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

Course Title: History of Bangladesh Independence, Society and Culture   Course Code: HSS105
Time: 1 hour   Credit Hour: 3.00   Full Marks: 60

Use separate answer scripts for Part-A and Part-B.

PART-A [30 MARKS]

QUESTION 1 [20 MARKS]

Explain the background of the Partition of Bengal of 1905.   [20]

QUESTION 2 [10MARKS]

a. Explain the Reaction of the Hindus and the Muslims to the Partition of Bengal of   [10]
1905.

OR

b. Discuss about the origin of the name of Bangladesh. CO2   [10]

PART - B [30 MARKS]

QUESTION 3 [20 MARKS]

'Industrialization drew people away from home to factories' -- Explain how the changes   [20]
occurred as the agrarian societies shifted to industrial societies in course of time.

QUESTION 4 [10 MARKS]

a. Distinguish between functionalist and conflict perspectives.   [10]

OR

b. Explain the effects of the sociological imagination on our lives.   [10]

Course Title: Engineering Mechanics I		Course Code: CE 101(OLD)
Time: 1 hour	Credit Hour: 3.00	Full Marks: 40

Answer all the questions

QUESTION 1 [10 MARKS]

A cylinder of weight 400 N has been suspended from a roof with the help of a cable and it remains in equilibrium on a smooth inclined plane as shown in **Figure 1**. Calculate the values of tension in the cable BC and the reaction at the contact point A between the cylinder and the inclined plane. Also find the components of pin reactions at B.
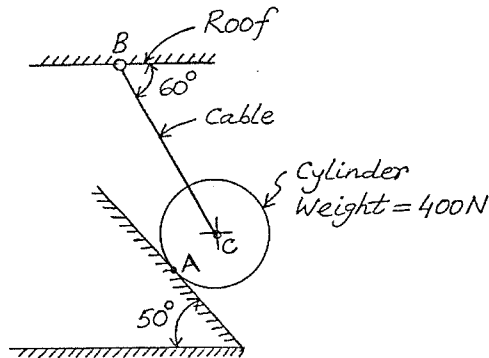

Figure 1

QUESTION 2 [10 MARKS]

A cylindrical roller of weight 12 kN and of diameter 2 m has to be pulled over the obstruction of height 357 mm by applying a horizontal force P as shown in **Figure 2**. Determine the minimum value of the force P to be applied to pull the roller over the obstruction. Also find the reaction at the contact point A between the roller and the obstruction.
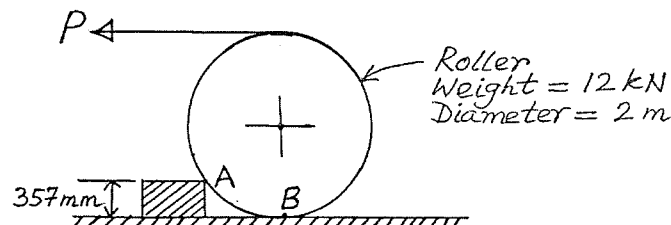

Figure 2

QUESTION 3 [10 MARKS]

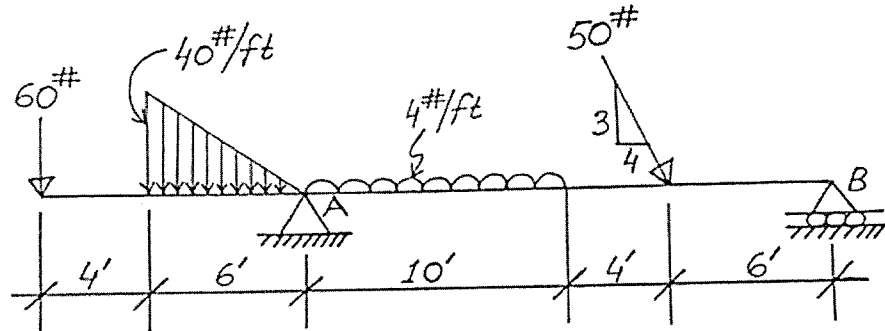For the simply supported beam shown in **Figure 3**, determine the reactions at support A and support B.

