

University of Asia Pacific
Department of Basic Sciences and Humanities
Mid Term Examination, Fall 2023
Program: B. Sc. in Civil Engineering
(Self-Study)

Course Title: Bangladesh Studies: Society and Culture
Time: 01 hour

Credit Hours: 02

Course Code: HSS 211(a)
Full Marks: 20

There are three questions. Answer ANY TWO. (10 x 2=20)

1. a. Name four major theoretical perspectives sociologists use. Mention the key persons. 4
b. Briefly state the differences between the conflict and the functionalist perspectives with relevant examples. 6
2. a. Define socialization. 2
b. Discuss how the agencies of socialization play a role in our lives. 8
3. a. How did Gerhard Lenski define sociocultural evolution? 2
b. How did he relate the evolution of human societies with the innovation of technology? 8
Briefly discuss how Lenski described societies that had changed over the past 3 million years.

University of Asia Pacific
Department of Basic Sciences and Humanities
Mid Semester Examination, Fall 2023
Program: B. Sc. Engineering (Civil)
Self Study

Course Title: Bangladesh Studies: History
Time: 1 hour

Credit Hours: 2

Course Code: HSS211(b)
Full Marks: 40

There are **three** questions. Answer any **two including Q-3**. All questions are of equal value.
Figures in the right margin indicate marks.

1. Describe the activities of the first important ruler of ancient Bengal. [20]
- OR**
2. Describe the glories of the Pala dynasty. [20]
3. Discuss the economic and political changes under the Muslim rule in the Medieval Bengal. [20]

University of Asia Pacific
Department of Basic Sciences and Humanities
Mid-term Examination, Fall-2023
Program: B.Sc. in Civil Engineering

Course Title: Mathematics-III
Time: 1.00 Hour

Credit Hour: 3.00

Course Code: MTH 201
Full Marks: 60

There are **four (4)** questions. Answer **three (3)** questions including **Q1** and **Q2**. Figures given in the right margin indicate the marks of the respective questions.

1. a) Define Matrix, Square Matrix, Symmetric Matrix, Singular Matrix and Co-factor of Matrix. 10

b) Find inverse of $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$. 10

2. a) If $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$, then prove that, $(A + B)^2 \neq A^2 + 2AB + B^2$. 10

b) Find $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}$. 10

3. a) Find the determinant of A, where $A = \begin{bmatrix} 0 & ab^2 & ac^2 \\ a^2b & 0 & bc^2 \\ a^2c & b^2c & 0 \end{bmatrix}$. 10

b) Solve the system: 10

$$\begin{aligned} 4x + y + z + w &= 6 \\ 3x + 7y - z + w &= 1 \\ 7x + 3y - 5z + 8w &= -3 \\ x + y + z + 2w &= 3. \end{aligned}$$

OR

4. a) Find the rank of the matrix A, where $A = \begin{bmatrix} 1 & 2 & -3 & -2 & -3 \\ 1 & 3 & -2 & 0 & -4 \\ 3 & 8 & -7 & -2 & -11 \\ 2 & 1 & -9 & -10 & -3 \end{bmatrix}$. 10

b) Solve the system: 10

$$\begin{aligned} -x - 4y + 2z + w &= -32 \\ 2x - y + 7z + 9w &= 14 \\ -x + y + 3z + w &= 11 \\ x - 2y + z - 4w &= -4. \end{aligned}$$

University of Asia Pacific
Department of Civil Engineering
Mid – Semester Examination (Self Study), Fall – 2023
Program: B.Sc. in CE (2nd Year/1st Semester)

Course Title: Basic Electrical Engineering

Course Code: ECE 201

Credit Hours: 3.00

Time: 1.00 Hour

Full Marks: 60

There are **four** questions. Answer any **three including question 1 and question 2**. All questions are of equal value. Figures in the right margin indicate marks.

1. For the circuit given in Figure 1, where all resistances are of equal value, $R = 2\ \Omega$, find: [20]
- i) The equivalent resistance R_{eq} .
 - ii) The current I_s .
 - iii) The current I_1 .

