University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Spring 2025
Course Code ACN 201: Principles of Accounting

Answer all the questions **Time: 1 Hour**

Marks: 2.5+2.5+10+5=20

1. Sandra Browne, a beginning accounting student, believes debit balances are favorable and credit balances are unfavorable. Is Sandra correct? Discuss.
2. Joe Kirby is confused about how accounting information flows through the accounting system. He believes the flow of information is as follows.
   i. Debits and credits posted to the ledger.
   ii. Business transaction occurs.
   iii. Information entered in the journal.
   iv. Financial statements are prepared.
   v. Trial balance is prepared.

Is Joe correct? If not, indicate to Joe the proper flow of the information.

3. Rockford Enterprises had the following selected transactions.
   i. Kris Rockford invested $5,000 cash in the business in exchange for ordinary shares.
   ii. Paid office rent of $1,100.
   iii. Performed consulting services and billed a client $4,700.
   iv. Declared and paid a $700 cash dividend.

Instructions
   a. Indicate the effect each transaction has on the accounting equation.
   b. Journalize each transaction.

4. The trial balance columns of the worksheet for Lim Company at June 30, 2023, are shown below.

Lim Company
Worksheet
For the Month Ended June 30, 2023

Account Titles	Trial Balance	
	Dr.	Cr.
Cash	$4,020	
Accounts Receivable	2,440	
Supplies	1,900	
Accounts Payable		$1,120
Unearned Service Revenue		240
Share Capital—Ordinary		5,000
Service Revenue		3,100
Salaries and Wages Expense	860	
Miscellaneous Expense	240	
	9,460	9,460

Other data:
1. A physical count reveals $500 of supplies on hand.
2. $100 of the unearned revenue is still unearned at month-end.
3. Accrued salaries are $250.

Required: Provide necessary adjusting entries.

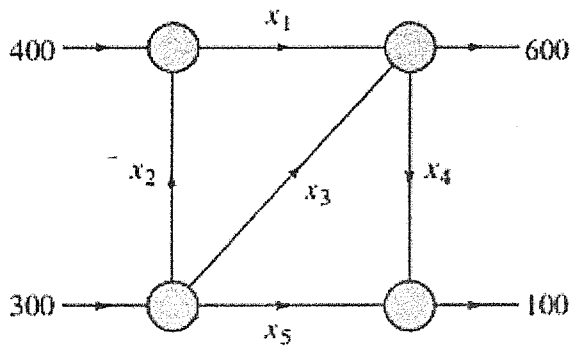
University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination, Spring 2025
Program: B.Sc. in Civil Engineering
2nd Year 1st Semester

Course Title: Mathematics-III | Course Code: MTH 201
Time: 1.00 Hour | Credit Hour: 3.00 | Full Marks: 60

Answer all the questions.

QUESTION 1 [20 MARKS]

a) The flow of traffic (in vehicles per hour) through a network of streets is shown in figure [15]



(i) Set up a linear system whose solution provides the unknown flow rates?

(ii) Solve the system for the unknown flow rates.

(iii) Find the flow rates if $x_3 = 50$ and $x_5 = 100$.

(iv) Find the flow rates if $x_3 = x_5 = 100$.

b) Define Symmetric and Skew Symmetric matrix. If $A = \begin{bmatrix} -5 & -8 & 0 \\ 3 & 5 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ then, prove that A is involuntary matrix. [05]

QUESTION 2 [20 MARKS]

a) Using row echelon form find inverse of $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 0 & -1 \\ 3 & 3 & 2 \end{bmatrix}$. [10]

b) Evaluate determinant of $A = \begin{bmatrix} 0 & 1 & 2 & 3 \\ -1 & 0 & 1 & 2 \\ -2 & -1 & 0 & 3 \\ -3 & -2 & -3 & 0 \end{bmatrix}$. [10]

QUESTION 3 [20 MARKS]

a) Calculate Mean, P_{77} and mode of the following data: [10]

Profit(Lakhs)	0-10	10-20	20-30	30-40	40-50	50-60
No of Companies	8	10	22	30	20	10

b) Calculate Mean deviation of the following data: [10]

Profit	70-90	90-110	110-130	130-150	150-170
No. of companies	8	12	17	9	4

OR

a) Prove that Arithmetic mean $\geq$ Geometric mean $\geq$ Harmonic mean, using the following data: [10]

Profit	70-90	90-110	110-130	130-150	150-170
No. of companies	8	12	17	9	4

b) The frequency distribution of profit per share of 10 companies are given below: [10]

Profit per share (Tk)	0-5	5-10	10-15	15-20	20-25
Number of Companies	1	2	4	2	1

Calculate standard deviation.

