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

Course Title: English Language II | Course Code: HSS 103
Time: 1hour | Credit Hour: 3.00 | 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. Your 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 <u>one</u> 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.

University of Asia Pacific

Department of Basic Science and Humanities

Mid-Semester Examination Fall-2021

Program: B.Sc. in CE

Course Title: Chemistry Course No.: CHEM 111 Credit: 3.00

Time: 1.00 Hour Full Mark: 60

There are **Four** Questions. Answer any three questions.

1	a.	Explain Arrhenius equation. Discuss Arrhenius concept of activation energy. Give graphical representation of activation energy diagram.	10
	b.	Deduce the rate expression for second order reaction where both the concentration terms are same. What is half-life period of the second order reaction?	10
2	a.	Describe the graphical method for the determination of order of reaction.	12
	b.	A first order reaction is one-fifth completed in 40 minutes. Calculate the time required for its 100% completion.	08
3	a.	Write short notes on : (i) Tyndall effect and Brownian movement (ii) Electrophoresis and its applications	5+5 =10
	b.	Describe different methods for purifying colloidal solutions.	10
4	a.	State Hess' Law of constant heat summation and explain some of its important applications.	12
	b.	Calculate the standard heat of formation of propane (C_3H_8) if its heat of combustion is -2220.2 kJ mol^{-1}. The heats of formation of $CO_2(g)$ and $H_2O(l)$ are -393.5 and -285.8 kJ mol^{-1} respectively.	08

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

Course Title: Mathematics II | Credit Hour: 3 | Course Code: MTH 103
Time: 1 hour | Full Marks: 60

There are **Four** Questions. Answer any **Three**. All questions are equal value. Part marks are shown in the Margin.

1 **(a)** Define the followings: **5**
Vector, Unit Vector, Null Vector, Parallel Vector, Equal Vector, Opposite Vector.

(b) Find the volume of the parallelepiped, whose edges are represented by **5**
$\vec{a}=2i-3j+4k, \vec{b}=i+2j-k$ and $\vec{c}=3i-j+2k$.

(c) Show that, $\vec{a}\cdot(\vec{b}\times\vec{c})$ is in absolute value equal to the volume of the parallelepiped with sides $\vec{a},\vec{b}\ \&\ \vec{c}$ **10**

2 **(a)** If $T=x^2y+y^2z+z^2x$ find the directional derivative at (2,-2,2) in the direction of $3\hat{i}+2\hat{j}-4\hat{k}$ **10**

(b) Show that $\vec{A}=(6xy+z^3)\hat{i}+(3x^2-z)\hat{j}+(3xz^2-y)\hat{k}$ is irrational. Find ϕ such that $\vec{A}=\vec{\nabla}\phi$. **10**

3 **(a)** If $\vec{F}=4xz\,\hat{i}-y^2\,\hat{j}+yz\,\hat{k}$ Evaluate $\iint_s \vec{F}.\hat{n}\,ds$ where S is the surface of the cube bounded by x = 0,x=1, y=0, y=1, z=0, z=1. **10**

(b) Let $F=2xzi-xj+y^2k$. Evaluate $\iiint_v FdV$ where V is the region bounded by the surface $x=0, y=0, y=6, z=x^2, z=4$ **10**

4 **(a)** Evaluate $\iint_s \vec{A}.\vec{n}ds$ where $\vec{A}=18zi-12j+3yk$ and S is that part of the plane $2x+3y+6z=12$ which is located in the first octant. **10**

(b) If $A=(3x^2+6y)i-14yzj+20xz^2k$, evaluate $\int_C A.dr$ from $(0,0,0)$ to $(1,1,1)$ along the following path C the straight lines from $(0,0,0)$ to $(1,0,0)$, then to $(1,1,0)$, and then to $(1,1,1)$. **10**

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

Course Title: Engineering Mechanics II | Credit Hours: 3.0 | Course Code: CE 103
Time: 1 hour | Full Marks: 30

ANSWER ALL THE QUESTIONS

1. A force P_1 = 25 N is required just to prevent downward motion of object A along a slope of 20° shown in ***Fig. 1(a)***. If the object rests on a steeper slope of 30° as shown in ***Fig 1(b)***, it requires minimum of P_2 = 500 N for impending motion upward. Forces P_1 and P_2 are acting parallel to their respective inclined surfaces.
Calculate the weight of A and co-efficient of static friction. **[10]**

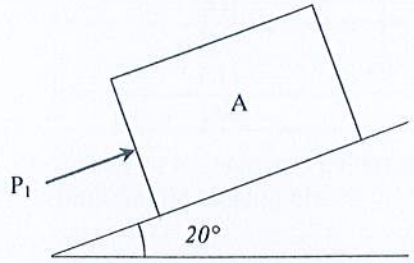

Fig. 1(a)

