# University of Asia Pacific
## Department of Civil Engineering
## Mid Semester Examination, Fall 2024
## Program: B.Sc. in Civil Engineering
## 2nd Year 1st Semester

Course Title: Basic Electrical Engineering | Course Code: ECE 201
Time: 3 hours | Credit Hour: 3.00 | Full Marks: 60

**Answer any three**

**QUESTION 1 [20 MARKS]**
What is the power of the current source of the DC circuit in figure 01?

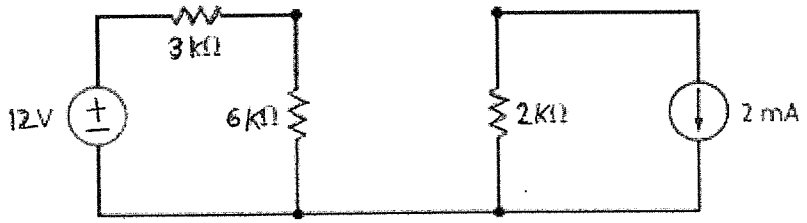


Figure: 01

**QUESTION 2 [20 MARKS]**
What is the power of the voltage source of the DC circuit in figure 01?

**QUESTION 3 [20 MARKS]**
Solve the given DC circuit of figure 02 to calculate the power of the current source.

**QUESTION 4 [10+10=20 MARKS]**
Construct a simplified presentation of the circuit given in figure 02 with respect to 4 kilo-ohm resistor. From that simplified circuit, containing a source and a resistor, calculate- the power absorbed by the 4 kilo-ohm resistor.

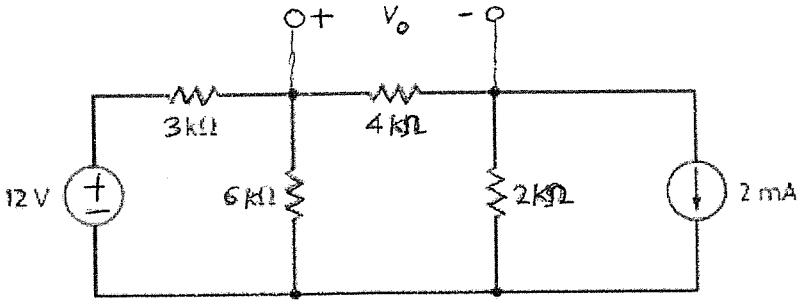


Figure: 02

# University of Asia Pacific
## Department of Civil Engineering
## Mid Semester Examination, Fall 2024
## Program: B.Sc. in Civil Engineering
## (Self Study)

Course Title: Bangladesh Studies: Society and Culture | Course Code: HSS211(a)
Time: 1 hour | Credit Hour: 2:00 | Full Marks: 40

There are three questions. Answer ANY TWO. (20 x 2=40)

1. a. Name four major theoretical perspectives sociologists use. Mention the key persons. 5

   b. Briefly state the differences between the conflict and the functionalist perspectives with relevant examples. 15

2. a. Define sociological imagination. 5

   b. What are the effects of the sociological imagination on our lives? 15

3. a. How did Gerhard Lenski define sociocultural evolution? 5

   b. 'Industrialization drew people away from home to factories' -- Explain how the changes occurred as the agrarian societies shifted to industrial societies in course of time. 15

# University of Asia Pacific
## Department of Civil Engineering

## Mid Semester Examination, Fall 2024

## Program: B. Sc. Engineering (Civil)

## 2nd Year 1st Semester

## Self -study

Course Title: Bangladesh Studies: Bangladesh History | Course Code: HSS 211(b)
Time: 1 hour | Credit Hours: 2 | Full Marks: 40

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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]** | **CO1** |
| | **OR** | | |
| **2.** | Describe the glories of the Pala dynasty. | **[20]** | **CO1** |
| **3.** | Discuss the economic and political changes under the Muslim rule in the Medieval Bengal. | **[20]** | **CO2** |

