KABARAK   **UNIVERSITY**

UNIVERSITY EXAMINATIONS
2009/2010 ACADEMIC YEAR
FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: **MATH 110**

COURSE TITLE: **BASIC MATHEMATICS**

STREAM: **SESSION I**

DAY: **WEDNESDAY**

TIME: **2.00 – 4.00 P.M.**

DATE: **07/04/2010**

INSTRUCTIONS:

Answer **QUESTION ONE** and **ANY OTHER TWO** questions.

PLEASE TURN OVER

QUESTION ONE (COMPULSORY) – (30 MARKS)

(a)   Use the binomial theorem to expand $\sqrt{1+2x}$ in ascending powers of x. State the values of x for which the expansion is valid.   (8mks)

(b)   Define a 'contradiction' and hence show that $(\sim p \wedge \sim q) \wedge (p \vee q)$ is contradiction.   (5mks)

(c)   Determine the relationship between the following propositional forms; $p \wedge (q \vee r)$ and $(p \wedge q) \vee (p \wedge r)$ (6mks)

(c)   Prove that $A\text{-}B = A \cap B^1$ (Use reasoning technique)   (4mks)

(d)   Write short notes on all the subsets of real line system.   (6mks)

(f)   Use venn diagram to show $(A \cup B)^1$ (1 mk)

QUESTION TWO (20 MARKS)

(a)   Express the following compounds in symbols.

    (i)   He is not either good at English or good at Chemistry   (2mks)
    (ii)   He is not good at both English and Chemistry   (2mks)
    (iii)   Its not the case that he is good at English and not at Chemistry   (2mks)
    (iv)   It is raining if and only if you are getting wet.   (2mks)
    (v)   I feel very good if and only if I do not go to bed early   (2mks)

(b)   Find the coefficient of x^{10} in the expansion $(3x - 2)^{12}$. (Use binomial theorem) and hence approximate the value of $(1.01)^{12}$ up to where x^3.   (5mks)

(c)   Show that in an interval (a,b) there is rational and an irrational number.   (5mks)

QUESTION THREE (20 MARKS)

(a)   Given the first term of an A.P. is a and the nth term is L, deduce the formula for the sum of A.P.s and hence use the formula to find the sum of the following A.P;

    x+2x +--------------+nx upto 14 terms   (8mks)

(b)   prove by mathematical induction that;

$$1^3 + 2^3 + ------- + n^3 = \frac{1}{4}n^2(n+1)^2$$ (6mks)

(c)   Derive the formula for finding the sum to infinity   (4mks)

(d)   In how many ways can 9 people sit at around table?   (2mks)

QUESTION FOUR (20 MARKS)

(a) What do you understand by the following terms:
    (i)   One-one mapping   (2mks)
    (ii)   Many – one mapping   (2mks)

(b) Given $f(x) \longrightarrow 3x+5$ and $g(x) \longrightarrow 4x+6$
    Find   (i) $f(x)g(x)$ (2mks)

    (ii) $(fg)^{-1}(x)$ (4mks)
    (iii) $(fog)^{-1}$ (4mks)

(c) Prove the identity
    $COS^2 A - COS^2 B = Sin(A+B)Sin(B-A)$ (6mks)

QUESTION FIVE (20Marks)

(a) Prove that $(A \cup B)^1 = A^1 \cap B^1$ by use of a truth table   (5mks)

(b) Using the Boolean algebra show that a+(b+c)=(a+b)+c   (5mks)

(c) Obtain the truth table of the following propositional form ~P=>q~Vr   (4mks)

(d) Show the originality of common ratios (sine &cosine) for:

    (i) $45°$
    (ii) $30°$ (6mks)
    (iii) $60°$