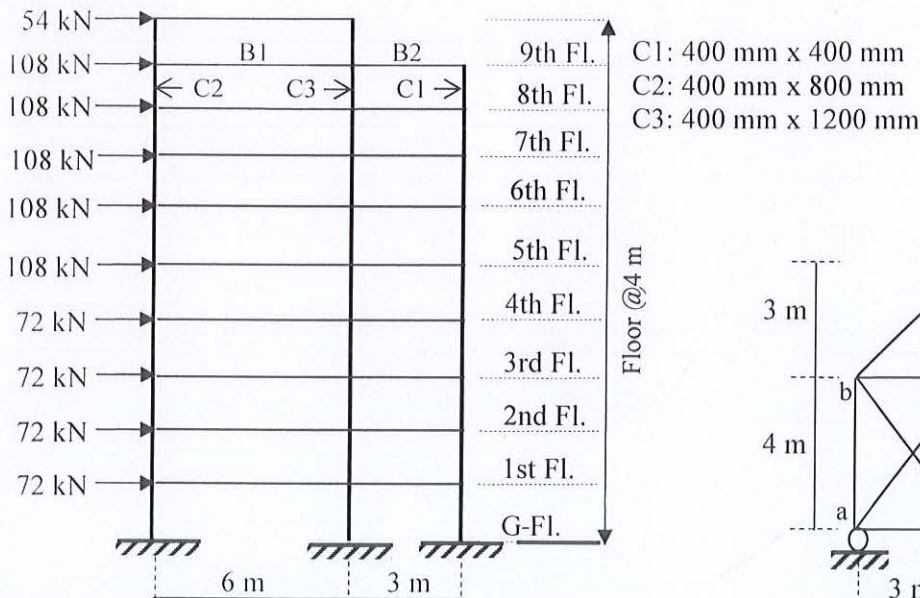

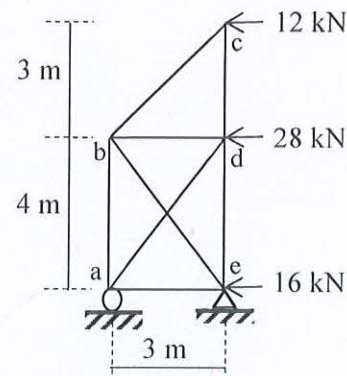**Figure 1:** Frame of student hostel building

Figure 2: Truss of billboard

QUESTION 2 [24 MARKS]

The frame structure is subjected under lateral and gravity loads as shown in **Figure 3**. **Analyze** the frame using virtual work method (unit load method) to obtain the **horizontal (lateral) deflection** at the location of **"E"** (shown in **Figure 3**). Assume, EI as constant.   [24 Marks]
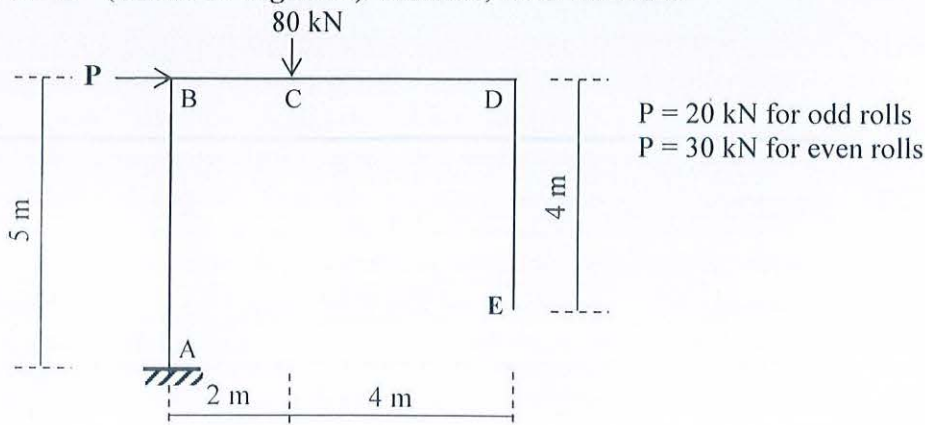
P = 20 kN for odd rolls
P = 30 kN for even rolls

Figure 3: Frame structure

Course Title: Design of Concrete Structures II   Course Code: CE 317
Time: 1 hour   Credit Hour: 3.00   Full Marks: 60

QUESTION 1 [30 MARKS]

