

1-1

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Midterm Examination, Fall 2021**  
**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. Use correct prepositions to complete the sentences by underlining the answers:**

10×0.5 = 5

- a) The passengers had to stand \_\_\_\_\_ a queue.
- b) I was standing \_\_\_\_\_ the counter in the baker's shop, waiting to be served.
- c) Meet me \_\_\_\_\_ the entrance to the supermarket \_\_\_\_\_ High Street.
- d) The meeting is \_\_\_\_\_ half past two in the afternoon \_\_\_\_\_ next Monday.
- e) We normally start lunch at about two \_\_\_\_\_ the afternoon \_\_\_\_\_ weekends.
- f) The son and the daughter are sitting in the office smiling \_\_\_\_\_ each other.
- g) The explosion on the street caused the car to catch \_\_\_\_\_ fire.

**2. Complete the sentences to make the subject agree with the verb:**

10×0.5=5

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

**3. Rewrite the following paragraph by correcting the errors:**

10×1=10

A greenhouse is a glass building isused to grow plants. A greenhouse has transparent glass that allows the sunlight to pass through, but does not allow the heat inside to be escaped. The same affectoccurson the earth. The sun's radiation passes through the atmosphere for heat the earth's surface. When heat, the earth's surface produces infrared radiation, which has a longer wavelength than that on sunlight. This infrared radiation rises into the atmosphere where gases, such as carbon dioxide, prevent the infrared radiation from escaping upto space. The concentrations of these gases which are called greenhouse gases, control how much infrared radiation escape. The retained radiation heats the earth's atmosphere, thus keep the planet warm.

**University of Asia Pacific**  
**Department of Basic Sciences and Humanities**  
**Mid-Term Examination Fall - 2021**  
**Program: B. Sc Engineering (Civil)**

Course Title: Physics  
Time: 1.00 Hour

Course Code: PHY-101

Credit: 3.00  
Full Mark: 60

*N.B.*- There are **four (04)** questions. Answer **three (03)** including Q. no. 1 and 4.

1. (a) Derive the differential equation of a progressive wave. [12]
- (b) A simple harmonic motion is represented by  $y = 20 \sin\left(10t - \frac{\pi}{6}\right)$ , where  $y$  is measured in metre,  $t$  in sec and phase angle in radians. Calculate displacement, velocity and acceleration at time,  $t = 0$  and  $t = 1$  sec. [08]
2. (a) Discuss Doppler's effect in sound and obtain an expression for the apparent frequency of the note when the observer moves towards and away from a stationary source. [12]
- (b) At each of two stations A and B, a siren is sounding with a constant frequency of 250 Hz. A cyclist from A proceeds straight towards B with a velocity of 12 km/hr and hears 5 beats/s. Calculate the velocity of sound. [08]

or

3. (a) Derive the Newton's equation for the velocity of sound waves in air. [12]
- (b) Calculate the increase in the velocity of sound in air per degree Celsius rise in temperature. [08]
4. (a) What is half wave plate? Deduce its thickness for a given wavelength in terms of its refractive indices. [12]
- (b) Calculate the thickness of a half wave plate for light of wavelength 5000 Å. [ $\mu_0 = 1.55$  and  $\mu_E = 1.45$ ] [08]

**University of Asia Pacific**  
**Department of Basic Sciences & Humanities**  
**Mid-Semester Examination, Fall 2021**  
**Program: B.Sc. in Civil Engineering**

Course Title: Mathematics I  
Credit: 3.00

Time: 1.00 Hour

Course Code: MTH 101  
Full Marks: 60

There are **Four (4)** Questions. Answer any **Three (3)**. All questions are of equal value. Part marks are shown in the margins.

