

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATION
RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS
EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
EDUCATION AND BACHELOR OF SCIENCE IN APPLIED COMPUTER SCIENCE

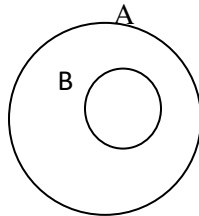
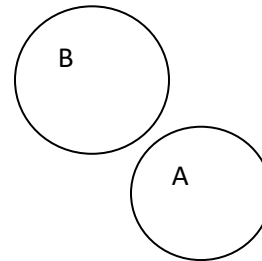
MATH 122: BASIC MATHEMATICS**STREAMS:****TIME: 2 HOURS****DAY/DATE: MONDAY 01/11/2021****8.30 A.M - 10.30 A.M.****INSTRUCTIONS:**

- Answer ALL Questions.

QUESTION ONE

- a. Shade the indicated operations in the given Venn diagrams

(4 marks)

(i) $(A \cup B)$ (ii) $(A \cap B)$

- b. In an examination 60 candidates sat for Mathematics, 80 sat for English and 50 sat for Chemistry. If 20 sat for Mathematics and English, 15 for English and Chemistry, 25 for Mathematics and Chemistry and 10 sat for all the three subjects. Illustrate this information on a Venn diagram and hence determine the total number of candidates who sat for the examination. (4 marks)
- c. Prove that $p \Rightarrow (q \wedge r)$ and $(p \Rightarrow q) \wedge (p \Rightarrow r)$ are logically equivalent (4 marks)
- d. Construct the truth table for the following proposition to determine whether it is a fallacy, tautology or an indeterminate. $(p \rightarrow q) \leftrightarrow [\sim q \rightarrow (\sim p \wedge \sim q)]$ (4 marks)

- e. If $z_1 = 1 - i, z_2 = -7 + i$. Express $\frac{z_1 - z_2}{z_1 z_2}$ in form of $a + bi$ and (r, θ) (4 marks)
- f. Find the constant term in the expansion of $\left(2x + \frac{1}{x}\right)^{10}$ (4 marks)
- g. In how many ways can 3 girls and 5 boys be arranged in a row so that all the three girls are together. (3 marks)
- h. Solve for n in $n C_2 = 28$ (3 marks)

QUESTION TWO

- a. Find the sum of the series $0.3 + 0.6 + 0.9 + \dots + 3.3$ (4 marks)
- b. Find the sum to infinity of the series $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{16} + \dots$ (4 marks)
- c. The 1st, 3rd and 5th terms of a GP form the 1st 3 consecutive terms of an AP. Obtain the 10th term of the AP given that the 1st term of the AP is 3. (4 marks)
- d. Use the binomial expansion of $(1 + x)^{\frac{1}{2}}$ to approximate $\sqrt{10}$ up to the 5th term. (4 marks)
- e. Given that $\sin A = \frac{4}{5}$ and $\cos B = \frac{3}{5}$, evaluate $\tan(A+B)$ (4 marks)

QUESTION THREE

- a. Solve the equation $\sin 4x + \sin 2x = 0$ in the interval $0 \leq x \leq 360$ (4 marks)
- b. Given that $f(x) = 2^x$, $g(x) = x + 3$ and $h(x) = x^2$, obtain
- (i). $f \circ g(x)$ (3 marks)

(ii). $f \circ g(1)$ (1 mark)

(iii). $(g \circ h(x))^{-1}$ (3 marks)

c. Determine the truth value of each of the following statements (4 marks)

i. $3 + 2 = 6$ and $4 + 4 = 8$

ii. Paris is in England or $3 + 4 = 7$

iii. $2 + 2 = 4 \rightarrow 1 + 1 = 5$

iv. Paris is in England if and only if $2 + 2 = 5$

d. Prove that $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$ (5 marks)

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