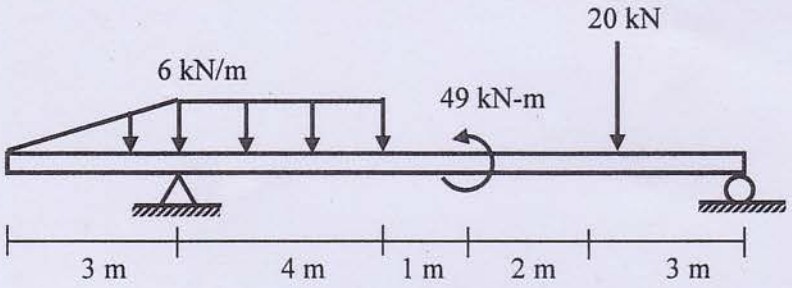
2-1

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2019
Program: B.Sc. in Civil Engineering

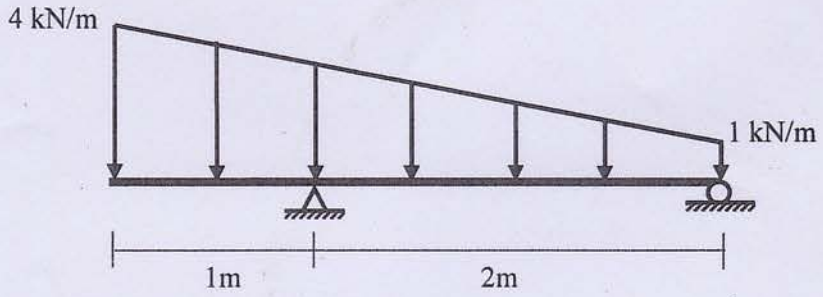
Course Title: Mechanics of Solids I | Course Code: CE 211
Time: 1:00 hour | Full Marks: 3 × 10 = 30

Answer all Questions
The symbols have their usual meanings.
[Assume Reasonable Values for Any Missing Data]

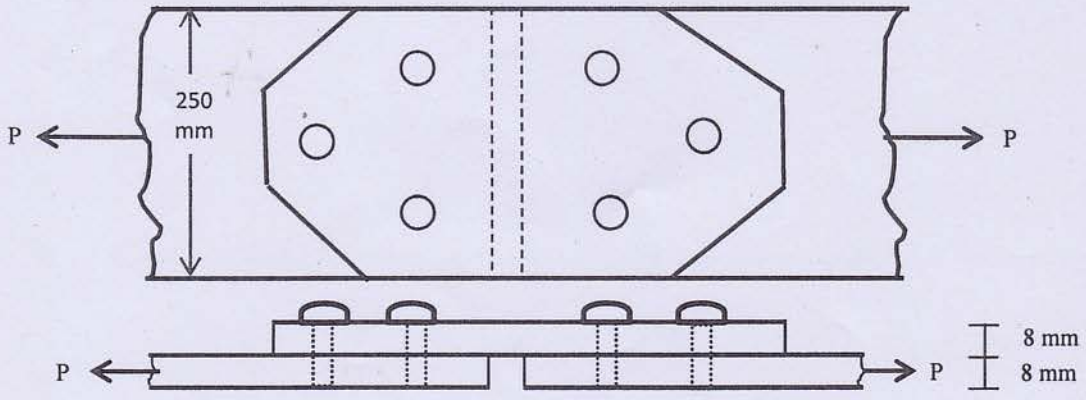
1. Draw shear force and bending moment diagram for the following beam.



2. Derive the complete equations of shear force and bending moment diagram for the following beam.



3. Calculate the safe load P on the lap connection shown below, if rivets are of 19-mm diameter in 22-mm holes and the plates are 8 mm thick. Use allowable shearing stress, τ = 95 MPa, tearing stress, σ_t = 140 MPa and bearing stress, σ_b = 220 MPa.



