MACHAKOS UNIVERSITY

INSTRUCTIONS;

You should have the following for the exam

A scientific calculator

A graph paper

This paper consists of 6 questions.

Answer any five of the eight

All questions carry equal marks

Candidates should answer questions in English.

1a (i) Develop the truth table for a 3-input AND gate.
(4mks)

(ii) determine the total number of possible input combinations for 5-input AND gate(2mks)

b) Explain two advantages of interview as a method of data collection
(4mks)

c) Convert each of the following number system to equivalent number systems

i) 364_8 to binary

ii) $4C6F_{16}$ to decimal

iii) 375_8 to hexadecimal   (6mks)

2. a)   (i) determine the 1's complement of the binary number 00101011 show working.
(3mks)

(ii) Evaluate the following binary operations using the 2's bit complement method

$10001_{(2)}$-$00111_{(2)}$ showing working   (4mks)

b) Distinguish between rounding off a number and truncating a number using the 45.56789,to 3 decimal places
                    (4mks)

c)   i) plot each of the following equations on one graph.

   I)$2x - 3y = -4$

   II)$2x + 3y = 8$

   ii) Outline three interpretations that could be made from the graph in (c) (i)
(6mks)

d) State four units used during storage of data in computer storage media with their respective equivalent in bytes   (2mks)

e) Solve the following set of equations using elimination method

$$2x - 3y = 2$$

$$5x + 4y = 6 \quad (4mks)$$

3 a) Table 2 shows frequency distribution of weight in kg of 160 students in a certain college. Use it to answer questions below

Weight	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85
Frequency	12	15	21	26	37	22	16	5	1

Calculate each of the following measures about the weight of the students

   i)   Mean
   ii)   median   (8mks)

b) Describe each of the following types of charts using a sketch in each case

   (i) Simple bar graph

   (ii) Histogram
        (6mks)

c) The actual length of a road is 500 metres.a measuring instrument was used to measure the length and the readings showed the length to be 510 metres. Using this example, differentiate between relative error and absolute error
                        (6mks)

d) Plot the graph of the, equation $x^2-3x-10=0$ for $-5 \leq x \leq 7$, hence solve the equation equation $x^2-3x-10=8$.
  (4mks)

4 a) Differentiate between categorical data and numerical data as used in statistics
  (4mks)

b) Using crammer's method , solve the following set of simultaneous equations

$$2x - 3y + 4z = 2$$

$$5x + 4y + z = 33$$

$$3x + 5y + z = 31$$ (9marks)

c) Define the terms as used in statistics:

  i) median

  ii) mode

  iii) mean

  iv) range
  (4mks)

d) a straight line passes through points(5,12) and (9,15).determine the value of y along the line where x=7
  (4mks)

5 a) a certain casino club uses three different coloured tokens for playing games.for ksh 2000 one can purchase any of the following combinations of tokens,14 gold,20 silver and 24 bronze,or 20 gold, 15 silver and 19 bronze,or 30 gold, 5 silver and 13 bronze.

i)illustrate the narrative as a system of simultaneous equation;
  (2mks)

ii) Determine the cost of one token for each of the three colours,using cramer's rule.
  (8mks)

b) Using completing square method solve the quadratic equation $2x^2+9x-5=0$.
  (4mks)

c) Using matrix method solve the following set of linear equations:

$x_1+2x_2+x_3=4$

$3x_1-4x_2-2x_3=2$

$5x_1+3x_2+5x_3=-1$

(10mks)

d) State four properties of the arithmetic mean.
(4mks)

6 a (i) using binomial theorem,expand $(x+y)^8$ in ascending powers of y upto the fifth term
(6mks)

(ii) Determine the value of the 6th term when $x = \frac{1}{2}$ and $y = \frac{2}{5}$ (4mks)

b) Machakos university presented two teams for the national games;the mens hockey team and ladies handball team.the probability of mens team hockey team winning is 3/5 while that of ladies team winning is 4/7.using tree diagram,determine the probability that:

i) at least one team wins;
(4mks)

ii) both teams lose
(4mks)

c) Using elimination method,solve the following system of simultaneous equations
(10mks)

$3z - 4y + x = 5$

$z + 4y - 3x = 10$

$2z - 5y - 2x = 8$