



FACULTY OF ENGINEERING & TECHNOLOGY

IN-CLASS TEST 04

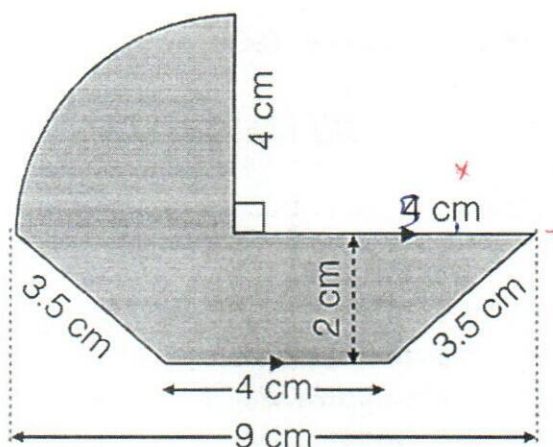
Module Code	:	STEM 1501
Module Title	:	Foundation mathematics I
Date	:	September 2025
Examiner	:	Mr. Supun Walpita
Time Allowed	:	2 hours

INSTRUCTIONS TO CANDIDATES

- This is a **closed book** examination
- Answer **all** questions.
- Show all stages of your work, with clear assumptions where appropriate.
- Write legibly in blue or black ink
- You may use a **scientific calculator**. This must not be programmable and may be inspected during the examination.

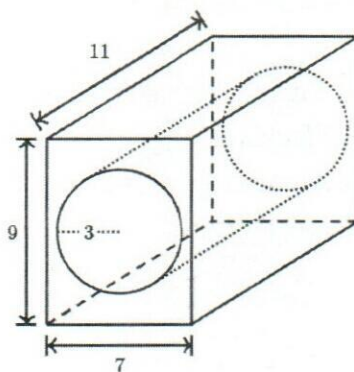
1)

- a) Find the area of the figure below. If you break the figure down into separate parts, show them clearly.



(10 marks)

- b) The solid object shown in the figure below is made of timber with a density of 700 kg/m^3 . A cylindrical portion has been drilled out from the block, making the object hollow on the inside. All dimensions are in centimeters.



- Find the total surface area of the object
- Find the volume of the object
- Determine the mass of the object in grams.

(20 marks)

2)

- a) Describe mean, median & mode and provide one practical example of how each is specifically used. (6 marks)

- b) Given the following set of numbers:

6, 9, 11, 13, 7, 9, 10, 12, 8, 9, 14, 7, 10

- What is the median of the data set?
- What is the mode of the data set?
- What is the mean of the data set?

(8 marks)

- c) What is meant by the term standard deviation in a data set? (3 marks)

- d) The bowling speeds (in km/h) of 10 deliveries each, recorded for two fast bowlers, Bowler A and Bowler B, are as follows:

Bowler A: 142, 145, 147, 144, 146, 143, 148, 145, 144, 146

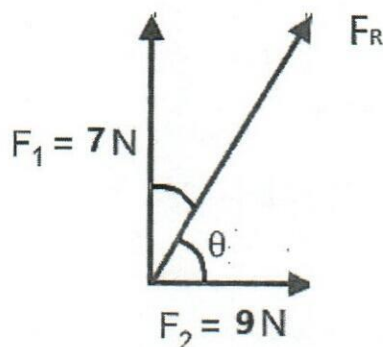
Bowler B: 138, 140, 141, 139, 142, 140, 139, 141, 140, 139

- Calculate the mean and standard deviation for Bowler A and Bowler B.
- Based on your results in part (i), comment on the consistency of the performance of two bowlers.