University of Asia Pacific
Department of Basic Sciences & Humanities
Mid-Semester Examination, Fall-2019
Program: B.Sc. in Civil Engineering

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

There are **Four** questions. Answer **Three** including question **3, 4**. All questions are of equal values, indicated in the right margin.

1. (a) Find the mode from the following table: **10**

Marks	40–50	50–60	60–70	70–80	80–90
No. of students	15	20	35	20	10

(b) Calculate geometric mean and harmonic mean of the data given in 1(a). **10**

OR

2. Calculate the Quartile, 3rd decile and 66th percentile from the data: **20**

Monthly Income	5–9	10–14	15–19	20–24	25–29	30–34
No. of family	15	30	55	17	10	3

3. (a) Find the rank of the following matrix **10**

$$\begin{pmatrix} 1 & 3 & 1 & -2 & -3 \\ 1 & 4 & 3 & -1 & -4 \\ 2 & 3 & -4 & -7 & -3 \\ 3 & 8 & 1 & -7 & -8 \end{pmatrix}$$

(b) Show that $\begin{vmatrix} a+b+c & -c & -b \\ -c & a+b+c & -a \\ -b & -a & a+b+c \end{vmatrix} = 2(b+c)(c+a)(a+b)$ **10**

4. **(a)** Find the value of x, y, z and t where $2\begin{pmatrix} x & z \\ y & t \end{pmatrix}+3\begin{pmatrix} 1 & -1 \\ 0 & 2 \end{pmatrix}=3\begin{pmatrix} 3 & 5 \\ 4 & 6 \end{pmatrix}$. **7**

(b) If $A=\begin{pmatrix} 1 & 2 & -1 \\ 2 & 0 & 3 \\ 0 & 1 & 2 \end{pmatrix}, B=\begin{pmatrix} 3 & -1 & 1 \\ 0 & 0 & 2 \\ 4 & -3 & 2 \end{pmatrix}$, verify that $(A+B)^2 = A^2 + AB + BA + B^2$. **13**

University of Asia Pacific

Department of Civil Engineering

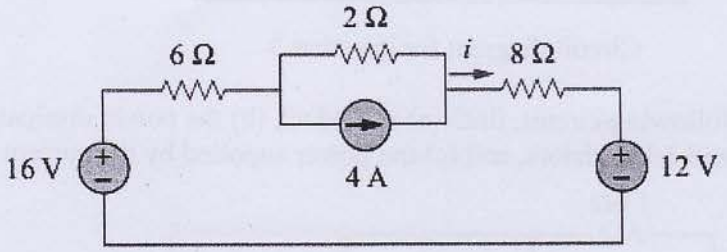
Mid Semester Examination, Fall-2019

Program: B. Sc Engineering (2nd Year / 1st Semester)

Course Title: Basic Electrical Engineering Course No. ECE(CE) 201 Credits: 3.00
Time: 1.00 Hour Full Marks: 60

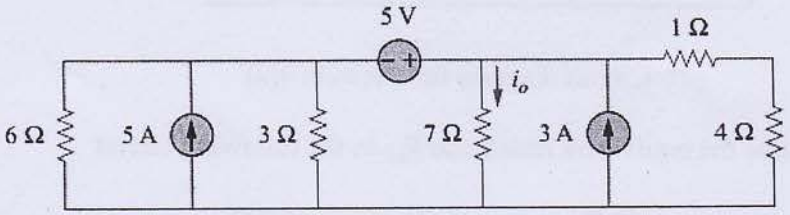
There are **Four** Questions. Answer any **Three** including **Question no. 1 and 2**. Figures in the right margin indicate marks.

