

**University of Asia Pacific**  
**Department of Basic Sciences and Humanities**  
**Mid Semester Examination, Fall 2017**  
**Programme: B.Sc. Engineering (Civil)**  
**(2<sup>nd</sup> Year 1<sup>st</sup> Semester)**

**Course Title: Bangladesh Studies: Society and Culture**

**Course Code: HSS 211(a)**

**Credit: 2**

**Time: 1 Hour**

**Full Marks: 40**

**Answer any 4 (FOUR ) questions of the following (4x10)**

1. Define Sociology. Can you find any connection between Sociology and Civil Engineering? Explain. 10
2. What was Auguste Comte's understanding about Sociology? Discuss the 'Law of the three stages' developed by him. 10
3. Define culture in the context of Bangladesh. Is there any difference between urban and rural culture in Bangladesh? Explain. 10
4. Critically discuss Durkheim's views about 'Suicide'. 10
5. Write short notes on the following topics: 2x5
  - a. Material and Non-material culture.
  - b. Feudalism and capitalism.

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**Mid Semester Examination, Fall 2017**  
**Program: B.Sc. Engineering (Civil)**  
**2<sup>nd</sup> year 1<sup>st</sup> semester**

Course Title: Bangladesh Studies: History      Course Code: HSS 211(b)

Credit: 2.00

Total Time: 1 Hour

Full Marks: 40

There are **Five** Questions. Answer any **Four**. All questions are of equal value. Figures in the right margin indicate marks.

1. Identify the origin of the name Bangladesh describing its transformation in different ages. 10
2. Locate the present locations of the different *janapadas* of ancient Bengal. 10
3. a. Define *Matsyanyam*. 2  
b. Explain its endind process. 8
4. Describe the process of Bakhtiar Khilji's occupation of Nadia in 1204. 10
5. Identify the groups that resisted the Mughals in Bengal during the time of Emperor Akbar and Jahangir. 10

**University of Asia Pacific**  
**Department of Basic Sciences & Humanities**  
**Mid Examination, Fall-2017**  
**Program: B.Sc. in Civil Engineering**

Course Title: Mathematics III  
 Time: 1.00 Hour

Course Code: MTH 201

Credit: 3.00  
 Full Marks: 60

There are **Four** questions. Answer any **Three**. All questions are of equal values, indicated in the right margin.

1. (a) Define rectangular matrix, diagonal matrix, transpose matrix, symmetric matrix with example. 8

(b) If  $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$ , then show that  $A^3 - 3A^2 - A + 9I = 0$  12

2. (a) Prove that  $\begin{vmatrix} 1+a_1 & a_2 & a_3 & a_4 \\ a_1 & 1+a_2 & a_3 & a_4 \\ a_1 & a_2 & 1+a_3 & a_4 \\ a_1 & a_2 & a_3 & 1+a_4 \end{vmatrix} = 1 + a_1 + a_2 + a_3 + a_4$  7

- (b) Find the rank of the following matrix using normal form 13

$$A = \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 1 \\ 0 & 5 & 0 \end{bmatrix}$$

3. Find the eigenvalues and eigenvectors of the matrix  $A = \begin{pmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{pmatrix}$ . Also find 20

the matrix  $P$  which diagonalizes the matrix  $A$ . Determine  $P^{-1}AP$ .

4. (a) If  $A = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$  then find  $A^{-1}$ ,  $A^{-2}$ ,  $A^{-3}$  using Cayley Hamilton Theorem. 10

(b) Show that the following homogeneous system of linear equations has non-zero 10  
solution. Find any one non-zero solution

$$x_1 - 3x_2 - 2x_3 = 0$$

$$2x_1 + x_2 + 3x_3 = 0$$

$$3x_1 - 2x_2 + x_3 = 0$$

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Mid-Semester Examination, Fall-2017**  
**Program: B.Sc Engineering (2<sup>nd</sup> Year/1<sup>st</sup> Semester)**