1. (a) Find the Domain and Range of the functions: 8

$$(i) f(x) = \frac{-1}{\sqrt{-(5-17x)}} \quad (ii) f(x) = \frac{x-12}{x^2-144}$$

- (b) Investigate the continuity of the function at  $x = 0, 1, -2$  12

$$\text{where, } f(x) = \begin{cases} -x^2 & \text{when } x \leq 0 \\ 5x - 4 & \text{when } 0 < x \leq 1 \\ 4x^2 - 3x & \text{when } 1 < x < -2 \\ 3x + 4 & \text{when } x \geq -2 \end{cases}$$

2. (a) Find the limit: 10

$$(i) \lim_{x \rightarrow 0} \frac{\sqrt{4+x} - 2}{4x} \quad (ii) \lim_{x \rightarrow 1} \frac{x^4 - 1}{x + 1}$$

- (b) Find the maximum and minimum values of  $f(x) = -2x^3 - 3x^2 + 12x + 10$ . 10

3. (a) Find the derivative with respect to  $x$ : 12

$$(i) \frac{2\sqrt{3x^2} - \frac{1}{4}x^{-4}}{x^2 + 3x}$$

$$(ii) \left[ \ln \left\{ \sqrt{2x+3} \ln 2x - \frac{1}{6} \sin 3x \right\} \right]$$

- (b) If  $v = 4\sqrt{2t} + 7t - t^2$ , find the value of  $\frac{dv}{dt}$  when,  $t = 9$  8

4. Find the derivatives  $\frac{dy}{dx}$  of the followings: 20

$$(i) y = 3x^3 \ln 2x + 4e^{-x} \cos 5x + 6x$$

$$(ii) y = \frac{x^3 + 64}{x + 4}$$

$$(iii) y = e^{\tan^2 x} \cos(a^x) + 2 \sin 2x$$

$$(iv) y = x^2 (\sin^{-1} x)^3$$

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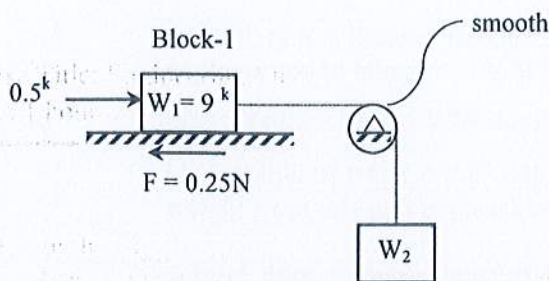
Course Title: Engineering Mechanics I  
 Time: 1 hour

Credit Hours: 3.0

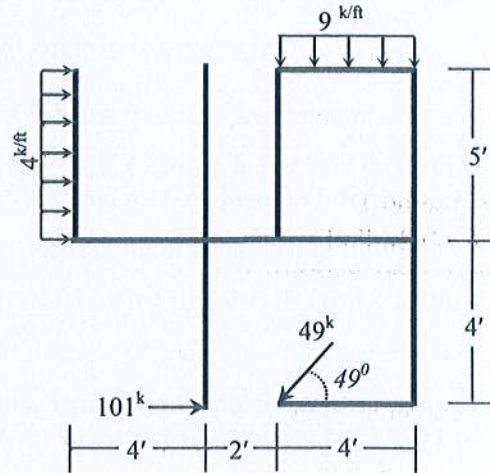
Course Code: CE 101  
 Full Marks: 40 (= 4 × 10)

ANSWER ALL THE QUESTIONS

1. In the **Fig. 1**, frictional force  $F = 0.25 \times N$  on Block-1. Determine the value of  $W_2$  that will cause the block (weighing  $W_1 = 9$  kips) to be at the point of moving rightward. [10]

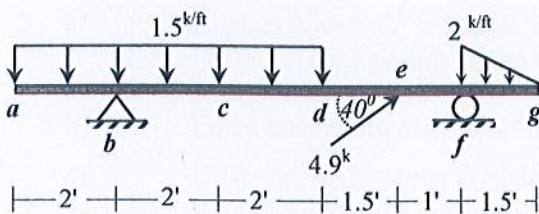


**Fig. 1**

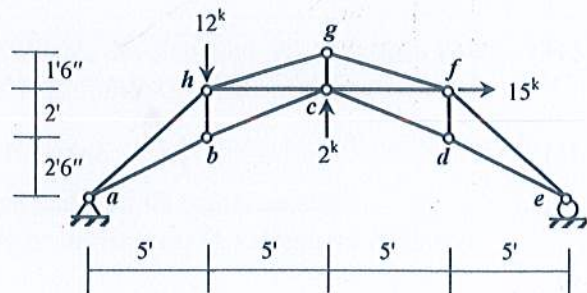


**Fig. 2**

2. **Fig. 2** shows a system of forces acting on a structure (shown by bold lines). Calculate the magnitude, direction and location of resultant of the forces. [4+4+2]
3. For the beam **abcdef** loaded as shown in **Fig. 3**, calculate the reactions at supports **b** and **e**. Also calculate shear force and bending moment at **c**. [6+4]



