

University of Asia Pacific
Department of Civil Engineering
Midterm Examination, Fall 2023
Program: B.Sc. Engineering (Civil)

Course Title: Oral and Written Skills
Time: 1 hour

Credit Hour: 3

Course Code: HSS 101
Full Marks: 20

1. Rewrite the sentences filling out the blanks with prepositions: 10×1 = 10

- a) The meeting is _____ half past two _____ the afternoon _____ next Monday.
- b) The players should stand _____ a line.
- c) He was sitting _____ the corner inside the baker's shop, waiting to be served.
- d) Meet me _____ the entrance to the supermarket _____ High Street.
- e) We normally start lunch _____ about two _____ the afternoon _____ weekends.

2. Complete the sentences with the right forms of subject-verb agreement. Write full sentences underlining the changes:

10×1=10

- a) Neither my cousins nor my sister (have/has) any clue about what is going on.
- b) The committee members (has/have) expressed different opinions about the issue.
- c) One of the visitors (were/was) reported lost in the area.
- d) Every one of those books (are/is) novel.
- e) Discovered in the soil of our city garden (was/were) a button dating from the Civil War.
- f) My university, one of the top private universities in Bangladesh, (are/is) at the cutting edge of research.
- g) The main source of income for Bangladesh (is/are) garments and agriculture.
- h) (Is/Are) the news on at five or six?
- i) (Is/Are) the tweezers on the table?
- j) The guard or the children (is/are) outside.

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

Course Title: Physics I
Time: 1 hour

Credit Hour: 3.0

Course Code: PHY 101
Full Marks: 60

There are **four** questions. Answer any **three** including **Q-1** and **Q-2**. Figures in the right margin indicate marks.

1. a. Show that total energy of a particle executing simple harmonic motion is given by $2\pi^2 m a^2 n^2$, where the symbols have their usual meanings. [12]

- b. A particle executes simple harmonic motion given by the equation [08]

$$y = 12 \sin\left(\frac{2\pi}{10}t + \frac{\pi}{4}\right)$$

Calculate (i) amplitude, (ii) frequency, (iii) epoch and (iv) displacement at $t = 1.25$ s.

2. a. Derive the relation [12]

$$\frac{d^2y}{dt^2} = v^2 \frac{d^2y}{dx^2}$$

where the symbols have their usual meanings.

- b. The velocity of sound in air at 14°C is 340 meter/second. What will be the velocity when the pressure of the air is doubled and its temperature is raised to 157.5°C ? [08]

3. a. Describe total internal reflection. Write down the conditions for total internal reflection. [5+3]

- b. Explain briefly Huygens' principle. [12]

OR

4. Show that the equation for the intensity at a point on the screen due to interference of light can be written as [20]

$$I = 4a^2 \cos^2 \frac{\phi}{2}$$

where a and ϕ are the wave amplitude and the phase difference respectively between the two waves reaching the point considered. Using this equation find out the conditions under which maximum and minimum intensity can be observed.

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

Course Title: History of Bangladesh Independence, Society and Culture
Time: 01 hour

Credit Hours: 03

Course Code: HSS 105
Full Marks: 60

Use separate answer scripts for Part-A and Part-B. All questions are of equal value. Figures in the right margin indicate marks.

Part - A

Answer **ANY ONE**.

1. a. Discuss the role of Lahore Resolution in the partition of India in 1947. 15
b. Analyze the foundation of Awami League in 1949. 15
2. a. Evaluate the success of the United Front in 1954 election. 15
b. Discuss the main features of the constitution of Pakistan in 1956. 15

Part - B

Answer **ANY ONE**.

1. a. Explain sociological imagination with examples. 15
b. Discuss functionalist theoretical perspective of sociology. 15
2. a. Define culture and explain different features of culture. 10
b. Discuss Gerhard Lenski's theory of socio-cultural evolution. 20

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

Course Title: Mathematics I

Course Code: MTH 101

Time: 1.00 Hour

Credit Hour: 3.00

Full Marks: 60

There are four (4) questions. Answer **three (3)** questions including **Q1** and **Q2**.

- 1.(a) Find the domain and range of (i) $f(x) = 1 + \sqrt{x-3}$ and (ii) $g(x) = \frac{x+2}{x+1}$. [8]
Also sketch the graph of $f(x)$ and $g(x)$.