Course Title: Basic Electrical Engineering

Course No. ECE201

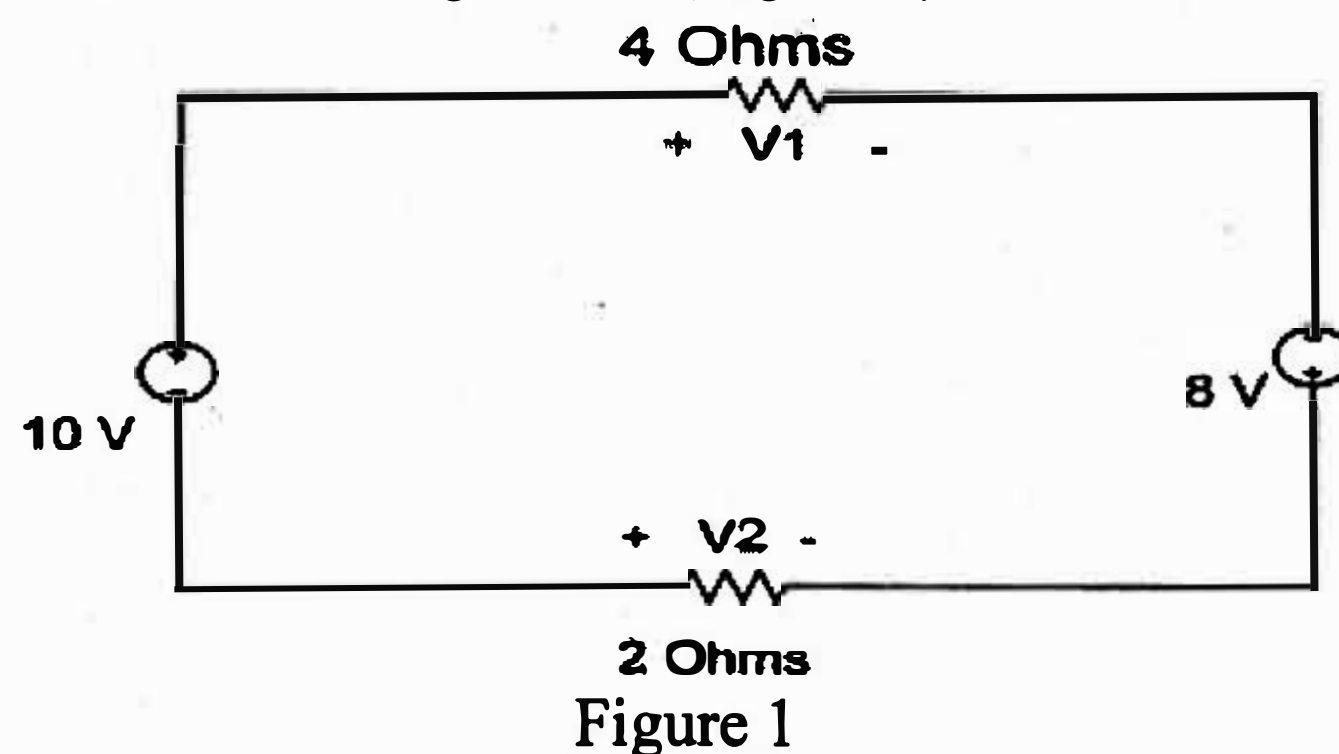
Credits: 3.00

Time: 1.00 Hour

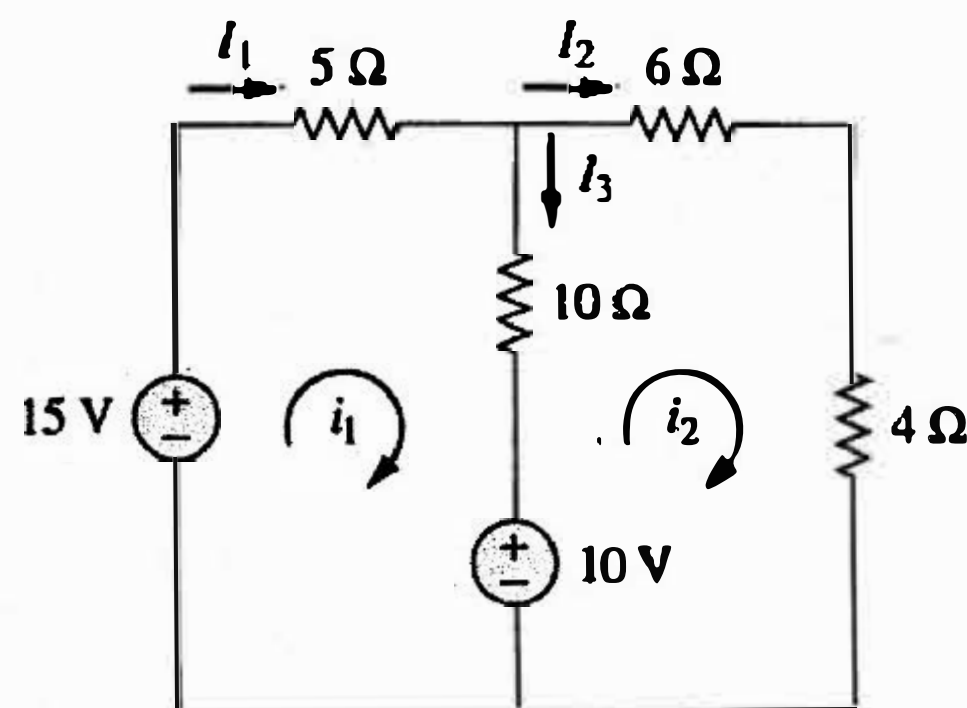
Full Marks: 60

[There are **Four** questions. Answer any **Three**. All questions are of equal value. Figures in the right margin indicate marks.

1. (a) Define voltage, current, resistance, capacitance and inductance with diagram 10
- (b) Find  $V_1$  and  $V_2$  in the following circuit (Figure 1). 10

