

KABARAK



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: 09/04/2009

INSTRUCTIONS:

Answer QUESTION ONE and ANY OTHER TWO questions.

PLEASE TURN OVER

QUESTION ONE (COMPULSORY) - 30MARKS

- (a) Show that $\sqrt{8}$ is an irrational number (6mks)
- (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 $A - B = A \cap B^1$ (Use reasoning technique) (4mks)
- (d) Write short notes on all the subsets of real line system. (4mks)
- (f) Use venn diagram to show
 - (i) $A \cap B$ (3mks)
 - (ii) $(A \cup B)^1$ (2mks)

QUESTION TWO (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 $\sim P \Rightarrow q \sim V r$ (4mks)
- (d) Show the originality of common ratios (sine & cosine) for:
 - (i) 45°
 - (ii) 30°
 - (iii) 60° (6mks)

QUESTION THREE (20Marks)

- (a) Given the first term of an A.P. is a and the n^{th} 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;
 $x + 2x + \dots + nx$ upto 14 terms (8mks)
- (b) prove by mathematical induction that;
 $1^3 + 2^3 + \dots + n^3 = \frac{1}{4} n^2 (n + 1)^2$ (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 (20Marks)

- (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) 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) He is 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)