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination, Spring 2025
Program: B. Sc. in Civil Engineering
Second Year, First Semester

Course Title: Mechanics of Solids I | Course Code: CE 211
Time: 1-hour | Credit Hours: 3.0 | Full Marks: 40 (10 × 4)

ANSWER ALL THE QUESTIONS

1. Use the Singularity Function to derive the shear force and bending moment equations for the beam ABCDE loaded as shown in **Figure 1**. Also, calculate the bending moment at C (M_C) and the shear force at the right of B (V_{BR}). [10]

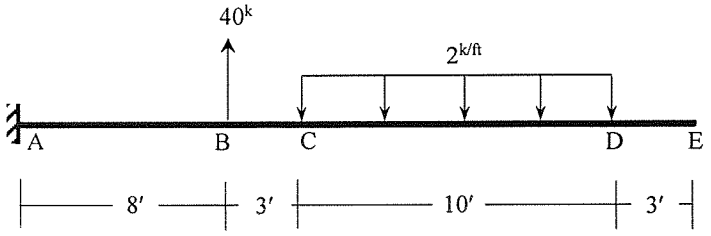


Figure 1

2. Use integration method to draw the shear force diagram and bending moment diagram of the beam *ABC* loaded as shown in **Figure 2**. [10]

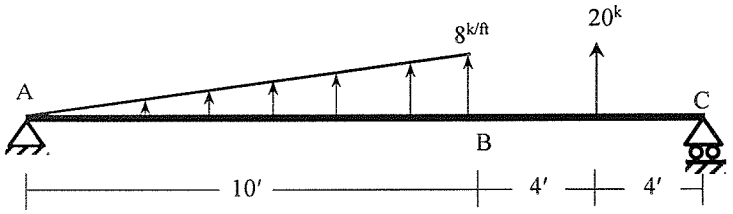


Figure 2

3. Draw the axial force, shear force and bending moment diagrams of member AB of the frame *ABC* loaded as shown in **Figure 3**. There is an internal hinge at point B. [10]

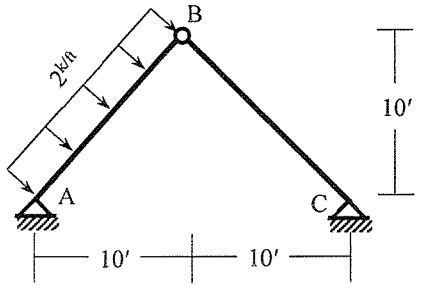
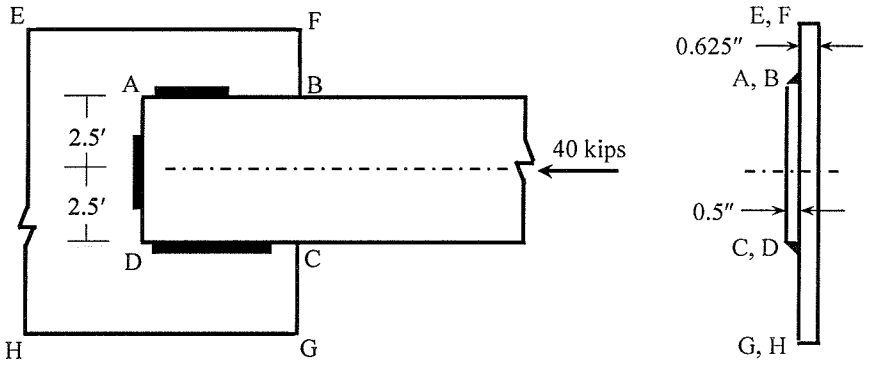


Figure 3

4. In **Figure 4** shown below, calculate the length of 0.5-inch weld joints required on sides AB, AD and CD to connect the 0.5″ thick plate section ABCD to the 0.625″ thick plate EFGH. Axial force of 40 kips passes through centroid of ABCD [10]
[Given: Allowable shear stress = 20 ksi].