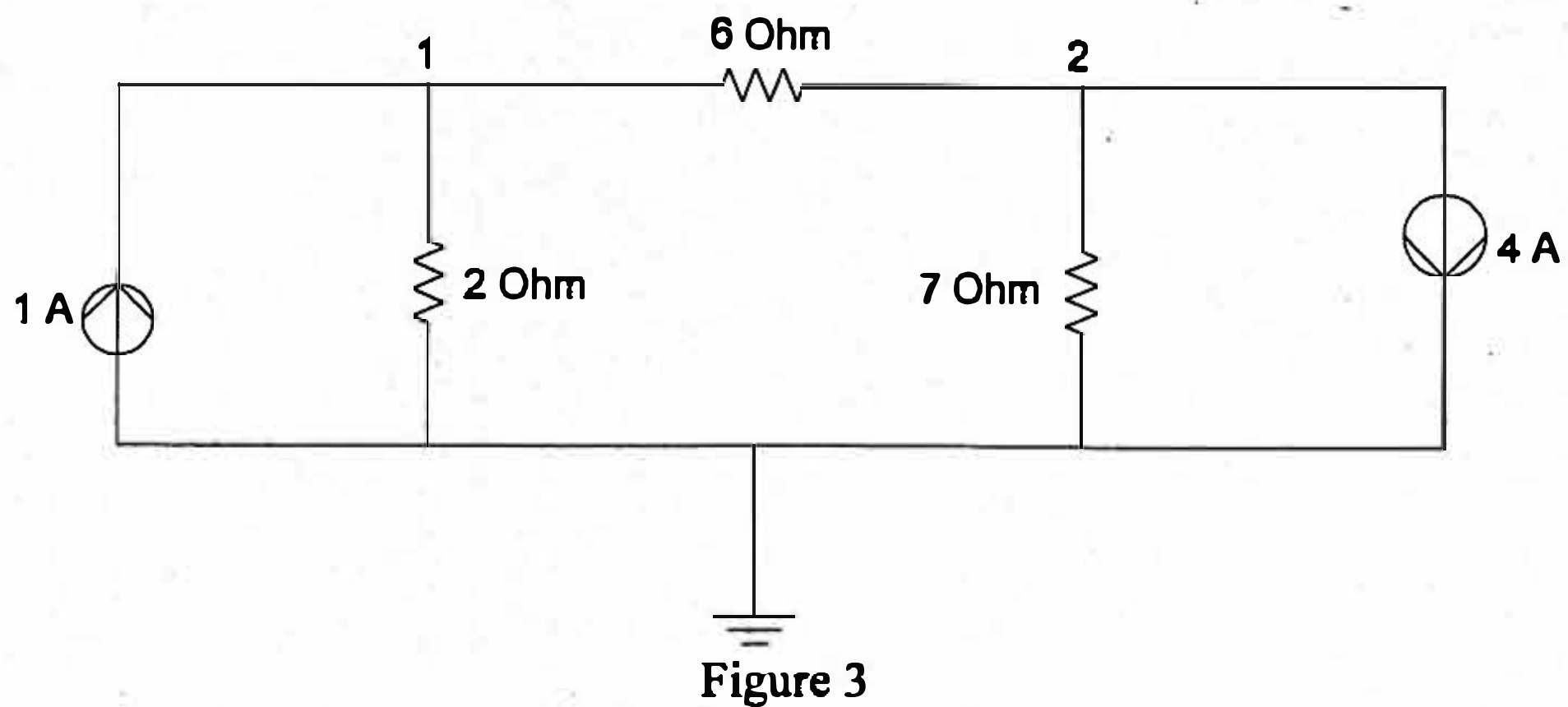


2. (a) What is Ohm's law? Explain linearity and non-linearity of resistance through diagram. Explain short circuit and open circuit in the electricity system with necessary diagram. 10
- (b) Find the mesh currents and the branch currents in the following figure 2 circuit. 10

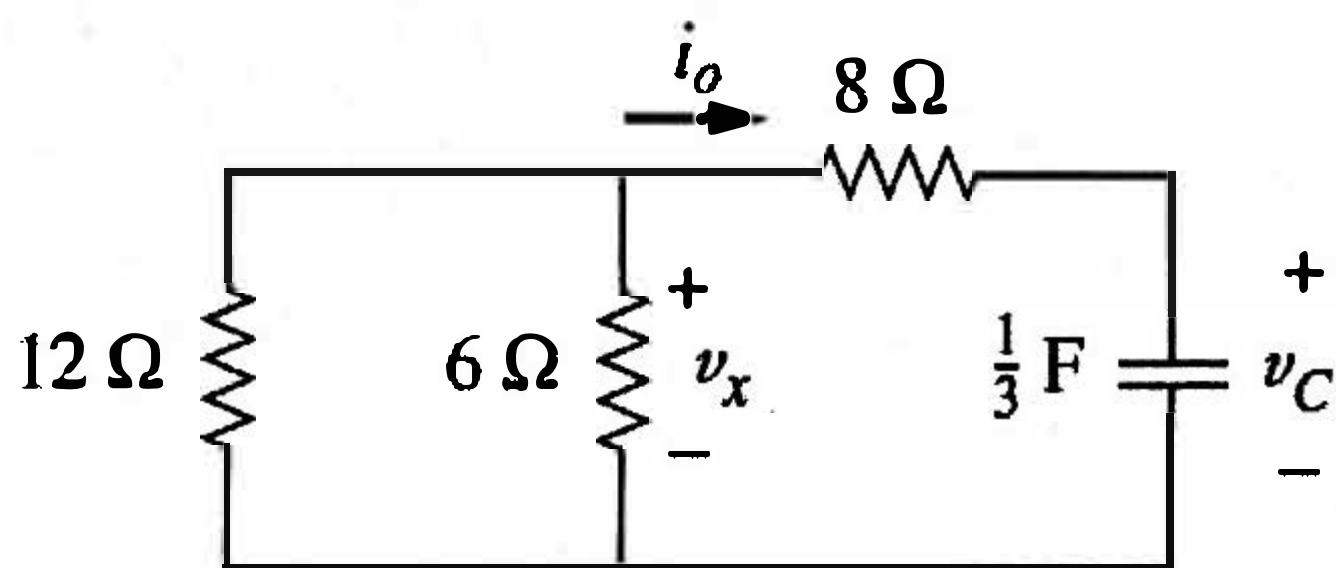


3. (a) Draw a diagram to define nodes, loops, elements, and branch. Develop an equation to relate  $n$ ,  $l$ , and  $b$ . 5
- (b) Explain Super Mesh and Super Node in an electrical circuit. 5

(c) In figure 3, find the node voltages  $V_1$  and  $V_2$  at node 1 and 2 respectively. 10



4. (a) Define First Order Circuit. Explain Source-Free RC circuit. 8  
 (b) Refer to the circuit in figure 4. Let  $V_c(0) = 60$  V. Determine  $V_c$ ,  $V_x$  and  $i_0$  for  $t \geq 0$ . 12



