



ZIMBABWE

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL DIPLOMA

IV

NETWORK THEORY IN PUBLIC HEALTH/PUBLIC HEALTH DISEASES

SUBJECT: Network Theory

PAPER NO: 609/23/M08

DURATION: 3 hours

OCTOBER/NOVEMBER 2024 EXAMINATION

REQUIREMENTS

1. Non-programmable calculator
2. Graph paper

INSTRUCTIONS TO CANDIDATE

1. Choose any five (5) questions.
2. Do not write your name on the answer booklet.
3. Do not write anything on the question paper.

This paper consists of 3 printed pages.

PAPER NO: 609/23/M08 - NETWORK THEORY

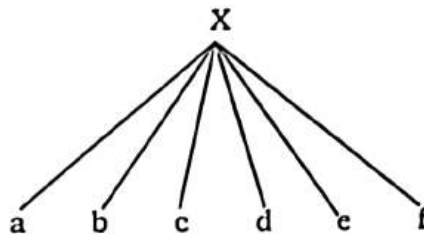
QUESTION 1

a) Define the following terms:

- | | |
|----------------|-----------|
| i) Disease | (2 marks) |
| ii) Network | (2 marks) |
| iii) Vertex | (2 marks) |
| iv) Mean | (2 marks) |
| v) Isomorphism | (2 marks) |

b) For the following undirected graph, find the:

- | | |
|-------------------------------|-----------|
| i) Degree of x | (2 marks) |
| ii) Degree of all other nodes | (2 marks) |



- c) i) Identify the obsences or nearness centrality of a node. (2 marks)
- ii) From the following undirected graph, find which nodes are more central than other node. (4 marks)

QUESTION 2

a) Define the following terms:

- | | |
|-------------------------------|-----------|
| i) Sampling | (2 marks) |
| ii) Probability sampling | (2 marks) |
| iii) Non-probability sampling | (2 marks) |
| iv) Data | (2 marks) |
| v) Public health | (2 marks) |

b) Outline any five (5) probability and five (5) non-probability sampling techniques. (10 marks)

QUESTION 3

- a) Prove by induction that $\sum_{i=1}^n i = \frac{n(n+1)}{2}$ for every natural number n . (7 marks)
- b) Prove by induction that for any positive integer n , $n^3 + 2n$ is divisible by 3. (7 marks)
- c) Prove by contradiction that $\sqrt{2}$ is irrational. (6 marks)

QUESTION 4

Examine any four (4) types of networks that can be used in public health. (20 marks)

QUESTION 5

Describe any five (5) advantages of internal data sources (20 marks)

QUESTION 6

- a) At a public health conference each person shakes hand with every other person exactly once. If there were a total of 28 handshakes, how many other people attended the conference. (5 marks)
- b) If $f(x) = |x|$
 - i) Draw the graph of x . Perform the following transformations on the graph of $f(x)$. (4 marks)
 - ii) $f(x) + 1$ (4 marks)
 - iii) $f(x - 2)$ (2 marks)
 - iv) $2f(x)$ (3 marks)
- c) Disapprove the statement that if n is an integer and n^2 is divisible by 4 then n is divisible by 4 also. (4 marks)

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**HIGHER EDUCATION EXAMINATIONS COUNCIL
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NATIONAL DIPLOMA

IN

**PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING, PUBLIC
HEALTH MONITORING AND EVALUATION**

SUBJECT: Statistical Data Analysis

PAPER NO: 609/20/S03

DURATION: 3 Hours

MARCH/APRIL 2024 EXAMINATION

REQUIREMENTS

- 1) Non-programmable scientific calculator
- 2) Formular booklet
- 3) Statistical tables
- 4) Graph paper

INSTRUCTIONS TO CANDIDATE

- 1) Answer any five (5) questions.
- 2) Show all working

This paper consists of 4 printed pages.