Figure 3

QUESTION 4 [10 MARKS]

Calculate the reaction at supports A and D and forces in members BC, BE, GE in the truss shown in Figure 4.
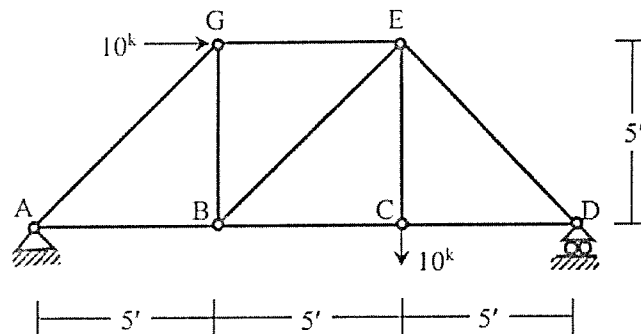

Figure 4

Course Title: Engineering Mechanics   Course Code: CE 101(OBE)

Time: 1 hour   Credit Hour: 3.00   Full Marks: 50

Answer all the questions

PART A

QUESTION 1 [8 MARKS]
A cylinder of weight 400 N has been suspended from a roof with the help of a cable and it remains in equilibrium on a smooth inclined plane as shown in **Figure 1**. Calculate the values of tension in the cable BC and the reaction at the contact point A between the cylinder and the inclined plane. Also find the components of pin reactions at B.

QUESTION 2 [8 MARKS]
A cylindrical roller of weight 12 kN and of diameter 2 m has to be pulled over the obstruction of height 357 mm by applying a horizontal force P as shown in **Figure 2**. Determine the minimum value of the force P to be applied to pull the roller over the obstruction. Also find the reaction at the contact point A between the roller and the obstruction.
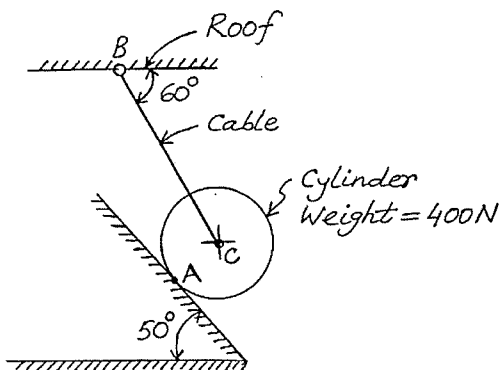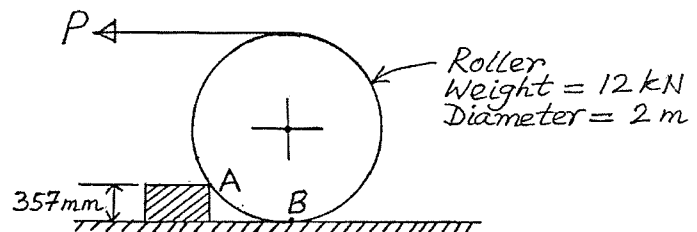