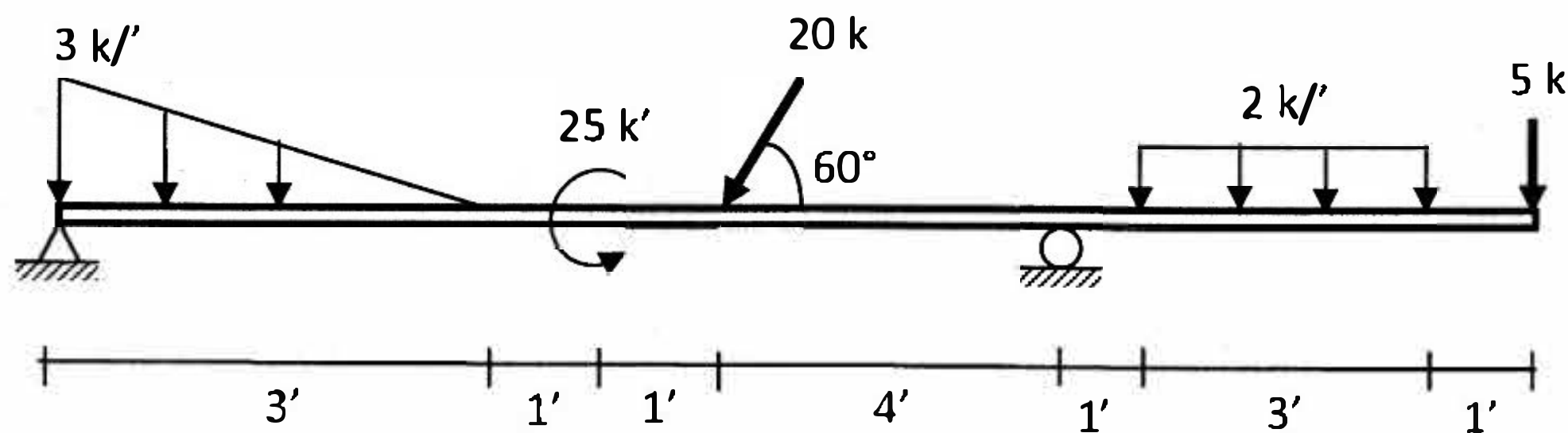
**University of Asia Pacific**  
**Department of Civil Engineering**  
**Mid-Term Examination Fall 2017**

Course Code: CE 211 (A & B)  
Course Title: Mechanics of Solids I

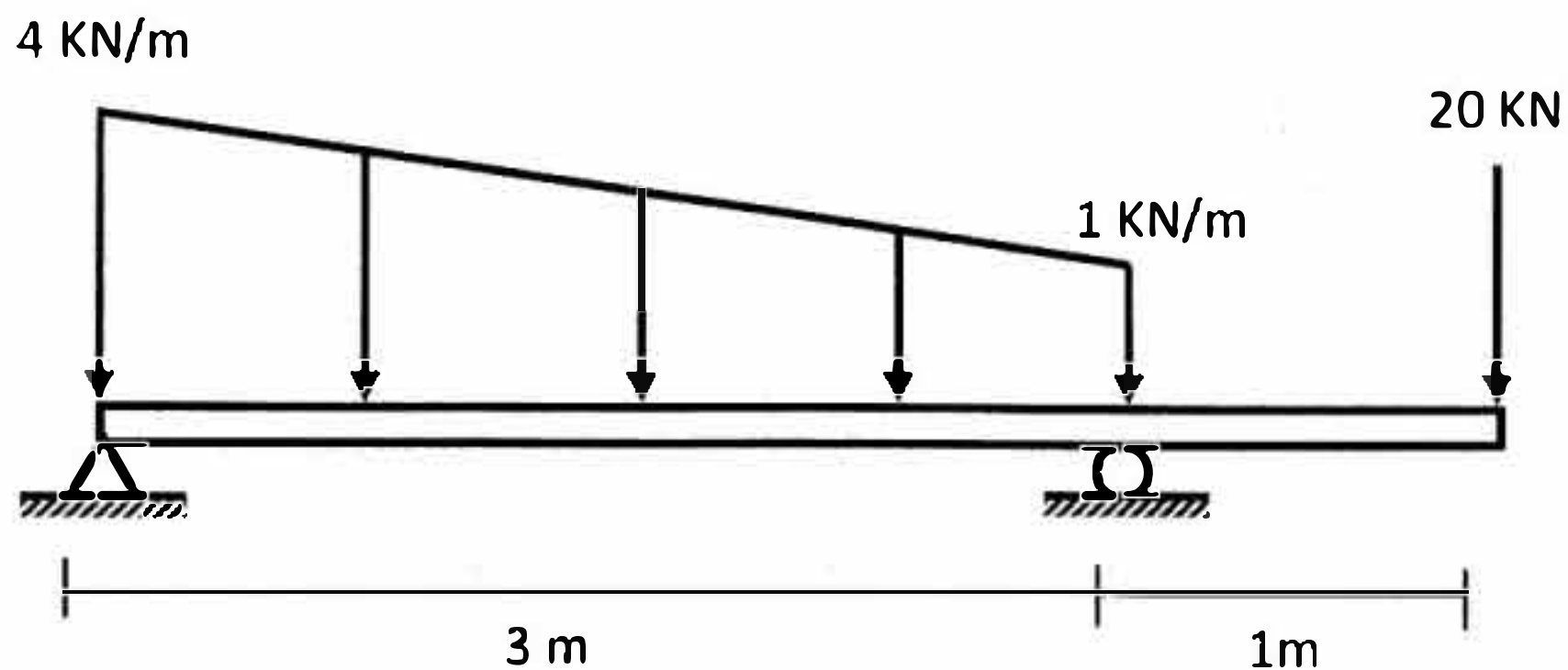
Time: 1 (one) Hour  
Full Marks: (3x20) = 60

