



KENYATTA UNIVERSITY EXAMINATIONS 2010/2011
FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE (INFORMATION TECHNOLOGY)
SEIT 108: MATHEMATICS FOR IT

DATE: FRIDAY 3RD DECEMBER 2010

TIME: 2.00 P.M. - 4.00 P.M.

INSTRUCTIONS

Answer Question ONE and any other Two.

Question one

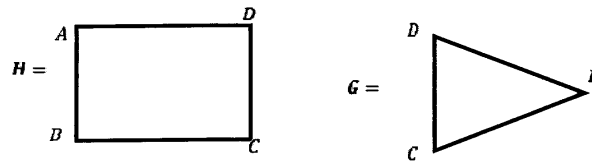
- a) Explain the terms
- i. Set
 - ii. Function 4mk
- b) By using truth tables or otherwise Are the following propositions logically equivalent?
- i. $\neg(p \vee q) \equiv \neg p \wedge \neg q$
 - ii. $\neg(p \rightarrow q) \equiv (\neg p \wedge q)$ 4mks
- c) Solve the following inequalities and draw their graphical representation
- i. $2x + 5 < x + 10$
 - ii. $2 \leq 5x - 3 < 7$ 6mks
- d) Suppose $A = \{x \mid -2 \leq x \leq 1\}$ and $B = \{2\}$,
- i. determine $A \times B$ 2MKS
 - ii. show a graphical representation of your answer 2MK
- e) Differentiate between a directed graph and an undirected graph 2mks
- f) Find dy/dx if
- i. $x^3 + y^3 - 3xy = 0$ 3mks
 - ii. $3x - x^3 + 5 = y$ 2mks
- g) Draw a binary tree for the expression $a + b \times c + d(f - 3) + z$ 5mks

QUESTION Two (20 mks).

- a) Solve for x in $\{3x - 5 \leq 4\}$ 2mks
- b) Given $A = \{x \mid |x - 1| < 2\}$ and $B = \{x \mid x \geq -2\}$, determine $A \times B$ and show the relation on a Cartesian coordinate 6mks
- c) Let $A = \{1, 3, 4, 5, 6, 7, 9, 13\}$ and $B = \{1, 5, 7, 11, 13\}$ and $C = \{5, 10, 15, 20\}$ determine
- i. $A \cup (B \cap C)$
 - ii. $(B \cup A) \cap C$
 - iii. $B \cap (A \cup C)$ 3MKS
- d) Let the functions f and g be defined by
 $f(x) = \sqrt{16 - x^2}$, $g(x) = 1 - x^2$
Describe the functions
- i. g/f 4mks
 - ii. f/g 4mks
- e) State the associative law in sets 1mk

Question Three

- a) Determine the domain of f if $f(x) = x^2 - 3$ 2mks
- b) Show the interval on the number line that satisfies the inequality $2 \leq 5x - 3 < 7$ 2mks
- c) Calculate each of the following integrals
- $\int (2 + x) dx$ 2mks
 - $\int \frac{x^2 - 4}{x - 2}, x \neq 2$ 6mks
- d) Consider the graphs below

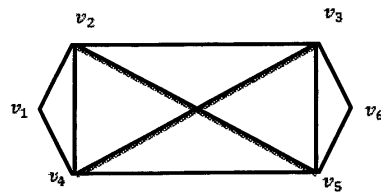


Determine

- $H \cup G$
 - $G \cup H$ 2MKS
- e) With an example, explain a tautology proposition 2mk
- f) State the following rules of inference
- Universal instantiation 2mks
 - Universal generalization 2mks

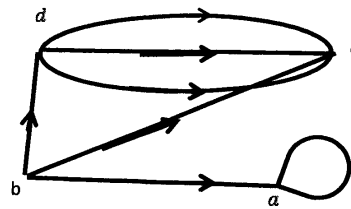
QUESTIONH FOUR (20mks)

- a) Find the degree of each vertex in the graph below.



6mks

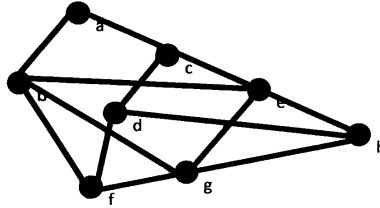
- b) find the in degree and the out degree of each vertex on the graph below



4mks

c) Find the antiderivative of $f(x) = x^2$

2mks



- i. Get the spanning tree from the graph below
- ii. What are the leaves of that tree
- iii. What are the levels of c and e in that tree

5mks

1mks

2mks

Question five (20mks)

a) Construct a truth table for each of the following

i. $p \wedge p(\neg q \vee q)$

6mks

ii. $(p \vee q) \vee (\neg p \wedge \neg q)$

6mks

b) List the ordered pairs in the following relation R from

$A = \{0,1,2,3,4,5,6\}$ and $B = \{0,1,2,3,4\}$ Where $a \in A, b \in B$ and $(a,b) \in R$ if

i. $a + b = 3$

ii. $a + b$

4mks

c) Find the domain of function f if $f(x) = 2x + 2$ for $0 < x < 2$

2mks

d) Explain the following terms

i. Proposition

ii. Relation

4mks