1. (a) Find i in the following circuit using the superposition principle. 10



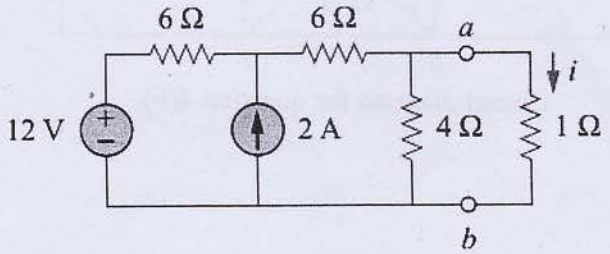
Circuit diagram for question 1(a)

(b) Find i_o in the following circuit using source transformation 10



Circuit diagram for question 1(b)

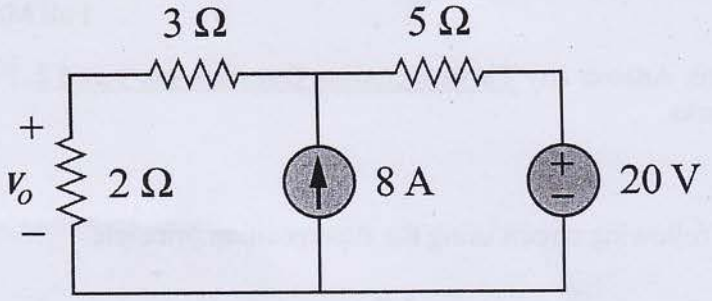
2. (a) Using Thevenin's theorem, find the equivalent circuit to the left of the terminals in the following circuit. Then find i. 10



Circuit diagram for question 2(a)

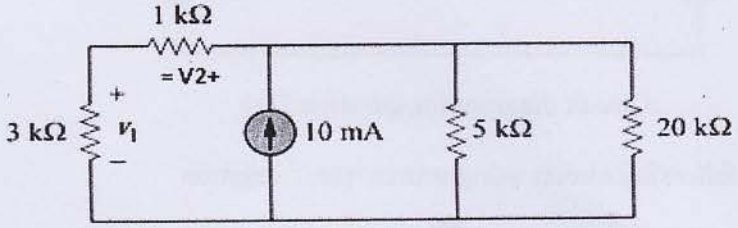
(b) Write short note on: (i) Superposition theorem (ii) KCL (iii) Thevenin's theorem (iv) Ohm's law 2.5*4

3. Find $\mathbf{V_o}$ in the following circuit using (i) nodal analysis (ii) loop analysis. 10 + 10



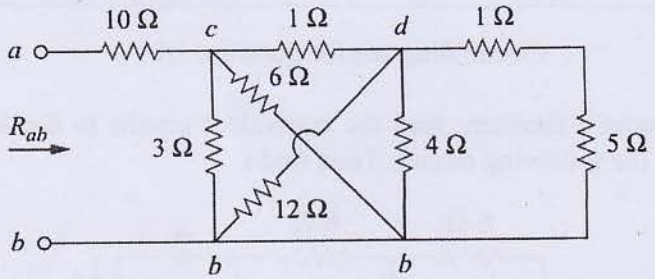
Circuit diagram for question 3

4. (a) For the following circuit, find: (a) $v1$ and $v2$, (b) the power dissipated in the 3-k and 1-k resistors, and (c) the power supplied by the current source. 10



Circuit diagram for question 4(a)

(b) Calculate the equivalent resistance R_{ab} in the following circuit 10



Circuit diagram for question 4(b)

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2019
Program: B.Sc. Engineering (Civil)

Course Title: Engineering Materials Course Code: CE 201 Credit: 4.0
Time: 1 hour Full Marks: 80

Answer all questions

QUESTION 1 [48 MARKS]

a. Plastering of the brick wall is necessary to enhance the aesthetic view and durability of the wall surface. Within this context, two fine aggregate samples (Sand-A and Sand-B) are collected from the local market and sieve analysis tests are performed at the engineering materials laboratory, UAP. The test data of the sieve analysis of the fine aggregate samples are given below:

