



KENYATTA UNIVERSITY
SUPPLEMENTARY/SPECIAL EXAMINATION 2021/2022
EXAMINATION FOR THE DEGREE OF BACHELOR OF PHARMACY
SMA 110: BASIC MATHEMATICS

AUGUST, 2022

TIME: 2 HOURS

INSTRUCTIONS

Answer ALL QUESTIONS IN SECTION A and ANY ONE question from SECTION A.

SECTION A

QUESTION ONE (15 MARKS)

- (a) If the roots of the equation $x^2 - 2x - 15 = 0$ are α and β , find the equation whose roots are $\alpha + 1$ and $\beta + 1$ (4 marks)
- (b) Determine the line of symmetry and minimum or maximum point of the graph $f(x) = x^2 + 2x + 2$ without drawing the curve. (4 marks)
- (c) A football team of 11 players is to be formed from 12 men and 6 women. In how many ways can this be done so that the team selected has at least 4 women? (4 marks)
- (d) Let A, B and C be subsets of some universal set U. Draw a Venn diagram for the following situation. $A \subseteq B$, $C \subseteq B$ and $A \cap C = \phi$ (3 marks)

QUESTION TWO [15MKS]

- a) Find the value of that will make continuous. (4 marks)
- b) Evaluate the following limits:
- i. [2 marks]
- ii. [2marka]
- c) Let . Determine (3 marks)
- d) Differentiate from first principles (4 marks)

QUESTION THREE [15MKS]

- a) Justify why the computer is called a digital computer. (1 mark)
- b) Mention four out of the five categories of computers. (2 marks)
- c) Draw a flowchart indicating the functional units of a computer. (4 marks)

d) Mention two characteristics each of first-generation computers and second-generation computers. (2 marks)

e) Give two reasons why every information in the computer is represented as binary patterns. (2 marks)

f) List four areas where computer automation has influenced our society. (2 marks)

g) Explain how the instruction given below is executed in a computer;

ADD LOCA, R0 (2 marks)

QUESTION FOUR [15MKS]

(a) Machine A is set to cut lengths of drug packaging wood 100mm long. To test the accuracy of the machine, a random sample is taken from the output. The sample size is denoted by n and the length in millimeters of each piece of wood is denoted by x . The results are summarized by

$$n = 50, \sum x = 5035, \sum x^2 = 507033$$

(i) Calculate the mean and the standard deviation of the lengths in the sample giving your answers correct to one decimal place. (2 marks)

(ii) Machine B is also set to cut lengths of wood 100mm long. A random sample of 50 items from this machine has mean 100.2mm and variance 1.21mm. Giving your reasons, comment briefly on the accuracy of the two machines. (2 marks)

(b) There are 28 students in a pharmacy class. A survey of how the students in the class travel to school was carried and the results are shown in the table below.

Method of travel	Number of students
Bus	12
Car	2
Bicycle	5
Walking	9

Illustrate the data by a pie chart and calculate to the nearest degree the sector angles of the pie chart. (2 marks)

(c) 31 pharmacy students tried to estimate the length of a poison container. The container was actually 60mm long. These are their results in millimeters.

61 70 46 44 26 23 30 83 52 44 38 37
 49 59 58 63 31 29 37 48 76 61 46 31
 38 41 49 52 56 75 61

Find the median and the quartiles of this distribution and use the quartiles to estimate the skewness.
 (2 marks)

(d) The marks of eight candidates in English and Mathematics are:

Candidate	1	2	3	4	5	6	7	8
English (x)	50	58	35	86	76	43	40	60
Mathematics (y)	65	72	54	82	32	74	40	53

Find the Spearman's rank correlation coefficient and comment on the value obtained.

(2 marks)

(e) In a large garden there are seven fruit trees and 13 other types of trees. Six of the trees have birds nesting on them but only two of these are fruit trees.

(i) Copy and complete the table below to illustrate this information.

(1 mark)

	Fruit tree	Other tree	Total
Bird's nest	2		6
No nest			
Total	7	13	

(ii) The owner of the garden has given permission for Abdul to play in the garden but has instructed him not to climb any fruit trees or trees that have birds on them. Abdul selects a tree at random to climb. Find the probability that Abdul will obey the owner's instructions.

(2 marks)

(iii) Given that Abdul climbs a fruit tree, find the probability that the tree has birds nesting on it.

(2 marks)

SECTION B

QUESTION FIVE [10MKS]

- (a) Let $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 6\}$. Find the $n(A \Delta B)$ the cardinality of the symmetric difference between A and B . (3 marks)
- (b) Given $z_1 = 1 + i\sqrt{3}$ and $z_2 = 3 + i\sqrt{3}$, express $z_1 z_2$ in polar form. (3 marks)
- (c) When the polynomial $x^3 + 2x^2 - 5ax - 7$ is divisible by $x + 1$, the remainder is R_1 . When the polynomial $x^3 + ax^2 - 12x + 6$ is divisible by $x - 2$, the remainder is R_2 . If $2R_1 + R_2 = 6$, find the value of a . (4 marks)

QUESTION SIX [10MKS]

- a) Find all the turning points of the curve of , hence sketch it.
(6 marks)
- b) Suppose that a ball is being deflated at the rate of 12/minute during a medical surgery. How fast is its radius decreasing when the radius is 6 cm? (4 marks)

QUESTION SEVEN [10MKS]

- a) Which generation of computer used the transistor and which one used integrated circuit? (2 marks)
- b) Convert to a number in base 10. (2 marks)
- c) Draw a flowchart for the functional units of a digital computer. (2 marks)
- d) Rewrite the given signed 8-bit word in decimal number (2 marks)
- e) Convert to a decimal number (2 marks)

QUESTION EIGHT [10MKS]

A group of drugs is subjected to advanced level testing modules. Each drug is subjected to only module M1 or only module M2 or both module M1 and module M2. The probability that a drug is subjected to module M2 given that it is subjected to module M1 is $\frac{1}{5}$. The probability that a drug is subjected to module M1 given that it is subjected to module M2 is $\frac{1}{3}$. Find the probability that

- (a) a drug selected at random is subjected to both module M1 and module M2. (6 marks)
- (b) a drug selected at random is subjected to only module M1. (4 marks)