*Answer all questions.*  
*Each question carries equal marks*

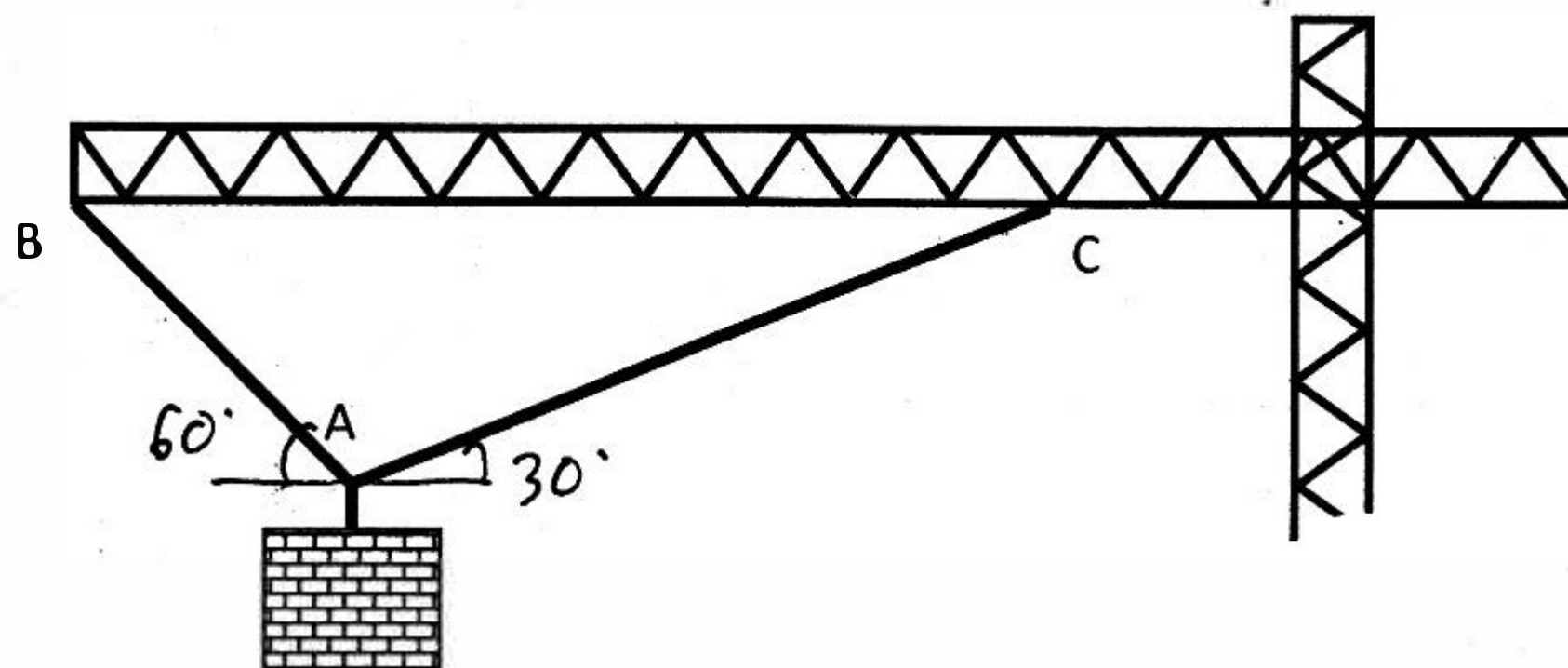
1. Draw Shear Force and Bending Moment Diagram for the following beam loading.



