JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR THE DIPLOMA IN COMMUNITY HEALTH
FIRST YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR

COURSE CODE: **SMA 2111**
COURSE TITLE: **MATHEMATIC I**
EXAM VENUE:
STREAM: **DIPLOMA IN COMMUNITY HEALTH**

DATE:…… **EXAM SESSION …….**

TIME: **2 HOURS**

Instructions:

1. **Answer all questions 1 and any other 2 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

a) Let $U = \{a, b, c, d, e, f, g, \ h\}$ be the universal set, $A = \{a, b, h\}$, $B = \{\ c, d, \ g, \ h\}$ and $C = \{\ a, b, e, f \ \ h\}$. (7 marks)

i) $A \cap B$ (2 marks)

ii) $A \cup B \cup C$ (2 marks)

iii) A^c (2 marks)

iv) $Card\ (B)$ (1 marks)

v) P(A) (3 marks)

b) Using the figures in the table below. Estimate (10 marks)

(i). Mean

(ii). Median

(iii). Modal Class

Class	10-15	15-20	20-25	25-30	30-35	35-40
frequency	25	40	36	30	20	15

c) Write each of the logarithmic equations into exponential form (2 marks)

i) $\log_5^{125} = 3$

ii) $\log_{10}^{100} = 2$

d) Given $\tan\theta = \frac{12}{5}$. Find $\cos\theta$ and $\sin\theta$ (4 marks)

e) Use binomial theorem to expand $(X + 2)^5$ (4 marks)

QUESTION TWO

a) Find the length of the arc of a circle of radius 2 meters subtended by central angle 303^0 (3 marks)

b) Convert each angle into radians (2 marks)

i) 107^0

ii) -90^0

c) Without using a calculator $6tan45^0 - 8cos60^0$. (4 marks)

d) Find the power set of $A = \{a, b, c\}$ (4 marks)

e) Write down the first three terms of the sequence (3 marks)

(i) $b_n = \frac{1}{3^{n-1}}$

(ii) $d_n = n^2$

(iii) $(-1)^n.n$

f) Expand $(2x + 3)^5$ (5 marks)

QUESTION THREE

a) Convert each angle in radians to degrees (3 marks)

i) $\frac{-\pi}{4}$

ii) $\frac{-5\pi}{6}$

iii) 4π

b) Given the $Sin\theta = \frac{1}{3}$ and θ is acute angle. Find the exact value of $Cos\theta$ and $\tan\theta$.

(4 marks)

c) Complete the table below (4 marks)

Radians	Degrees	$Sin\theta$	$Cos\theta$	$\tan\theta$
$\frac{\pi}{6}$		$\frac{1}{2}$		
$\frac{\pi}{4}$				1
	60		$\frac{\sqrt{3}}{2}$	

d) Use quadratic formula to evaluate $9x^2 - 6x + 1 = 0$ (4 marks)

e) Rationalize $\frac{\sqrt{2}+3}{\sqrt{3-\sqrt{2}}}$ (4 marks)

f) Evaluate (2 marks)

i) ${}^6C_3$

ii) ${}^5C_2$

QUESTION FOUR

a) To save her daughter's college education Ms. Miranda decides to put ksh. 5,000 aside every month in a credit union paying 10% interest compounded monthly. She thus begins savings program when her daughter is 3 years old.
   i) How much will she have saved by the time she makes 180thdeposit. (3marks)
   ii) How old is her daughter at the time. (2 marks)

b) Evaluate. (2 marks)
   i) ${}^{3}P_{2}$
   ii) ${}^{7}P_{3}$

c) Use binomial theorem to evaluate $(x+2)^4$. (4marks)

d) In how many ways can a committee of 2faculty members and 3 students be formed if 6 faculty members and 10 students are eligible to serve in the committee. (3marks)

e) Simplify $(2x^3)$ X $5x^4$ / 2^2X5^2 (3marks)

f) Given the geometric sequence; 1, 3, 9,… (3 marks)

   Find (i) The common ratio.

   (ii) The 10th term of the sequence.

QUESTION FIVE

a) The eight term of arithmetic sequence is 8 and the twentieth term is 44. (5 marks)
   i) Find the first term
   ii) Common difference
   iii) Find the sum of the first twenty terms of the sequence

b) Given $f(x) = x^2 + 5x$, $g(x) = \frac{3x}{x^2 - 4}$. Find (5 marks)
   i) $f(2)$
   ii) $g(3)$
   iii) $fg(x)$

c) Solve the equation $(2y+1)(y-1) = (y+5)(2y-5)$ (5 marks)

d) Express in logarithm form (2 marks)
   i) $a^m = n$
   ii) $2^4 = 16$

e) Solve $2y^2 - 3y - 1 = 0$ (3 marks)