



UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF EDUCATION (SOE)

DEGREE OF BACHELOR OF EDUCATION ARTS

SPECIAL/SUPPLEMENTARY EXAM

MTH 225: ANALYTICAL GEOMETRY

DATE: 6TH AUGUST 2026

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

- a) A straight line passes through points $(-2,1)$ and $(6,3)$. Find:
- The equation of this line in the form $y = mx + c$
(2marks)
 - The slope of the a line perpendicular to the line in a) i)
(1mark)
- b) The equation of a circle centre (a,b) and radius r is
 $x^2 + y^2 - 6x - 10y + 30 = 0$. Find a , b and r **(4 marks)**
- c) Find the coordinates of the point of intersection between the line
 $x + y = 1$ and the parabola $y^2 - y + x = 0$
(3 marks)
- d) Convert the equation of the ellipses given below into standard form
- $25x^2 + 4y^2 = 100$ **(2 marks)**
 - $25x^2 + 4y^2 + 150x - 16y + 141 = 0$ **(3 marks)**
- e) Determine the eccentricity of the hyperbola $\frac{x^2}{25} - \frac{y^2}{16} = 1$ **(3 marks)**
- f) Find the x - and y - intercepts, the vertex, the equation of the axis of symmetry and the nature of the parabola defined by $x = y^2 + 3y - 4$ **(7 marks)**

QUESTION TWO

- a) Given that the coordinates of the points A , B , C and D are
 $(-15,8)$, $(-6,10)$,
 $(-8,-7)$ and $(-6,-16)$ respectively , determine whether the line segments AB and CD are parallel, perpendicular or neither
(3 marks)

b) Find, in slope – intercept form, the equation of the straight line passing through the point (3,1) and parallel to the straight line passing through two points (1,-1) and (4,-3)

(3 marks)

c) The end points of line segment AB are located at (5,-2) and (-3, 10). Find the equation of the line that is perpendicular bisector to AB

(4 marks)

d) The vertices of a rectangle ABCD have the coordinates A(-3,5), B(3,7), C (6,-2) and D (x,y)

Determine the values of x and y

(5 marks)

QUESTION THREE

a) Convert the Cartesian plane coordinates $(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$ into polar coordinates

(4

marks)

b) Find the centre and the radius of the circle whose equation is given by $x^2 + y^2 - 12x - 16y + 19 = 0$

(3 marks)

c) Find the angle between the tangents to the circle $x^2 + y^2 = 25$ drawn from the point (6,8)

(4 marks)

d) Find the equation of a circle passing through the points (1, 2), (3,-4), (5,-6)

(4

marks)

QUESTION FOUR

- a) Find the equation of the hyperbola with foci (5,2) and (-1,2) whose transverse axis is 4 units long

(7 marks)

- b) The equation of the ellipse is defined by $25x^2 + 9y^2 - 100x - 54y - 44 = 0$. Find the coordinates of the centre, vertices, foci and end points of the minor axis.

(8 marks)

QUESTION FIVE

- a) Find the equation of normal to the parabola $x^2 = 4y$ at point (6,9)

(3 marks)

- b) Find the equation of the tangent to the parabola $y^2 = 12x$, which passes through the point (2,5). Find also the coordinates of their points of contacts

(5 marks)

- c) Find the normal to the ellipse $9x^2 + 16y^2 = 288$ at point (4,3)

(3 marks)

- d) Find the points of intersection of the ellipse $x^2 + 4y^2 = 2$ and the tangents parallel to the line $x - 2y - 6 = 0$

(4 marks)

QUESTION SIX

- a) Find the eccentricity of the ellipse for the given equation

$$9x^2 + 25y^2 = 225$$

(5

marks)

- b) Find the position of the point (6,-5) relative to the hyperbola

$$\frac{x^2}{9} - \frac{y^2}{25} = 1$$

**(5
marks)**

- c)** The coordinates of the vertices of hyperbola are $(9,2)$ and $(1,2)$ and the distance between its two foci is 10. Find its equation and also the length of its latus rectum

(5 marks)