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PAPER NO: 609/20/S03-STATISTICAL DATA ANALYSIS

QUESTION 1

- a) Define the following terms:
- i) Population (2 marks)
 - ii) Sample (2 marks)
 - iii) Type 1 error (2 marks)
 - iv) Correlation analysis (2 marks)
 - v) Confidence interval (2 marks)
- b) Classify the following data as qualitative or quantitative. If quantitative state whether it is discrete or continuous:
- i) Time taken to finish an examination. (2 marks)
 - ii) Number accidents during a festive season. (2 marks)
 - iii) Fuel consumed by a vehicle. (2 marks)
 - iv) Number of babies born at Parirenyatwa (2 marks)
 - v) Number of telephone calls made per day (2 marks)

QUESTION 2

Describe the following probability sampling methods:

- a) Simple random sampling (5 marks)
- b) Stratified sampling (5 marks)
- c) Snowball sampling (5 marks)
- d) Systematic sampling methods (5 marks)

QUESTION 3

- a) Compare mutually exclusive and independent events (4 marks)
- b) A company employs 9 males and 6 females. A committee of three (3) employees is to be randomly chosen. Find the probability that:
- i) All will be females. (5 marks)
 - ii) There will be more males than females. (5 marks)
 - iii) At least one will be male. (6 marks)

QUESTION 4

The table below shows monthly rentals paid by 152 workers at KTS company.

Rent (\$)	Number of workers
100-160	20
160-220	35
220-280	40
280-340	23
340-400	19
400-460	15

Calculate the following:

- a) Mean (3 marks)
- b) Median (4 marks)
- c) Mode (4 marks)
- d) Standard deviation (6 marks)
- e) Pearson's coefficient of skewness (3 marks)

QUESTION 5

- a) A story of past participants of a certain program indicates that the mean length of time spend on a program is normally distributed with a mean of 500 hours and a standard deviation of 100 hours. Find the probability that a candidate selected at random will:
 - i) Require less than 580 hours to complete the program.(5 marks)
 - ii) Take more than 700 hours to complete the program. (5 marks)
 - iii) Take between 420 hours to 650 hours to complete a program. (6 marks)
- b) State any four (4) characteristics of a normal distribution. (4 marks)

QUESTION 6

A survey on employee remuneration at Blacks (Pvt) Ltd was carried out. An extract of data for a sample of 8 employees is given in the following table

Experience (years)	5	9	15	8	0	21	9	7
Salary (\$000)	22	29	30	24	23	35	27	24

As part of data analysis, you are required to

- Identify the independent and dependent variable. (2 marks)
- Plot the scatter plot and comment on it. (6 marks)
- Estimate the least squares regression equation (7 marks)
- Calculate Pearson's correlation coefficient and interpret it. (5 marks)

QUESTION 7

- A biased die produces a score y with the following probability distribution table.

Y	1	2	3	4	5	6
P(y=y)	x	2x	3x	4x	5x	6x

- Find x (1 mark)
 - Find $E(y)$ (4 marks)
 - Var (y) (3 marks)
- In $f(x)=k(4-x)$, $1 \leq x \leq 3$
 - Find k (4 marks)
 - Sketch the graph of $y=f(x)$ (3 marks)
 - Find $p(1.2 \leq x \leq 2.4)$ (5 marks)

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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

SUBJECT: Game theory and Prevention

PAPER NO: 609/23/M05

DURATION: 3 Hours

OCTOBER/NOVEMBER 2024 EXAMINATION

REQUIREMENTS

Scientific calculator

INSTRUCTIONS TO CANDIDATE

- 1) Do not write your name on the booklet.
- 2) Do not write anything on the question paper.
- 3) Answer any five (5) questions.

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QUESTION 1

- a) Assume Ann has four (4) moves A_1, A_3, A_4 and Beth has three B_1, B_2 and B_3

Draw up the payoff bimatrix of this:

- i) Non- zero-sum two person game. (4 marks)
 - ii) Describe the scenario and give both Beth's and Anns best responses. (6 marks)
- b) i) Define a Nash Equilibrium. (2 marks)
- ii) The famous Prisoners DILEMMA Adam and Bob have robbed a bank and been arrested. They are interrogated separately. Adam and Bob have the option to confess (move C) or to remain silent (moves). The police have little evidence and if both remain silent they will be sentenced to one year on a minor charge. Therefore the police interrogators propose a deal, if one confesses while the other remain silent. The one confessing goes free while the other is sentenced to 3 years. However, if both talk both still will sentenced to 2 years. If each player payoffs in 3 minus the number of years served in jail.
- c) i) Draw up the expected bimatrix payoff tables. (4 marks)
- ii) Describe the prisoners- dilemma scenario for the two robbers. (4 marks)

QUESTION 2

Define the following terms as applied in game theory:

- a) Game (4 marks)
- b) Game theory (4 marks)
- c) Payoffs (4 marks)
- d) Zero-sum game (4 marks)
- e) Nash equilibrium (4 marks)

QUESTION 3

Using relevant examples, describe how Nash Equilibrium can be applied in the field of public health. (20 marks)

PAPER NO: 609/23/M05-GAME THEORY AND PREVENTION

QUESTION 4

- a) Outline any five (5) criteria used to classify games. (10 marks)
- b) Assume a rock-paper-scissors game is being played for one dollar. Draw up the payoff matrix for the game. (10 marks)

QUESTION 5

Table below shows payoffs that can result from decisions under various states of nature.

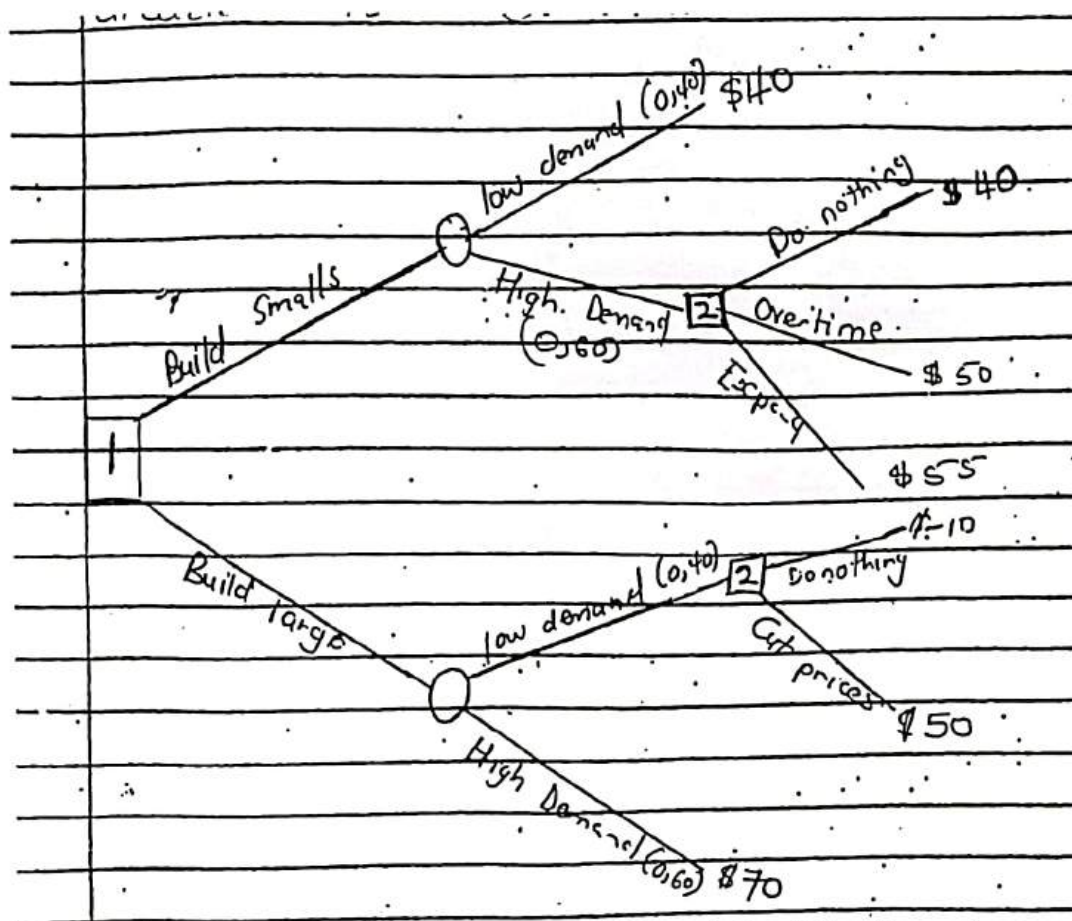
	Possible future demands		
	Low	Medium	High
Small facilities	\$10	\$10	\$10
Medium facilities	7	12	12
Large facilities	-4	2	16

A decision is being made concerning which facility should be constructed using the present value (in millions) for each alternative under each state of nature as expressed in the body of the above payoff table.
Find which facility must be constructed under the following decision criteria.

- a) ~~Maximum~~ Maxmin (4 marks)
- b) Max max (4 marks)
- c) Laplace (4 marks)
- d) Minimax regret (8 marks)

QUESTION 6

Information below has been collected on payoffs and the manager has drawn a decision tree so as to decide on the size of a video arcade to construct.



Analyse the decision tree (build small or build large) should be chosen by the manager in order to maximise expected monetary value. (20 marks)

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NATIONAL DIPLOMA

IN

**PUBLIC HEALTH PROGRAM MONITORING, PUBLIC HEALTH DISEASE
SURVIELLENCE AND MODELLING**

MODULE: Health Survey Methods

PAPER NO: 609/23/M07

DURATION: 3 Hours

OCTOBER/NOVEMBER 2024 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

1. Answer any five (5) questions.
2. Do not write your name on the answer booklet.
3. Do not write on the question paper.

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QUESTION 1

- a) Define the following terms:
- i) Survey (2 marks)
 - ii) Sampling (2 marks)
 - iii) Pilot test (2 marks)
 - iv) Hypothesis (2 marks)
 - v) Coding (2 marks)
- b) Outline any five (5) uses of a health survey. (10 marks)

QUESTION 2

Explain on the following methods of data collection:

- a) Health interviews (5 marks)
- b) Health examination survey (5 Marks)
- c) Health records survey (5 marks)
- d) Mailed questionnaire survey (5 marks)

QUESTION 3

Describe five (5) methods of conducting a health related survey. (20 marks)

QUESTION 4

Assess five (5) standards of good survey questions. (20 marks)

QUESTION 5

Explain any five (5) non probability sampling methods used in public health. (20 marks)

QUESTION 6

Discuss any five (5) ethical considerations when carrying out a survey. (20 marks)

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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE

SUBJECT: Predictive Modelling

PAPER NO: 609/23/M04

DURATION: 3 Hours

OCTOBER/NOVEMBER 2024 EXAMINATION

REQUIREMENTS

- 1) Scientific calculator
- 2) Graph paper

INSTRUCTIONS TO CANDIDATE

- 1) Answer any five (5) questions.
- 2) Do not write anything on the question paper.
- 3) Do not write your name on the booklet.

QUESTION 1

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PAPER NO: 609/23/M04-PREDICTIVE MODELLING

To find out if physical activities has any relationship to some patients blood pressure, the Doctor collected number of minutes that 10 patients of the same age spend daily in gym and their systolic blood pressure as shown in the table:

Name	A	B	C	D	E	F	G	H	I	J
Physical Activity (Min)	60	55	25	50	40	45	35	10	30	20
Blood Pressure (mm Hg)	118	117	120	121	119	122	123	124	125	126

Calculate the Spearman's Rank correlation coefficient and comment on the results. (20 marks)

QUESTION 2

- a) Distinguish between qualitative and quantitative data. (10 marks)
- b) With the aid of examples discuss the two (2) sources of data in public health disease surveillance. (10 marks)

QUESTION 3

- a) What are the four (4) advantages in data collection. (4 marks)
- b) The heights of ten (10) randomly selected patients are given below:
1,63, 1,65, 1,71, 1,92, 1,47, 1,71, 1,75, 1,64, 1,71, 1,64

Calculate a 95% confidence interval for the heights of the patients. (8 marks)

- c) A part of a dietary- instruction program, thirty- six, 25-34 year- old female report an average daily intake of saturated fat of 12g with a standard deviation of 11g while on a vegetarian diet. If the average intake of saturated fat among 25-34 year old female in the general population is 24g. Test the hypothesis that the intake of saturated fat in the group is less than that in the general population. (8 marks)

QUESTION 4

- a) If 25% eleven year old children have no decayed, missing or filled (DMF) teeth, find the probability that in sample of 20 children there will be:
- i) Exactly 3 of them with no DMF teeth. (3 marks)
- ii) Less than 3 with no DMF teeth (4 marks)

PAPER NO: 609/23/M04-PREDICTIVE MODELLING

- iii) 3 or more with no DMF teeth (4 marks)
- b) At a certain hospital, there is an average of 3 accidents per week. Assuming that the number of accidents per week follow a poisson distribution. What is the probability that in a given week:
- i) There are no accidents (3 marks)
- ii) There are exactly 2 accidents (3 marks)
- iii) Six or more accidents (3 marks)