- (b) Evaluate $\lim_{x \rightarrow 0} (\cos x)^{\cot^2 x}$. Let $f(x) = \begin{cases} x^2 - 5, & -2 < x \leq 3 \\ \sqrt{x+13}, & x > 3 \end{cases}$. Find $\lim_{x \rightarrow 3} f(x)$. [12]

- 2.(a) Let $f(x) = \begin{cases} 2-x & \text{for } 1 \leq x \leq 2 \\ x - \frac{1}{2}x^2 & \text{for } x > 2 \end{cases}$ Test the differentiability of $f(x)$ at $x = 2$. [8]

- (b) If $y = (ax+b)^m$ find y_n . Expand $\cos x$ in powers of $\left(x - \frac{\pi}{4}\right)$ in an infinite series. [12]

- 3.(a) If $y = e^{a \sin^{-1} x}$ then show that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+a^2)y_n = 0$. [10]

- (b) An open box is to be made from a 16-inch by 30-inch piece of cardboard by cutting out squares of equal size from the four corners and bending up the sides. What size should the squares be to obtain a box with the largest volume? [10]

OR

- 4.(a) If $u = \sin^{-1} \left(\frac{x^2 + y^2}{x+y} \right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$. [10]

- (b) Show that the function $f(x) = x^3 + x - 4$ satisfies the hypotheses of the Mean-Value theorem over the interval $[-1, 2]$, and find all values of c in the interval $(-1, 2)$. [10]

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

Course Title: Engineering Mechanics

Time: 1-hour

Credit Hours: 3.0

Course Code: CE 101(OBE)

Full Marks: 50

ANSWER ALL THE QUESTIONS

1. In Fig.1, the bodies A and B weighing 200N and 300N, respectively are connected by a cable. The bodies pass over a smooth frictionless pulley and rest on smooth inclined planes. Find the values of tension in the cable, the angle θ and the reactions at the inclined planes, if the bodies A and B are in equilibrium. (8)

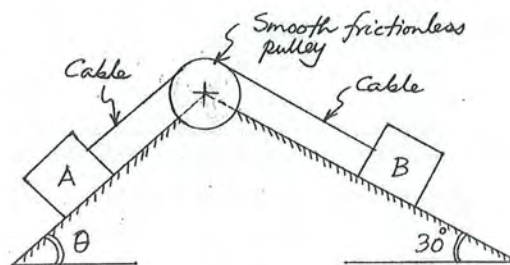


Fig.1

2. For the simply-supported overhanging beam shown in Fig.2, determine the reactions at the supports A and B. (7)

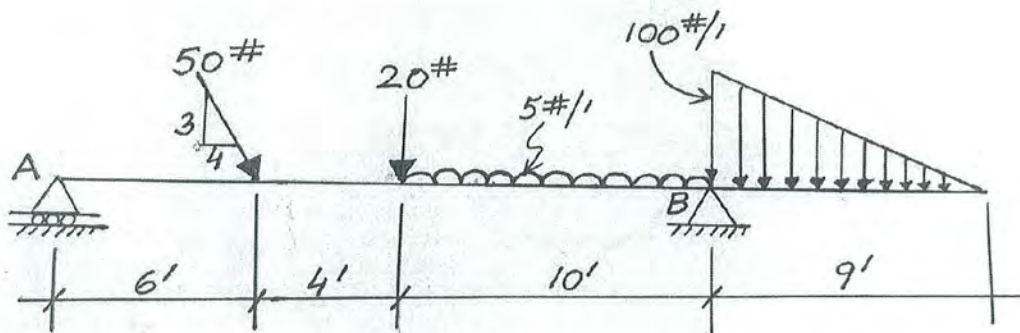


Fig.2

3. In Fig.3, the members AC and BC have been assumed to be weightless. Find the values of force in the members AC and BC and the components of pin reactions at A and B. (10)

