475/1

ADD. MATHS

Paper 1 Jul./ Aug. 2012

– hours

DEPARTMENT OF MATHEMATICS

MOCKS EXAMINATIONS

Uganda Certificate of Education

ADDITIONAL MATHEMATICS

Paper 1

2 hour 30 minutes

INSTRUCTIONS TO CANDIDATES:

Attempt any *eight* questions.

All working **must** be shown clearly.

All questions carry **equal** marks.

Mathematical tables and squared papers are provided.

Turn over

1. (a) Find the values of for which the equation $x^2 - 2kx + 3k + 4 = 0$ has equal roots.

(b) Given that $\sqrt{37 + 20\sqrt{3}} =_p + q\sqrt{3}$, find the values of and . (07 marks)

2. (a) Solve the equations: (i) $4^{x} - 2^{x+1} - 15 = 0$, (04 marks)

(ii)
$$-\frac{1}{x} + - = -, x - .$$
, (05 marks)

(05 marks)

(iii)
$$x \cdot 2x$$
 . (03 marks)

3. (a) Given that
$$s = \frac{-a}{+a}$$
, find in terms of :
(i) (ii) sec + cot . (07)

marks)

(b) Solve the equation $2\cos ec^{-2} x + \cot x = 3$ for $0^{-0} \le x \le 180^{-0}$. (05 marks)

4. The first, third and eleventh terms of an arithmetic progression(A.P) are also the first, second and third terms of a geometric progression (G.P). Given that the first term of the A.P is 2, find the:

marks)

(ii) sum of the first 10 terms of the A.P, (04

marks)

(iii) number of terms of the G.P that give a total of 699050. (04 marks)

5.(a) Differentiate with respect to :

(i) $1 - x^3 \sqrt{1 + x}$ (ii) (06)

marks)

(b) Determine the maximum and minimum values of the function

$$= \frac{4}{x} + \frac{4}{1-x}, (06 \text{ marks})$$
6 (a) Evaluate $\frac{\pi}{6} \cos^2 x x$. (05 marks)
(b) Find the area of the region bounded between the curve $= +x - x^2$ and the line
7. In a triangle ABC, $AB = 9 cm$, $AC = 12 cm$, angle and
. Find the:
(i) size of angle ,
(ii) the length of ,
(iii) the area of the triangle. (12 marks)
8. (a) Two points A and B have coordinates , and , respectively. P is
a point which moves such that $AP^2 + PB^2 = 34$.
(i) Show that the locus of P is a circle,
(ii) Find the radius and centre of the circle. (08
marks)
(b) Find the length of the tangent from the point , to the circle in
(a) (i) above. (04)
9. (a) Given the vectors $\mathbf{a} = 2\mathbf{i} - 3\mathbf{j}, \mathbf{b} = -2\mathbf{i} + \mathbf{j}$ and $\mathbf{c} = -4\mathbf{i} - 5\mathbf{j}$, find
(i) the modulus of $\mathbf{a} -$ and $=\mathbf{a} + +\mathbf{c}$.
(ii) the angle between and . (07
marks)
(b) Points P, Q and R have position vectors $2\mathbf{a} - 5\mathbf{b}, 5\mathbf{a} - \mathbf{b}$ and $11\mathbf{a} + 7\mathbf{b}$
respectively. Show that P, Q and R are collinear and find
(05 marks)
10.(a) Use the matrix method to solve the simultaneous equations
 $x - 3y + 3 = 0$
 $-5x + 2y = -11$ (06 marks)

- (b)A transformation maps triangle ABC whose vertices are A(1, 0), B(0, 1) and C(2, 1) onto the triangle ' ' 'whose vertices are A'(- 2, 0), B(0, 2) and C(- 4, 2) respectively. Find the matrix of transformation and describe it fully. (06 marks)
- 11. A and B are points whose position vectors are and respectively. Given that P divides AB in the ratio and another point C which is in straight line with P is such that 3PC = 2 B. Find:
 - (i) the position vectors of P and C,
 - (ii) C an CB,
 - (iii) the ratio : . (12 marks)

12. (a) Given the matrices $\mathbf{A} = \frac{1}{2} - \frac{1}{1}$ and $\mathbf{B} = \frac{1}{4} - \frac{1}{1}$, show that $(\mathbf{A} + \mathbf{B})^2 = \mathbf{A}^2 + \mathbf{B}^2$. (06 marks)

(b) Given that $= \frac{1}{0} \frac{2}{1}$ and is a identity matrix, obtain the values of and such that $D^2 = pD + qI$. (06 marks)

End