JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF HEALTH SCIENCES

UNIVERSITY EXAMINATIONS

END SEMESTER EXAMINATIONS

YEAR 1 SEMESTER I

SMA 1111 MATHEMATICS I

TIME 2 HRS   **December 2013**

ANSWER QUESTION 1 AND ANY OTHER TWO QUESTIONS

QUESTION 1   **(30 MARKS)**   **COMPULSORY**

a. A set A is defined as $A = \{a,b,c\}$. determine the power set of A   (3 marks)

b. A line passes through a point *P(2,6)* and cuts the *x-axis* at *x=4*, determine its equation in the form *y=mx+c*   (3 marks)

c. Solve the quadratic equation below.
$2x^2+13x+6=0$ (3 marks)

d. Write down the surd $\sqrt{42525000}$ in its simplest form.   (3 marks)

e. Simplify $\dfrac{\left(x^4 y^3 z^{-2}\right)^3 \left(x^6 y^4 z^2\right)^{\frac{1}{2}}}{x^2 yz^{-3}}$ (3 marks)

f. Evaluate $\dfrac{\log 243 + \log 27 - \log 81}{\log 9}$ (3 marks)

g. Expand $(x + y)^5$ (3 marks)

h. determine the mean, mode and median of the following data   (5 marks)
12, 11, 14, 17, 24, 19, 21, 10, 26, 24

i. Evaluate the following logarithms   (4 marks)
$\log_4 64 + \log_{11} 121$

QUESTION 2   **(15 MARKS)**

a. Three sets are defined as
   A={2,4,5,7,9,11,13,15,16,19,20} B={2,4,6,8,10,12,14,16,18} and
   C={1,2,3,5,7,11,13,17,19,23}
   Determine
   $A \cup B$
   $(B \cap C) \cup (A \cap C)$
   $(A \cup C) \cap (B \cup C)$

b. A universal set U is defined as a set of all numbers from 1 to 10. Two other
   sets P and Q are defined in such away that P is the set of all even numbers
   that lie between 1 and 10 while Q is the set of all odd numbers that lie
   between 1 and 10.
   Determine   i. $P^C \cup Q^C$
                ii. $P^C \cap Q^C$

QUESTION 3   **(15 MARKS)**

a. A line L1 passes through P(3,7) and Q(6,16)
   i)   Determine its equation in the form $y=mx+c$ hence state the
         coordinates of its y- intercept   (3 marks)
   ii)   Determine the equation of a line L2 that is parallel to the line L1
         above and passes through the origin   (3 marks)
   iii) Determine equation of another line L3 that is perpendicular to L1 and
         passes through (4,6)   (3 marks)
b. Determine the meeting point of the two lines whose equations are given as
   $2y + 3x = 23$ and $5y - 2x = 10$ (4 marks)
c. Determine the acute angle that lies between the line *2y=x-6* and *x-axis*

QUESTION 4   **(15 MARKS)**

a. Solve the following quadratic equations using the stated method

i) Factorization method

       $3x^2 + 11x + 10 = 0$ (3 marks)

ii) Completing square method

       $2x^2 + 14x + 24 = 0$ (4 marks)

iii) Quadratic formula method

       $3x^2 - 11x - 4 = 0$ (3 marks

b. The length of a rectangle is 9cm longer than its width. Given that its area is 22cm^2. Determine its perimeter and the length of its diagonal   (5 marks)

QUESTION 5   **(15 MARKS)**

a. Simplify the following surds $\left(3\sqrt{5} + 4\sqrt{2}\right)\left(6\sqrt{5} - 11\sqrt{2}\right)$ (3marks)

b. Evaluate $\dfrac{6\sqrt{3} + 3\sqrt{5}}{7\sqrt{3} - 2\sqrt{5}}$ in the form $a + b\sqrt{c}$ hence state the values of a, b and c

c. Evaluate the logarithms below   (4 marks)

      $\dfrac{\log 625 + \log 125 + \log 5^7}{\log 25}$ (3 marks)

d. Expand $\left(2x + 3y\right)^6$ (5 marks)