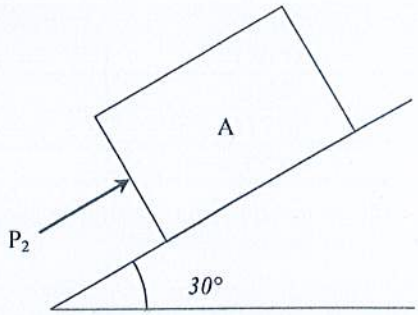

Fig. 1(b)

2. Calculate moment of inertia of the following scarecrow with respect to Y axis shown in ***Fig. 2***. **[12]**

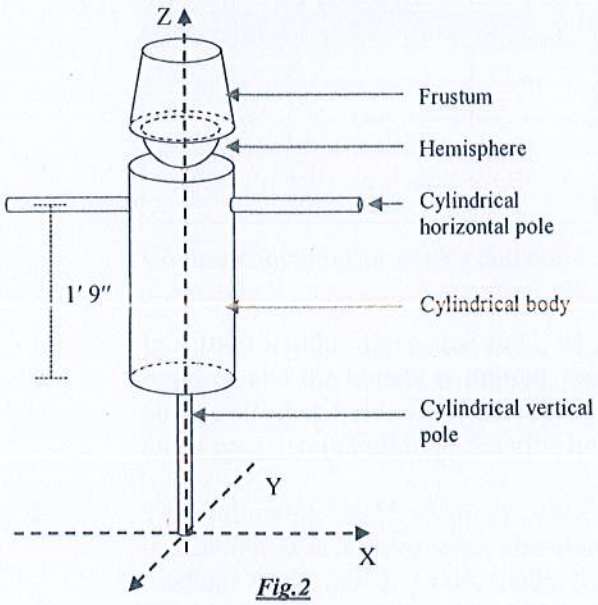

Fig.2

Object	Radius	Height	Unit weight
Frustum	9"(top)	9"	50 lb/ft^3
	12"(bottom)		
Hemisphere	9"	-	50 lb/ft^3
Cylindrical body	1'	2'	50 lb/ft^3
Cylindrical vertical pole	3"	1' 3"	100 lb/ft^3
Cylindrical horizontal pole	3"	1' 6"	70 lb/ft^3

3. (a) If a turbine slows to 250 rpm from 1300 rpm during 7200 revolutions, determine the corresponding average acceleration in rad. per sec^2. **[3]**

(b) A car moves along a road such that its velocity (in fps) is described by the following equations:

$$v = \begin{cases} 6t, & \text{if } t \le 10 \text{ sec}, \\ 160 - t^2, & \text{if } t > 10 \text{ sec} \end{cases}$$

Draw the acceleration profile and calculate the distance traversed between t = 8 sec and t = 12 sec. **[5]**

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

Course Title: Surveying | Course Code: CE 105
Time: 1 hour | Credit Hour: 4 | Full Marks: 80

1. a) During running a closed traverse if you found that the first end of the traverse did not meet with the last end; an error occurred at that point. How do you adjust the traverse? Explain graphically. (5)

   b) The length and bearing of lines of a closed traverse ABCDEA are as follows: (15)

Line	Length	W.C.B
AB	250	130°0'
BC	600	42°0'
CD	100	317°0'
DE	635.46	235°40'

   Calculate latitude and departure, apply corrections to latitude and departure. Also find out the closing error.

2. a) What is magnetic declination? If magnetic declination found in the observation at a place; how true bearing can be calculated? (5)

   b) The following are bearings taken on a closed compass traverse: (15)

Line	FB	BB
AB	171°50'	351°50'
BC	232°10'	49°30'
CD	310°20'	135°15'
DE	80°10'	255°0'
EA	126°48'	301°50'

   Compute the interior angles and correct them for observational error.

3. In a 1000'x1000' dimension field, while surveying, if only linear measurements are required and the budget is limited, describe which method of surveying you would choose. In that field, while surveying, the surveyor faces a steep downward slope and a preexisting building, describe how you would overcome these obstacles. (20)

4. The following staff readings were observed successively with a level. The instrument was moved after the third, sixth and eighth readings. The obtained readings were: 2.385, 1.606, 0.685, 3.05, 3.65, 1.65, 0.625, 1.982, 1.044, 2.587 m. RL of the first point was (685.24+ last two digits of your ID) m. Enter the readings properly in a levelling book and determine the RLs of other stations and provide necessary checks. (20)