QUESTION 5

Use the continuous SIR model (Susceptible-infected- removed mode) by Norman Bailey to investigate the model

$$\begin{cases} x^1 = \frac{-bxy}{x+y} \\ y^1 = \frac{bxy}{x+y} - cy \\ Z^1 = cy \end{cases}$$

With initial conditions $x(t_0) = x_0 > 0, y_0 > 0, Z(t_0) = Z_0 \geq 0$, where $x, y, Z; IR \rightarrow IR_0^+$ and that $b, C, E/IR_0^+$

x Represents the grouping of susceptible
 y The infected population
 Z The removed population

(20 marks)

QUESTION 6

- a) Distinguish between probability and non -probability sampling methods. (10 marks)
- b) Discuss two (2) sources of data in public health. (10 marks)

QUESTION 7

- a) Define Markov chains. (4 marks)
- b) Consider a simple observable 3-state Markov model of the weather. Assume that on a day the weather is observed as being one of the following 3-states, S_1 , Sunny, S_2 ; cloudy S_3 ; rain and the weather on the n^{th} day is characterised by one of the above three states and the matrix of states transition probabilities is

$$A = \begin{pmatrix} p_{11} & p_{12} & p_{13} \\ p_{21} & p_{22} & p_{23} \\ p_{31} & p_{32} & p_{33} \end{pmatrix} = \begin{pmatrix} 0,2 & 0,4 & 0,4 \\ 0,6 & 0,1 & 0,3 \\ 0,2 & 0,5 & 0,3 \end{pmatrix}$$

Where $p_{ij} = (ij = 1,2,3)$ and $\sum_{j=1}^3 p_{ij} = 1 (i = 1,2,3)$

- a) In the case that the weather is in the rain state S_3 on the first day ($n=1$) and the weather for the next seven days will be rain-sunny-cloudy- rain-rain-sunny-cloudy..., then for the probability of the observation sequence $O = \{S_3, S_3, S_1, S_2, S_3, S_1, S_3\}$ evaluate the 3-state observable Markov mode and hence write down the probability density function of duration d in S_1 of the observable sequence. (10 marks)
- b) Compute the expected number of consecutive days of the rain weather. (6 marks)

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NATIONAL DIPLOMA

IN

**PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING, PUBLIC HEALTH
MONITORING AND EVALUATION**

MODULE: Health Education and Promotion

PAPER NO: 609/23/M06

DURATION: 3 hours

OCTOBER/NOVEMBER 2024 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

- 1. Answer any five (5) questions.**
- 2. Do not write on the question paper.**
- 3. Do not write your name on the answer booklet.**

This paper consists of 3 printed pages.



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PAPER NO: G09/23/M06 - HEALTH EDUCATION AND PROMOTION

QUESTION 1

a) Define the following terms:

- | | |
|-----------------------|-----------|
| i) Health | (2 marks) |
| ii) Health education | (2 marks) |
| iii) Health promotion | (2 marks) |
| iv) Knowledge gap | (2 marks) |
| v) Community | (2 marks) |

b) Outline any five (5) approaches to health education. (10 marks)

QUESTION 2

The concept of health is multi-dimensional. Delineate the validity of the verdict. (20 marks)

QUESTION 3

Discuss five(5) importance of health education in improving populations health. (20 marks)

QUESTION 4

With the use of relevant examples assess diseases that affect the following groups and how they can be averted in Africa.

- | | |
|-------------|------------|
| a) Children | (10 marks) |
| b) Women | (10 marks) |

QUESTION 5

Analyse the effectiveness of modern communication channels in disseminating health information in Zimbabwe. (20 marks)

PAPER NO: 609/23/M06 – HEALTH EDUCATION AND PROMOTION

QUESTION 6

Assess key strategies that can be utilized in delivering health education to the following setting:

- | | |
|------------------------|-----------|
| a) Urban setting | (5 marks) |
| b) Rural setting | (5 marks) |
| c) Workplace setting | (5 marks) |
| d) Educational setting | (5 marks) |

QUESTION 7

Analyse the view that healthcare is the most important determinant of health.
(10 marks)

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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

**SUBJECT: Network Theory in Public
Health**

PAPER NO: 609/23/M08

DURATION: 3 Hours

MAY/JUNE 2024 EXAMINATION

REQUIREMENTS

1. Non- programmable calculator.
2. Graph paper

INSTRUCTIONS TO CANDIDATE

1. Do not write anything on the question paper.
2. Do not write your name on the answer booklet.
3. Answer any Five (5) questions.