2. Determine the functions for loading, shear and bending moment for the following beam.



3. Find the weight of the stock of blocks being carried by the crane boom with two metal wires AB (area:  $800 \text{ mm}^2$  and allowable stress:  $110 \text{ MPa}$ ) and AC (area:  $400 \text{ mm}^2$  and allowable stress:  $120 \text{ MPa}$ ).



**University of Asia Pacific**  
**Department of Civil Engineering**  
**Mid Semester Examination Fall 2017**

Course No: CE 201  
 Course Title: Engineering Materials

Time: 1 Hour  
 Full Marks: 60

There are FOUR questions. Question No. 1 is compulsory. Answer any TWO questions from the rest.

1. For a building construction, the recommended FM for sand is 2.3. From a market, two sand samples (Sand-X and Sand-Y) were collected and were sent to UAP for sieve analysis. The sieve analysis data are given below: (20)

ASTM Sieve	Sieve opening (mm)	Amount Retained (gm)	
		Sand – X	Sand – Y
3 inch	76.20	0	0
1.5 inch	38.10	0	0
3/4 inch	19.05	0	0
3/8 inch	9.50	0	0
# 4	4.75	0	0
# 8	2.36	60	0
# 12	1.70	60	80
# 16	1.19	0	80
# 30	0.59	90	50
# 40	0.425	90	70
# 50	0.30	0	45
# 100	0.15	100	25
# 200	0.075	50	100
<b>Pan</b>	-	50	0

- (i) Calculate FM of the sand samples,
- (ii) Draw the grading curve of the sand samples and make comments on the grading curves,
- (iii) In what proportions, the sand samples are to be mixed to get the recommended FM?
2. (a) Write short notes on: (i) Share strain, (ii) Modulus of Resilience, and (iii) Offset Yield Point (Proof Stress). (2 x 3 = 6)
- (b) Draw stress-strain curves of concrete, mild steel, glass, and rubber. (1 x 4 = 4)
- (c) Explain instantaneous strain and creep of concrete. (1.5 x 2 = 3)
- (d) How to reduce the emission of CO<sub>2</sub> making by cement industry? (2)
- (e) What are the advantages and disadvantage of high fineness cement? (1.5 x 2 = 3)
- (f) Why setting time of cement is important? (2)



3. (a) Brick get strength during burning"-how? (2)
- (b) What causes efflorescence of brick and how to remove it? (2+1 = 3)
- (c) What is the function of frog mark of brick? (2)
- (d) Why is drying of brick important? (2)
- (e) Explain the functions of Alumina in clay brick. (2)
- (f) What is flash setting of cement and how to control it? (2+2 = 4)
- (g) Draw the development of strength of pure compounds:  $C_2S$ ,  $C_3S$ ,  $C_3A$ , and  $C_4AF$ . Explain hydration of Silicate with chemical reaction. Who is the main strength giving compound and what is the shape and size of that compound? (1.5+2+1.5 = 5)
4. (a) Explain bulking of sand? How water content and aggregate fineness affects the Bulking of sand? (2.5+2.5 = 5)
- (b) Mix design of mortar is necessary for plastering work of a brick masonry wall of 30 ft long and 10 ft height. The following data are provided: (15)
- Sand to cement ratio (weight basis) = 3
- Water to cement ratio = 0.45
- Specific gravity of sand = 2.6
- Cement type = Ordinary Portland cement
- Air content = 2%
- Mortar thickness = 5 mm
- (i) Calculate the unit contents of sand, cement, and water,
- (ii) Calculate the unit weight of mortar,
- (iii) Estimate the amount of each ingredient of mortar necessary for the plastering work of both surfaces of the wall. Assume 10% extra volume of material is necessary due to the loss of mortar during application on the wall.
- (iv) What adjustment in sand volume is necessary, if the bulking of sand is 20%?  
[Unit weight of sand (with void) =  $1500 \text{ kg/m}^3$ ]