Front View

Side View

Figure 4

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination, Spring 2025
Program: B.Sc. in Civil Engineering
2nd Year 1st Semester

Course Title: Engineering Materials | Course Code: CE 201
Time: 1 hour | Credit Hour: 3.00 | Full Marks: 60

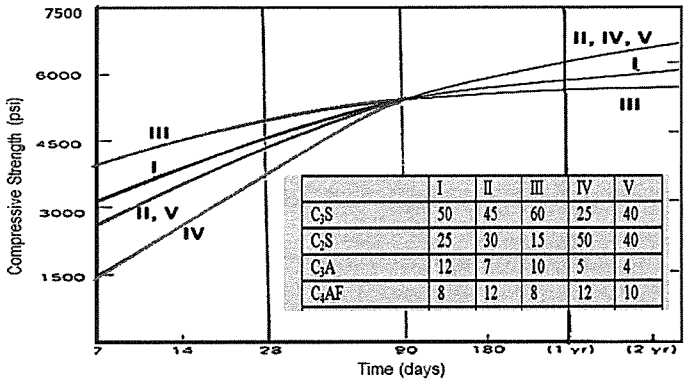
Answer all the questions

PART A

QUESTION 1 [20 MARKS]

a. List in tabular form the ASTM designations, names and compositions of blended cements. **[4]**

b. Explain the following graph as shown in **Figure 1**. **[8]**



	I	II	III	IV	V
C_3S	50	45	60	25	40
C_2S	25	30	15	50	40
C_3A	12	7	10	5	4
C_4AF	8	12	8	12	10

Figure 1: Compressive strength vs time

c. Suppose you have received cement bags with markings '**CEM II/B-L 42.5 N**'. Identify the composition and strength class of the cement. **[4]**

d. State the type of ASTM cement recommended for construction in cold climate regions. Justify your answer by explaining how its composition differs from that of Ordinary Portland Cement. **[4]**

QUESTION 2 [10 MARKS]

The data obtained from sieve analysis of a 1 kg sand sample is provided in **Table 1**. If the entire sample is passed through #10 sieve only, then 250 gm would retain in it.

Table 1: Particle distribution

Sieve No.	Material retained (gm)
#4	5
#8	45
#10	?
#16	360
#30	?
#40	140
Pan	20

i. Calculate the FM of the sand sample. **[6]**

ii. If the experiment is repeated using #50 sieve instead of #40 sieve, and the same data is obtained, Calculate the new FM. **[4]**

QUESTION 3 [18 MARKS]

a. The typical ingredients of a burnt clay brick are shown in Table 2. Fill up the table properly with composition % and comment the adverse effect of excess lime on brick. **[6]**

Table 2: Typical composition of burnt clay brick

Ingredients	Percentage
Silica	?
Alumina	?
Lime	?
Others	?

b. Answer the following questions from the typical cross-section of a brick kiln sketch shown in **Figure 2.** **[6]**

i. Name the brick kiln and its type.
ii. Explain which internal and external doors must be kept closed to complete brick's burning process.
iii. Describe the process which occurs in chambers 2, 3, 4 and 5.
iv. Mention the temperature in chamber 6, 7 and name the catalyst used here.
v. Name the central chamber and the door attached to it.
vi. Describe advantages of this type of kiln.

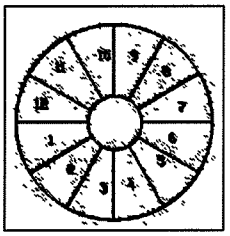


Figure 2. Cross-section of a brick kiln

c. Complete the following table using calibration equation: $Y = 0.952X - 4.658$ and comment on the probable class of the brick. **[6]**

Table 3: Laboratory test result of brick

SL	Dimension (in)				Unit weight (lb/ft^3)	Observed load lb	Average area, $inch^2$	Actual load, lb	Compressive strength, psi	SSD wt, lb	Water absorption capacity
	Side-1		Side-2								
	L	B	L	B							
1	4.5	4.6	4.5	4.5	100	61570	?	?	?	3.90	?