(22 marks)

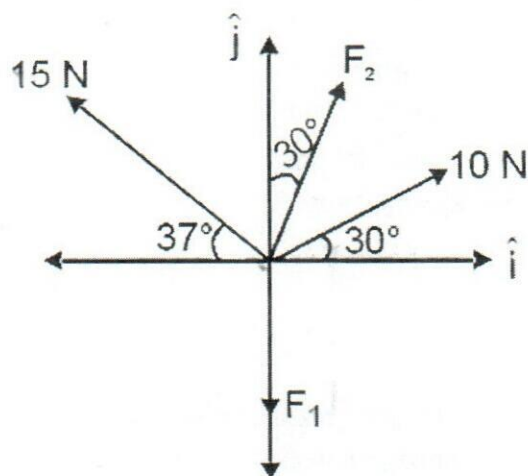
3)

- a) Find the resultant force F_R & its direction θ



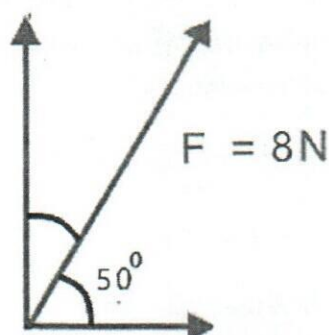
(6 marks)

- b) If the four forces as shown are in equilibrium determine the magnitudes of F_1 & F_2



(13 marks)

- c) Write the following Force (F) in unit vector form



(6 marks)

- d) Consider two unit vectors,

$$\vec{u} = 6\hat{i} + 8\hat{j}, \quad \vec{v} = 7\hat{i} - 5\hat{j}$$

- i. Find the vector sum $\vec{u} + \vec{v}$
- ii. Find the vector difference $\vec{u} - \vec{v}$

(6 marks)

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FACULTY OF ENGINEERING & TECHNOLOGY

IN-CLASS TEST 02

Module Code	:	STEM 1501
Module Title	:	Foundation mathematics I
Date	:	August 2025
Examiner	:	Mr. Supun Walpita
Time Allowed	:	2 hours

INSTRUCTIONS TO CANDIDATES

- This is a closed book examination
- Answer **all** questions.
- Show all stages of your work, with clear assumptions where appropriate.
- Write legibly in blue or black ink
- No calculators are allowed

1)

a) Simplify following

I. $(x + 2)(x - 5)$

II. $\frac{15x^2 - 10x}{5x}$

III. $6(x - 3) + 2x$

IV. $(x + 1)(x^2 - x + 1)$

(9 marks)

b) Solve following quadratic equations

I. $x^2 - 6x + 5 = 0$

II. $2x^2 + 9x + 4 = 0$

III. $x^2 + 4x + 2 = 0$

(12 marks)

c) Sketch the graphs of $y = -2x + 1$ and $y = x^2 - 2x - 3$ on the same coordinate axes. Make sure to show all critical points as well as the points where the two graphs intersect.

(15 marks)

2)

a) Find factors of cubic equations

I. $x^3 - 3x^2 + 3x - 1$

II. $2x^3 - 6x^2 + 2x + 6$

(8 marks)

b) A company produces and sells a high-tech product. The total profit "y" (in million rupees) obtained by the production of "x" number of units is given by:

$$y = -2x^2 + 40x - 150$$

sketch a graph for above relationship and find:

- I. The profit if the company produces 6 units.
- II. The maximum profit.
- III. The number of units that maximize the profit.

(12 marks)

c) Simplify following

I.
$$\frac{x^3 + 3x^2 - x - 3}{x + 3}$$

II.
$$\frac{x^3 - 4x^2 + x + 6}{x - 2}$$

(10 marks)

3)

a) Solve the following system of equations:

$$2x + 3y = 1$$

$$4x - y = 7$$

(6 marks)

b) A theater sells adult and child tickets. Adult tickets cost \$18 each and child tickets cost \$10 each. If a total of 85 tickets are sold and the total revenue is \$1230, how many adult and child tickets were sold?

(8 marks)

c) Simplify following

i. $\frac{x^2 - 6x + 8}{x - 2} \div \frac{x - 4}{x^2 - 4}$

ii. $\frac{5x}{x^2 - 16} - \frac{2}{x - 4}$

(8 marks)

d) Find partial fractions of following

i. $\frac{2x + 7}{x^2 - x - 2}$

ii. $\frac{4x^2 + 5x + 6}{(x - 3)(x + 1)(x + 4)}$

(12 marks)