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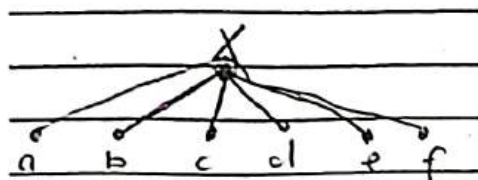


QUESTION 1

a) Define the following terms:

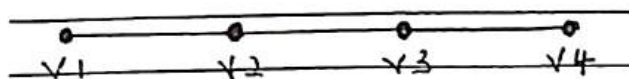
- i) Network (2 marks)
- ii) Node (2 marks)
- iii) Degree (2 marks)
- iv) Vertex (2 marks)
- v) Isomorphism (2 marks)

b) For the following undirected graph, find the :



- i) Degree of x (2 marks)
- ii) Degree for all other nodes. (2 marks)

c)



- i) Identify the closeness or nearness centrality of a node. (2 marks)
- ii) From the following undirected graph, find which nodes are more central than other nodes. (4 marks)

QUESTION 2

a) With the aid of a clearly labelled diagram describe the four (4) types of networks. (12 marks)

- b) i) Define eigen values of a square matrix. (2 mark)
- ii) Find eigen values of the matrix.

$$\begin{bmatrix} A &= & \begin{matrix} 1 & 3 \\ 2 & 2 \end{matrix} \end{bmatrix} \quad (6 \text{ marks})$$

PAPER NO. 009/23/M08 - NETWORK THEORY IN PUBLIC HEALTH

QUESTION 3

Describe ten (10) steps disease outbreak investigation. (20 marks)

QUESTION 4

Compare any two (2) sources of data in public health surveillance. (20 marks)

QUESTION 5

At Pari Hospital there are 25 nurses. Each nurse travels to work every morning using own car. The distribution of the driving times from home to work for nurses is shown in table below:

Driving time in minutes	Number of nurses
0-10	3
10-20	10
20-30	6
30-40	4
40-50	2

- a) Calculate the following:
- i) Mean for the data. (3 marks)
 - ii) Mode (3 marks)
 - iii) Pearson coefficient of skewness. (5 marks)
 - iv) Median (3 marks)
- b) Draw a histogram and use it to find the mode (6 marks)

QUESTION 6

- a) At a party, each person shakes hands with every other person exactly once. If there were a total of twenty-eight (28) handshakes, how many people attended the party. (5 marks)
- b) If $f(x) = |x|$
- i) Draw the graph of x (4 marks)

c) Perform the following transformations on the graph of $f(x)$

i) $f(x) + 1$ (2 marks)

ii) $f(x - 2)$ (2 marks)

iii) $2f(x)$ (3 marks)

d) Disapprove the statement that if n is an integer and n^2 is divisible by 4 the n is divisible by 4 also. (4 marks)

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**HIGHER EDUCATION EXAMINATIONS COUNCIL
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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE AND SURVEILLANCE

**MODULE: Decision Theory in Public
Health**

PAPER NO: 609/23/M03

DURATION: 4 Hours

MAY/JUNE 2024 EXAMINATION

REQUIREMENTS

Non-programmable calculator, Graph paper

INSTRUCTIONS TO CANDIDATE

- 1. Do not write your name on the answer booklet.**
- 2. Do not write anything on question paper.**
- 3. Do not tear any page.**
- 4. Do not write your name anywhere**

