JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTURIAL SCIENCE

UNIVERSITY EXAMINATION FOR CERTIFICATE IN COMMUNITY HEALTH

SPECIAL RESIT 2020/2021 ACADEMIC YEAR

MAIN REGULAR: SPECIAL EXAM

COURSE CODE: SMA 1111

COURSE TITLE: MATHEMATICS I

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

DATE:…… **EXAM SESSION: ONE**

TIME: 2.00 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) Without using a calculator, evaluate $\cos\theta$ and $\tan\theta$ if $\sin\theta = {}^{12}\!/_{37}$. (3 marks)

b) Define the following terms: power set, subset and disjoint sets. (3 marks)

c) Let $U = \{1,2,3,4,5,6,7,8\}$ $A = \{2,3,4\}$ $B = \{5,6,2,1\}$. Find card(B), $A \cap B$, $A \cup B$, $B \setminus A$ and $P(A)$. (7 marks)

d) Expand $(2x-3)^4$ (3 marks)

e) Determine the value of x $\log_5(x+6) + \log_5(x+2) = 1$ (4 marks)

f) Work out ${}^7P_4$ and ${}^6C_2$ (4 marks)

g) Use quadratic formula to evaluate $x^2 + 8x + 5 = 0$ (3 marks)

h) Suppose $f(x) = x^2 + 3x - 1$ and $g(x) = 2x + 3$. Find $f \circ g(3)$ (3 marks)

QUESTION TWO (20 MARKS)

a) Let $U = \{a, b, c, d, e, f\}$ $B = \{a, c, e,\}$ $X = \{a, b, d, f\}$ and $M = \{b, e, f\}$. Find (10 marks)

(i) $P(M)$

(ii) $X \cap M$

(iii) $B \cup X$

(iv) X^c

(v) Card(B)

(vi) Use venn diagram to represent the regions $X \cap M$ and $B \cup X$

b) Use binomial theorem to expand $(x+2)^5$ and hence evaluate 2.1^5 (5 marks)

c) Simplify $\frac{(3x+2)^2}{6x} \times \frac{x^4}{6x+4}$ (3 marks)

d) Solve the linear equation $\begin{aligned} 4x + 3y &= 5 \\ 2x - 6y &= -5 \end{aligned}$ (3 marks)

QUESTION THREE (20 MARKS)

a) Given $f(x) = x^2$ and $g(x) = 3x + 4$. Evaluate $f \circ g(2)$ and $g \circ f(3)$ (4 marks)

b) Ten books are to be arranged in a shelf. How many ways can this be done (2 marks)

c) How different committees of seven people can be chosen from ten people if only three people qualify for chairmanship. (4 marks)

d) Solve the equation $x^2 + 8x + 7 = 0$ (4 marks)

e) Write each of the following exponential equations into logarithm form (2 marks)

i) $64 = 8^2$

ii) $r^n = W$

f) A student wishes to spend ksh. 100 at a bookshop. All items are assumed to have same fixed price. She can buy five books and eight spring files. Alternatively, she can buy ten books and six spring files. Represent the above information as a pair of simultaneous equation and find the cost of each item. (4 marks)

QUESTION FOUR (20 MARKS)

a) Find the sum of the first 8 terms of series 20+10+ 5+… (4 marks)

b) Change the following degrees into radians (2 marks)

i) 230^0

ii) 150^0

c) Evaluate $\log_3(4x - 7) = 2$ (3 marks)

d) Change into exponential form $\frac{1}{9} = 3^{-2}$ (2 marks)

e) A credit union pays interest of 8% per annum compounded quarterly on certain savings plan. If ksh. 1000 is deposited in such a plan and interest is left to accumulate. How much is in the account after one year? (3marks)

f) Rationalize the denominator $\frac{\sqrt{3}}{\sqrt{7}-\sqrt{2}}$ (3 marks)

QUESTION FIVE (20 MARKS)

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

b) How many terms of series 2+6+10+… need to be taken for the sum equal to 1800? (3 marks)

c) Find the exact values of cos, sin, cot and cosec of the positive angle θ if (4,-3) is a point on the terminal side. (4 marks)

d) The data below represents the marks of students taking mathematics at JOOUST. (10 marks)
70, 65, 39, 23, 45, 59, 83, 89, 55, 23, 59, 39, 23, 69, 72, 78, 47
Find the mean, mode, median and range.