3-2

University of Asia Pacific

Department of Civil Engineering

Mid Term Examination, FALL- 2023

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

Time : 01 Hour Marks : 20 .

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

1. a) Define Management with example. 3

   b) Critically explain the functions of Management. 7

2. a) Draw the MBO Process. 4

   b) Describe the Unique features and advantages of MBO. 6

3. a) Mention the name of 'Father of Scientific Management, and 'Father of Modern Management'. 3

   b) What are the Principles of Modern Management ? 7

Best of Luck

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

Course Title: Structural Engineering II | Course Code: CE 313
Time: 1 hour | Credit Hour : 3.0 | Full Marks: 40

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

Part-A

1. Analyze the beam to calculate the vertical deflection at **C** shown in ***Fig.1*** (EI=constant)**[08]**

2. Analyze the frame to calculate the horizontal deflection at **E** or **C** shown in ***Fig.2*** (EI=constant). **[12]**

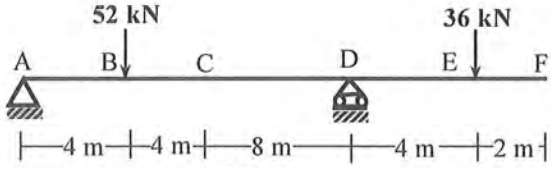


Fig.1

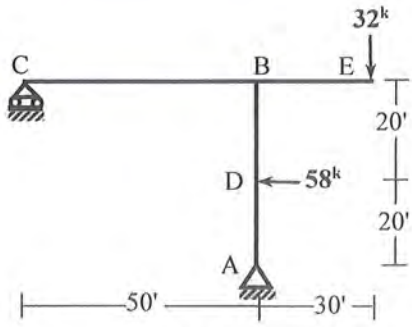


Fig.2

Part-B

3. Analyze the frame using Cantilever Method to draw Shear force and bending moment diagrams of the two-storied frame shown in ***Fig.3***.All columns have same cross-sectional area **[13]**

4. Calculate member forces of **CB** and **CD** in the statically indeterminate truss shown in ***Fig.4*** assuming, diagonal members take an equal share of the sectional shear force. **[07]**

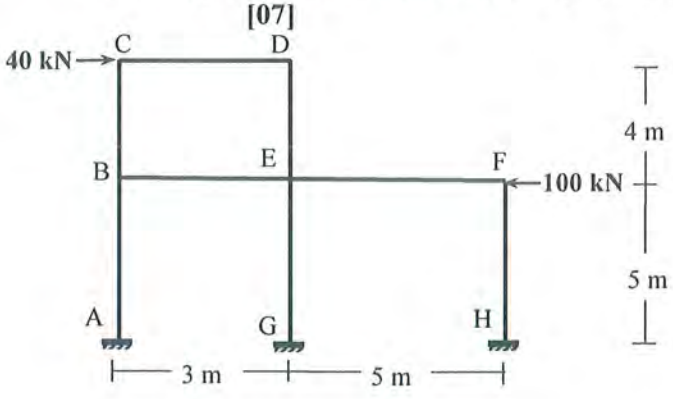


Fig.3

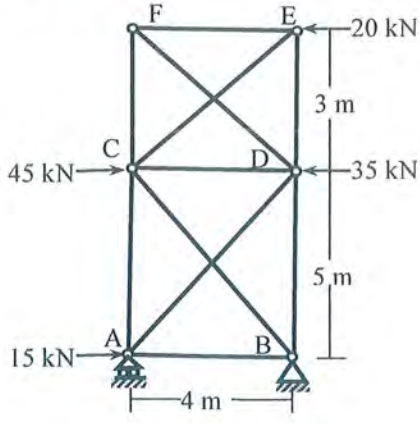
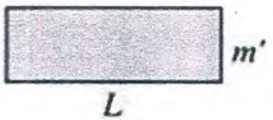
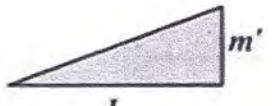
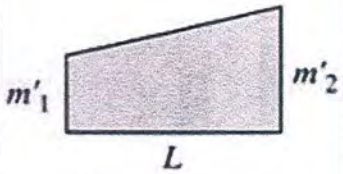
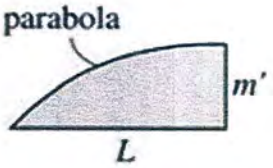
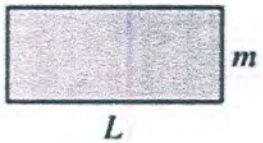
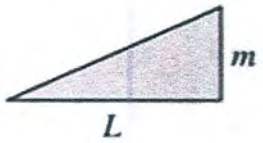
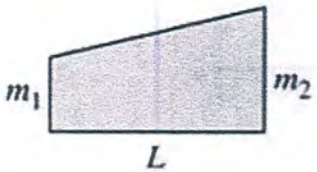
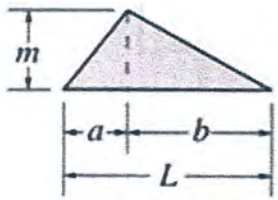
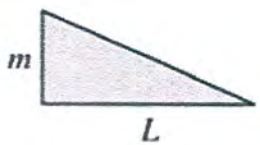


