



GRETSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATIONS MAY - AUGUST 2018 SEMESTER

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE CODE: BSCS 111

COURSE TITLE: ANALYTICAL GEOMETRY

DATE: 8 AUGUST 2018

TIME: 11.30 AM – 2.30 PM

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY**.
2. SECTION B: ANSWER ANY OTHER **THREE** 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) Use synthetic division to find the quotient and remainder when dividing $-2x^3 + 5x^2 - 6x + 5$ by $2x-1$ [5marks]
- b) Show that
$$\frac{\tan^2 \theta + 1}{\tan^2 \theta} = \frac{1}{1 - \cos^2 \theta}$$
 [5marks]
- c) Find the distance from the point $(-3,7)$ to the line $y = \frac{6}{5}x + 2$ [5marks]
- d) State and sketch the vertex and focus of the parabola having the equation. $(y - 3)^2 = 8(x - 5)$ [5marks]
- e) Evaluate the angle between $3x - 6y = 12$ & $y = 4x + 1$ [6marks]
- f) 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 of the circle and the radius. [5marks]
- g) A line passes through $(-3, 9)$ and $(4, 4)$. Another line passes through $(9, -1)$ and $(4, -8)$. Are the lines parallel or perpendicular? [4marks]
- h) Define the Remainder and Factor theorem [5marks]

SECTION B: ANSWER ANY THREE QUESTIONS

Question Two

- a) Given the point A $(3,-2)$ and B $(2, 4)$.
- i. Find the equation of the line in Point slope form, Slope intercept Form and in Standard Form. [3marks]
- ii. Find the equation of the perpendicular bisector of AB. [3marks]
- b) Find the length of a tangent from the point $(2,8)$ to the circle $x^2 + 4x + y^2 - 10y + 20 = 0$ [6marks]
- c) The equation of a circle is given by $x^2 + y^2 = 10$. Prove that $y = 3x + 10$ is the tangent to the circle. [5marks]
- d) Convert $(-3, -1)$ to polar form. [3marks]

Question three

- a) Define a conic section [3marks]
- b) List the four types of conic sections. [2marks]
- c) Determine the angle between $y = 5x + 3$ and the x -axis [2marks]
- d) Given the polynomial $P(x) = x^3 - 7x - 6$, divide $P(x)$ by the linear factor $x - 4$ [3marks]
- e) Given a triangle at right angle with the height 5cm and a hypotenuse of 6cm, express the exact values of the six trigonometric functions in relation to θ . [5marks]
- f) Show that $\frac{\cos \theta \tan \theta}{\sin \theta} - \cos^2 \theta = \sin^2 \theta$ [5marks]

Question Four

- a) Describe and sketch the region given by $\{(x, y) / |y| < 1\}$ [2marks]
- b) Define a *parabola* and state its standard equation. [4marks]
- c) If $A(-2, 1)$, $B(2,3)$ and $C(-2, -4)$ are three distinct points, find the angle between the line segment AB and BC. [5marks]
- d) Given the focus $(-6, 0)$ and the vertex at the origin. Graph the parabola and Write the equation of the parabola. [5marks]
- e) Graph the Hyperbola given by the equation below [6marks]
- $$\frac{(x-3)^2}{9} - \frac{(y+2)^2}{16} = 1$$

Question five

- a) Graph the Ellipse given by the equation below [5marks]
- $$49x^2 + y^2 = 49$$
- a) Convert $(16,5\frac{\pi}{2})$ to rectangular form. [4marks]
- b) Determine the length of the tangent drawn from $P(5,6)$ to the point of contact with the circle $x^2 - 6x + y^2 + 10y + 14 = 0$. [6marks]
- c) Define and prove the distance formula given two points. [4marks]