The floor layout plan of a 10-storeyed student hostel (live load 2 kN/m^2) is shown in **Figure 1**. The floor of the structure will be supported by beam, and it carries 3 kN/m^2 dead load due to random wall and floor finishes. The size of the beam could be assumed as 300 mm x 750 mm. The secondary beam is located at the centre of the main beam. Design the **slab panel "S1" (short span only)** as shown in **Figure 1** considering safety, societal and environmental issues. Synthesize (optimize) the thickness of the slab as per deflection and shear requirements of ACI / BNBC code. Assume required data to design the slab. The shear coefficient of the slab is 0.5, the bending moment coefficient of slab is shown in the Table.   [30 Marks]
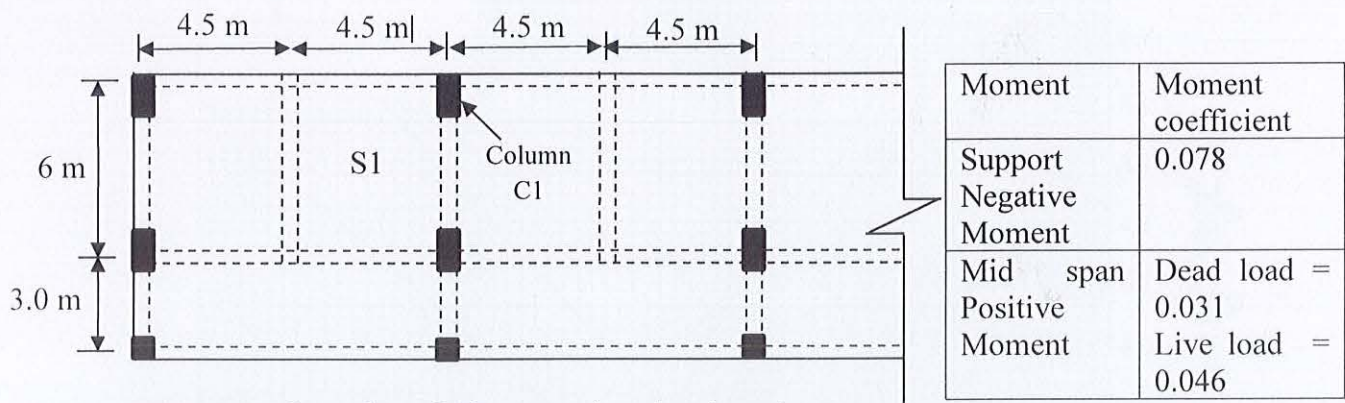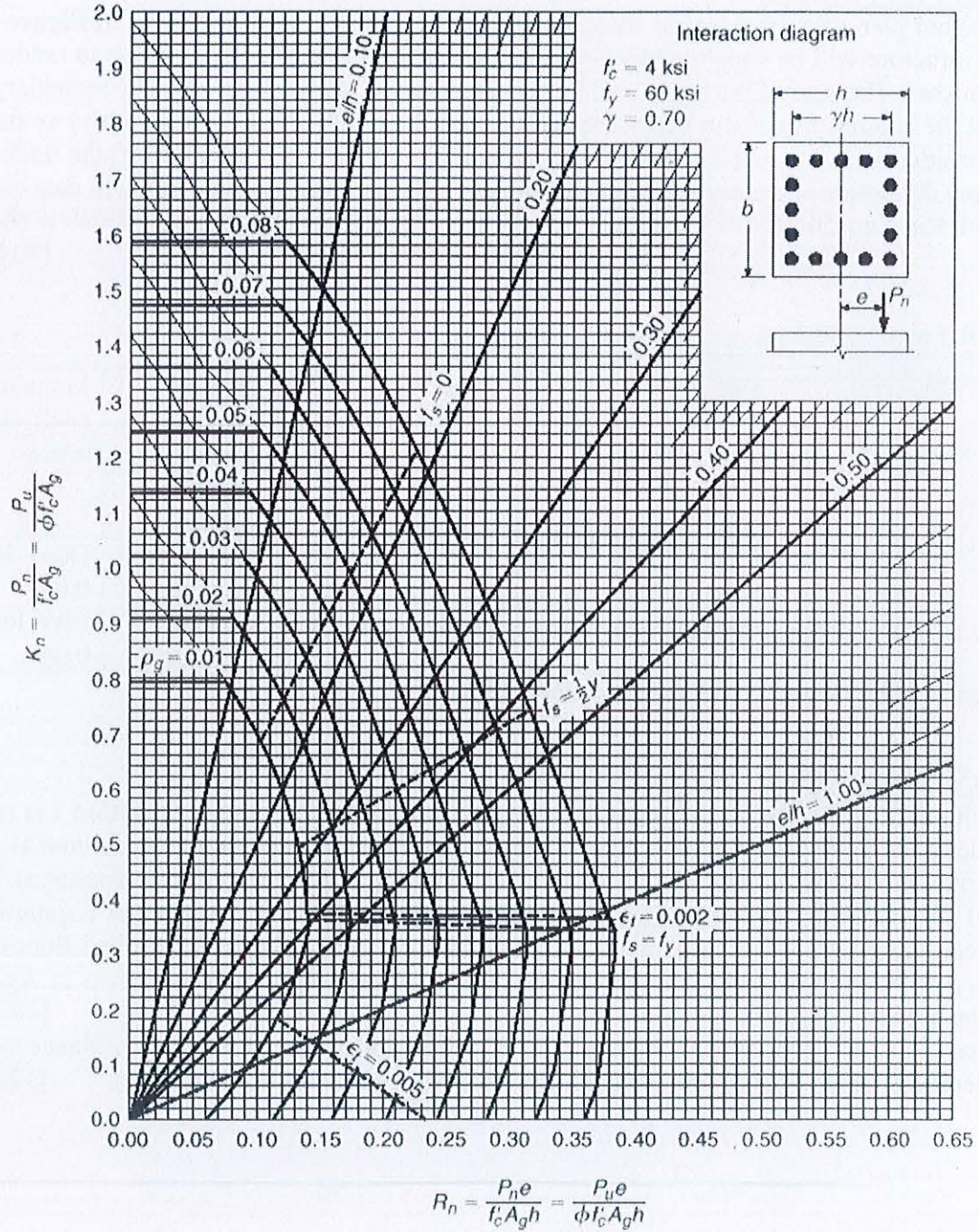

Moment	Moment coefficient
Support Negative Moment	0.078
Mid span Positive Moment	Dead load = 0.031 Live load = 0.046

Figure 1. Floor plan of 10-storeyed student hostel

QUESTION 2 [30 MARKS]

a. The column **"C1"** as shown in **Figure 1** of the building structure stated in **Question 1** is required to be designed as rectangular tie column. The uni-axial design moment of the column at ground floor could be considered as 450 kN-m (along the direction of long dimension of column). Design load of the column could be obtained using approximate method. As per the requirement of Architect, the width of the column should be within 400 mm. **Design** the ground floor column considering safety and societal requirements. The column design chart as shown in **Appendix** could be used to design the column.   [18 Marks]

b. **Synthesize the design** for the maximum minimal dimension of the column in accordance to design considerations of BNBC 2020 and available construction materials in Bangladesh.   [12 Marks]

Appendix

Interaction diagram

$f'_c = 4$ ksi
$f_y = 60$ ksi
$\gamma = 0.70$

$K_n = \dfrac{P_n}{f'_c A_g} = \dfrac{P_u}{\phi f'_c A_g}$

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

Course Title: Environmental Engineering II		Course Code: CE 333
Time: 1 hour	Credit hour: 3	Full Marks: 40

There are Four (4) questions. <u>Answer all the questions</u>.

1. As an environmental engineer, how could you solve the odor and fly problems associated with a common pit latrine? **[10]**

2. Explain the following statement: *"Septic tank is considered a partial wastewater treatment system."* **[10]**

3. Calculate the velocity through a preliminary rack treatment unit, when the approach velocity is 0.80 m/s, the flow open area through the clean bar rack is 0.2 m², and the headloss across the rack is 40 mm. Also estimate the headloss, when 50% area of the flow area is blocked off due to coarse solids accumulation. **[10]**

   Use the following equation: $h = h_1 - h_2 = \dfrac{V^2 - v^2}{2gC^2}$

4. Describe the following Stokes equation for measuring the discrete settling velocity of suspended solids in a rectangular primary sedimentation tank with necessary assumptions and boundary conditions. **[10]**

   $$v_t = \frac{g(\rho_\rho - \rho_\omega)d^2}{18\mu}$$

University of Asia Pacific
Department of Civil Engineering
Mid-term Examination Spring 2023
Program: B.Sc. Engineering (Civil)

Course Title: Transportation Engineering I   Credit Hour: 3.00   Course Code: CE 351
Time: 1 hour   Full Marks: 60

Answer all the questions

1. a) Define the traffic system in Bangladesh and explain with relevant diagram why road construction is expensive in this country. **[10]**

   b) Between the approach road and the exit road in a junction design, which one will have a greater width? Discuss the rationale behind this. **[5]**

