**P425/1**

**PURE MATHEMATICS**

**Paper 1**

**Jul/Aug 2016**

**3 Hours**



**MUKONO EXAMINATIONS COUNCIL**

**Uganda Advanced Certificate of Education**

**PURE MATHEMATICS**

Paper 1

**Time: 3 Hours**

**INSTRUCTIONS TO CANDIDATES**

* *Attempt* ***ALL*** *the* ***Eight*** *questions in section* ***A*** *and not more than* ***Five*** *Questions from Section* ***B****.*
* *Any additional questions answered will not be marked*
* ***All*** *working* ***must*** *be shown clearly.*
* *Begin each answer on a fresh sheet of paper.*
* *Graph papers are provided.*
* *Silent non- programmable scientific calculators and mathematical tables with a list of formulae may be used.*

**SECTION A (compulsory)**

1. Solve the equation . ***(5 marks)***
2. Expand in descending powers of x, stating the first three non zero terms and the values of x for which the expansion is valid. ***(5 marks)***
3. Solve the equation , for values of θ is the range  ***(5 marks)***
4. Find the equation of the normal to the curve which is parallel to the line ***(5 marks)***
5. Given that , find when . ***(5 marks)***
6. Points A and B are (1, 5, -7), and (4, 2, 1) respectively. Find the angle between line AB and plane . ***(5 marks)***
7. Find . ***(5 marks)***
8. Find the equation of lines which bisect angles formed by the straight lines

and ***(5 marks)***

**SECTION B** *(Answer not more than* ***five****)*

1. Given that , prove that .

Hence find,

(a) the exact value of , where P, q and r are integers.

(b) the values of θ between and for which ***(12 marks)***

1. (a.) Show that the locus given by is a circle. Find the coordinates of its centre and the length of its radius. ***(6 marks)***

(b.) If Find.

(i) Modulus of z.

(ii) Argument of z. ***(6 marks)***

1. A are points on the same plane

Find;

(a) Point of intersection of lines AB and TS. ***(7 marks)***

(b) Equation of the plane containing points A, B, T and S. ***(5 marks)***

1. Given that Express in the form .

Hence;

(i.) find the minimum value of , stating the value of x for which it occurs.

(ii) Evaluate . ***(12 marks)***

1. The tangent to the curve at point P meet the x – axis at the point Q. The point S is

(a) Prove that PQ is perpendicular to SQ. ***(9 marks)***

(b) Find a Cartesian equation for the locus of the point M, the mid- point of PS. ***(3 marks)***

1. Solve for x in the following equations

(a) ***(6 marks)***

(b) ***(6 marks)***

1. Sketch the graph of the curve with equation , indicating clearly the asymptotes. ***(12 marks)***
2. (a) Solve the differential equation.

for , given that when . ***(4 marks)***

(b) On a local poultry farm, the rate at which the birds are decreasing due to a certain disease is proportional to the square of the number of birds present. Initially there were 600 birds and after 10 days there was 500 birds.

(i) Form a different equation relating number of birds x after time t days. And solve it.

(ii) find when there will be only 300 birds on the farm. ***(8 marks)***

***End-***