3-2

University of Asia Pacific
Department of Civil Engineering
Mid-term Examination Spring 2024
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 Multimodal Transportation and discuss its benefits and constraints in urban transportation systems with relevant examples. [8]
   b) Explain where the traffic safety problems arise mainly. Describe the traffic engineering tools used for ensuring traffic safety. [3+5]

2. a) Discuss the concept of Road Hierarchy in transportation system by showing a detailed schematic diagram. [8]
   b) Identify the 'Green Road' in front of 'University of Asia Pacific, Dhaka' based on Roadway Classification system by mentioning every types. [6]

3. a) "Design Speed is the most controlling vehicular dynamic characteristic for the geometric standards of highway"- Explain the statement. [6]
   b) Name the grade separated interchanges for four-legged junction and mention the difference between them? [8]

4. a) Determine the conflict points of a 4-leg intersection having following configuration; Road A = 2-lane 2-way road and Road B = 2-lane 1-way road. [6]
   b) The primary road of Dhaka city is a two-way road and has 15m width. Design lighting layout of the road with mounting height of 40 ft, surface reflectance of 5% and a maintenance factor of 0.7. Consider, Fluorescent bulb. [10]
   Given, Day-time vehicle flow (both direction) = 5000 vph
   Night-time vehicle flow (both direction) = 600 vph
   Refer to the annexure (Table 1-3, Figure 1) for necessary data.

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2024
Program: B. Sc. Engineering (Civil)

Course Title: Environment Engineering II Credit hour:3.00 Course Code: CE 333
Time-1hour Full marks: 40

PART A

There are two questions. Answer all the questions. ***(10*2 = 20)***

[Assume reasonable data if any]

1. For a rural area where mostly children and women suffer from waterborne disease due to poor sanitation system and poor human waste management systems, select an appropriate onsite sanitation system among Pit, VIP, and ROEC for the community and explain how your selected sanitation system is the best among these three in terms of treatment process. [10]

2. A 24-inch sewer is laid on a slope of 0.003; determine the depth of flow and velocity when the wastewater flow is 7.5 m^3/ min in the pipe. The necessary graphs are attached with question. [10]

PART B

There are two questions. Answer all the questions. ***(10*2 = 20)***

[Assume reasonable data if any]

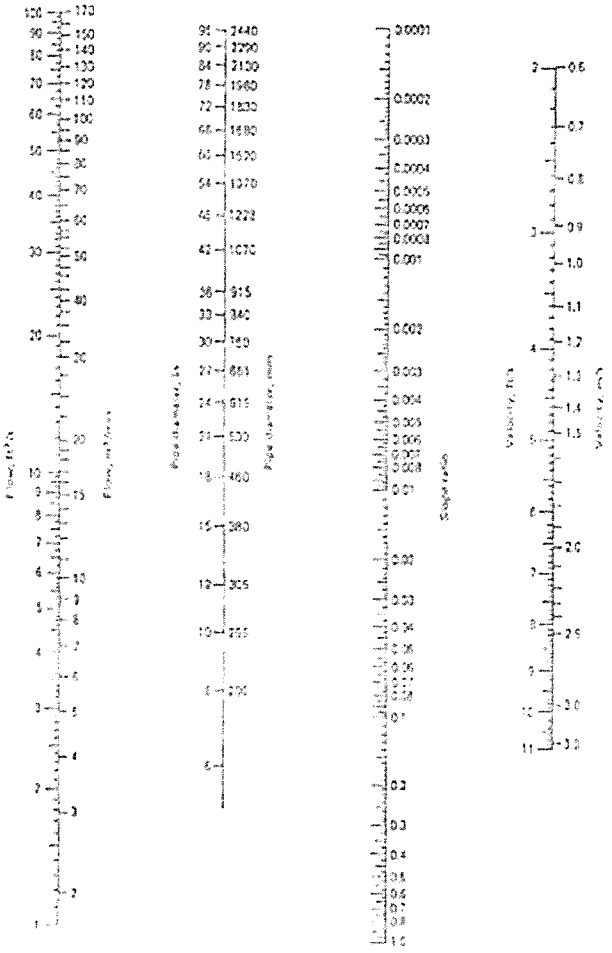
3. Design a coarse screen for a wastewater treatment plant with the following data: [10]

