MACHAKOS UNIVERSITY

UNIVERSITY EXAMINATION 2020/2021
SCHOOL OF PURE AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS,STATISTICS AND ACTUARIAL SCIENCE
FIRST SEMESTER FIRST YEAR FOR
1920/104- CRAFT CERTIFICATE IN INFORMATION COMMUNICATION TECHNOLOGY
1920/104-   MATHEMATICS

1. Explain the following as applied in probability

   i)   An outcome

   ii) Sample space   (4mks)

2. Convert each of the following number systems to their respective equivalents, showing your working.

    i) 475_8 to binary

    ii) $7B2D_{16}$ to denary
    (4mks)

3.with the aid of examples in each case distinguish between lower triangular matrix and identity matrix

    (4mks)

4.using the graphical method, solve the quadratic equation $y=2x^2-12x+16$,for $0 \le x \le 5$.
    (4mks)

5   i) using binomial theorem, expand the expression $(2 + x)^4$ in ascending powers of x ,simplifying the results
    (2mks)

 ii)using Pascal's triangle ,determine the coefficients of the expression $(a + b)^4$
(3mks)

6 a) determine the equation of the line passing through point (18,6) and has a gradient of -12
    (2mks)

  b) the size of matrix X is a 5 by 3 matrix and the product of XY is a matrix of size 5 by 7 matrix. Determine the size of matrix Y.   (3mks)

7. a) the ages of 6 students in a class are:

    17,15,18,21,14,19

    Determine the median age
    (2mks)

  b) Given the following matrix: $\begin{pmatrix} 7 & -3 \\ -2 & 4 \end{pmatrix}$

determine the value of B^{-1}
(2mks)

8 (a) The probability that Tom and Mary will pass in an interview is 0.4 and 0.5 respectively.

Determine the probability that both will fail in the interview
(2mks)

(b) solve the following inequality

$(5x + 5)/-10 \leq 2x - 1$
(2mks)

9 a) in a class of 100 students ,45 study history,53 study English and 15 study both subjects. Using Venn diagram determine the number of students who study neither English nor history.
(4mks)

10.outline two advantages of range as measure of dispersion
(2mks)

b) Given the matrix

A=$\begin{pmatrix} -4 & 3 \\ 5 & 2 \end{pmatrix}$ and B=$\begin{pmatrix} 7 & -3 \\ -2 & 4 \end{pmatrix}$

Determine (i) $(A^T)^{-1}$ (4mks)

(ii)2A+3B   (4mks)

c) Given matrices C=$\begin{pmatrix} 2 & 5 & 1 \\ 0 & 0 & -3 \end{pmatrix}$ and   D=$\begin{pmatrix} 3 & -1 & 2 \\ 1 & 5 & 3 \\ 2 & 0 & -4 \end{pmatrix}$.state with reasons whether the following matrix operations can occur.

i) C$\times D$ ii)D$\times 2C$ (6mks)

11. a) in a particular cyber café, the probability of one of the computers to fail to operate is 0.15. if 5 computers are selected at random, using tree diagram determine the probabilities that:

i) 2 computers will fail to operate

ii) less than 3 computers will fail to operate

iii)4 computers will operate

iv)at least 1 of the computers will fail to operate
(9mks)

12.   a) the following is a distribution table of profits of companies in the same industry

Profit(ksh 000's)	Number of companies

0-10	5
10-20	15
20-30	40
30-40	20
40-50	16
50-60	4

Calculate the:

i)   Mean
ii)   Median
iii)   Standard deviation   (9mks)

b) explain three properties of a normal distribution curve   (6mks)

13. solve the following simultaneous equations using matrix method

$$8x + 12y + 4z = 368$$

$$4x + 10y + 4z = 264$$

$$10x + 4y - 2z = 216$$

(10mks)

14.(a) A shop sold three types of products;A,B and C on a cetain day as follows:

2 units of A,3 units of B and 1 unit of C for ksh 490.

3 units of A,4 units of B and 2 units of C for ksh 700

1 unit of A , 2 units of B and 1 unit of C for ksh 330

(i)   Formulate simultaneous equations to represent the information above
(ii)   Using elimination method determine
(a) Price per unit of each of the three products;
(b) Total amount to be paid for 4 units of A and 2 units of B
            (9mks)

   (b)explain three challenges that an organization may encounter from the use of computers in its operations
         (6mks)

15.(a)using relevant examples define the following as applied in matrix

(a)diagonal matrix

(b)singular matrix

(c)identity matrix

                                                                              (6mks)

   b)a group of 6 boys has a mean weight of 54 kg.when 2 more boys joined the group, one with x kg and the other with $(x + 10)$ kg, the new mean is 55kg.determine the value of x
         (6mks)