Figure 1

Figure 2

QUESTION 3 [9 MARKS]
For the simply supported beam shown in **Figure 3**, determine the reactions at support A and support B.
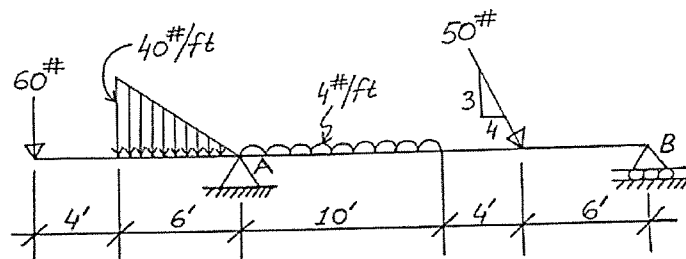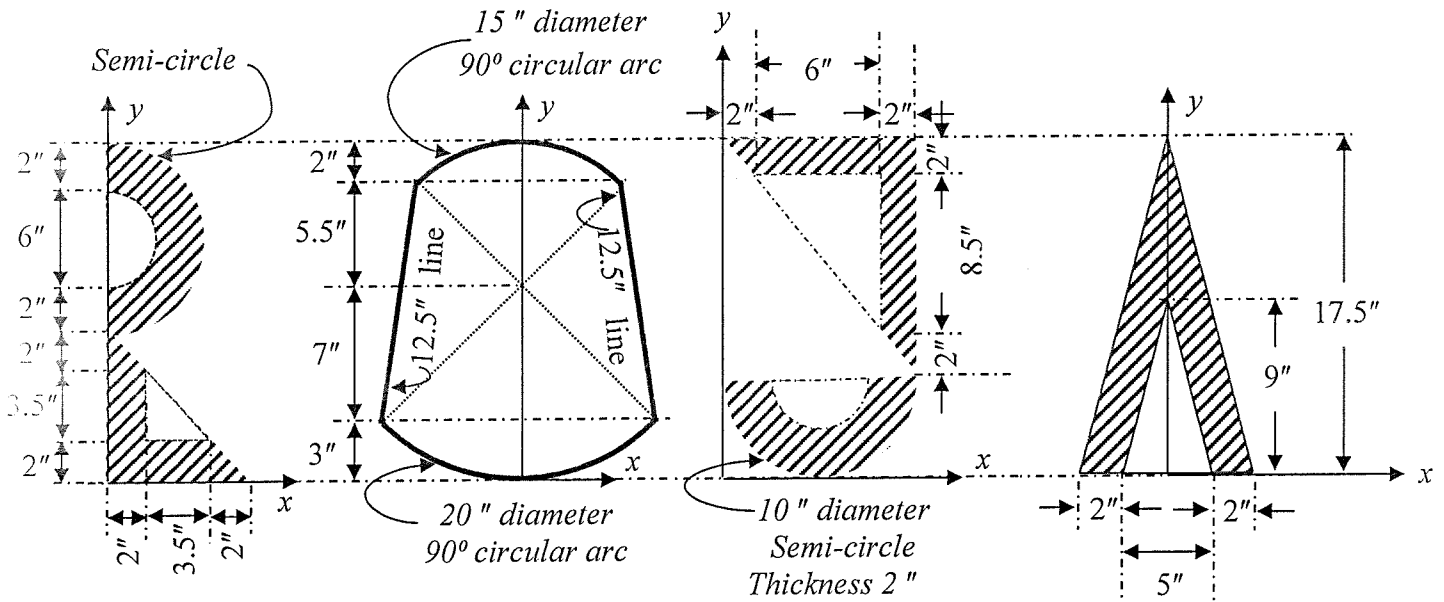

Figure 3

Figure 4 **Figure 5** **Figure 6** **Figure 7**

QUESTION 4 [10 MARKS]

Locate the centroid of the shaded composite area shown in **Figure 4** with respect to the given coordinate system.

OR

Locate the centroid of the shaded composite area shown in **Figure 6** with respect to the given coordinate system.

QUESTION 5 [8 MARKS]

Locate the centroid of the composite line shown in **Figure 5** with respect to the given coordinate system. (Given, $\bar{x} = 0$)

QUESTION 6 [7 MARKS]

Compute the moment of inertia I_y as well as radius of gyration k_y with respect to the given coordinate system of the composite area shown in **Figure 7**.

Course Title: Basic Electrical and Electronic Engineering	Course Code: ECE 101
Time: 1 hour	Credit Hour: 3.00	Full Marks: 60

Answer all the questions

QUESTION 1 [20 MARKS] (answer any one of the two)
a) **What** is the power of the current source of the DC circuit in figure 01?
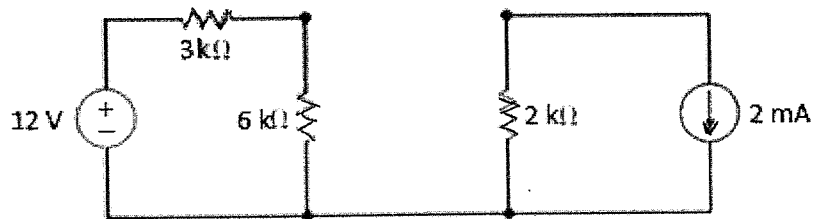b) **What** is the power of the voltage source of the DC circuit in figure 01?

Figure: 01

QUESTION 2 [20 MARKS]
Solve the given DC circuit of figure 02 to calculate the power of the current source.