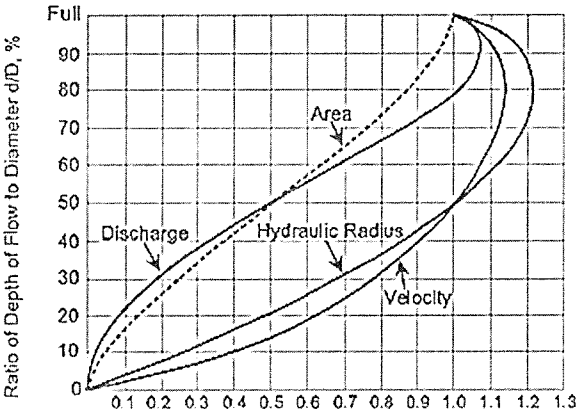
   - Peak flow through the rack, Q_p=0.75 m^3/s
   - Velocity through rack during peak flow, v= 0.6 m/s
   - Angle of the rack to the horizontal, θ =60°
   - Upstream depth of wastewater, d=2 m

4. Explain the cell growth curve of bacteria with respect to different phases. [10]

Nomograph for the solution of Manning's equation,

for full flowing circular pipes:





Ratios of sewer hydraulic elements.

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Spring 2024
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)

1. What are the methods of measuring average precipitation over a specific area? Compare the methods based on the accuracy and complexity. [10]

2. The daily streamflow data for a river, at a site having a drainage area of 6000 km^2 are given in table below. Separate the baseflow from the direct runoff hydrograph (DRH) by the Arbitrary Approach. Determine the runoff volume and equivalent depth of the direct runoff. [15]

Time (days)	Flow (m^3/s)
1	170
2	180
3	500
4	1200
5	900
6	700
7	550
8	400
9	290
10	220
11	180
12	150
13	130
14	128
15	127

3. a) Given below a 3-hr unit hydrograph of 1 inch. Derive a 9-hr unit hydrograph using the lagging method. [6]

Time (hr)	Flow (m^3/s)
1	0
2	50
3	80
4	100
5	150
6	110
7	90
8	80
9	40
10	0

b) According to field measurements, a watershed of interest is capable of infiltrating at a rate of 2.9 in/hr at the beginning of a storm. By the end of the storm, it can only infiltrate at 1/10 of the initial rate. Assume the decay constant is 0.36 hr^{-1}. How long after the storm the infiltration depth will be 1 inch? [4]

c) In a reservoir reach, the rate of inflow and outflow are 410 and 290 cfs, respectively. After 75 minutes, the inflow and outflow are 300 and 200 cfs, respectively. The storage is observed 10.2 acre-ft after 75 minutes. Determine the change in storage and initial volume. [5]

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Spring 2024
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. Using Virtual Work Method analyze the beam shown in ***Fig.1*** to calculate rotation at support **B** or **C** (EI=constant). **[08]**

2. Using Virtual Work Method analyze the frame shown in ***Fig.2*** to calculate the horizontal deflection at **D** (E = constant, $I_{AB} = I_{CD} = I$ and $I_{BC} = 2I$). **[12]**

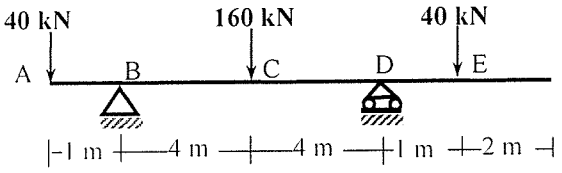


Fig.1

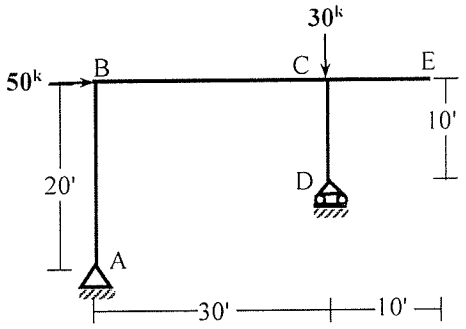


Fig.2

Part-B

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

4. Analyze the statically indeterminate truss shown in ***Fig.4*** to calculate all member forces assuming diagonal members take an equal share of the sectional shear force. **[07]**