QUESTION 4 [12 MARKS]

a. The typical stress-strain test result for MS steel is shown in the table below. Plot the stress strain curve qualitatively and find yield, breaking, ultimate stress and breaking strain from the plotted curve. **[5]**

Table 4: Stress-strain test result for MS steel

Stress (psi)	4000	9000	24000	24000	65000	89000	80000	70000
Strain	0.25	0.80	1.8	2.65	60	175	305	340

Find yield, breaking, ultimate stress and breaking strain from the plotted curve.

b. For the loading history shown in the figure, draw the strain response of a plastic material and state the characteristics of it. Consider equal time interval. **[7]**

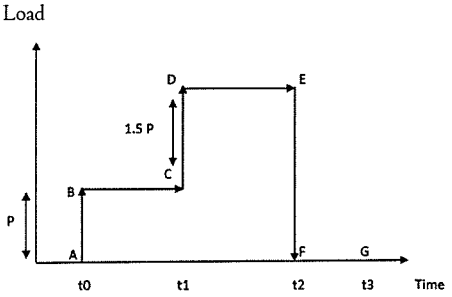


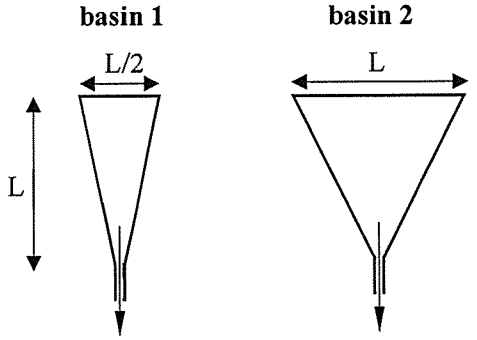
Figure 3: Loading pattern for a material

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Spring 2025
Program: B.Sc. in Civil Engineering

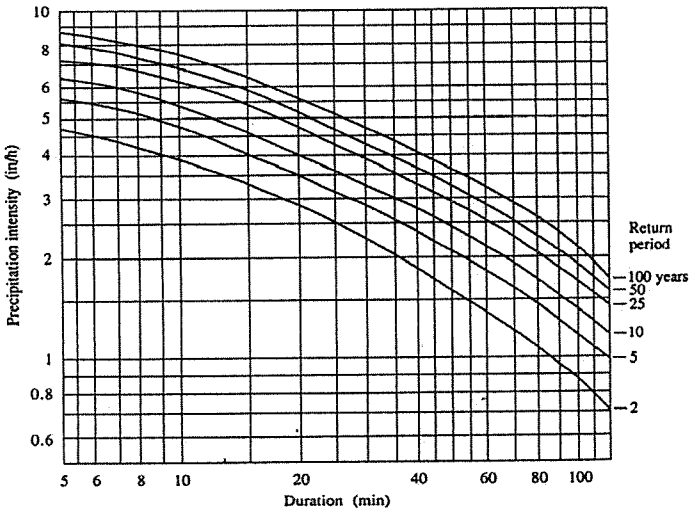
Course Title: Engineering Geology and Geomorphology (OBE) | Course Code: CE 203
Time:1 hour | Credit Hour: 3 | Full Marks: 40

(Answer all questions)

1. The coefficient of runoff of basin 2 is twice than that of basin 1. Compare their Form Factors, Compactness coefficients, and Peak runoffs. Consider same intensity of rainfall for both basins. **[6]**



2. A square shaped urban park area is a drainage basin with a *green grass region* (area = 0.7 acre; coefficient of runoff = 0.2) and a *concrete sidewalk* (area = 0.15 acre; coefficient of runoff = 0.8). The slope of the basin is 0.006 and the maximum length of travel of water is equal to the diagonal of the basin. Using the intensity-frequency-duration graph provided below, calculate the peak runoff (m^3/s) for a return period of 50 years.
Note: $t_c(min) = 0.01947L^{0.77}S^{-0.385}$ **[7]**



3. List the four major interacting components of the Earth system and describe a specific interaction between these components. [5]
4. Explain the difference between **cleavage** and **fracture** in minerals, and provide an example of a mineral that exhibits each property. [5]
5. Differentiate between **intrusive** and **extrusive** igneous rocks differ? [5]
6. Define **lithification** and the two processes that are involved in it? [5]
7. Discuss the classification of igneous rocks based on their mineral content. Also discuss their formation order. [7]

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination, Spring 2025
Program: B.Sc. in Civil Engineering
2nd Year 1st Semester

Course Title: Material Science and Environmental Sustainability | Course Code: CE 207
Time: 1 hour | Credit Hour: 3.00 | Full Marks: 60

Answer all the questions. Assume reasonable data if required.