# University of Asia Pacific
## Department of Civil Engineering
## Mid Semester Examination, Fall 2024
## Program: B.Sc. in Civil Engineering
## 2nd Year 1st Semester

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

**Answer all the questions**

1. Differentiate between cleavage and fracture of minerals. [5]

2. Discuss how different earth system interact with each other with examples. [5]

3. Explain Lithification. [5]

4. Differentiate silicate minerals from non-silicate minerals in terms of their structure and formation. [5]

5. Explain Fractional Crystallization of Igneous Rocks using Bowen's Reaction Series. [5]

6. Define geomorphic processes. Explain physical weathering with examples. [5]

7. (a) Explain the assumptions of rational method. Define time of concentration. [5]

   (b) The runoff coefficient of a drainage basin is 0.40 having an area of 0.85 $km^2$. The slope of the catchment is 0.006 and the maximum length of travel of water is 950 m. The maximum depth of rainfall for the duration is 50 mm. Estimate the peak flow rate for the catchment. [5]

**Appendix:** can be used for question 7(b).

$$t_c\ (\text{min}) = 0.01947 L^{0.77} S^{-0.385}$$

# University of Asia Pacific
## Department of Civil Engineering
## Mid Semester Examination, Fall 2024
## 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: 40

**Answer all the questions. Assume reasonable data if required.**

## PART A

### QUESTION 1 [27 MARKS]

a. Sketch a Face centered orthorhombic unit cell and within that indicate the location of $\frac{1}{3}\ \frac{1}{2}\ \frac{1}{4}$. [6]

b. Determine the Miller-Bravais indices for the plane shown in **Figure 1** (hexagonal surface resulting from joining point 7,8,9,10,11 and 12). [4]

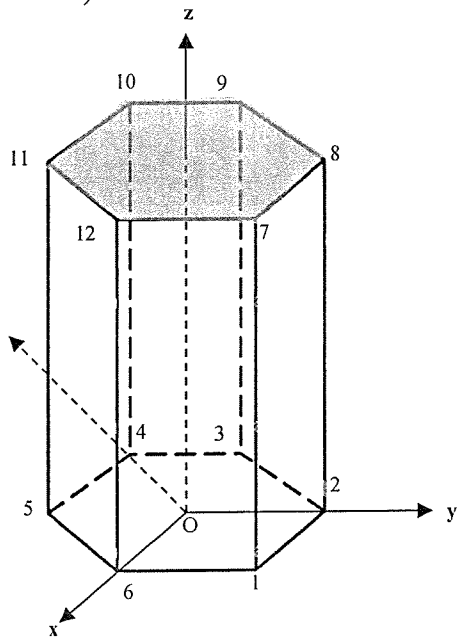



**Figure 1.** Hexagonal unit cell

c. Construct a $[\ 0\ \ \bar{1}\ \ \bar{1}\ ]$ direction within a Body Centered Tetragonal unit cell and determine the linear density. Given, length of unit cell along x axis = 0.122 nm and z axis = 0.312 nm. [8]

d. With neat sketch discuss fluctuating induced dipole bonds. [5]

e. Determine the type of the bond comparing the percent of ionic and covalent character in Al-Cl bond of $AlCl_3$ compound. Given that, electronegativity of Al = 1.61 and Cl = 3.16.

[4]

## PART B

### QUESTION 2 [13 MARKS]

a. Differentiate between non- renewable and renewable energy.

[2]

b. State two examples of Adaptation and Mitigation.

[3]

c. Define Indirect use values and Bequest values and explain how these values apply to Jaflong of Sylhet.

[3]

d. On 20 March 2025, the following air quality data have been recorded at a monitoring station in Dhaka:$PM_{2.5}$ = 450 μg/$m^3$ (24-hr); $O_3$ =0.42 ppm (8-hr); $N0_2$= 940 μg/$m^3$ (Annual). Prepare the AQI index report of the given scenario.

