



GRETSA UNIVERSITY – THIKA

**UNIVERSITY EXAMINATIONS
JANUARY - APRIL 2025 SEMESTER**

BACHELOR OF EDUCATION ARTS

**COURSE CODE: BSCS 209/109
COURSE TITLE: ANALYTICAL GEOMETRY**

DATE: APRIL 2025

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY**.
2. SECTION B: ANSWER ANY OTHER **TWO** QUESTIONS.
3. **DO NOT** WRITE ANYTHING ON THIS QUESTION PAPER AS IT WILL BE AN EXAM IRREGULARITY.
4. ALL ROUGH WORK SHOULD BE AT THE BACK OF YOUR ANSWER BOOKLET AND CROSSED OUT.

CAUTION: *All exam rooms are under CCTV surveillance during the examination period.*

SECTION A: COMPULSORY

Question One

- a) State and sketch the vertex and focus of the parabola having the equation.

$$(y - 3)^2 = 8(x - 5) \quad [5 \text{ Marks}]$$

- b) Evaluate the angle between $y - 2x = 2$ and $y + x = 4$ [6 Marks]

- c) Given the circle with equation $x^2 + y^2 - 6x + 2y + 8 = 0$. Rewrite the equation in the standard form and give the coordinates of the centre and the radius. [5 Marks]

- d) A line passes through $(-3, 9)$ and $(4, 4)$. Another line passes through $(9, -1)$ and $(4, -8)$. Are the two lines parallel or perpendicular? [4 Marks]

- e) Find the equation of a straight line passing through the point $(4, -5)$ and which is perpendicular to the line $3x + 4y + 5 = 0$ [5 Marks]

- f) Show that

$$\frac{(1 - \cos \theta)(1 + \cos \theta)}{(1 - \sin \theta)(1 + \sin \theta)} = \tan^2 \theta$$

SECTION B: ANSWER ANY TWO QUESTIONS

Question Two

- a) Given the point A (3, -2) and B (2, 4). Find the equation of the perpendicular bisector of AB. [5 Marks]
- b) Find the length of a tangent drawn from the point (2,8) to the circle $x^2 + 4x + y^2 + 10y + 20 = 0$. [5 Marks]
- c) Find all the solutions of the equation $12\cos x + 5\sin x + 3 = 0$ in the range $0 \leq x \leq 2\pi$, give your answers in radians. [7 Marks]
- d) Convert (-1, -1) to polar form. [3 Marks]

Question Three

- a) The equation of a circle is given by $x^2 + y^2 = 10$. Prove that $y = 3x + 10$ is the tangent to the circle. [6 Marks]
- b) Given that the point $A(x, 3)$ is 5 units distant from another point $B(-1, 0)$. Find the value of x . [5 Marks]
- c) Find the radius of a circle which passes through the vertices of triangle ABC with sides $AB=3\text{cm}$, $AC=2.5\text{cm}$ and $\angle ABC = 49^\circ$. [5 Marks]
- d) If $\tan \theta = \frac{1}{a}$, show that $\frac{\cos \theta + \sin^2 \theta + \cos^3 \theta}{\sin \theta} = \frac{1}{a}$ [4 Marks]

Question Four

- a) The equation of a circle is given by $x^2 + y^2 = 10$. Prove that $y = 3x + 10$ is the tangent to the circle. [5 Marks]
- b) If A(-2, 1), B(2,3) and C(-2, -4) are three distinct points, find the angle between the straight line AB and BC. [5 Marks]
- c) Given the focus (-6, 0) and the vertex at the origin. Graph the parabola and write the equation of the parabola. [5 Marks]
- d) Graph the hyperbola given by the equation below [5 Marks]

$$\frac{x^2}{3^2} - \frac{y^2}{2^2} = 1$$

Question Five

- a) Graph the ellipse given by the equation below

$$25x^2 + y^2 = 25$$

$$10 \leq x \leq 10$$

[5 Marks]

- b) Convert $(16, \frac{\pi}{2})$ to rectangular form.

[5 Marks]

- c) Determine the length of the tangent drawn from $P(5,6)$ to the point of contact with

the circle $x^2 + 6x + y^2 + 10y + 14 = 0$.

[5 Marks]

- d) Given that $2\sin^2 \theta = \sin \theta$, find θ in the range $0^\circ \leq \theta < 360^\circ$.