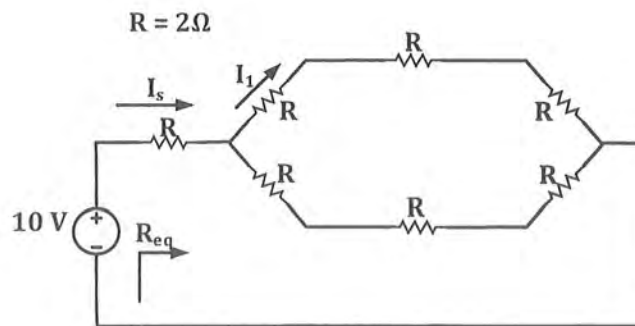


Figure 1

2. Compute V_o for the circuit shown in Figure 2, using Nodal or Mesh analysis. [20]

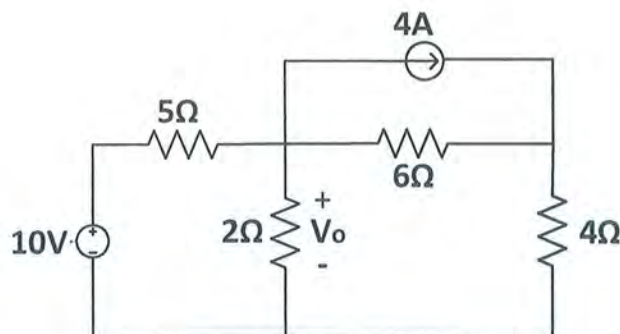


Figure 2

3. Using Superposition Theorem, find voltage I_o in figure 3.

[20]

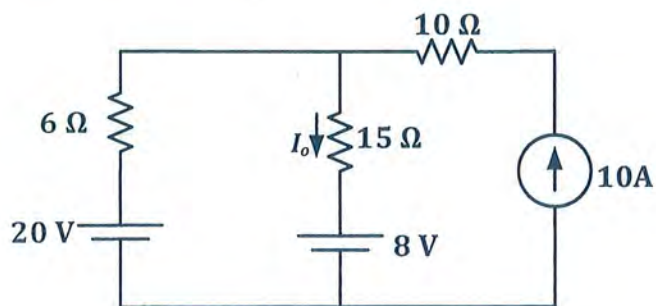


Figure 3

OR

4. For the circuit in shown Figure 4, find the smallest equivalent circuit [one current source and a resistor] with respect to the load resistor R_L .

[20]

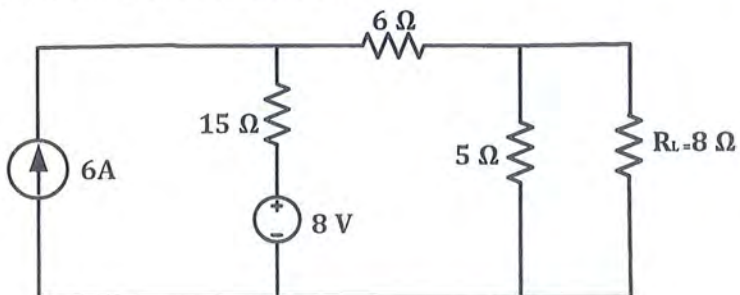


Figure 4

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

Course Title: Mechanics of Solids I

Time: 1-hour

Credit Hours: 3.0

Course Code: CE 211

Full Marks: 40 (10 × 4)

ANSWER ALL THE QUESTIONS

1. Use Singularity Function to derive the shear force and bending moment equations of the beam *ABCD* loaded as shown in *Fig.1*. Also calculate bending moment at B (M_B) and shear force at right of B (V_{BR}).