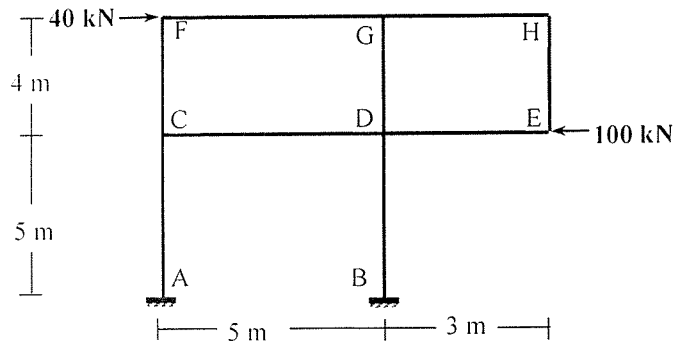


Fig.3

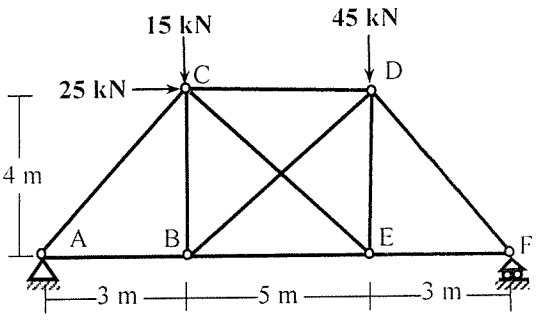
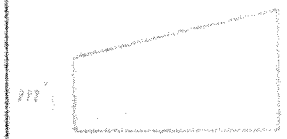
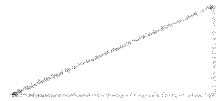
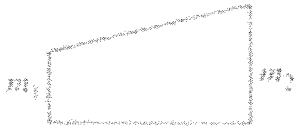
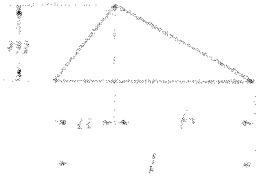


Fig.4

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

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

University of Asia Pacific

Department of Civil Engineering

Mid – Term Examination, Spring-2024

Program: BSc in Civil Engineering

Course Title: Principles of Management | Course Code: IMG 301

Time: 1 hour | Credit: 2 | Full Marks: 20

(There are five questions. Answer any four of them)

1. Describe the "decision making" errors that a manager make? [5]
2. What are the drawbacks of ethnocentric and polycentric parochialism according to you? [5]
3. As a manager, what types of diversity would you ensure in your workplace? [5]
4. Differentiate between persuasive and laissez faire management style with proper examples. [5]
5. Explain different dimensions of organizational culture. [5]

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination, Spring 2024
Program: B.Sc. 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. The side panel of beam supported slab (as shown in **Figure 1**) of warehouse is subjected to floor live load of 6 kN/m^2. Thickness of the slab is 165 mm. Apply the design concept to obtain the reinforcement of slab for **long span support moment** (negative) only. Assume required data to design the slab. Coefficient for long span negative moment of the slab is **0.056**. [18 Marks]

b. A ground floor column of 10 storeyed apartment building is subjected to 4000 kN of dead load and 1000 kN of live load. Apply the concept to design the column as tie and spiral. The concrete strength of the column is 30 N/mm^2. [12 Marks]

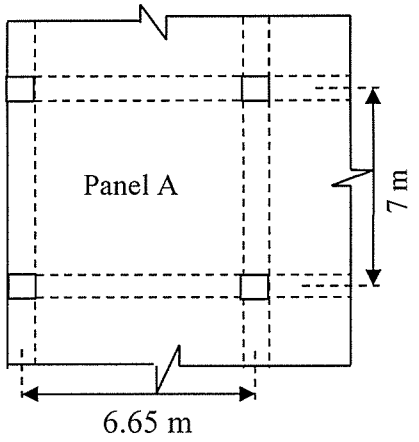


Figure 1. Side slab panel

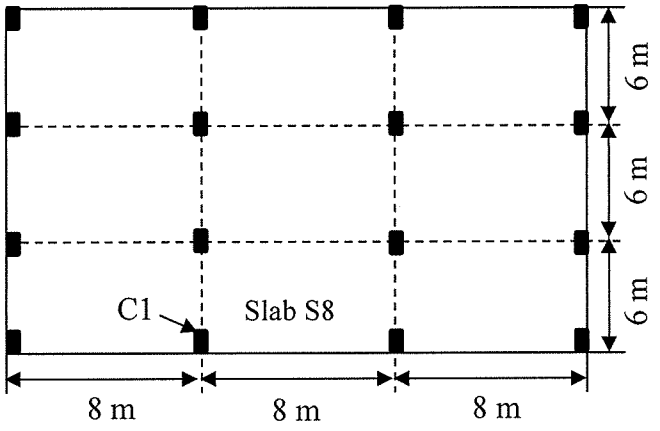


Figure 2. Flat slab floor plan

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 2**. 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 "S8" (long span only)** as shown in **Figure 1** considering safety and environmental issues. Positive and negative moment coefficients of the panel are 0.35 and 0.65, respectively. 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]

QUESTION 3 [12 MARKS]

The thickness of flat slab of **Question 2** is required to be minimized. The dimension of the **Column C1** could be considered as **400 mm x 600 mm**. Develop the punching shear resisting formulation of the column. 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

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	$l_n/30$	$l_n/33$	$l_n/33$