MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN INFORMATION TECHNOLOGY

DIT 103: MATHEMATICS FOR COMPUTING

DATE: 13/12/2017 **TIME: 2.00 4.00 PM**

INSTRUCTION:

Answer Question One and any other two questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Simplify using indices

i) $(3a^2b^3)^2 \times (27b^3a^6)^{\frac{1}{3}}$ (3 marks)

ii) $\frac{3x^2}{2y} \div \sqrt{\frac{81x^4}{16y^2}}$ (3 marks)

b) Convert

i) 17_{10} to binary (3 marks)

ii) 11.0101_2 to denary (3 marks)

iii) 249_8 to denary (3 marks)

c) Solve the following equations

i) $\frac{2}{3x-1} + \frac{3}{x+2} = 5$ (2 marks)

ii) $\frac{3}{x\_2} - \frac{2x}{x+1} = 1\frac{1}{2}$ (2 marks)

d) Given the set $A = \{1,3,5,6,7\}$ $B = \{3,4,5,8,9,7\}$ $U = \{0,1,2,3,4,5,6,7,8,9,10\}$

Write i) $A \cap B$ (2 marks)

ii) $B \cup A$ (2 marks)

iii) $\{A \cap B\}'$ (2 marks)

iv) $\{A \cup B\}'$ (2 marks)

v) Represent the sets in a veinn diagram (3 marks)

QUESTION TWO (20 MARKS)

a) Solve the following equations

I. $9^{x+1} + 3^{2x-1} = 28$ (5 marks)

II. $3^{2+x} = 5^{x-1}$ (5 marks)

b) Solve without using tables

$$\log_{10} 5 + \log_{10}(2x+1) = \log_{10}(x-4) + 2$$ (5 marks)

c) solve the simultaneous equations

$$8x - 5y = 10$$

$$6x - 4y = 11$$ (5 marks)

QUESTION THREE (20 MARKS)

Simplify

i) $\frac{\log 6 + \log\frac{1}{4}}{\log 3 - \log 2}$

ii) (5 marks)

$$\frac{\log_{10} 25 - \log_{10} 125 + \frac{1}{2}\log_{10} 625}{3\log_{10} 5}$$

(5 marks)

iii) $\sqrt{\frac{86.76 \div 0.03645}{9.463 \times 756.8}}$ (10 marks)

QUESTION FOUR (20 MARKS)

Use logarithms to evaluate

a) $\frac{0.00964 \times 2.1875}{0.003 \times 0.09}$ (4 marks)

b) Plot the graph of $-2x^2 + 3x + 6$ for the values of $x = -2 \quad to \quad x = 4$

Use the graph to find the roots of the following equation

i) $-2x^2 + 3x + 6 = 0$

$ii)\ -2x^2 + 3x + 2 = 0$

iii) $-2x^2 + 3x + 9 = 0$ (10mks)

c) $\sqrt{\frac{86.76 \div 0.03645}{9.463 \times 756.8}}$ (6 marks)

QUESTION FIVE (20 MARKS)

a) Solve the simultaneous equation

$6x - y = 5$

$5x + 2y = 7$ (5 marks)

b) Solve

i) $e^{2x} - 5e^x - 6 = 0$

(5 marks)

ii) $5.4^{x+3} \times 8.2^{2x-1} = 4.8^{3x}$ (5 marks)

c)

i) Determine the value of K such that x+3 is a factor of $x^3 + kx + 6$ (3 marks)

ii) Find c and d such that 1 and 2 are roots of the equation $x^3 - 4x^2 + cx + d = 0$
(2 marks)