[5]

### Required Table

| Breakpoints | | | | | | | AQI |
|---|---|---|---|---|---|---|---|
| $O_3$ (ppm) 8-hr | $O_3$ (ppm) 1-hr | $PM_{2.5}$ (μg/$m^3$) 24-hr | $PM_{10}$ (μg/$m^3$) 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 (≥ 301). AQI values of 301 or higher are calculated with 1-hr $O_3$ concentration.

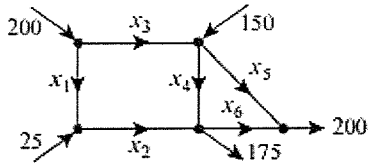
# University of Asia Pacific
## Department of Civil Engineering
## Mid Semester Examination, Fall 2024
## Program: B.Sc. in Civil Engineering
## 2nd Year 1st Semester

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

**Answer any three questions including 'Question 1' and 'Question 2'.**

**QUESTION 1 [20 MARKS]**

a) The accompanying figure shows known flow rates of hydrocarbons into and out of a network of pipes at an oil refinery. [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 and directions of flow if $x_4 = 50$ and $x_6 = 0$.

b) Find Symmetric and Skew Symmetric part of the matrix $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$. [05]

**QUESTION 2 [20 MARKS]**

a) Using row echelon form find inverse of $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$. [10]

b) Using co-factor find Determinant of $A = \begin{bmatrix} 3 & 3 & 0 & 5 \\ 2 & 2 & 0 & -2 \\ 4 & 1 & -3 & 0 \\ 2 & 10 & 3 & 5 \end{bmatrix}$. [10]

**QUESTION 3 [20 MARKS]**

a) Calculate mean and median using empirical relation find 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 $P_{31}$, $D_6$, $Q_3$ 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**

**QUESTION 4 [20 MARKS]**

a) Calculate Arithmetic, Geometric and Harmonic mean of the following data: [10]

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

b) Establish the relationship among Arithmetic, Geometric and Harmonic mean. [10]

# University of Asia Pacific
## Department of Civil Engineering
## Mid-Semester Examination, Fall 2024
## Program: B. Sc. in Civil Engineering
## 2nd Year 1st Semester

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

**Answer all the questions**

**QUESTION 1 [10 MARKS]**

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

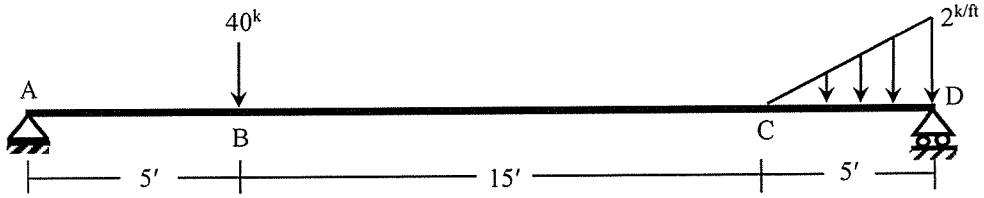



**Figure 1**

**QUESTION 2 [10 MARKS]**

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

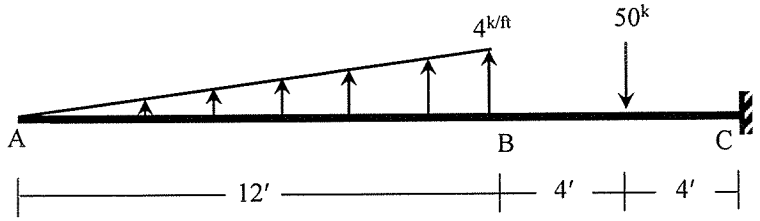



**Figure 2**

**QUESTION 3 [10 MARKS]**

Draw the axial force, shear force and bending moment diagram of column ***AB*** for the frame ***ABCDE*** loaded as shown in **Figure 3.** [10]

