GRETSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATIONS

JANUARY – APRIL 2026 SEMESTER

BACHELOR OF EDUCATION

COURSE CODE: BSCS 109

COURSE TITLE: ANALYTICAL GEOMETRY

DATE: 09 APRIL 2026 **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(30 MARKS)

a) Find the slope of a line L which is perpendicular to the line joining points A (2, 4) and B (-2, 1). **[3 Marks]**

b) Find the acute angle between the lines 8x +3y -5 = 0 and 3x – 2y +8 = 0. **[5 Marks]**

c) Find the Cartesian equation of the curve whose polar equation is r $=\frac{8}{1+4\cos\theta)}$.

[4 Marks]

d) Express the equation of the circle $x^2+y^2-5x+4y-7=0$ in standard form, hence write down the coordinate of the Centre and the length of the radius.[**[4 Marks]**

e) Determine whether circle $x^2+y^2-3x+2y-3=0$ is orthogonal to circle$x^2+y^2+2x+y=-1$**.**

[5 Marks]

f) Find the equation of the ellipse with vertices (5, 1) and (-1, 1) and foci at (4, 1) and (0, 1).

[4 Marks]

g) Write the equation of the tangent and the normal to the hyperbola

$16x^2-9y^2-128x-54y+31=0$ at point $(\frac{1}{4},0)$**.**

[5 Marks]

QUESTION TWO (20 MARKS)

a) Find the length of a tangent drawn from the point (2, 8) to the circle ,

x^2+y^2 +4x – 10y +20 = 0. **[6 Marks]**

b) Find the equation of an ellipse centered at the origin whose major axis has a length of 10 lying about the x-axis and the minor axis has a length of 6. **[5 Marks]**

c) The following is an equation of a hyperbola. $16x^2-9y^2-128x-54y+31=0$ Compute;

i. The coordinates of the Centre, vertices and foci**.** **[7 Marks]**

ii. The eccentricity and equations of the directrices. **[2 Marks]**

QUESTION THREE (20 MARKS)

a) Given the parabola with equation $y^2-8x-6y+49=0$, express it in standard form and hence find the coordinates of the vertex, focus and then find the equation of the directrix and length of the Latus rectum. **[10 Marks]**

b) 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**?** **[5 Marks]**

c) **W**ithout using tables or calculator, find the value of $\cos 165^0$. **[5 Marks]**

QUESTION FOUR (20 MARKS)

a) A student in BSCS 109 class argues that $\frac{(1-\cos\theta)(1+\cos\theta)}{(1+\sin\theta)(1-¿\sin\theta)¿} = \tan^2\theta$. Is this argument True or False? **[3 Marks**]

b) The equation of a circle is given by $x^2+y^2=10$. Prove that y =3x + 10 is a tangent to the circle, hence find the point of tangency **[5 Marks]**

c) Solve the equation $3\cos x - 4\sin x = 2$, over the range $0 \le x \le 360$. **[7 Marks]**

d) Show that $\cot\left(\sin^{-1}\left(\frac{3}{5}\right)+\cos^{-1}\left(\frac{24}{25}\right)\right)=\frac{3}{4}$. **[5 Marks]**

QUESTION FIVE (20 MARKS)

a) Compute the coordinates of the foci, vertices as well as the equations of the directrices and length of Latus rectum of the ellipse whose equation is $25x^2+y^2=25$. Hence sketch the ellipse**.** **[10 Marks]**

b) Find,

i) The Cartesian equation of the polar equation $r\cos(\theta-n)=p$ **[4 Marks]**

ii) Obtain the polar equation of the equation $x^2+y^2-2y=0$. **[3 Marks]**

c) Show that $\frac{1-\cos 2\theta}{\sin 2\theta}=\tan\theta$. **[3 Marks]**