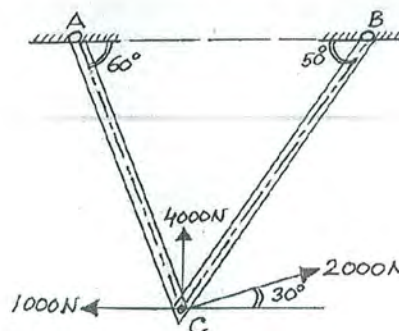


Fig.3

4. Locate the centroid of the composite line shown in Fig.4 with respect to the given coordinate system. (10)

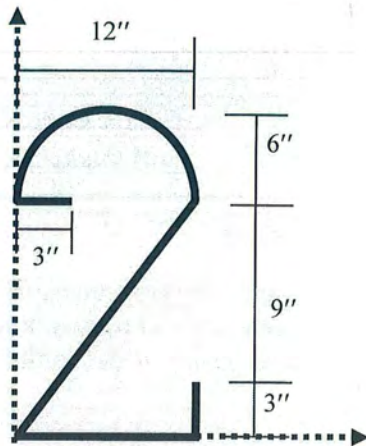


Fig.4

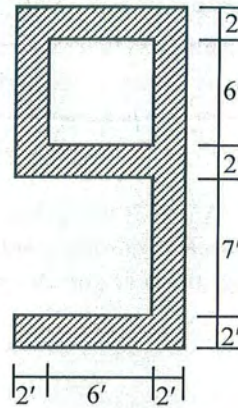


Fig.5

5. Compute the product of inertia P_{xy} , the minimum moment of inertia I_{min} , and the maximum moment of inertia I_{max} about the centroidal axes of the shaded area shown in Fig.5. (15)

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

Course Title: Engineering Mechanics I

Time: 1-hour

Credit Hours: 3.0

Course Code: CE 101

Full Marks: 50

ANSWER ALL THE QUESTIONS

1. In Fig.1, the bodies A and B weighing 200N and 300N, respectively are connected by a cable. The bodies pass over a smooth frictionless pulley and rest on smooth inclined planes. Find the values of tension in the cable, the angle θ and the reactions at the inclined planes, if the bodies A and B are in equilibrium. (10)

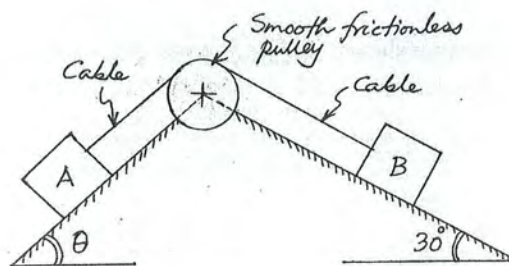


Fig.1

2. For the simply-supported overhanging beam shown in Fig.2, determine the reactions at the supports A and B. (10)

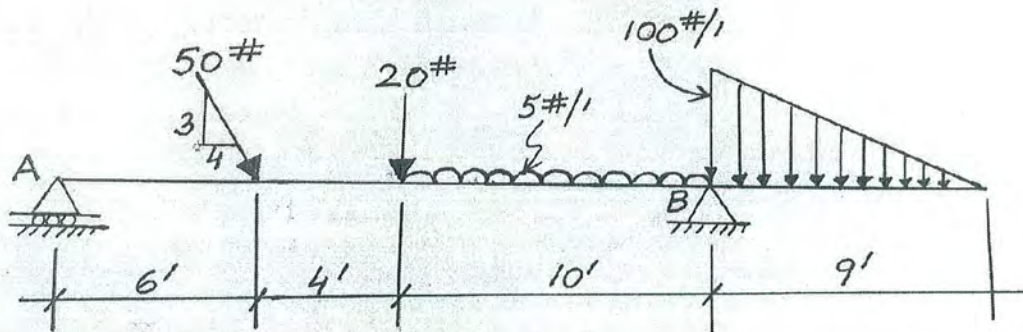


Fig.2

3. In Fig.3, the members AC and BC have been assumed to be weightless. Find the values of force in the members AC and BC and the components of pin reactions at A and B. (15)

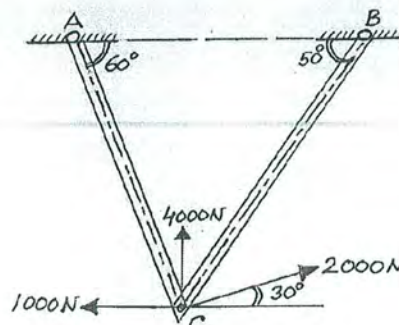


Fig.3

4. The sphere of weight 50N resting on two smooth inclined planes remains in equilibrium as shown in **Fig.4**. Calculate the magnitudes of reactions to the smooth planes at contact points A and B. (8)