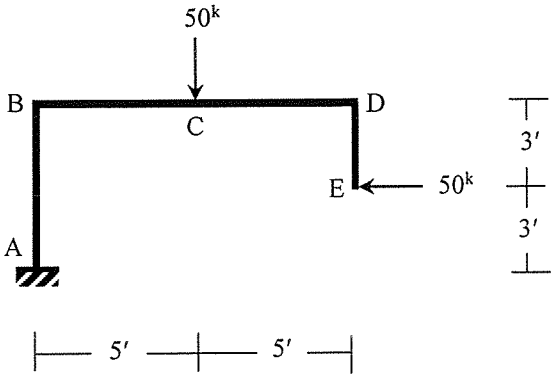
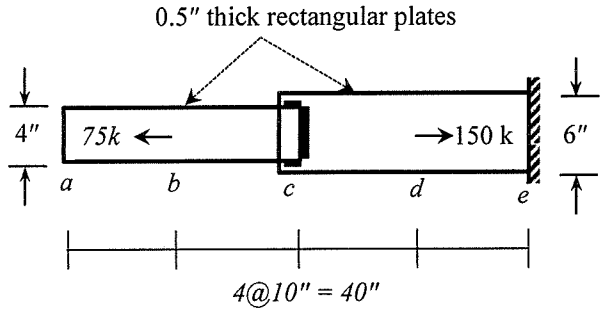



**Figure 3**

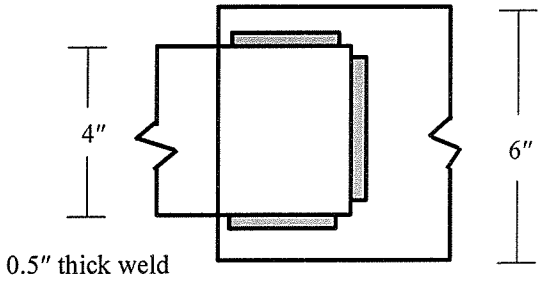
**QUESTION 4 [10 MARKS]**

Design the connection ***c*** (calculate length of the weld) of the member *abcde* shown in **Figure 4.** Also check adequacy of the member.

[Given: Allowable stress in shear = 30 ksi, tension = 40 ksi, compression = 25 ksi]. [10]




*Member* ***abcde***




*joint c*

**Figure 4**

# University of Asia Pacific
## Department of Civil Engineering
## Mid Semester Examination, Fall 2024
## Program: B.Sc. in Civil Engineering
## 2nd Year 1st Semester

Course Title: Engineering Materials | Course Code: CE 201
Time: 1 hour | Credit Hour: 4.00 | Full Marks: 80

**Answer all the questions**

***PART A***

**QUESTION 1 [25 MARKS]**

a. Interpret and explain the graph as shown in **Figure 1**. [8]

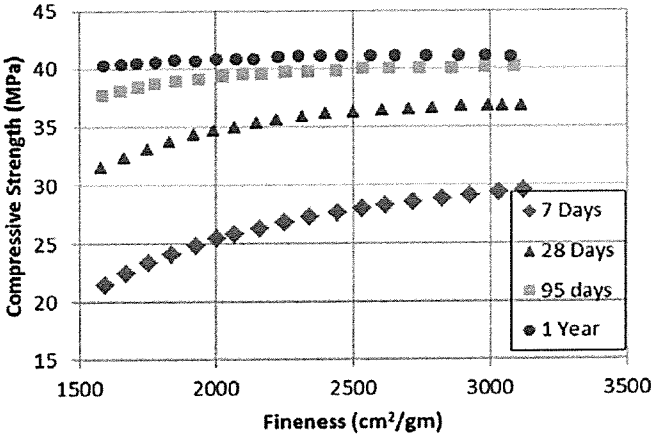



**Figure 1:** Compressive strength vs fineness of cement

b. Draw the calorimetric curve (rate of heat evolution vs time) of Portland cement hydration process. Label the different stages and add brief descriptions on the figure. [10]

c. Suppose you have received cement bags with markings '**CEM III 32.5 L**'. Identify the composition and strength class of the cement. [3]

d. Write down the type of cement required to construct bridge pier and justify your answer by explaining the modification of the composition of OPC required. [4]

**QUESTION 2 [15 MARKS]**

Classify aggregates based on size. Determine the fineness modulus of an aggregate sample from the data obtained from sieve analysis, which is provided in **Table 1**. [15]

