

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2016/2017**

**FIRST YEAR SECOND SEMESTER UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY**

**SMA 2100: DISCRETE MATHEMATICS**

**DATE: NOVEMBER, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER**

**TWO QUESTIONS**

**QUESTION ONE: 30 MARKS**

a. Define the following terms as used in discrete moths:-

i. Propositional statement.

ii. A set.

iii. Logic.

iv. Disjoint set.

b. Write each of the following as a conditional statement:- [3 marks]

i. One can pass this course only if one studies.

ii. A necessary condition for a person to vote is that, that person be registered.

iii. A sufficient condition for water to be salty is that it be taken from the pacific ocean.

c. Determine the domain and range of the following functions:-

i. y = x2+x-2 [3 marks]

x2-x-2

ii.

64-x2 [2 marks]

d. Given that f(x)=10x and g(x)=x+3,

Find fg(x) and (fg)-1x [3 marks]

e. Given that A=(0,1,2,3,4,5) and

B=(1,3,5,7,9,), Find the following:-

i. AVB

ii. ANB

iii. A-B

iv. B-A

v. ADB [7 marks]

f. Probably inductions that:-

12+22+32 +….+n2=n(n+1) (2n+1) [6 marks]

6

g. Construct a truth table for the proposition

P2q [2 marks]

**QUESTION TWO: 20 MARKS**

a. p is “the printer is off-line”

q is “the printer is out of paper”

r is “ the document has finished printing”

Write as English sentences as in a natural way as you can:

(i) pq (ii) r q (iii) q r (iv) 7(Pq) [8 marks]

b. Prove by contradiction that is an irrational number. [4 marks]

c. Construct truth tables for:-

i. p ( q r)

ii. (p ) (p r)

and hence show that there propositions are logically equivalent.

[8 marks]

**QUESTION THREE:20 MARKS**

a. Define p, and r as : p: mathematics is easy

q: mathematics in fun

r: mathematics is useful

Write in reasonable English, the proposition represented by:- [7 marks]

i) p ii) PVq iii) (PVq) iv) (Pq) r

v)np r vi) (p q) vii)q (p r)

b. Given u=(1,2,3,4,5,6,7,8,9,10)

A=(1,5,7,10) B=(5,6,8,10) and C=(4,6,8)

List the elements in the sets: [13 marks]

i)AnB ii)BnC iii)Ann(BnC) iv) (AvB)VC

v) B vi)(AnB)v(BnC) vii)AnB viii)ADB

**QUESTION FOUR: 20 MARKS**

a. If f (y) = 1 and g(x)=2x-1, h1x)=x2x4x-2,

x42,

Find:-

i) (fog)(x) ii)gvf)(x) iii)(hog)(x) iv)(goh)(x) [10 marks]

b. Given that f(x)= x2+2 and g(x)= ,

Find:-

i. The composite function (gof)(x) and its domain.

ii. The composite function (fog)(x) and its domain. [6 marks]

c. Define the following two statement and give their equivalent truth tables:-

i.

ii. Contradiction [4 marks]

**QUESTION FIVE: 20 MARKS**

a. Let f(x)=2x2 + x+5 and g(x)=3x2+2XY, find the following:-

i) Domain of f ii) Domain of g iii) (f+g)(x)

iv) Domain of (f+g)(x) v) (f-g)(x) vi) Domain of f.g(x)

vii) f/g(x) viii) Domain of f/g(x) [18 marks]

b. Explain the following terms:-

i. Predicate ii. Injection iii. Surjection

iv. Bijection [14 marks]