Fig.4

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
Mid Term Examination Fall 2023
Program: BSc in Civil Engineering

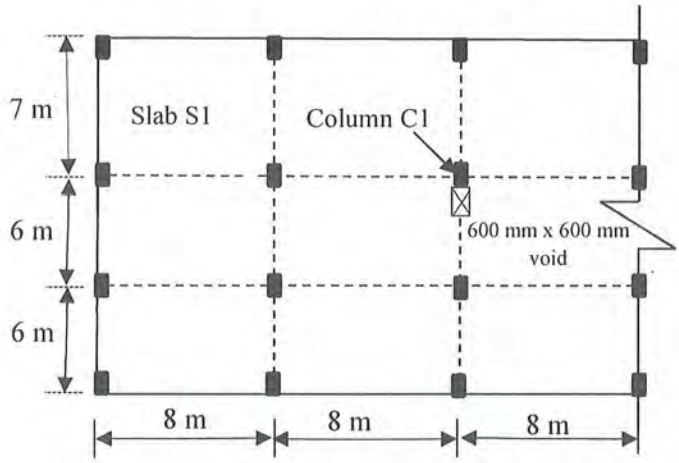
Course Title: Design of Concrete Structures II | Course Code: CE 317
Time: 1 hour | Credit Hour: 3.00 | Full Marks: 60

QUESTION 1 [30 MARKS]

A ground floor column of a multi-storeyed office building is subjected to design load of 5900 kN and uni-axial bending moment of 700 kN.m. Apply the concept to design the column as tie column with square and rectangular size. The concrete strength of 30 MPa could be used in design. The width of the rectangular column is 500 mm. Show the reinforcement details in accordance to BNBC 2020. The column design chart is shown in **Appendix**. [30 Marks]

QUESTION 2 [18 MARKS]

The floor layout plan of an 8-storeyed office building (live load 2.4 kN/m^2) is shown in **Figure 1**. The floor of the structure is flat plate (flat slab), and it carries 2 kN/m^2 dead load due to random wall. Design the **column strip** of the **slab panel "S1" (long span only)** as shown in **Figure 1** considering safety and environmental issues. Synthesize (optimize) the thickness of the slab as per deflection of ACI / BNBC code for that particular panel only. Assume required data to design the slab. [18 Marks]



Minimum thickness of flat slab (without drop panel)			
f_y MPa	Exterior Panel		Interior panel
	Without edge beam	With edge beam	
280	$l_n/33$	$l_n/36$	$l_n/36$
420	$l_n/30$	$l_n/33$	$l_n/33$
520	$l_n/28$	$l_n/31$	$l_n/31$