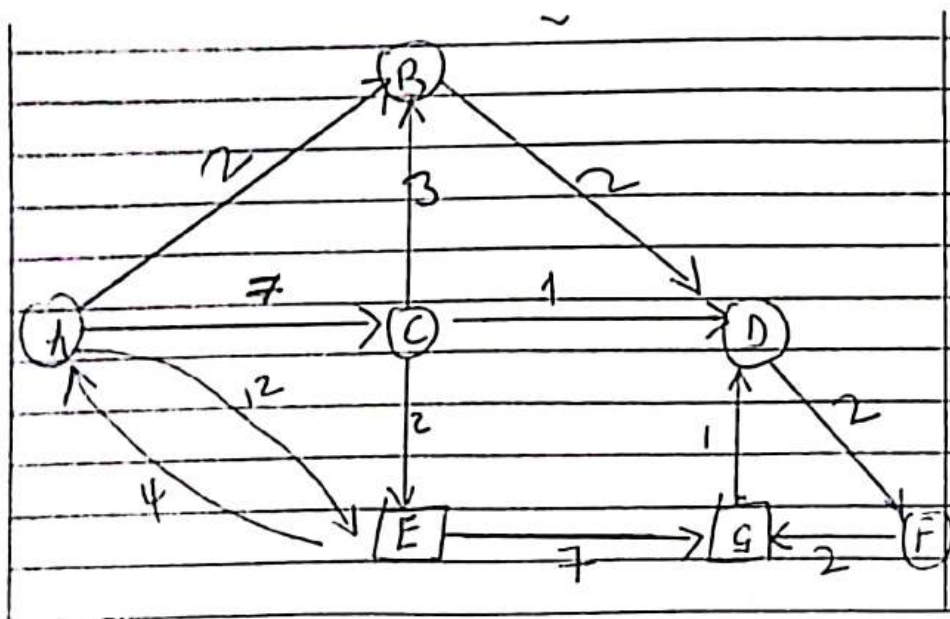
This paper consists of 4 printed pages.

QUESTION 1

a) Define the following term as used in decision theory:

- i) Degeneracy (2 marks)
- ii) Sensitivity analysis (2 marks)
- iii) Duality (2 marks)
- iv) Objective function (2 marks)
- v) Decision variable (2 marks)

b) Delineate the final costs and SPT (shortest path tree). If the Dijkstra's algorithm is run starting on node A.



(10 marks)

QUESTION 2

Table below shows payoff that can result from decisions under various states of nature:

Alternatives	Possible future Demand		
	Low	Medium	High
Small facility	\$10	\$10	\$10
Medium facility	7	17	12
Large Facility	-14	-12	16

PAPER NO: 609/23/M03- DECISION THEORY IN PUBLIC HEALTH

A decision is being made concerning which facility should be constructed using the present value (in millions) for each alternative under each states of nature as expressed in the above payoff table. Find which following facility must be constructed under the following decision criteria:

- a) Maximin (5 marks)
- b) Maximax (5 marks)
- c) Laplace (5 marks)
- d) Minimax regret (5 marks)

QUESTION 3

- a) Outline the three (3) decision environment. (6 marks)
- b) Using the expected payoffs and related probabilities, under various states of nature, Calculate EVPI (Expected Value of Perfect Information) using:
 - i) Expected payoff under uncertainty (7 marks)
 - ii) Minimum expected regret (7 marks)

QUESTION 4

Examine (4) importance of contact tracing in public health. (20 marks)

QUESTION 5

Consider the LPP model below:

Objective Function Max; $Z(x) = 3x_1 + 2x_2$

Subject to constraints

$$x_1 + x_2 \leq 4$$

$$x_1 - x_2 \leq 2$$

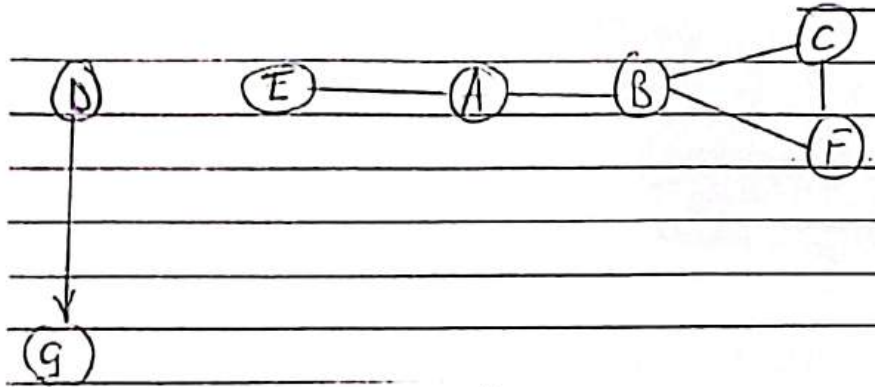
$$x_1, x_2 \geq 0$$

Apply the simplex method to find the Optimal solution to the problem.

(20 marks)

QUESTION 6

Consider the undirected, unweighted graph below:



Answer the following questions about the graph.