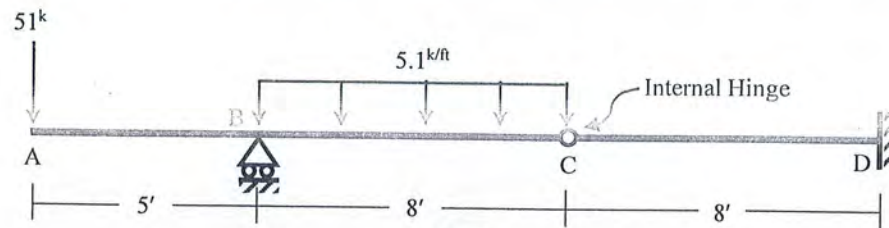


Fig.1

2. Draw the shear force diagram and bending moment diagram of the beam *ABCD* loaded as shown in *Fig.2*.

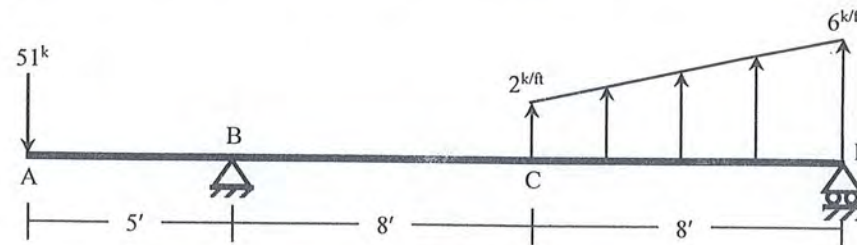


Fig.2

3. Draw the axial force, shear force and bending moment diagram for the frame *ABC* loaded as shown in *Fig.3*.

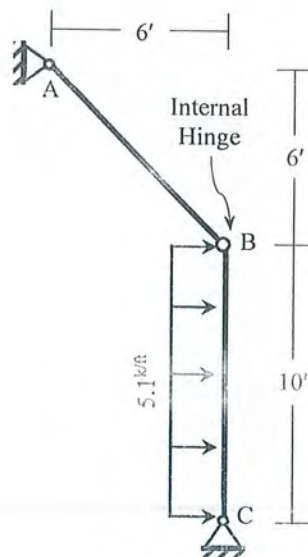


Fig.3

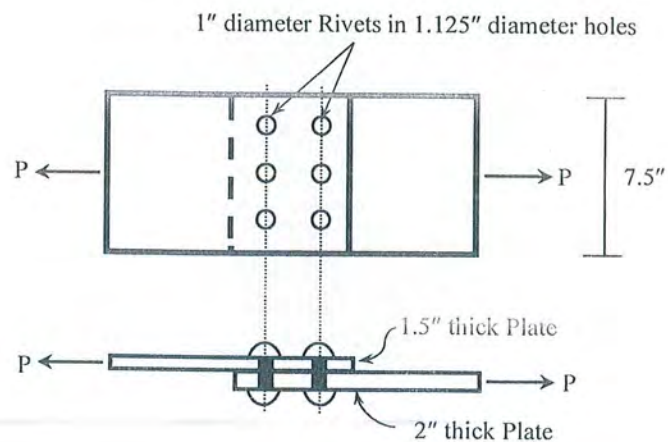


Fig.4

4. Find the allowable tensile force P that the multiple-riveted structural joint shown in *Fig.4* can transmit, if the allowable shearing, tearing and bearing stresses are 12, 24 and 20 ksi respectively.

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

Course Title: Material Science and Environmental Sustainability
Time: 1 hour

Credit Hour: 3.0

Course Code: CE 207
Full Marks: 40

Answer all the questions.
[Assume reasonable data if required]

PART A

1. Different properties of steel and concrete is given in the following table.

Name of properties	Steel	Concrete
Coefficient of thermal expansion	$12 \times 10^{-6} \text{ } ^\circ\text{C}$	$11 \times 10^{-6} \text{ } ^\circ\text{C}$
Modulus of elasticity	200 GPa	40 GPa

- Calculate the stress generated in both material due to 50°C temperature drop. [4]
 - Compare stain generated in steel and concrete due to the thermal stress. [4]
2. An alloy material was tested for tension and a stress vs strain curve was obtained (Figure 1). Dimensional property of the test specimen is charted as follows:

Initial length	120mm
Initial diameter	25 mm

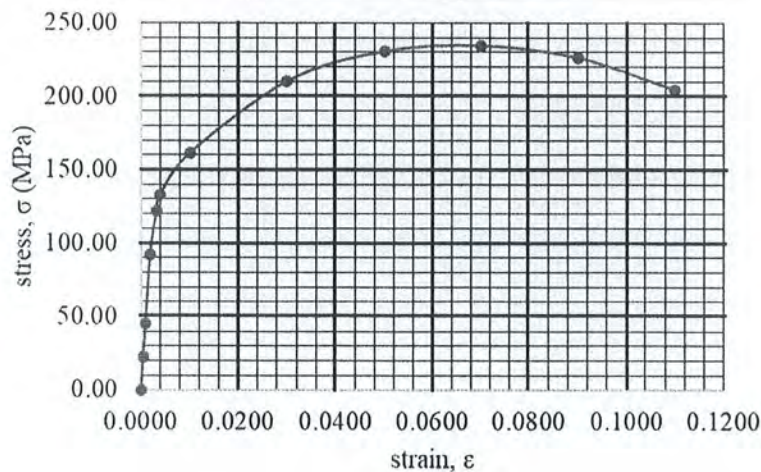


Figure 1

- Determine maximum load that was applied on the specimen. [4]
- Estimate true strain at a stress level of 220 MPa. [4]