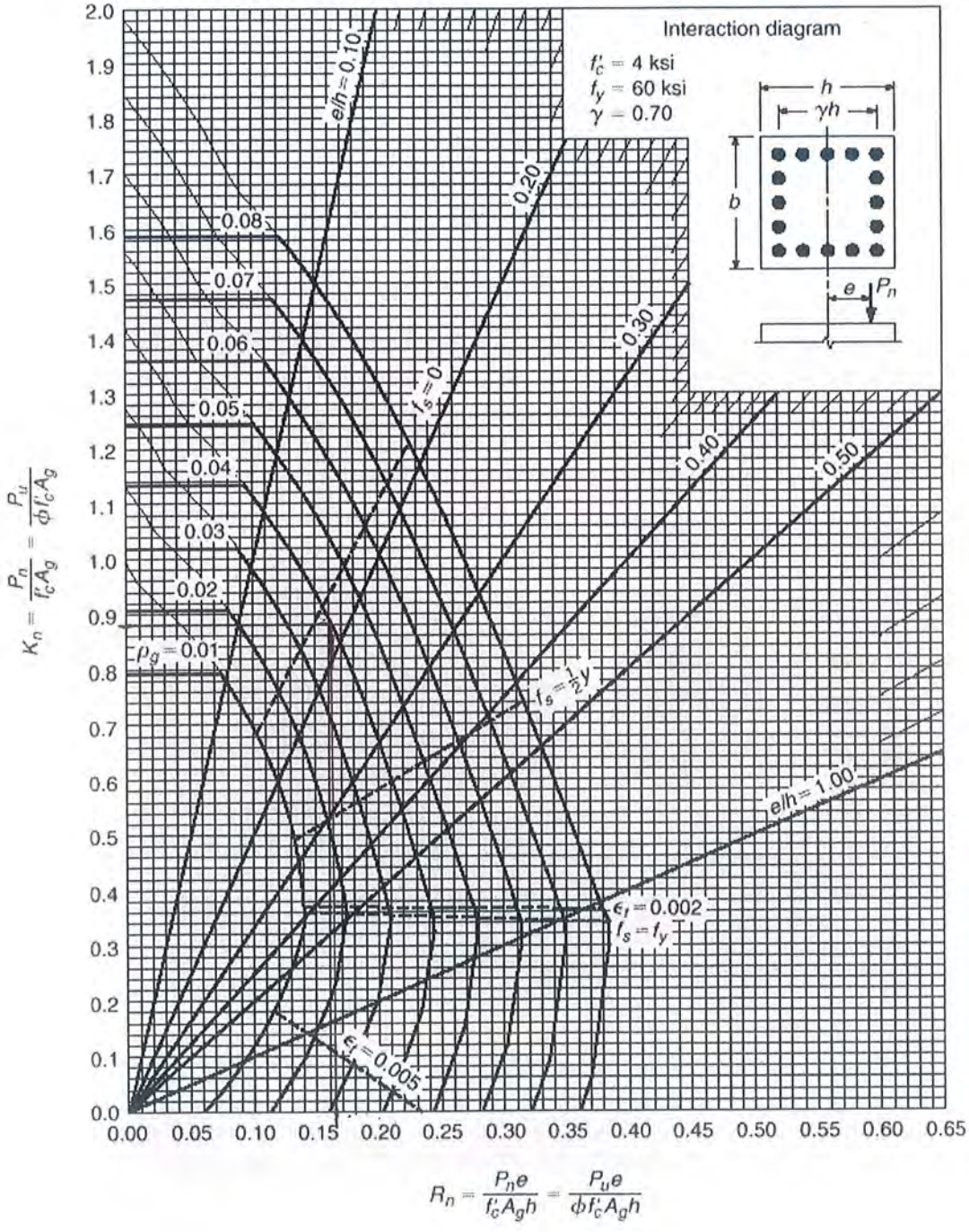
Distribution of factored static moment in end span		
Interior Negative Moment	Positive Moment	Exterior Negative Moment
0.7	0.52	0.26

Figure 1: Floor Layout Plan of 8-Storeyed Office Building

QUESTION 3 [12 MARKS]

The thickness of flat slab of **Question 2** is required to be minimized. There is a void beside the column C1 to pass the sanitation pipe lines as shown in **Figure 1**. Develop the punching shear resisting formulation of **Column C1**. Propose a solution for the possible maximum optimization of slab thickness, justify your proposal in accordance to all options of deflection and punching shear requirements of BNBC 2020 considering safety and environmental issues. [12 Marks]

Appendix


Interaction diagram
f'_c = 4 ksi
f_y = 60 ksi
γ = 0.70
h
γh
b
e
P_n
e/h = 0.10
0.20
0.30
0.40
0.50
e/h = 1.00
0.08
0.07
0.06
0.05
0.04
0.03
0.02
ρ_g = 0.01
$f_s = 0$
$f_s = \frac{1}{2}f_y$
ϵ_t = 0.002
$f_s = f_y$
ϵ_t = 0.005
$K_n = \frac{P_n}{f'_c A_g} = \frac{P_u}{\phi f'_c A_g}$
$R_n = \frac{P_n e}{f'_c A_g h} = \frac{P_u e}{\phi f'_c A_g h}$

