P425/1

**PURE MATHEMATICS**

PAPER 1

**AUGUST 2016**

3 HOURS

**UGANDA ADVANCED CERTIFICATE OF EDUCATION**

**INTERNAL MOCK EXAMINATION SET 2**

**PURE MATHEMATICS**

Paper 1  
3 hours

**INSTRUCTIONS TO CANDIDATES:**

* Attempt **ALL** the **EIGHT** questions in section **A** and any **FIVE** from section **B**.
* All working must be clearly shown.
* Mathematical tables with list of formulae and squared paper are provided.
* Silent, non-programmable calculators should be used.
* State the degree of accuracy at the end of each answer using **CAL** for calculator and **TAB** for tables.
* Clearly indicate the questions you have attempted in a grid on your answer scripts. ***DONOT*** *hand in question paper*.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Qn |  |  |  |  |  |  |  |  |  |
| Marks |  |  |  |  |  |  |  |  |  |

SECTION A (40 marks)

*Attempt* ***ALL*** *questions in this section*

1. Given that the equations  and  have a common root, show that . (5 marks)

2. is any point on the curve whose parametric equations are ,  The line joining the origin to is produced to  where  Describe the locus of . (5 marks)

3. Find the set of values of  satisfying the inequality: . (5 marks)

4. The points  and  have position vectors  and , determine the values of  given that the angle , O is the origin. (5 marks)

5. Prove that: . (5 marks)

6. The equation of a curve . Show that the gradient of the curve at the point for which  is . (5 marks)

7. The parametric equations of a curve are  and . Find  in terms of , simplifying your answer as far as possible. (5 marks)

8. Use the substitution  to find . (5 marks)

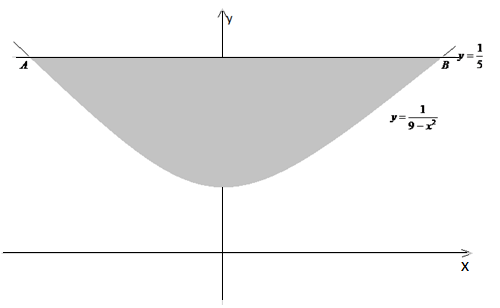
SECTION B

*Attempt ONLY 5 questions from this section.*

9a) Prove by induction that  is divisible by 7 for all . (5 marks)

b) At the beginning of the January 2012, Mr Ssekyewa deposits 100,000 Ug shs on a new bank account. The bank offers a 2% interest on account balance at the end of every month. If he continues depositing 100,000 Ug shs at the beginning of every month without withdrawing, find his account balance at the end of November 2012. (7 marks)

10a) The diagram shows part of the curve with equation , together with the line . The curve and the line meet at the points  and .



a) Find the coordinates of  and .

b) Calculate the area of the shaded region. (12 marks)

11. Expand , as far as and including term in  . Taking the first three terms and , evaluate  correct to 4 significant figures. (12 marks)

12a) The position vectors of points A,B, C are ,  and

 respectively. Prove that the points lie in a straight line and determine the ratio  (5 marks)

b) Prove that the vectors ,  and  are coplanar. (4 marks)

c) The vector equation of a line is given by . Find:

i) A vector parallel to this line.

ii) State one point through which the line passes. (3 marks)

13a) Prove that: . (6 marks)

b) A vertical pole  stands with its base  on a horizontal plane,

where,  and . A point  is situated on the horizontal plane at a distance  from , and angle . Show that .

(6 marks)

14. A variable chord through the point , intersects the parabola at points  and . Determine the equation of  and show that the locus of the midpoint of  is the parabola .

15a) Evaluate:  (6 marks)

b) Find:  (6 marks)

16. Sketch the curve by clearly finding the turning points and asymptotes. (12 marks)

**END**

S 6 MARKING GUIDE MOCK TERM 2 2015

|  |  |  |
| --- | --- | --- |
| 1. | Let the common root be . Then eliminate  to get  ,  eliminate  to get  and  ,  Thus  therefore, |  |
| 2. | If , then the parametric coordinates of are  ,  but  locus is an equation of an ellipse. |  |
| 3. | , ,    solution . |  |
| 4. | ,  ,  , ,  , |  |
| 5. | Let ,  thus  and  , |  |
| 6 | ,  For , |  |
| 7. | ,  , |  |
| 8. |  |  |
| 9a) | Let  For , divisible by 7.  For , divisible by 7.  For ,  When  Thus    which is still divisible by 8. Thus if its true for , then  is divisible by 7 for all . |  |
| b) | Let  End of January 2012, balance  End of February 2012, balance  End of  month, balance  End of November,  Thus balance      ALT   |  |  |  | | --- | --- | --- | | MONTH | DEPOSIT B.O.M | CASH END OF MONTH | | JANUARY | 100,000/= | 102,000/= | | FEBRUARY | 202,000/= | 206,040/= | | MARCH | 306,040/= | 312,160.8/= | | APRIL | 412,160.8/= | 420,404.016/= | | MAY | 520,404.016/= | 530,812.0963/= | | JUNE | 630,812.0963/= | 643,428.3382/= | | JULY | 743,428.3382/= | 758,296.905/= | | AUGUST | 858,296.905/= | 875,42.8431/= | | SEPTEMBER | 975,462.8431/= | 994,972.1/= | | OCTOBER | 1,094,972.1/= | 1,116,871.542/= | | NOVEMBER | 1,216,871.542/= | 1,241,208.973/= | |  |
| 10a) | ,  solve  , ,  thus  and    ,  If  , for |  |
| 11. | =  =  =  =  =  If ,    = 3.41975  3.420 correct to 4 significant figures.  ALT        Thus |  |
| 12a) | ,  ,  is  Thus since the AB is a scalar multiple of BC, then A,B,C are collinear. |  |
| b) | For coplanar vectors , , where  are scalars.  So, , thus  solving to get  Check using equation (iii) L.H.S =  = R.H.S  Since the value of  are consistent, then the vectors are coplanar. |  |
| c) | Note: Parallel lines have the same direction ratios.  , so either  or are parallel to the line. |  |
| ii) |  |  |
| 13a) | .      But        as required |  |
| b) | ,  ,    ,  as required |  |
| 14. | The gradient of  Hence, the equation of chord  is  ,  Thus the equation is  Given that the point lies on the chord,  thus .  The coordinates of  are ,  to obtain the cartesian equation,  , , ,  , so equation of locus is . |  |
| 15a) | let |  |
| b) | Let ,   =   Let  Solving,  Thus  = |  |
| 16. | Intercepts: For , thus .  Turning points:  ,  and   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | L |  | R | L |  | R | | Sign of |  |  |  |  |  |  |     As ,  so, vertical Asymptotes:  As .  is the horizontal asymptote.  Region table:   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |