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**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE**

**UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION SCIENCE/BACHELOR OF SCIENCE(ACTUARIAL SCIENCE WITH IT)**

**1ST YEAR 1STSEMESTER 2016/2017 ACADEMIC YEAR**

**MAIN CAMPUS**

**COURSE CODE: SMA 101**

**COURSE TITLE: ANALYTIC GEOMETRY**

**EXAM VENUE: STREAM:**

DATE: EXAM SESSION:

TIME: 2.00 HOURS

**Instructions:**

1. **Answer question one (compulsory) and any other two questions.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE (COMPULSORY 30 MARKS)**

1. Define the Conic sections given below

i)Parabola

ii) Ellipse (2 marks)

1. Determine the perpendicular distance between a point (4,3) and the line passing through (0,0) and (1,6) (4 marks)
2. Find the centre and equation of an ellipse which is inscribed in a rectangle bouinded by the lines *x* = -1, *x*= 5 , *y*=3 and *y* = 7 giving your answer in the form  (4 marks)
3. A triangle has vertices A(-5, 2) , B(0, 3) and C(5, 7). Calculate the value of the largest angle in the triangle hence state whether it is acute or obtuse. (6 marks)
4. Use the third order matrix determinant to determine the equation of a line passing through the points (-10, -2) and (10, 3) giving your answer in double intercept form, hence declaring the intercepts. (4 marks)
5. Convert the following polar coordinates in to Cartesian coordinates

(i)(-5, 700) (ii) (4 marks)

1. Calculate the area of a circle which passes through (7, 7), (-10, 0) and (14,0). (Take ) (6 marks)

**QUESTION TWO(20 MARKS)**

1. Determine the the distance between two parallell lines  and the line  (4 marks)
2. A parabola has the equation , Determine
3. The vertex (4 marks)
4. The focus (2 marks)
5. The equation of the directrix (3 marks)
6. Suppose another parabola is an exact translation of the parabola above through a vector , what would be the equation of the parabola (3 marks)
7. Identify the conic sections given below

c) (i)

(ii)  (4 marks)

**QUESTION THREE(20 MARKS)**

1. The equation of a hyperbola is given by

Find

1. The centre and axes of the hyperbola (6 marks)
2. The foci (3 marks)
3. Eccentricity (1 mark)
4. the equations of the directrices of the hyperbola (2 marks)
5. the equation of the asymptotes of the hyperbola. (4 marks)
6. Determine the pair of parametric equations for the curve  (4 marks)

**QUESTION FOUR (20 MARKS)**

1. Find the cartesian equation represented by the pairs of parametric equations given below.

(i) , 

(ii)  ,  (6 marks)

1. (i) A second degree curve is represented by the equation . By eliminating the cross product term give the new equation of the conic section on the new  plane and state the equation of its axis. (8 marks)

(ii) On the new  plane determine the foci, the eccentricity and the directrices of the conic section. (6 marks)

**QUESTION FIVE (20 MARKS)**

1. The equation of an ellipse is given by

Determine on the *xy* plane

(i) The centre of the ellipse (4 marks)

(ii) The foci (3 marks)

(iii) The eccentricity (1 mark)

(v) The equations of the directrices (3 marks)

(vi) TheEquations of the axes of the ellipse (3 marks)

1. Consider the polar curve of a conic section given by, sketch the curve hence determine the eccentricity, focus and equation of the directrices of the conic section. (6 marks)