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2023
Program: B. Sc. Engineering (Civil)

Course Title: Environment Engineering II Credit Hour:3.0 Course Code: CE 333
Time-1hour Full marks: 40

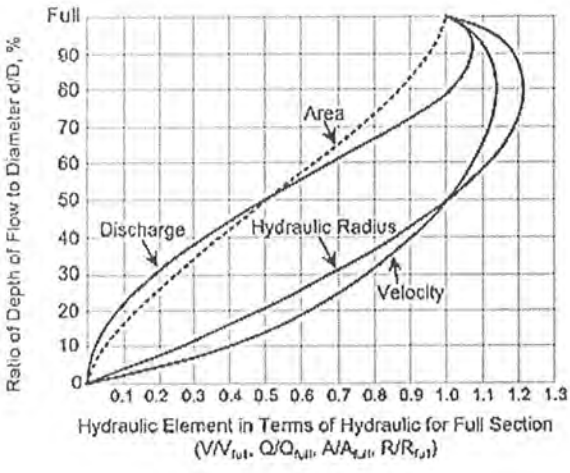
PART A

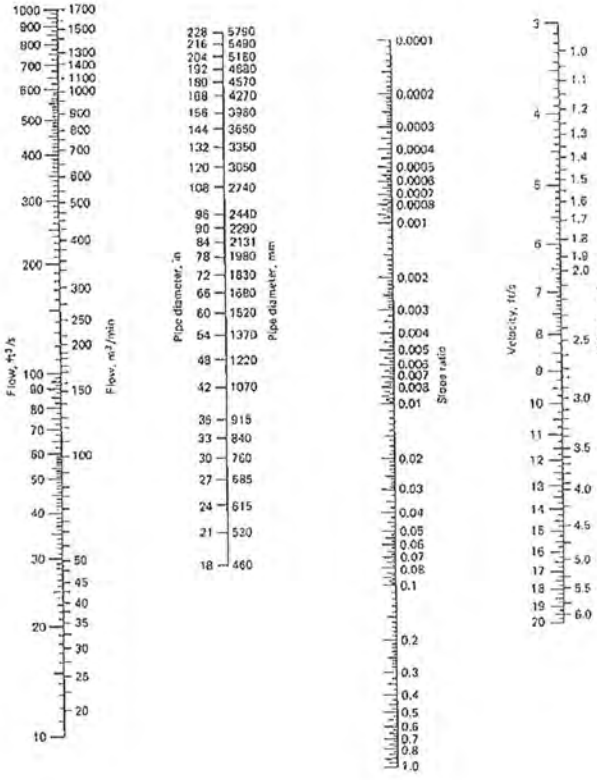
There are <u>two</u> questions. Answer all the questions. *<u>(10*2 = 20)</u>*

[Assume reasonable data if any]

1. In a rural area water supply is limited, that's why a pit latrine is installed by the local authority. However, children and women still face several diseases. Then the local authority decided to install a new sanitation system which removes odor and has a longer life. [5+5]
   i) Select appropriate sanitation technology for that area and justify your answer.
   ii) Explain why this on-site sanitation technology is better than other on-site technologies.

2. A 915 mm (36 inches) sewer is laid in a slope of 0.002. Calculate the depth of flow and velocity when the flow is 10 m^3/ min? Necessary graph and Nomograph for the solution of Manning's equation, for full flowing circular pipes are attached below. [5+5]





PART B

There are <u>two</u> questions. Answer all the questions. *<u>(10*2 = 20)</u>*

[Assume reasonable data if any]

3. 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^3/h)
6.00 A.M-10.00 A.M	400
10.00 A.M -14.00 P.M	270
14.00 P.M -18.00 P.M	530
18.00 P.M -22.00 P.M	110
22.00 P.M -2.00 A.M	60
2.00A.M-6.00 A.M	130

4. Describe the function of bacteria and fungi in a secondary biological reactor. [5+5]

University of Asia Pacific
Department of Civil Engineering
Mid-term Examination Fall 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) Between overpass and underpass, which one will you recommend to be introduced in an urban road? Discuss rationale behind your answer. **[5]**

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

2. a) Discuss the drawbacks with uncontrolled street parking. **[8]**

   b) Discuss on where adequate street lighting is needed. Write down the issues to be considered for street lighting installment. **[4+3]**

3. The primary road of Hamster city is a two-way road and has 3 lanes on each direction. Determine lighting layout of the road with mounting height of 40 ft, surface reflectance of 10% and a maintenance factor of 0.8. Consider, Fluorescent bulb. **[8]**
   Given, Night-time vehicle flow (both direction) = 800 vph
   Refer to the annexure (Table 1-4, Figure 1) for necessary data.