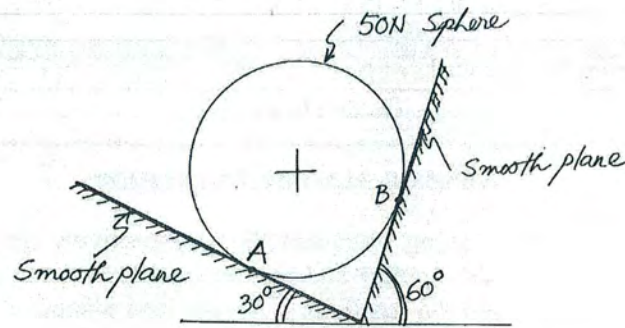


Fig.4

5. Using the system of four pulleys shown in **Fig.5**, a weight W has to be lifted by applying a pulling force of P at one end. Determine the value of P if $W = 8000\text{N}$ (7)

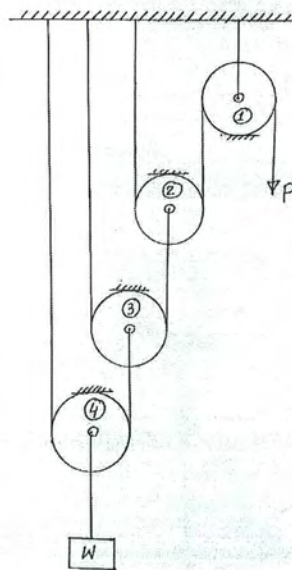


Fig.5

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

Course Title: Basic Electrical and Electronic Engineering

Course Code: ECE 101

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 .

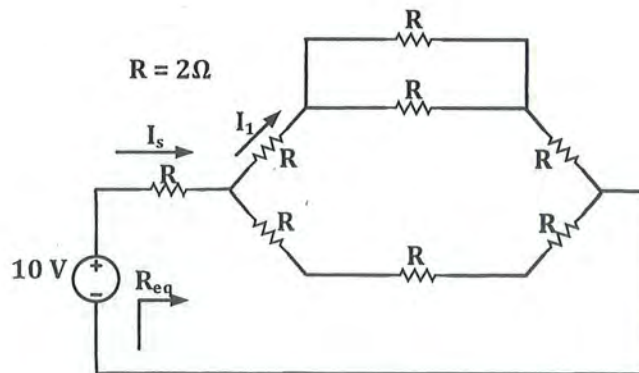


Figure 1

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

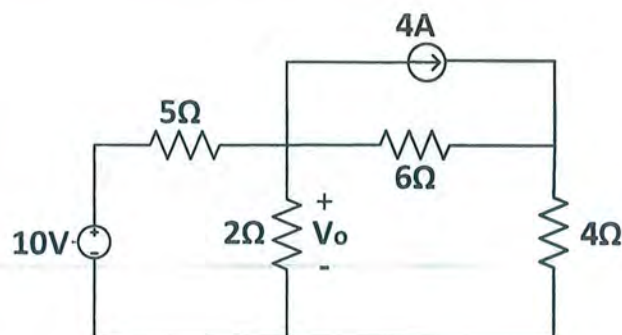


Figure 2

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

[20]

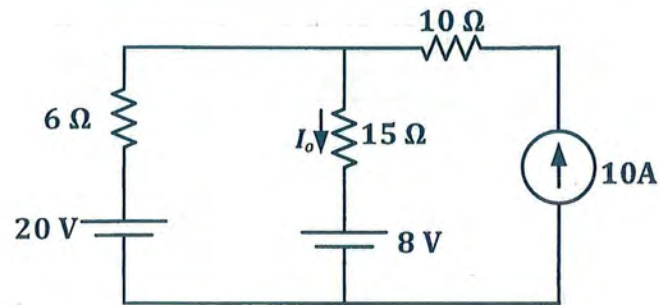


Figure 3

OR

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

[20]

