



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
FIRST YEAR SECOND SEMESTER**

**SCHOOL OF SCIENCE
BACHELOR OF SCIENCE**

**COURSE CODE: MAT 1205/1208
COURSE TITLE: ANALYTICAL GEOMETRY**

DATE: 24TH APRIL 2018

TIME: 0830 - 1030HRS

INSTRUCTIONS TO CANDIDATES

- *Answer ALL questions in Section A and ANY Other TWO questions from Section B*
- *DO NOT MAKE ANY WRITING ON THIS QUESTION PAPER*

*This paper consists of **THREE** printed pages. Please turn over.*

SECTION A (30 MARKS).

QUESTION ONE (30 MARKS).

- a) Find the equation of the following lines:
- i. The line passes through the point (2,1) and (5,2) **(2 Marks)**
 - ii. The gradient is $\frac{1}{3}$ and passes through the point (2,-3) **(2 Marks)**
 - iii. Passing through the point (2,1) and parallel to the line $2x + 3y = 5$. **(3 Marks)**
- b) Convert the Cartesian point $(x, y, z) = (-2, 2\sqrt{3}, 1)$ to cylindrical coordinates. **(2 Marks)**
- c) Find the distance of the point (-15,8) from the origin **(3 Marks)**
- d) Determine the equation of a circle whose center is (-1,2) and radius 3cm **(3 Marks)**
- e) Show that (3,5) lies on a circle $x^2 + y^2 - 8x - 2y = 0$ and find the equation of the tangent at (3,5) **(4 Marks)**
- f) Convert the spherical point $(\rho, \theta, \phi) = (2, \frac{\pi}{4}, \frac{\pi}{3})$ to Cartesian coordinates. **(3 Marks)**
- g) Find the coordinates of the point that divides internally, the segment joining points A (7,-5) and B (-8, 4) into the ratio 1:2. **(4 marks)**
- h) Express the following as polar coordinates
- i) (5,2) **(2 Marks)**
 - ii) (-3,4) **(2 Marks)**

SECTION B (40 MARKS)
QUESTION TWO (20 MARKS)

- a) Find the equation of the parabola whose focus is $F(2,0)$ and the directrix is $x = -2$ **(3 Marks)**
- b) Find the focus, the equation of the directrix, the length of latus rectum for the parabola $5y^2 = 24x$ **(4 Marks)**
- c) Find the vertex, the axis of symmetry, the focus, the equation of the directrix and the length of the latus rectum of the parabola $x^2 - 10x - 6y + 40 = 0$ **(4 Marks)**
- d) Find the directrix, eccentricity and focus of the ellipse given by $4x^2 + 9y^2 = 36$ **(5 Marks)**
- e) Find the equation of the ellipse whose focus is $\frac{2}{3}$ and the directrix is $y = 9$ **(4 Marks)**

QUESTION THREE (20 MARKS)

- a) Find the polar equation of the circle whose center has the Cartesian coordinates $C(5,8)$ and radius is 10 **(4 Marks)**
- b) Write in Cartesian form the equation $r = 9 \cos \theta$ **(4 Marks)**
- c) Find the polar equation of the parabola $x^2 = -12(y - 3)$ **(4 Marks)**
- d) Find the polar equation of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ **(4 Marks)**
- e) Determine the equation of the hyperbola whose eccentricity is $\frac{3}{2}$ and the foci are $F'(-2,0)$ and $F(2,0)$ **(4 Marks)**

QUESTION FOUR (20 MARKS)

- a) Find the equation of the tangent to the parabola $y^2 - 2y - 12x - 23 = 0$ at a point $P\left(-\frac{7}{4}, 10\right)$ **(5 Marks)**
- b) Draw the curve $6y^2 = x(x - 2)^2$ for $0 \leq x \leq 2$ **(4 Marks)**
- c) Find the point of intersection of the curve in (b) with the x - axis **(3 Marks)**
- d) Calculate the length of the loop of the curve $y^2 = \frac{1}{6}x(x - 2)^2$ **(8 Marks)**

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