ASTM Sieve	Sieve opening (mm)	Materials Retained (gm)	
		Sand-A	Sand-B
3 inch	76.2	0	0
1.5 inch	38.1	0	0
3/4 inch	19.05	0	0
3/8 inch	9.5	0	0
# 4	4.75	0	0
# 8	2.36	5	20
# 12	1.7	25	5
# 16	1.19	50	150
# 30	0.59	100	200
# 40	0.425	50	20
# 50	0.3	150	75
# 100	0.15	75	25
# 200	0.075	20	5
Pan	-	25	0

(i) Complete the calculation including % passing of each sieve and find the Fineness Modulus of sand samples (Sand-A and Sand-B). If these two fine aggregate samples (Sand-A and Sand-B) are used in mortar for plastering the brick wall, explain the mechanical and durability performances of both plasters based on their Fineness Modulus. **[20]**

(ii) If the recommended Fineness Modulus is assumed 2.49, then find in what proportions the sand samples are to be mixed to get the recommended Fineness Modulus? **[4]**

b. To ensure the durability of the brick wall surfaces, 14 mm thick mortar is applied to both surfaces (interior and exterior) of the wall. The following data are provided for the mix design:

Fine aggregate to cement ratio (weight basis) = 2.5
Water to cement ratio = 0.5; Air content = 2%
Specific gravity of fine aggregate = 2.2
Specific gravity of cement = 3.15
Size of the wall: Length = 10 m, Width = 0.25 m, Height = 3 m

(i) Estimate the amount of each ingredient (cement, sand and water) of mortar necessary for 14 mm thick plastering work of both surfaces (interior and exterior) of the brick wall. Assume 20% extra volume of material is necessary due to total loss of mortar during application on the wall surfaces. **[20]**

(ii) Calculate the actual volume of sand that is required to complete the plastering of the brick wall surfaces, if the bulking of sand is 19%? [Unit weight of sand (with void) = 1500 kg/m^3]. **[4]**

QUESTION 2 [16 MARKS]

a. With the help of a neat sketch, describe briefly creep and creep recovery of concrete. **[8]**

b. How will you determine the efflorescence of brick, explain the test procedure using a schematic diagram? **[8]**

QUESTION 3 [16 MARKS]

a. Sketch the development of strength of pure compounds of cement: C_2S, C_3S, C_3A and C_4AF. Explain the hydration of Silicate with chemical reaction. Write which is the main strength giving compound and what is the shape and size of that compound. **[8]**

Or

Using chemical reaction and curve, describe why the long term strength of Portland composite cement beyond a couple of months is higher than Ordinary Portland Cement.

b. List the advantages and disadvantages of high fineness cement. **[8]**

University of Asia Pacific
Department of Basic Sciences and Humanities
Mid Semester Examination, Fall 2019
Programme: B.Sc. Engineering (Civil)
(2nd Year 1st Semester)

Course Title: Bangladesh Studies: Society and Culture **Course Code: HSS 211(a)**
Credit: 2
Time: 1 Hour **Full Marks: 40**

Answer TWO questions including QUESTION NO. 3 (2x20)

1. a) Define culture. 4

   b) Show the interrelationship between material and non material culture. 16

   OR

2. a) Define family. 4

   b) Write if there are any differences between urban and rural families in Bangladesh.. 16

3. Write in details:

   a) Cultural lag. 10

   b) Conflict perspective 10

University of Asia Pacific
Department of Basic Sciences and Humanities
Mid Semester Examination, Fall 2019
Program: B.Sc. Engineering (Civil)
2nd year 1st semester

Course Title: Bangladesh Studies: History Course Code: HSS 211(b) Credit: 2.00

Total Time: 1 Hour Full Marks: 40

There are **Three** questions. Answer **Two Questions including Q-1**

1.	a.	Explain Janapadas.	10
	b.	Describe any two Janapadas of ancient Bengal.	10
2.	a.	Explain why Bengal was called Bulgakpur.	10
	b.	Describe the achievements of Illiyas Shahi dynasty.	10
		OR	
3.	a.	Identify the Bara Bhuiyans.	10
	b.	Explain how Murshid Quli Khan revolutionized the revenue system of Bengal.	10