KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE AND BACHELOR OF ECONOMIC & MATHEMATICS

COURSE CODE: **MATH 110**

COURSE TITLE: **BASIC MATHEMATICS**

STREAM: **Y1S1**

DAY: **FRIDAY**

TIME: **9.00 – 11.00 A.M.**

DATE: **19/03/2010**

INSTRUCTIONS:

Attempt question **ONE** and any other **TWO** Questions

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

(a) Draw the truth table of the following propositional form $p \Rightarrow \sim q \sim (V \sim r)$ **(5 marks)**

(b) Use the binomial theorem to expand $\frac{1}{(1-x)}$ in ascending power of x, as far as the term in x^3. **(5 marks)**

(c) Prove that $\frac{\sqrt{3}+1}{\sqrt{3}+1}$ is irrational. **(5 marks)**

(d) Using Boolean Algebra show that$(A \cup B)^1 = A^1 \cap B^1$. **(5 marks)**

(e) The 3rd, 5th and 8th terms of an A.P are the consecutive terms of a G.P. Given that the first term of the A.P is 8 determine the common difference d and the common ratio r. **(5 marks)**

(f) Using reasoning technique prove that $\boldsymbol{A - B = A \cap B^1}$ **(5 marks)**

QUESTION TWO (20 MARKS)

(a) Define composition of functions **(3 marks)**

(b) Given $f(x) = x^3 + 4x^2 + 5x + 2$, $g(x) = x^2 + 1$
$h(x) = x + 1$, $n(x) = 2$
Find;

(i) $f(x)\ g(x)$ **(3 marks)**

(ii) fog **(3 marks)**

(iii) $fogoh$ **(3 marks)**

(iv) $fogohon$ **(3 marks)**

(v) $\{(h(x))^2\}^{-1}$ **(3 marks)**

(vi) $\frac{f(x)}{h(x)}$ **(2 marks)**

QUESTION THREE (20 MARKS)

(a) Derive the formula of A.P and G.P and hence find the sum of $\{X_n\} = 0.\dot{4}\dot{5}$ **(10 marks)**

(b) Prove the following by mathematical induction;

$1^2 + 2^2 + --- + n^2 = \frac{1}{6}n(n+1)(2n+1)$ **(5 marks)**

(c) Using the Binomial theorem estimate the value of $\sqrt{10}$. **(5 marks)**

QUESTION FOUR (20 MARKS)

(a) Without using tables or calculators find the value of $\sin(120^0 + 45^0)$ **(6 marks)**

(b) If $\sin(x + \alpha) = \cos(x - \beta)$ Find $\tan x$ in terms of α and β **(4 marks)**

(c) Derive the sine and cosine Rules **(10 marks)**

QUESTION FIVE (20 MARKS)

(a) What do you understand by the following terminologies

(i) Permutation **(2 marks)**

(ii) Combination **(2 marks)**

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

(c) Evaluate $12_{C_9} - 10_{P_7}$ **(5 marks)**

(d) How many even numbers, greater than 2000, can be formed with digits 1, 2, 4, 8, if each digit may be used only once in each number? **(5 marks)**