**Table 1:** Particle distribution

| Sieve No. | Sieve opening (mm) | Material retained (gm) |
|---|---|---|
| **3 in.** | 75.0 | 120.1 |
| **2 in.** | 50.0 | 229.5 |
| **3/4 in.** | 19.0 | 136.6 |
| **1/2 in.** | 12.5 | 425.8 |
| **3/8 in.** | 9.5 | 350.2 |

| | | |
|---|---|---|
| #4 | 4.75 | 170.8 |
| #8 | 2.36 | 34.7 |
| Pan | - | 32.3 |

## *PART B*

**QUESTION 3 [5*2=10 MARKS]**

Answer the following question from the typical cross-section of a brick kiln sketch shown below: [10]

a. Name the brick kiln and its type shown in **Figure 2**
b. Explain which internal and external doors must be kept close to complete brick's burning process.
c. Describe the process which occurs in chambers 2, 3, 4 and 5.
d. Name the central chamber and the door attached to it.
e. Describe advantages of this type of kiln.

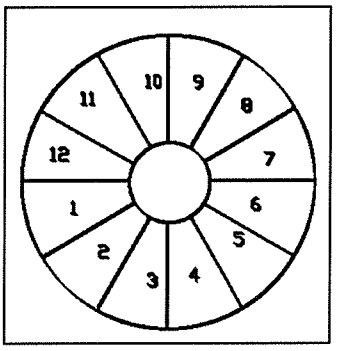



**Figure 2.** Cross-section of a brick kiln

**QUESTION 4 [6+6=12 MARKS]**

A brick sample (unit weight= 100lb/ft$^3$; volume= 57 inch$^3$, SSD weight= 3.90 lb) has been tested and found that it contains 60% silica, 30% alumina but excessive amount of lime (over 10%). Answer the questions below: [12]

a. Find out the harmful ingredient for the brick. discuss type of defect may arise from it.
b. Find out the absorption capacity of the sample. Estimate the brick's grade from the absorption capacity and write properties of such graded brick.

**QUESTION 5 [18 MARKS]**

Draw the strain vs time graph for the following loading pattern of an ***elastic*** material shown in **Figure 3.** [18]

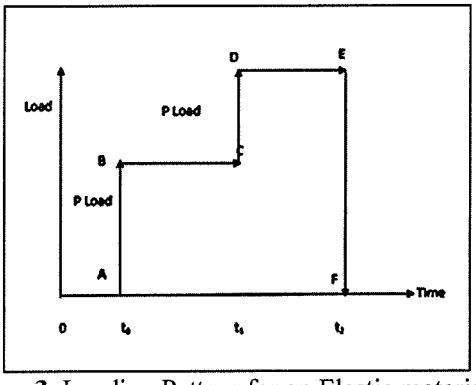



**Figure 3.** Loading Pattern for an Elastic material

# University of Asia Pacific
# Department of Civil Engineering
# Mid-Term Examination, Fall 2024
# Program: B.Sc. in Civil Engineering
# 2nd Year 1st Semester

Course Title: Principles of Accounting | Course Code: ACN 201

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

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**Submit your question inside your answer script**

(CO1/PO11/C2)

(3)

1. "Accounting is a systematic process to provide information to decision makers"- explain.

(CO2/ PO11/ C3)

(7+7+3= 17)

2. Real Holdings, a real estate company, has the following transaction:

| | |
|---|---|
| January 1 | The owner invested cash in the business TK 2,000,000. |
| 2 | Equipment purchased for TK 400,000 on account. |
| 5 | Paid one year rent for TK 100,000 in advance. |
| 10 | Real holdings provided services for TK 500,000. |
| 15 | The business purchased supplies that will be used for more than 1 year for TK 100,000. |
| 25 | Real holdings again provided services for TK 200,000 on account. |
| 31 | Provided employees' salaries for TK 60,000. |

Required:

i. Prepare tabular analysis.

ii. Prepare journal entries.

iii. Prepare "Cash" ledger.