QUESTION 3 [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.
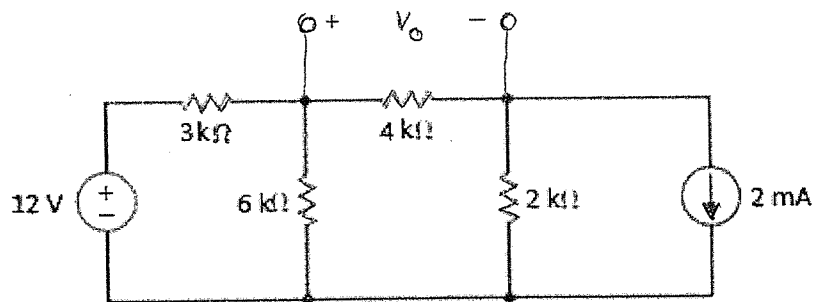

Figure: 02

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

Course Title: Mathematics-I	Course Code: MTH 101
Time: 1 hour	Credit Hour: 3.00	Full Marks: 60

There are four questions. Answer any three including **QUESTION 1** and **QUESTION 2**.

QUESTION 1 [20 MARKS]

a. Define domain of the function Find the domain of the following functions and locate the region in a real line: I. $f(x) = \sqrt{\frac{x-4}{5-x}}$ II. $f(x) = \sqrt{x^2 - 5}$ [10]

b. Write down the relationship between continuity and differentiability of a function, and also verify that $f(x) = |x|$ is continuous but not differentiable at $x = 0$.   [10]

QUESTION 2 [20 MARKS]

a. Calculate the nth derivative of the function $y = \frac{1}{x^2 - 3x + 2}$.   [10]

b. If $y = \log(x + \sqrt{1 + x^2})$ then applying Leibnitz's theorem prove that
$(1 + x^2)y_{n+2} + (2n + 1)xy_{n+1} + n^2 y_n = 0$.   [10]

QUESTION 3 [20 MARKS]

a. Obtain the equation of tangent and normal of $f(x) = 2x^2 + 5x - 7$ at $x = 1$ [10]

b. State Euler's theorem. If $w = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$, show that   [10]

$x\frac{\partial w}{\partial x} + y\frac{\partial w}{\partial y} = \tan w$.

OR

QUESTION 4 [20 MARKS]

a. Find the maximum and minimum value of the function
$f(x) = x^4 - 8x^3 + 22x^2 - 24x + 5$.   [10]

b. If $u = \ln(x^2 + y^2)$, prove that $u_{xx} + u_{yy} = 0$.   [10]

Course Title: Physics I		Course Code: PHY 101
Time: 1 hour	Credit Hour: 3.00	Full Marks: 60

There are four questions. Answer **any three** including **QUESTION 1** and **QUESTION 2**.

QUESTION 1 [20 MARKS]

a. Show that total energy of a particle executing simple harmonic motion is given by $2\pi^2 ma^2 n^2$, where the symbols have their usual meanings. [10]

b. For a particle vibrating simple harmonically the displacement is 4 cm at the instant the velocity is 3 cm/sec and the displacement is 3 cm at the instant the velocity is 4 cm/sec. Calculate (i) amplitude (ii) frequency and (iii) time period. [10]

QUESTION 2 [20 MARKS]

a. Prove that work done per unit volume, $W = \frac{1}{2} \times$ stress $\times$ strain for volume strain energy, where the symbols have their usual meanings. [10]

b. Calculate the total work done in stretching a uniform metal wire of area of cross section 2×10^{-5} m² and length 2.5 m through 3×10^{-3} m. Given that $Y = 2 \times 10^{11}$ Nm⁻². [10]

QUESTION 3 [20 MARKS]

a. Define elastic fatigue and load. [05]

b. Show that $K = \frac{Y}{3(1-2\sigma)}$, where the symbols have their usual meanings. [15]

OR

QUESTION 4 [20 MARKS]

a. Define elasticity and Poisson's ratio. [05]

b. Explain briefly stress- strain diagram of a metallic wire. [15]

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination, Fall 2024
Program: B.Sc. in Civil Engineering
3rd year 1st Semester

Course Title: Introduction to Civil & Environmental Engg. **Credit Hour:** 2 **Course Code:** CE 107
Time: 1 hour   **Full Marks:** 40

Answer all the questions

QUESTION 1 [10 MARKS]
What is 3R principle in environmental engineering. Discuss the impact of 3R principle in reducing pollution. [10]

QUESTION 2 [10 MARKS]
Define the following: Biotic environment, abiotic environment, micro environment, macro environment and built environment [10]

QUESTION 3 [10 MARKS]
Discuss ecosystem hierarchy. [10]

QUESTION 4 [10 MARKS]
Discuss different types of pollution [10]