MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN INFORMATION TECHNOLOGY

MATHS FOR COMPUTING

DATE: 4/8/2016 **TIME: 8:30 – 10: 30 AM**

INSTRUCTIONS:

Answer QUESTION ONE and Any other TWO Questions

QUESTION ONE (COMPULSORY)

a) Solve the following equations (3 marks)

$y = x^2 - 5x + 7$

$y = 2x + 1$

b) Solve $9x^2 - 12x - 1 = 0$ by competing the squares (3 marks)

c) Winnie and Steve are travelling to a church conference. The trip takes 2hrs for Winnie and 2.5hrs for Steve, since he lives 40 miles farther away. Steve travels 5mph faster than Winnie. Find the average rates (4 marks)

d) Solve (3 marks)

$$\frac{8a^2b^3}{3a^3b} \div \frac{4ab^2}{9a^3b^2}$$

e) Convert decimal number 12 to binary (2 marks)

f)

i) Find the value of $\frac{8!}{5!}$ (2 marks)

ii) Without using a calculator find the value for ${}_5C_3$ (2 marks)

g)

i) Define then term set (1 mark)

ii) Define cardinality of a set and give its symbolic notation (3 marks)

h) Draw a histogram for the following data (4 marks)

Daily wages	Number of workers
0-50	8
50-100	16
100-150	27
150-200	19
200-250	10
250-300	6

i) State the binomial theorem (3 marks)

QUESTION TWO

a) In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together? (4 marks)

b) The data below represents the scores by 150 applicants in an achievement text for the post of Botanist in a large company. Give your answer to 2 decimal place.

Scores	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Frequency	1	6	9	31	42	32	17	10	2

Estimate (12 marks)

(i) The mean score

(ii) The median score

(iii) The modal score

c) Using the following matrices A and B, to find AB (4 marks)

$$A=\begin{pmatrix}1 & -1 & 2\\ 5 & -4 & 3\\ 1 & -2 & -3\end{pmatrix} \qquad B=\begin{pmatrix}-2 & 6 & -2\\ -1 & 0 & 1\\ -2 & 1 & 0\end{pmatrix}$$

QUESTION THREE

a)

i. Expand the following using the binomial theorem (4 marks)

$(x^2-2a)^5$

ii. Find the coefficient of x^3 in $(1-2x)^5$ (4 marks)

iii. Fin the constant term in the expansion of $\left(x^2-\frac{2}{x}\right)^6$ (6 marks)

b) Find the determinant of matrix A (6 marks)

$$A = \begin{pmatrix} 5 & 4 & 2 \\ 2 & 3 & 1 \\ 3 & -2 & -1 \end{pmatrix}$$

QUESTION FOUR

a) In the year 2011, Fortune Magazine surveyed the presidents of the 500 largest corporations in the United States. Of these 500 people, 310 had degrees (of any sort) in business, 238 had undergraduate degrees in business, and 184 had postgraduate degrees in business. By applying the laws of set theory:

i) How many presidents had both undergraduate and postgraduate degrees in business? (3 marks)
ii) How many presidents had no undergraduate and no postgraduate degree in business? (3 marks)
iii) How many presidents had undergraduate degree in business and no postgraduate degree in business? (3 marks)
iv) Draw a Venn diagram to represent this information (3 marks)

b)

i) Define logic gates (2 marks)
ii) State any six basic logic gates (6 marks)

QUESTION FIVE

a) Solve x by applying the laws of indices and logarithm. (3marks)

$200(1.1)^x = 20000$

b) A club has 20 members. The offices of president, vice president, secretary and treasurer are to be filled, and no member may serve in more than one office. How many different slates of candidates are possible? (3 marks)

c) How many committees of five people can be chosen from 20 men and 12 women? If at least four women must be on each committee? (3 marks)

d) Find the value of x $\log_2 x = 5$ (2 marks)

e)

i. What is the decimal equivalent of the binary number 10101011? (3 marks)
ii. Convert $1A_{16}$ to binary (3 marks)
iii. Convert the binary number 0110101110001100 to hexadecimal (3 marks)