Mount Kenya University

UNIVERSITY EXAMINATION 2014/2015

SCHOOL OF PURE AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCES

BSNE/BEDS/BEDA
SCHOOL BASED

UNIT CODE: BMA1208 **UNIT TITLE: ANALYTICAL GEOMETRY**

DATE: APRIL/MAY 2015 **MAIN EXAM** **TIME: 2 HOURS**

INSTRUCTIONS: Answer question one and any other two
ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

1. a). The line GH with coordinates $G(7,5)$ and $H(9,7)$ is the diameter of a circle. Find
   i. The coordinates of the centre of the circle. (2mks)
   ii. The equation of the circle. (5mks)
   iii. The equation of the tangent to the circle at point H (4mks)

   b). Sketch the parabola with equation $x^2+2x+4y-3=0$ clearly indicating the vertex and the focus. (5mks)

   c). Determine the equation of the ellipse that has major axis of length 8 along the y-axis ,minor axis of length 4 along the line $x=-1$ (4mks)

   d). Find the equation of the line that passes through the point $(1,2)$ and the intersection of the lines $x+2y=3$ and $2x-3y=-1$ (5mks)

   e). A hyperbola has one focus F' at $(-2,3)$.The corresponding directrix is the line $x=3$. Find the coordinates of V' (3mks)

   f) Convert $(3,5)$ into polar coordinates (2mks)

2. a). An ellipse has equation $3x^2+6y^2-48x+36y+222=0$. Determine
   i. the coordinates of the centre, foci, and vertices,
   ii. the length of the major and minor axis
   iii. Equation of tangent to the ellipse at point $(8,-5)$ (10 mks)

b). Find the equation of the circle that passes through the points $(2,3),(3,2)$ and $(-4,3)$ (7mks)

C). Convert $x^2+(y-3)^2$ into a polar equation. (3mks)

3. a). A hyperbola has equation $2x^2-3y^2+16x-6y+7=0$ .Find
   i. The coordinates of the centre, and vertices
   ii. Find the equation of the asymptotes
   iii. Sketch the curve (10 Mks)

b). Write a polar equation of the parabola with focus at origin and directrix y=2. (6mks)

c). Show whether the circles $x^2+y^2-4x-6y+9=0$ and $x^2+y^2+6x-2y-26=0$ are orthogonal (4mks)

4. a) Determine the equation of the tangents at the end points of the latus rectum of the parabola with equation $x^2+2x+4y+15=0$ (10mks)

b) Given the lines $3x-2y=6$ and $x-3y=-5$ find the size of the angle between the two lines. (6 Mks)

c) Express
   i. $(4,-4)$ in polar coordinates (2mks)

   ii. $r=\dfrac{4}{1+2\sin\theta}$ as a Cartesian equation. (2mks)

5. a) The triangle PQR has vertices $P(6,-2)$, $Q(4,3)$ and $R(-1,-1)$. Find
   i. The coordinates of the point T which divides the line PQ in the ratio $3:2$ (4mks)
   ii. The distance from the point T to the line PR (4mks)

b) Find

i. The length of the tangent to the circle $x^2+y^2-4x-8y=5$ from the point $(8,2)$ (6mks)

ii. Determine whether the point $(2,-3)$ lies in, on or outside the circle (6 mks)