3. A crystal structure is shown in Figure 2.

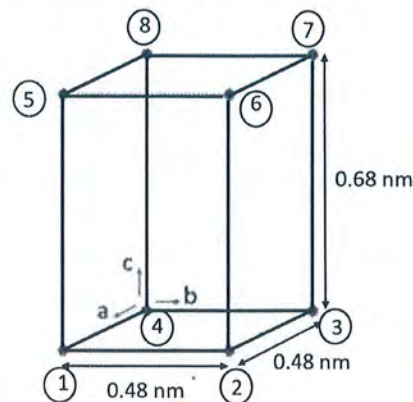


Figure 2

- Locate point "P" having coordinates $\frac{1}{3} \frac{1}{2} \frac{3}{4}$ and show it with a neat sketch. (Origin at corner 4) [4]
- Draw the plane that passes through corner point 4, 2, 6 & 8 and determine its Miller indices showing steps. [4]

PART B

- State the effects of nanomaterials on the hydration kinetics and rheology of portland cement pastes. [4]
- With neat sketch show types of point defects in crystal structure. [4]
- Differentiate resilience and toughness. [4]
- Prepare a list of possible actions to be done to increase thermal shock resistance of a material. [4]

University of Asia Pacific
Department of Civil Engineering
Mid – Term Examination, Fall – 2023
Program: BSc in Civil Engineering

Course Title: Principles of Accounting Course Code: ACN 201 Credit: 2

Time: 1 hour

Full Marks: 20

(You have to answer all the questions.)

1. What is accounting? Briefly describe the accounting process. (2+2)
2. Differentiate between financial accounting and managerial accounting. (4)
3. Sanjida Afrin opened her own law office on July 1, 2024. During the first month of operations, the following transactions occurred.
 - a. Invested \$10,000 in cash in the law practice.
 - b. Paid \$800 for July rent on office space.
 - c. Purchased office equipment on account \$3,000.
 - d. Provided legal services to clients for cash \$1,500.
 - e. Borrowed \$700 cash from a bank on a note payable.
 - f. Performed legal services for client on account \$2,000
 - g. Paid monthly expenses: salaries \$500, utilities \$300, and telephone \$100.
 - h. The owner withdrew Tk. 300 during July for personal expenses.

Instructions

- (a) Prepare a tabular summary of the transactions. (6)
- (b) Prepare the income statement and owner's equity statement, on July 31, 2024. (3+3)

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

Course Title: Engineering Materials
 Time: 1 hour

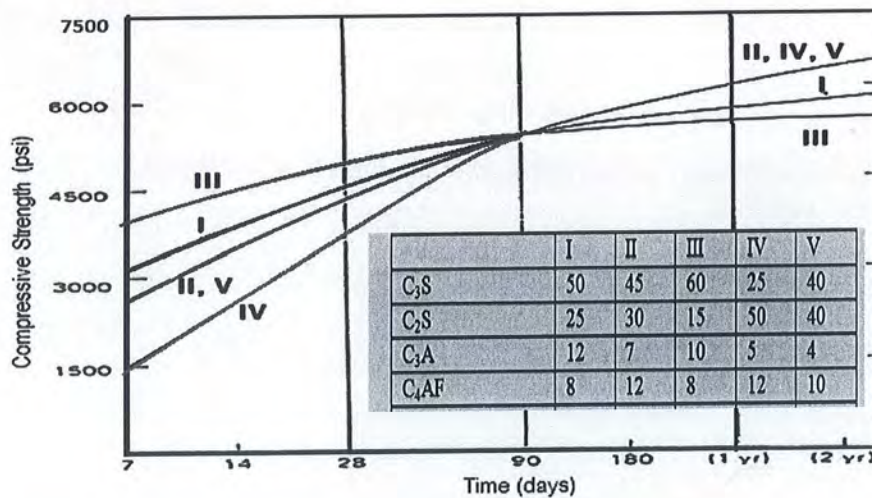
Credit Hour: 3.00

Course Code: CE 201
 Full Marks: 60

Answer all three questions

1. a) Cement hydration leads to the setting and hardening of cement. Draw the cement hydration process and explain how cement hydration results in strength gain of cement. [12+7+6]
- b) Cement markings are provided on top of cement bags by the manufacturers. Suppose you have received cement bags with markings 'CEM II /B-M (S-L) 42.5 R'. Identify the composition and strength class of the cement.
- c) With the aid of a diagram, compare the stress/strain graph of a brittle material and a ductile material.

