



MOI UNIVERSITY

OFFICE OF THE DEPUTY VICE CHANCELLOR
(ACADEMICS, RESEARCH & EXTENSION)

UNIVERSITY EXAMINATIONS

2017/2018 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE OF

BACHELOR OF EDUCATION SCIENCE

COURSE CODE: MAT 104

COURSE TITLE: BASIC MATHEMATICS AND ANALYTIC
GEOMETRY

DATE: 15TH FEBRUARY, 2018 **TIME:** 11.40 A.M. – 2.40 P.M

INSTRUCTION TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF (4) PRINTED PAGES

PLEASE TURN OVER

MOI UNIVERSITY

2016/2017 EXAMINATION

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE WITH EDUCATION

COURSE CODE: MAT 104

COURSE TITLE: BASIC MATHEMATICS AND ANALYTIC GEOMETRY

INSTRUCTION TO CANDIDATES

Answer ALL questions from section A and any THREE from section B

Duration of the examination: 3 hours

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Section A: 31 Marks (Compulsory)

Question one (16 marks)

- What is the distance between points (4, 6) and (28, 13) (3mks)
- Find the equation of the line $y = 3x + 2$ in polar coordinates (3mks)
- Prove that $\sin^2 \theta + \cos^2 \theta = 1$ (5mks)
- Convert the equation $x^2 + y^2 + 2x - 4y - 11 = 0$ into center radius form and state the coordinates of the centre and its radius. (5mks)

Question two (15marks)

- If A (-2,1), B(2,3) and C(-2,-4) are three points. Find the angle between the lines $9x - 4y = 0$ and $3x - 11y + 5 = 0$ (4mks)
- Determine the slope and the y intercept of the line whose equation is $8x + 3y = 5$ (2mks)
- Prove that the two circles $x^2 + y^2 - 2y - 15 = 0$ and $x^2 + y^2 - 8x - 6y + 21 = 0$ are orthogonal circles (5mks)
- Find the focus and directrix of the parabola that has equation $y^2 = -6x$ (4mks)

Section B: (39 Marks)

Attempt any THREE questions in this section

Question three (13 Marks)

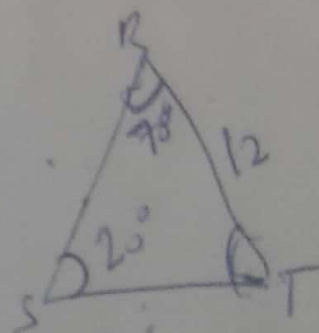
- a. What is the equation of the tangent to the circle $x^2 + y^2 + 2x + 4y - 3 = 0$ at point $(1, -4)$ (7mks)
- b. Rewrite the general equation of the ellipse $25x^2 + 9y^2 - 100x - 54y = 64$ then find the centre and its vertical major axis. (6mks)

Question four (13 Marks)

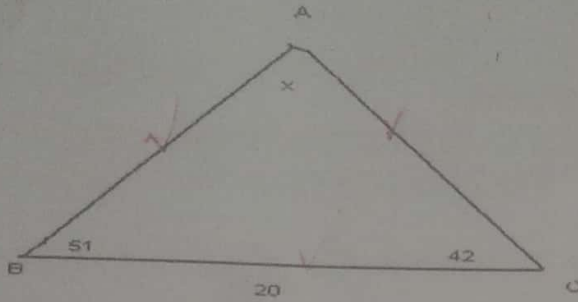
- a. Sketch the graph of the curve C that has parametrization $x = -2 + 2t^2, x = 2 + t^2, y = 1 + 2t^2$ in R. (6mks)
- b. Eliminate parameter in the following sets of parametric equations $x = t + 2, y = t^2 + 4t + 4$ (3mks)
- c. Determine the equation of a line which cuts off the intercepts 5 and -3 on x and y Axis respectively (4mks)

Question five (13 Marks)

- a. In a triangle RST $R=70^\circ, S=20^\circ$, and $RT = 12\text{cm}$ solve for triangle (5mks)
- b. Find the other three trigonometric function if $\cos \theta = \frac{1}{2}$ (3mks)
- c. a) Solve the triangle below (5mks)



$$\frac{12}{\sin 70} = \frac{RS}{\sin 20}$$



Question six (13 Marks)

- a. Find the remainder when the expression $x^3 - 4x^2 + 3x + 5$ is divided by $x-3$ (3mks)
- b. Use synthetic division to divide the following polynomials (4mks)
 $f(x) = x^4 - 10x^2 - 2x + 4$ by $x + 3$
- c. In how many ways can 4 boys and 2 girls be seated in a row when (6mks)
 - i. The boys and girls can sit anywhere
 - ii. The 2 girls must be together
 - iii. The two girls must be separated

$(5!) 2!$
 $5 \times 4 \times 3 \times 2 \times 1 \times 2$

Question Seven (13 marks)

- a. Express in terms of sine and cosine and simplify (6mks)

$$\frac{\tan(90^\circ - A)}{\cos A \sin A}$$
- b. Find the equation of the hyperbola whose vertices are $(\pm 6, 0)$ and one of the Directrices is $x = 4$ (7mks)