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University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination, Spring 2025
Program: B.Sc. in Civil Engineering
1st Year 1st Semester

Course Title: Physics II
Time: 1 hour

Credit Hour: 3.00

Course Code: PHY 103
Full Marks: 60

Answer all the questions

QUESTION 1 [20 MARKS]

- a. Define electric potential. Derive that the electric potential at a point for a positive point charge of Q coulomb is given by $V = \frac{1}{4\pi\epsilon_0} \frac{Q}{r}$. [2+10]
- b. Calculate the potential at the centre of a square of side a where four charges q_1, q_2, q_3 and q_4 are placed at its corner. Assume that $q_1 = +2.0 \times 10^{-9}$ coul, $q_2 = -3.0 \times 10^{-9}$ coul, $q_3 = +4.0 \times 10^{-9}$ coul, $q_4 = +1.0 \times 10^{-9}$ coul and $a = 1.0$ meter. [08]

QUESTION 2 [20 MARKS]

- a. Define capacitance. Show that the capacitance of a parallel plate capacitor can be written as $C = \frac{\epsilon_0 A}{d}$, where the conducting plates of area A are separated by a distance d . [2+10]
- b. Consider that a dielectric slab of thickness b and dielectric constant κ placed between the plates of a parallel plate capacitor of plate area A and separation d . A potential difference is applied with no dielectric present. The battery is then disconnected and the dielectric slab is inserted. Assume that $A = 1000 \text{ cm}^2$, $d = 10 \text{ cm}$, $b = 0.5 \text{ cm}$, $\kappa = 7$, and $V_0 = 1000$ volts. [08]
- (i) Calculate the capacitance before the slab is inserted.
- (ii) Determine the free charge q .

QUESTION 3 [20 MARKS]

- a. State Ampere's law and using this law prove that the magnetic field within a solenoid is given by the relation $B = \mu_0 nI$, where the symbols have their usual meanings. [2+10]
- b. A solenoid is 2 meter long and 3 cm in mean diameter. It has 25 layers of windings of 1700 turns each and carries a current of 1 amp. [08]
- (i) Calculate B at its centre.
- (ii) Measure the magnetic flux ϕ_B for the cross section of the solenoid at its centre.

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Program: B.Sc. in Civil Engineering
1st Year 2nd Semester

Course Title: English Composition and Communication

Course Code: HSS 103

Time: 1 hour

Credit Hour: 3.00

Full Marks: 20

Answer all the questions

QUESTION 1 [05 MARKS]

The following paragraph contains 10 grammatical errors (3 article-related errors, 4 preposition-related errors, and 3 pronoun-related errors). **Rewrite the excerpt by correcting the errors and underline the corrections you have made in your script.**

[5]

In account of working as a junior editor at a top fashion magazine, Amelias days are a whirlwind of runway shows, tight deadlines, and last-minute photo shoots. Her tiny apartment in a expensive area of New York City can barely hold her growing collection of shoes. Irrespective from the cramped space, she loves living here because it's facilities are perfect for her. Amelia moved to this city from Philippines 4 years since. Hers family is very proud of her. Her office is right next to a Metropolitan Museum of Art. Everyday before sleeping, she watches her favourite show in TV.

QUESTION 2 [05 MARKS]

Change the tense of the following into the past. Underline the changes you are making in your script.

[5]

In a quiet forest, a lost princess finds a glowing wolf who speaks in riddles. He leads her to a hidden well that grants one wish at sunset. While waiting for the sunset, the shadows creep close. Her heart shrinks in fear. Finally, at sunset, the princess wishes not for riches, but for the freedom of her kingdom. An endless winter traps her kingdom. After her wish, the snow thaws, and their grateful hearts rejoice.

QUESTION 3 [10 MARKS]

You are Tazeen Farhana. You recently ordered an English grammar book from "The Haven Bookstore" as you had heard about their fast delivery service. However, the order has not arrived even after 2 weeks. The customer service manager was also uncooperative when you called to inquire about the delay. Now, write a letter to the bookstore manager to complain about their service.

[10]

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1st Year 2nd Semester

Course Title: Mathematics-II
Time: 1.00 Hour

Self study
Credit Hour: 3.00

Course Code: MTH 103
Full Marks: 60

Answer all the questions.