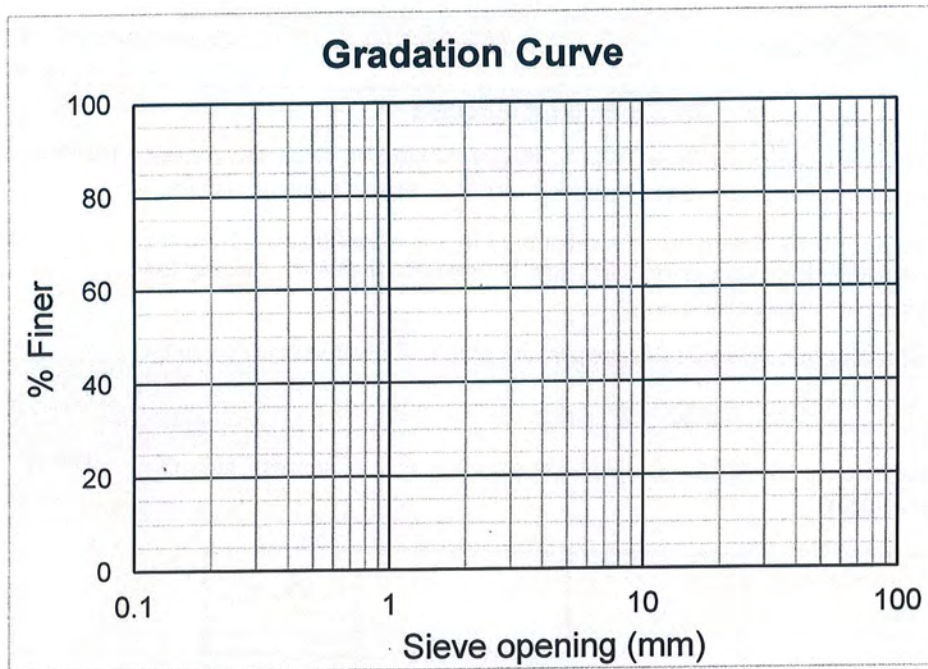
2. a) Interpret and explain the following graph showing the rate of strength gain of different types of cement. [10+5]



- b) Differentiate between burnt clay brick and sand lime brick.

3. a) The following data is obtained from sieve analysis of 1 kg coarse aggregate sample. [12+8]
 Draw the gradation curve on the semi-log graph paper provided below.

Sieve No.	Sieve opening (mm)	Material retained (gm)
1 in.	25.0	9.5
3/4 in.	19.0	36.6
1/2 in.	12.5	425.8
3/8 in.	9.5	350.2
#4	4.75	170.8
#8	2.36	4.8
Pan	-	2.3



b) Calculate coefficient of uniformity, C_u and coefficient of curvature, C_c and comment on the type of aggregate gradation.

$$\left[C_u = \frac{D_{60}}{D_{10}}, C_c = \frac{D_{30}^2}{D_{10} \times D_{60}} \right]$$

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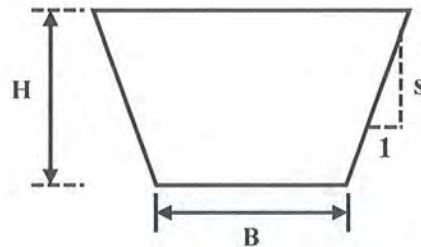
Course Title: Engineering Geology and Geomorphology
Time: 1 hour

Credit Hour: 3.00

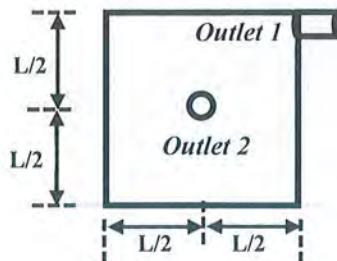
Course Code: CE 203
Full Marks: 40

There are five questions in total. Answer all

1. a) Write one similarity and two differences between faults and joints. (3)
b) Draw the rock structures for syncline fold and horst. (4)
c) Write short notes on the following geomorphic process: (4)
 - i. Wedging action of ice
 - ii. Spreading of roots of plants
- d) Illustrate the process by which an igneous rock transforms into a metamorphic rock using a diagram. (4)
- e) In the context of rapid urbanization in Bangladesh, how is the transition from agricultural land to urban areas affecting surface runoff and infiltration? What are the potential risks associated with this shift? (5)
2. Formulate the equation of Compactness Co-efficient (CC) for the trapezoidal-shaped drainage basin shown below. (4)



3. Compute the value of Compactness Co-efficient (CC) for the catchment area provided in Question No.2 with the following values. [$B=5\text{ m}$, $s=2$, $H=2\text{ m}$] (3)
4. Determine the Form Factors (FF) for **Outlet 1** and **Outlet 2** in the drainage area depicted below. Also, demonstrate your understanding on the relation between form factor and run-off for these two outlets. (6)



P.T.O.

5. For the following catchment basin, calculate the peak runoff in m^3/s . Use $C_1 = 0.8$, $C_3 = 0.7$ and $I = (C_1 + C_2 + C_3)/5$ cm/hour. Area 2 is a circular area (1 m diameter) that has an impervious layer on top. (7)