4. A traffic engineer requires vehicle volume data for geometric design purpose of a rural primary road. AADT for the concerned road is recorded as 15,500. He decided to carry out a hands-on survey on Wednesday, June 2023. He went to the road at 7 AM, 1 PM and 6 PM and got vehicle volume data per hour of 300, 400 and 500 respectively. **[2+3+2]**

   a) Determine AWT.
   b) Determine ADT particularly for the survey day.
   c) Determine HEF for 6 PM.

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

5. A speed study has been conducted before and after installing carpeting on an urban street. Following data were found before carpeting was laid. **[10+5]**

Speed Range (kmph)	**No of vehicles observed**
10-20	5
20-30	40
30-40	?
40-50	80
50-60	100
60-70	50

If 150 vehicles in total were found having speed less than 50 kmph, then

a) Determine average speed and cumulative % frequencies of vehicles observed.
b) Based on the average speed obtained in ques (a), determine whether there was any significant difference between the average speeds of before and after study at 95% confidence level.

Given, Avg. speed after carpeting = 50.5 kmph
Standard deviation before carpeting = 7.5
Standard deviation after carpeting = 7.6
Sample size before carpeting = 300
Sample size after carpeting = 280

University of Asia Pacific
Department of Civil Engineering
Midterm Examination, Fall 2023
Program: B.Sc. in Civil Engineering

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

(Answer all the questions. Figures in the right margin indicate marks. Please attach the question with answer script before submission)

1. "Among the parameters of hydrologic cycle, evaporation is most difficult parameter to estimate. However, estimating evaporation in some areas is very important". Justify the statement. [10]

2. For the rainfall data given below, construct the Intensity-Duration-Frequency (IDF) curve for return periods of 5 years. 1-hr, 4-hr, and 12-hr rainfall depths are given in mm. [10]

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

3. a) Rainfall data for a 50-minute storm is given in the table below. [5]

Time (minutes)	Rainfall depth (in)
10	0.1
20	0.2
30	0.15
40	0.1
50	0.05

Find the maximum 30-minute intensity in in/hr.

b) According to field measurements, a watershed of interest is capable of infiltrating at a rate of 2.8 in/hr at the beginning of a storm. By the end of the storm, it can only infiltrate at $\frac{1}{8}$ of the initial rate. Assume the decay constant is 0.35 hr^{-1}. How long after the storm the infiltration rate will be $\frac{2}{3}$ of the initial rate? [5]