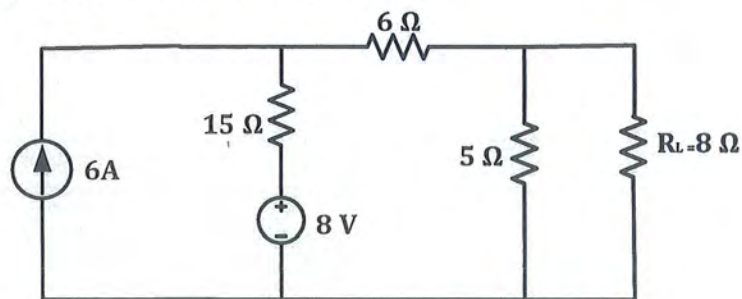


Figure 4

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Course Title: Engineering Mechanics

Time: 1-hour

Credit Hours: 3.0

Course Code: CE 101(OBE)

Full Marks: 50

ANSWER ALL THE QUESTIONS

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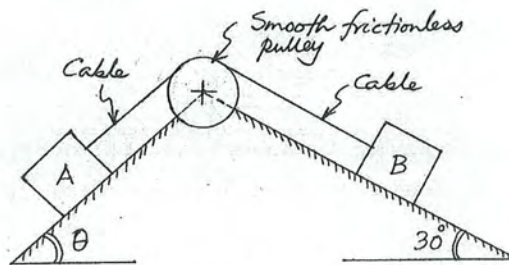


Fig.1

2. For the simply-supported overhanging beam shown in Fig.2, determine the reactions at the supports A and B. (7)

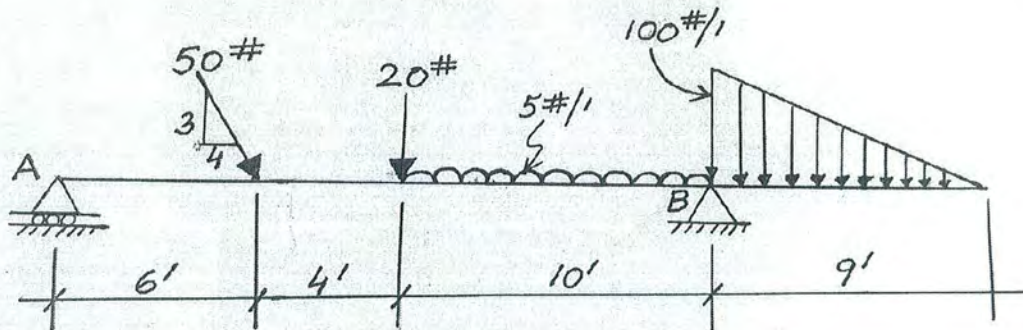


Fig.2

3. In Fig.3, the members AC and BC have been assumed to be weightless. Find the values of force in the members AC and BC and the components of pin reactions at A and B. (10)

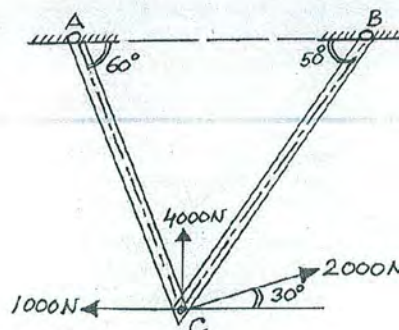


Fig.3

4. Locate the centroid of the composite line shown in Fig.4 with respect to the given coordinate system. (10)

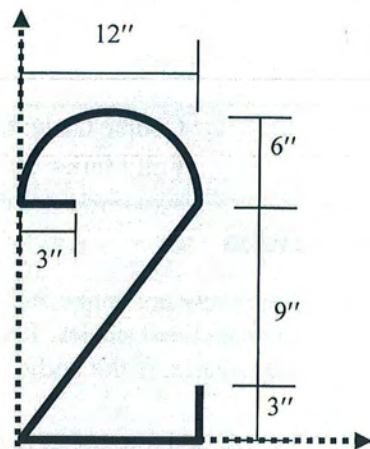


Fig.4

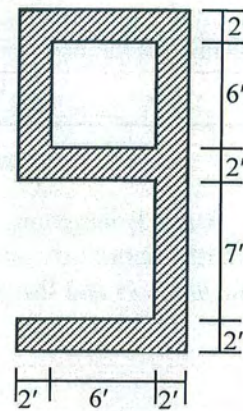


Fig.5

5. Compute the product of inertia P_{xy} , the minimum moment of inertia I_{min} , and the maximum moment of inertia I_{max} about the centroidal axes of the shaded area shown in Fig.5. (15)