TEVETA

CERTIFICATE IN COMPUTER STUDIES

LEVEL 4 EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: JULY/AUGUST 2024

SUBJECT: MATHEMATICS AND STATISTICS

TIME: THREE (3) HOURS

TOTAL MARKS: 100

PASS MARK: 50

INSTRUCTIONS

1. Write your examination number and National Registration Card number on the answer Booklet provided. Ensure to append your signature in the space provided on the answer booklet.
2. Write your answer SCRIPT SERIAL NUMBER on the examination register provided and the entry slip.
3. There are two sections in this paper, Section A and B. Section A is compulsory. Answer both questions in this section.
4. Section B has Five (5) questions. Answer any Three (3) questions of your choic
5. All questions carry equal marks.
6. Cell phones and programmable calculators are NOT allowed in the examination room.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

SECTION A: COMPULSORY

QUESTION 1

a) Simplify; $3\frac{1}{2} \times \frac{2}{7} + 1\frac{3}{5} \times \frac{3}{16}$ (4 marks)

b) If 20% of the length of a bar is 230 mm, find the complete length of the bar. (3 marks)

c) A metal bar is 10.5 m long. If it is cut into 3 parts in the ratio $\frac{1}{2} : 1\frac{3}{4} : 3$, find the length of each part. (7 marks)

d) Find the volume and surface area of a sphere of diameter 8 cm. (6 marks)

Total (20 marks)

QUESTION 2

a) A company manufactures two types of boxes, corrugated and ordinary cartons. The boxes undergo two major processes: cutting and pinning operations. The profits per unit are K60 and K 40 respectively. Each corrugated box requires 2 minutes for cutting and 2 minutes for pinning operation, whereas each carton box requires 3 minutes for cutting and 1 minute for pinning. The available operating time is 120 minutes and 60 minutes for the cutting and pinning machines respectively.

Required:

(i) State the decision variables. (2 marks)

(ii) State the objective function. (2 marks)

(iii) Graph the constraint functions (8 marks)

(iv) Determine the optimum quantities of the two boxes to maximize the profits. (2 marks)

b) Three quarters of a pile of pipes were used for certain project at a new site. When two - thirds of the remainder had been used; 50 pipes were left.

Calculate the number of pipes that were there from the start. (6 marks)

Total (20 marks)

SECTION B: ANSWER ANY THREE (3) QUESTIONS.

QUESTION 3

a) Given matrix H, G and Q as outlined below

$$H = \begin{pmatrix} x & 3 \\ 1 & -2 \\ 2 & 7 \end{pmatrix}, G = \begin{pmatrix} 3 & 3 \\ 1 & y \\ 6 & 2 \end{pmatrix} \text{ and } Q = \begin{pmatrix} y & 6 \\ 2 & 2x \\ 8 & 9 \end{pmatrix}$$

Find the values of x and y if $Q = H + G$ (8 marks)

b) Find the determinant of matrix $K = \begin{pmatrix} 3 & 2 & -1 \\ 1 & 1 & 1 \\ 3 & 1 & 2 \end{pmatrix}$ (6 marks)

c) Solve the simultaneous equations by inverse matrix method.

$y = 3x + 5$

$2y + 3x = 28$

(6 marks)

Total (20 marks)

QUESTION 4

a) Classify the following as qualitative or quantitative data.

(i) The time that each of Acer laptops batteries lasts. (1 mark)

(ii) The amount of money spent by each of families on food. (1 mark)

(iii) Students' gender. (1 mark)

b) Given the following set of ages of children: {2,3,7,5,5,13,1,7,4,8,3,4,3}

Determine the;

(i) mean age. (2 marks)

(ii) median age. (3 marks)

(iii) modal age. (1 mark)

c) The number of days 200 workers were absent in a factory during one year was recorded. The results are in the table below:

DAYS ABSENT	NUMBER OF WORKERS
0 < 5	22
5 < 10	80
10 < 15	18
15 < 20	20
20 < 30	60

$1 - \frac{6\Sigma d^2}{n^3 - n}$

(i) Draw the cumulative frequency curve (Ogive). (7 marks)

(ii) Use the graph in (i) above to estimate the median number of days workers were absent. (4 marks)

Total (20 marks)

QUESTION 5

a) The distribution of ranks of seven students in Mathematics and programming test is shown below:

STUDENT	A	B	C	D	E	F	G
MATHEMATICS	3	1	4	5	7	6	2
PROGRAMMING	1	6	7	3	2	4	5

(i) Calculate the coefficient of rank correlation using Spearman formula. (8 marks)

(ii) Interpret your result in (i) above (2 marks)

b) Eight candidates sat for examinations in Mathematics and Architecture. Their corresponding marks were:

Mathematics	63	72	41	56	44	89	70	45
Architecture	48	71	50	46	35	92	42	48

Determine the equation of the regression line of y on x by the method of least squares.

(10 marks)

[Total: 20 marks]

QUESTION 6

a) The following data shows the sales revenue (in MK' million) of a local company from 2021 to 2023

Year	Sales revenue 2021 – 2023			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2021	79	48	68	107
2022	97	66	85	134
2023	113	91	100	148

Compute:

(i) The 4-quarter centered moving averages trend values. (6 marks)

(ii) The seasonal variation values by additive model. (4 marks)

[Total: 20 marks]

b) A certain mobile phone company starts producing 1000 phones per week and plans to increase output by 200 each week.
Calculate the total production during the first 15 weeks for this firm. (5 marks)

c) Given the following the series: 3, 9, 27, . . .
Find the tenth (10^{th}) series. (5 marks)

QUESTION 7

a) The Maize production, in tons, of company X in year 2022 and 2023 is shown below:

MONTH	J	F	M	A	M	J	J	A	S	O	N	D
2022	150	154	183	162	181	149	130	152	180	199	193	186
2023	162	163	171	158	175	145	121	138	172	175	163	152

Draw a Z – Chart for 2023 (10 marks)

b) The table contains the prices and quantities of two items **A** and **B** sold in 2022 and 2023.

ITEM	2022		2023	
	PRICE	QUANTITY	PRICE	QUANTITY
A	1500	100	1000	200
B	1600	95	1200	220

Calculate:

(i) Laspeyres price index number for 2023 taking 2022 as base year. (5 marks)

(ii) Paasche price index number for 2023 taking 2022 as base year. (5 marks)

Total (20 marks)