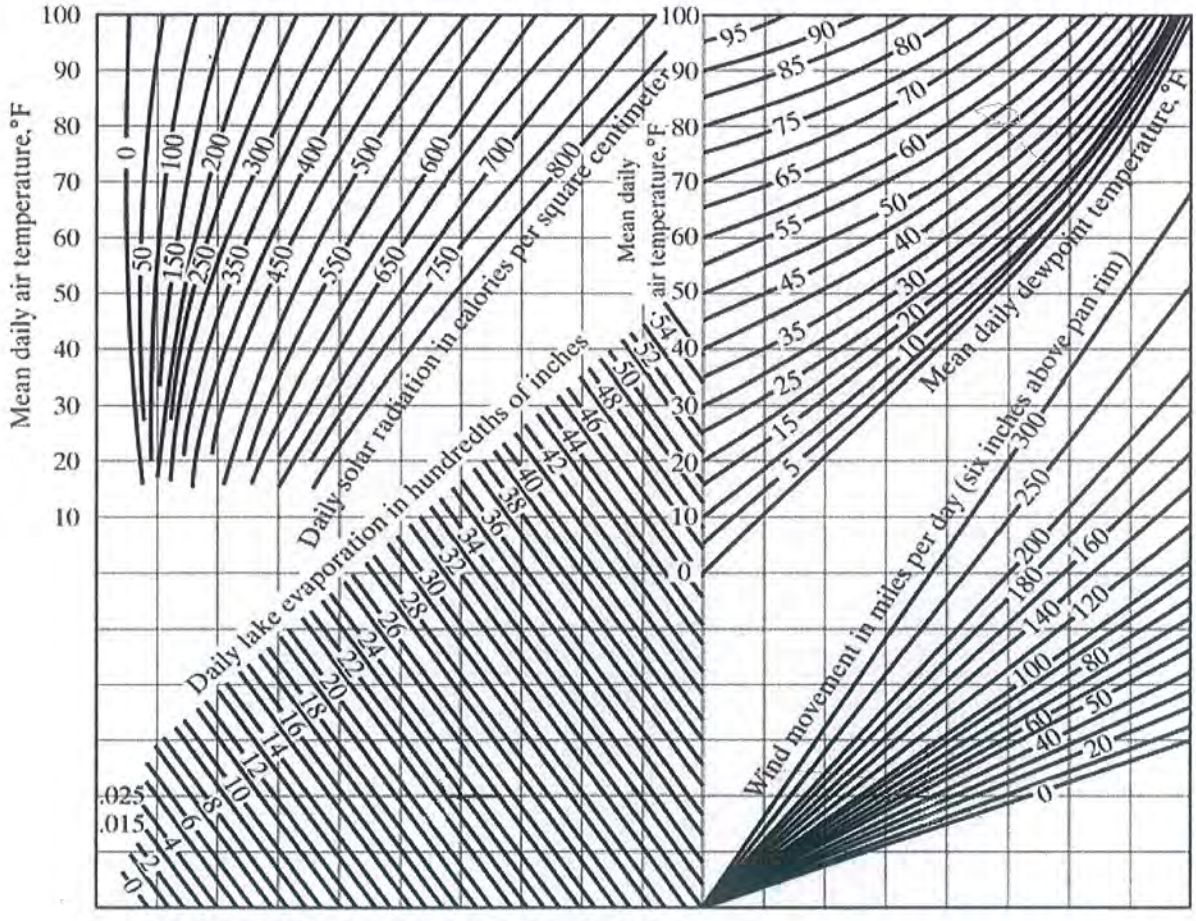
4. Using the Penman-Kohler Nomograph given below, find the daily evaporation from a small lake with following characteristics. [10]

   Mean Daily air temperature = 20°C

   Dewpoint temperature = 5°C

   Daily solar radiation = 500 ly/day

   Wind velocity = 6 ft/s



University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Fall 2023
Program: B.Sc. in Civil Engineering

Course Title: Engineering VIII (GIS and Remote Sensing) | Credit Hour: 2 | Course Code: CE531 | Full Marks: 50
Time: 1 hour

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1. Write a chronological list of events leading to cholera prevention in London. Mention the names of relevant persons and places, the year, and the source of your information. (10)

2. Topology
   a. What is topology in GIS? (1)
   b. How is the topology of a vector GIS dataset organized? (i.e., how points, lines, and polygons are connected to each other to form the dataset.) Explain with diagrams. (3)
   c. What is a topology error? List the different topology errors and draw diagrams to describe them. (3)
   d. What is a special type of vector data? Draw a figure to explain. (3)

3. Projection
   a. What is a projection system in GIS and RS? (2)
   b. What map aspects are distorted by projection systems? (2)
   c. What are the three basic ways to transfer a curved surface to a plane? (2)
   d. What are the 4 different projection systems commonly used in Bangladesh? (2)
   e. Which projection system is used for preparing Mouza maps (land ownership maps) in Bangladesh? (2)

4. Suppose you are a Highway Engineer designing a national highway. The alignment goes through private lands, and you will need to prepare land acquisition maps. Your manager wants you to prepare it with GIS.
   a. What kinds of data will you need to do this job? (4)
   b. What is the sequence of activities to prepare the land acquisition maps? You may draw figures to explain your answer. (6)

5. Remote Sensing
   a. You are working for a consulting firm that is carrying out agricultural mapping for a large area. One of the project outputs is the preparation of NDVI maps for 10 years (the months of January and December only). Your manager doesn't have any idea about Remote Sensing, and you decide to show him how you can complete the job with Landsat images.
      i. What will be your data source? (2)
      ii. What will be the formula for NDVI calculation? (3)
      iii. Which software can you use for preparing NDVI datasets? (1)
      iv. How would you prepare a time series of vegetation change for a given area? (4)