**Fig. 3**



**Fig. 4**

4. In the truss loaded as shown in **Fig. 4**, calculate the (i) reactions at supports **a** and **e**, (ii) forces in member **bc**, **ch** and **gh**. [4+6]

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Midterm Examination Fall 2021**  
**Program: B.Sc. Engineering (Civil)**

Course Title: Introduction to Civil and Environmental Engineering  
Time: 1 hour

Credit Hour: 2

Course Code: CE 107  
Full Marks: 40

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**Part A**

**Answer all the questions.**

- 1 a) What should be the major foci of any civil engineering project? [3]
- b) Mention six major roles of civil engineers in infrastructure development. [3]
- c) According to a broader interdisciplinary approach, mention the people that a civil engineer has to interact with. Why should the government develop infrastructure? [3+2]
- d) What is plinth beam? Why does engineer provide plinth beam in a building? [1+2]
- 2 a) Unit weight of water is  $9.81 \text{ kN/m}^3$ . Convert (showing unit details) water's unit weight from this unit expression into  $\text{gm/ft}^3$ . [3]
- b) A brick does not have standard dimensions. The longest dimension is missing. Other two dimensions are 7.5 cm and 4.8 in. The unit weight of the brick is  $122 \text{ lb/ft}^3$ .  
Calculate the missing dimension of the brick, in mm, if its weight is 5 kg. Show all the calculations in details. [3]

**Part B**

**Answer all the questions.**

- 3 a) Explain how "3R" principle supports sustainable development. Also, explain how the green engineering process can control pollution according to the fundamental of environmental pollution. [3+3]
- b) Enlist ecosystem hierarchy from smaller to larger. [4]
- 4 a) Differentiate between i) Biotic Component and Abiotic component of Environment; ii) Anthropocentrism and Ecocentrism; iii) Development ethic and Conservation Ethic [6]
- b) Show temperature changes in different layers of Atmosphere in a neat sketch [4]

1-2

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Midterm Examination Fall 2021**  
**Program: B.Sc. Engineering (Civil)**

Course Title: English Language II  
Time: 1 hour

Credit Hour: 3.00

Course Code: HSS 103  
Full Marks: 20

**Instructions:**

- \*Marks are indicated in the right margin.
- \*Answer all the questions

**1. Change the voice of the following passage:**

**0.5 X 6 = 3**

Arman made an error in his calculations in an experiment. (ii) His absentmindedness during his experiment has surprised him a lot. (iii) He had always dreamed of doing the best in any experiment. (iv) Now he has to write a report to his boss. (v) Otherwise, his boss will misunderstand him. (vi) In fact, his boss always keeps faith in him.

**2. Write the correct form of the verb in parentheses:**

**1 X 5 = 5**

- A) Both candidates oppose increased defense spending. Neither of the two candidates (oppose) the war in Iraq.
- B) Not one of these cell phones belongs to me. One of the phones (belong) to Afreen.
- C) One of my hobbies is collecting shopping bags. My hobbies (be) unusual.
- D) Professor Jahan often goes for long walks in the rain. The lights in his house (go) on at midnight.
- E) The players take turns rolling a ball down the court. Each of the players (take) one ball and aims for the goalpost.

**3. Answer the following questions:**

**6 X 1 = 6**

Suppose you are the Project Manager of Home Builders Ltd., Road#52, House#12/B, Gulshan-1, Dhaka-1212. You need to buy some office decoration materials that include curtains (100), mattresses (20), cushions (50) and sofa covers (40) for furnishing an office building at Bashundhara. Write a memo to the Managing Director of your company asking for a budget.

**4. Attempt one of the following:**

**6 X 1 = 6**

- A) It was the 21st of February recently and University of Asia Pacific observed Ekushey February with several programs and events from different departments. You are Connor Delworth, a reporter from the Daily Sun writing an event report on it.
- B) Write a report for your departmental bi-yearly magazine "*The Horizon*" about the existing facilities for the students and some expectations they may have from your department and university.