QUESTION 1 [20 MARKS]

- a) Define Direction cosine. Find the ratio in which XY plane divides the line [10]
joining (2, 1, -3) and (1, 3, 2). Also find the coordinates of that point.
- b) Write the relation between direction cosine and direction ratio. Find the angle [10]
between lines AB and BC. Where A(-11, 8, 4), B(-1, -7, -1) and C(9, -2, 4).

QUESTION 2 [20 MARKS]

- a) Find the equation of plane which is passing through (2, 1, 3), (-1, -2, 4), (4, 2, [10]
1). Also find the perpendicular distance from the point (1, 1, -1) to this plane.
- b) Find the equation of plane which is passing through (1, 1, 2) and perpendicular [10]
to two planes $2x - 2y - 4z - 6 = 0$, $3x + y + 6z - 4 = 0$.

QUESTION 3 [20 MARKS]

- a) Define the followings: [15]
Vector, Sense, Position vector, Unit vector, Null vector, Parallel vector, Equal
vector, Opposite vector, Co-planer vector, Like vector.
- b) Find the volume of the parallelepiped whose edges are given by $\vec{A} = 2\hat{i} - 3\hat{j}$, [05]
 $\vec{B} = \hat{i} + \hat{j} - \hat{k}$ and $\vec{C} = 3\hat{i} - \hat{k}$.

OR

- a) Discuss about scalar triple product also write down its property. [10]
- b) Find the sine of the angle between vectors $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = 3\hat{i} - 4\hat{j} + 2\hat{k}$. [10]

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination, Spring 2025
Program: B.Sc. in Civil Engineering
1st Year 2nd Semester

Course Title: Surveying
Time: 1 hour

Credit Hour: 3.00

Course Code: CE 105
Full Marks: 40

Answer all the questions

QUESTION 1 [8 MARKS]

- a. Describe four reasons why magnetic declination varies from place to place. [4]
- b. Explain any three advantages of Photogrammetry. [3]
- c. Define Local Attraction. [1]

QUESTION 2 [12 MARKS]

A surveyor conducted a close traverse and tabulated the obtained readings in **Table 1** below.

Table 1

| Line | Fore Bearing (F.B.) | Length (m) |
|------|---------------------|------------|
| TQ' | 276°57'23" | 702 |
| ST | 247°11'51" | 678 |
| RS | 57°37'39" | 609 |
| QR | 356°12'41" | 598 |

- i. Calculate Length of Closing Error. [05]
- ii. Compute Relative Error of Closure. [01]
- iii. Apply Graphical Method to eliminate closing error. Also draw the modified figure of the traverse. [4+2]

QUESTION 3 [8 MARKS]

While conducting aerial photogrammetry from an aircraft, four random points P, Q, R and S were located on a ground surface. The elevations of points P and Q were found 723 ft and 862 ft, respectively. The scales at P and Q points in the photographs are 1:12345 and 1:11901, respectively. Determine the followings:

- i. Focal Length (in ft) of the camera. [2]
- ii. Flying Height (in ft) of the aircraft. [2]
- iii. Elevation of point R (in ft) where scale at point R is 1: 10279. [2]
- iv. Scale at point S where elevation of point S is 786 ft. [2]

QUESTION 4 [8 MARKS]

Suppose, you have conducted a close traverse with a compass and obtained the following interior angles and forward bearing of AB Line: [8]

$$\angle A = 105^{\circ}56'$$

$$\angle B = 11^{\circ}19'$$

$$\angle C = 126^{\circ}55'$$

$$\angle D = 115^{\circ}50'$$

Forward Bearing of AB = $133^{\circ}01'$

Calculate the Fore Bearings and Back Bearings of all other lines.

QUESTION 5 [4 MARKS]

Suppose, you are a surveyor. Recently you have visited two lands. **Land 1** was located in Dhaka and **Land 2** was located in Chittagong. In **Land 1**, a steel building was situated and many electric conduits ran through it. In **Land 2**, a river went through it. Explain the suitable surveying method/s for the two lands you will suggest as a surveyor and justify your suggestions. Also discuss the challenges you may face while conducting your suggested methods for both of the lands. [4]