2. a) Recommend the relatively secure method to on-street parking and explain the advantages and disadvantages associated with this recommended approach. **[8]**

   b) Discuss on how you will select traffic design hourly volume (DHV) for rural and urban road respectively. Write down the conditions under which contra flow can be seen. **[4+3]**

3. The primary road of Dhabaka city is a two way road and has 30 ft width on each direction. Determine lighting layout of the road with mounting height of 40 ft, surface reflectance of 10% and a maintenance factor of 0.7. Consider, Fluorescent bulb.
   Given,   Day-time vehicle flow (both direction)= 5000 vph
                  Night-time vehicle flow (both direction)= 600 vph
   Refer to the annexure (Table 1-4, Figure 1) for necessary data. **[8]**

4. A traffic engineer collected vehicle volume data on a rural primary road. He found 650 vehicles for 7 AM to 8 AM on Thursday, August 2022. To get more appropriate estimation, he again took the volume data for 5 PM to 6 PM on the same day. Additionally, a data is known of AWT= 70,000 for the road. **[4+3]**

   a)   Determine vehicle volume obtained for 5 PM to 6 PM.
   b)   Determine AADT.

   Refer to annexure (Table 5-7) for necessary data.

5. A survey has been conducted on six vehicles traversing throughout a 20 km stretch of a road to calculate spot speed. Data are obtained as follows: [7+8]

Vehicle No.	Travel Time (hr)	Spot Speed (kmph)
1	4	A
2	2	B
3	1.33	C
4	1	D
5	0.8	E
6	0.67	F

a) Determine the spot speed values and calculate time-mean speed.
b) Given the spot speeds obtained in ques (a), the cumulative (%) frequencies of vehicles are observed respectively as follows:

Spot Speed (kmph)	Cumulative (%) Frequencies
A	5
B	20
C	50
D	90
E	100
F	100

Determine design speed and safe speed for the road.

Course Title: Engineering Hydrology   Course Code: CE 363
Time: 1 hour   Credit Hour: 3.0   Full Marks: 40

(Answer all the questions. All questions are of equal value. Figures in the right margin indicate marks)

1. a) Among the methods for measuring precipitation, which method is more accurate? [5] Justify the reasons.

   b) For a particular storm event Φ index model and Horton's model for infiltration [5] gives the same value of infiltration volume. Do you agree? Justify your answer.

2. On a winter day, the weather station in Dhaka recorded the following values: [10]

   Average air temperature: 30°F

   Average wind speed: 6 mph

   Average relative humidity: 45%.

   Estimate the evaporation using the Herbeck and Meyers formula.

3. Calculate the average precipitation using Isoheytal method for the figure given [10] below.
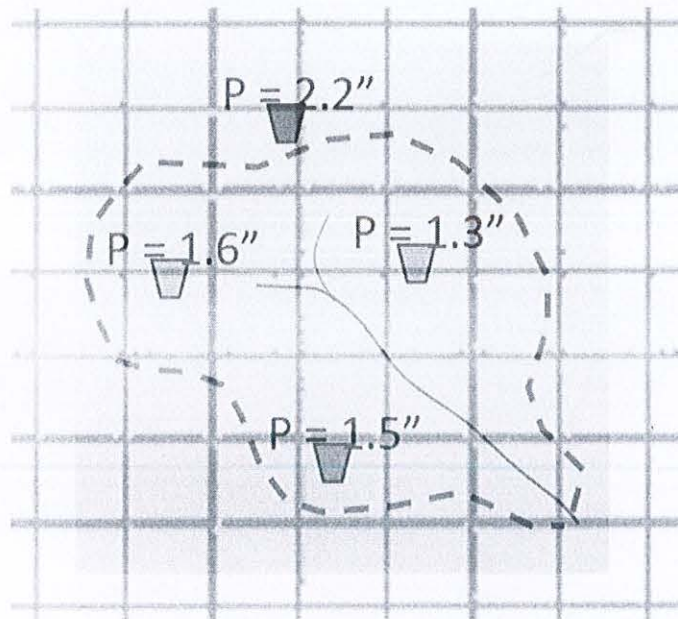
4. The daily streamflow data at a site having a drainage area of 6450 km^2 are given in [10] the table below. Determine the runoff volume and runoff depth using the 2nd method of Arbitrary approach.

Time (Hour)	Total Flow (m^3/s)
1	170
2	220
3	510
4	1135
5	870
6	660
7	500
8	380
9	300
10	220
11	180
12	160
13	140