JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTURIAL SCIENCE

UNIVERSITY EXAMINATION FOR DIPLOMA IN COMMUNITY HEALTH

SPECIAL EXAM 2020/2021

MAIN REGULAR

COURSE CODE: SMA 2111

COURSE TITLE: MATHEMATICS I

EXAM VENUE **STREAM: Diploma in community health**

DATE:…… **EXAM SESSION: ONE**

TIME: $1^1/_2$ HOURS

Instructions:

1. **Answer ONE and any other two questions only.**
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 COMPULSORY (30 MARKS)

a) The first term of an arithmetic sequence is 12. The seventh term is 36 and the last term is 144.
   i) Find the common difference (5 marks)
   ii) Find the number of terms in the sequence
   iii) Find the sum of the terms in the sequence

b) Convert each in radians to degrees (2 marks)
   i) $\pi/6^{r}$
   ii) $5\pi/8^{r}$

c) Given $\sin\theta = 3/5$. Find $3\tan\theta$ and $\cos\theta$ (4 marks)

d) Let $U = \{1,2,3,4,5,6,7,8,9\}$, $P = \{2,3,5,7\}$, $N = \{1,3,5,7,9\}$, $F = \{2,5,8\}$ and $E = \{2,4,6,8\}$. Find:
   i) Card*(P)* (7 marks)
   ii) $N \cup P$
   iii) $E \cap F$
   iv) $\wp(F)$
   v) N^{c}

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

f) Given two functions $f(x) = 2x+3$ and $g(x) = x^{2}$. Find: (5 marks)
   i) $f(1)$
   ii) $g(2)$
   iii) $fg(x)$

g) Solve for x in $x^{2} - 2x - 24 = 0$ (4 marks)

QUESTION TWO (20 MARKS)

a) Simplify $3(2x - 4y) - 4(x - 5y)$ (3 marks)

b) Expand $(x + 3)^{4}$ (4 marks)

c) Solve $y^{2} - 5x + 6 = 0$ (4 marks)

d) How many different committees of seven people can be chosen from a group of ten people if only three qualify for chairmanship? (4 marks)

e) Evaluate : (5 marks)
   i) 5!
   ii) ${}^{7}P_{3}$
   iii) ${}^{9}C_{4}$

QUESTION THREE (20 MARKS)

a) A credit union pays interest of 16% per annum compounded quarterly on a certain savings plan. If ksh.10,000 is deposited in such a plan and the interest is left to accumulate. How much is in the account after two years. (4 marks)

b) Solve $2\log_3(x+4) - \log_3 9 = 2$ (4 marks)

c) Simplify $\frac{4\sqrt{2}}{\sqrt{5}}(\sqrt{2}+\sqrt{8})$ (4 marks)

d) Solve $9x^4 - 13x^2 + 4 = 0$ (4 marks)

e) Let $f(x) = x^2 + 3x - 1$ and $g(x) = 4x + 5$. Find $f \circ g(4)$ (4 marks)

QUESTION FOUR (20 MARKS)

A. One hundred joust students were asked about their leadership of three magazines: Jooust weekly, Somo times and Fortune. The following results were obtained, 1 student read all the three, 6 read fortune and joust weekly, 10 read somo times and joust weekly, 20 read fortune and somo times, 15 read joust weekly, 40 read somo times and 25 read the fortune. (6 marks)

   a. Represent the above information on venn diagram
   b. How many read none of these
   c. How many people read fortune only

B. Expand $(1+\frac{1}{2}x)^5$ and use it to solve $(1.05)^5$. (5 marks)

C. Find the sum of the first 8 terms of the series: $20 + 10 + 5 + \cdots$. (4 marks)

D. Prove the identity $\sin^2\theta + \cos^2\theta = 1$ (5 marks)

QUESTION FIVE (20 MARKS)

The table below shows the distribution of marks of 40 candidates in a test.

MARKS	1-10	11-20	21-30	31-40	41-50
FREQUENCY	2	2	3	9	12
MARKS	51-60	61-70	71-80	81-90	91-100
FREQUENCY	5	2	3	1	1

Construct a frequency distribution table and use it to find mean, median, standard deviation and variance. (20 marks)