PART A

QUESTION 1 [36 MARKS]

a. Sketch a Face centered monoclinic unit cell and within that indicate the location of $\frac{1}{5}\ \frac{1}{3}\ \frac{1}{4}$.

[5]

b. A crystallographic direction is shown in **Figure 1** such that the arrow tail starts at point 5 and the arrow head falls on the connecting line of 1,7. Determine the Miller-Bravais indices for the direction shown in **Figure 1.** Assume, $a_2 = x$ and $a_3 = y$.

[8]

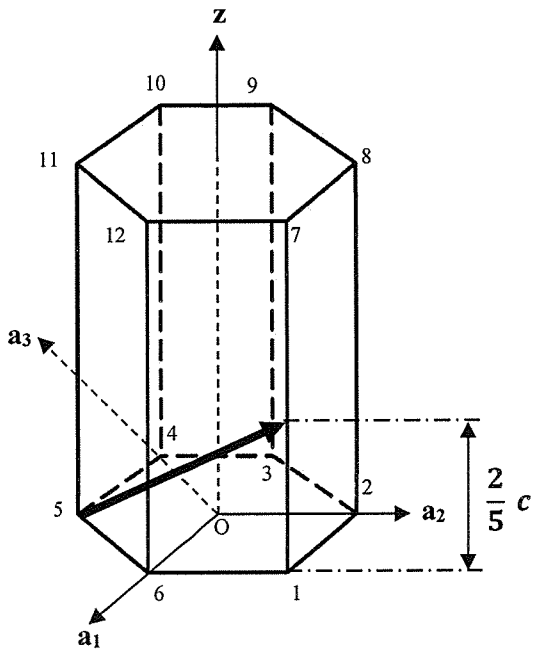


Figure 1. Hexagonal unit cell

c. Construct a (**2 0 $\bar{1}$**) plane within a Body Centered orthorhombic unit cell and determine the planer density. Given, length of unit cell along x axis = 0.123 nm, y axis = 0.222 nm and z axis = 0.312 nm.

[12]

d. With neat sketch discuss the bonding forces acting among atoms.

[5]

e. Compare three characteristics of ionic, covalent and metallic bonds.

[6]

PART B

QUESTION 2 [24 MARKS]

a. Classify ecosystem with two examples each.

[4]

b. Express whether greenhouse gases are necessary or not. Illustrate how natural and enhanced greenhouse effect differ, with a figure.

[1+3]

c. Give three examples of adaption to climate change.

[3]

d. Explain why averaging period is associated with air quality standard. On 1st September, 2025 the following air quality data have been recorded at a monitoring station in Dhaka: $PM_{2.5}$ = 150 $\mu g/m^3$ (24-hr); PM_{10} = 380 $\mu g/m^3$ (24-hr); CO = 12 mg/m^3 (Annual). Prepare the AQI index report of the given scenario according to USEPA using Table 1.

[3+10]

Table 1: AQI breakpoints table

Breakpoints							AQI
O_3 (ppm) 8-hr	O_3 (ppm) 1-hr	$PM_{2.5}$ ($\mu g/m^3$) 24-hr	PM_{10} ($\mu g/m^3$) 24-hr	CO (ppm) 8-hr	SO_2 (ppm) 24-hr	NO_2 (ppm) Annual	
0.000-0.064	--	0.0-15.4	0-54	0.0-4.4	0.000-0.034	(ii)	0-50
0.065-0.084	--	15.5-40.4	55-154	4.5-9.4	0.035-0.144	(ii)	51-100
0.085-0.104	0.125-0.164	40.5-65.4	155-254	9.5-12.4	0.145-0.224	(ii)	101-150
0.105-0.124	0.165-0.204	65.5-150.4	255-354	12.5-15.4	0.225-0.304	(ii)	151-200
0.125- 0.374	0.205-0.404	150.5-250.4	355-424	15.5-30.4	0.305-0.604	0.65-1.24	201-300
(iii)	0.405-0.504	250.5-350.4	425-504	30.5-40.4	0.605-0.804	1.25-1.64	301-400
(iii)	0.505-0.604	350.5-500.4	505-604	40.5-50.4	0.805-1.004	1.65-2.04	401-500

(ii) NO_2 has no short-term air quality standard and can generate an AQI only above 200.
(iii) 8-hr O_3 values do not define higher AQI values ($\geq$ 301). AQI values of 301 or higher are calculated with 1-hr O_3 concentration.