KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: MATH 110

COURSE TITLE: BASIC MATHEMATICS

STREAM: SESSION I

DAY: THURSDAY

TIME: 9.00 – 11.00 A.M.

DATE: 12/08/2010

INSTRUCTIONS:

Attempt question **ONE** and any other **TWO** questions.

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

(a) Expand $\frac{1}{(2+x)^2}$ in ascending powers of x, as far as the term in x^3 using Binomial theorem. **(6 marks)**

(b) Derive the formula of sum of Arithmetic progression (A.P) given that 1st term is "a" and nth term is $L = a + (n-1)d$. Hence find the sum of all the terms in a sequence.

$1, -3/2, -4,$ ----------, -49 **(12 marks)**

(c) Prove that $\sqrt{2}$ is irrational number. **(4 marks)**

(d) Using Vern's diagram show $(A \cap B)^1 = A^1 \cup B^1$ **(4 marks)**

(e) Solve the equation $\sin(x + 15^\circ)\cos(x - 15^\circ) = 0.5$ for value of x from 0° to 360° inclusive. **(4 marks)**

QUESTION TWO (20 MARKS)

(a) Using truth table show that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ **(7 marks)**

(b) Prove that $\sin 3A = 3\sin A - 4\sin^3 A$. **(7 marks)**

(c) Use mathematical induction to prove that
$1^2 + 2^2 + ----- + n^2 = \frac{1}{6}n(n+1)(2n+1)$ **(6 marks)**

QUESTION THREE (20 MARKS)

(a) Differentiate between permutation and combination. **(3 marks)**

(b) In how many ways can r objects be chosen from n unlike objects? **(5 marks)**

(c) In how many different ways can the word Mississippi be written without repetition? **(4 marks)**

(d) In how many ways can committee of 4 be chosen from 4 girls and 5 boys if the committee must have at most 2 girls. **(5 marks)**

(e) A mixed hockey team containing 5 men and 6 women is to be chosen from 7 men and 9 women. In how many ways can this be done? **(3 marks)**

QUESTION FOUR (20 MARKS)

(a) Let $f(x) = x + 5$ and $g(x) = x + 2$
Find;

(i) fog **(2 marks)**

(ii) gof **(2 marks)**

(iii) $\{f(x)g(x)\}^{-1}$ **(4 marks)**

(b) Derive the sum of the G.Ps given 1st term is a and common ratio is r. Hence find the smallest number of terms of the G.P $8 + 24 + 72 + ----$, that will give a total greater than 6,000,000? **(7 marks)**

(c) If $\sin(x + \alpha) = \cos(x - \beta)$ find $\tan x$ in terms of $\propto$ and β. **(5 marks)**

QUESTION FIVE (20 MARKS)

(a) How many permutation are there of r objects chosen from n unlike objects? **(7 marks)**

(b) How many even numbers greater than 50,000 can be formed with digits 3, 4, 5, 6, 7, 0 without repetitions. **(7 marks)**

(c) Show that $\frac{p}{q} + \sqrt{2}\frac{n}{m}$ is irrational. **(6 marks)**