- a) Find V , E , $|V|$ and $|E|$. (6 marks)
- b) Find the maximum degree of the graph. (2 marks)
- c) Locate the cycles if they are any. (4 marks)
- d) What is the maximum length simple path in the graph. (5 marks)
- e) Find the connected components of the graph. (3 marks)

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**HIGHER EDUCATION EXAMINATIONS COUNCIL
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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

**MODULE: Decision Theory in Public
Health Strategies**

**PAPER NO: 609/23/M03
609/20/S07**

DURATION: 3 Hours

MARCH/ APRIL 2025 EXAMINATION

REQUIREMENTS

Graph paper, Non- programmable Calculator

INSTRUCTIONS TO CANDIDATE

- 1. Answer any five (5) questions.**
- 2. Do not write your name on the answer Booklet.**
- 3. Do not write on the question paper.**

This paper consists of 4 printed pages.



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PAPER NO: 609/23/M03 & 609/20/S07- DISEASE THEORY IN PUBLIC HEALTH STRATEGIES

QUESTION 1

A firm makes two products P_1 and P_2 and a production capacity of 18 tonnes of P_1 and require same production capacity. The firm must supply at least 4 tonnes of P_1 and 6 tonnes of P_2 per day. Each tonne of P_1 and P_2 requires 60 hours of machines hours available are 720. Profit per tonne for P_1 is \$160 and for P_2 is \$240. Calculate the optimal solution by use of the graphical method:

(20 marks)

QUESTION 2

Table below shows payoffs that can result from decisions under various states of nature.

	Possible future Demand		
Alternatives	Low	Medium	High
Small facility	\$10	\$10	\$10
Medium facility	7	12	12
Large facility	-4	2	16

A decision is being made concerning which facility should be constructed using the present value (in millions) for each alternative under every states of nature as expressed in the body of the above payoff table. Find the facility which must be constructed under the following decision criteria:

- a) Maxmin (4 marks)
- b) Maxmax (4 marks)
- c) Laplace (4 marks)
- d) Minimax regret (8 marks)

QUESTION 3

- a) Define the following terms
 - i) Linear programming (2 marks)
 - ii) Basic solution (2 marks)
 - iii) Feasible solution. (2 marks)

PAPER NO: 609/23/M03 & 609/20/S07- DISEASE THEORY IN PUBLIC HEALTH STRATEGIES

- b) Consider the LPP model below
objective Max; $Z(x) = 3x_1 + 2x_2$
function

Subject to constraints

$$X_1 + X_2 \leq 4$$

$$X_1 + X_2 \leq 2$$

Non-negative; $X_1, X_2 \geq 0$

Apply the simplex Method to find the optimal solution to the problem.

(14 marks)

QUESTION 4

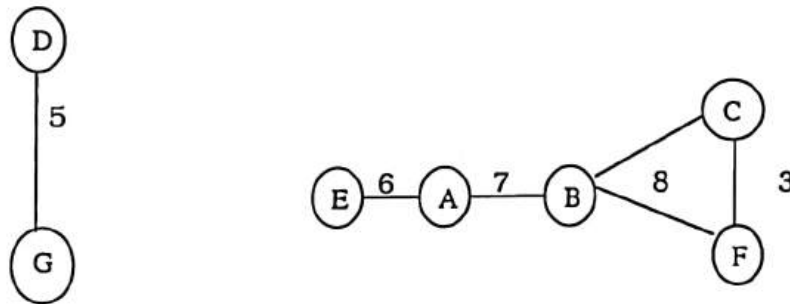
- a) Define the three decision environment (6 marks)
- b) Using the expected payoffs and related probability, under various states of nature, Calculate EVP1. (Expected value of perfect information) using:
- i) Expected payoffs under uncertainty (7 marks)
- ii) Minimum expected regret. (7 marks)

QUESTION 5

- a) i) Define contact tracing (2 marks)
- ii) Outline four (4) importance of contact tracing in public health disease surveillance. (8 marks)
- b) Using example of a certain disease, describe any one contact tracing technique of your choice. (10 marks)

QUESTION 6

Consider the undirected, unweighted graph below and attempt the following questions.



- a) Find $V, E, |V|$ and $|E|$ (4 marks)
- b) Find the maximum degree of the graph. (2 marks)
- c) Identify any circles if they are there. (4 marks)
- d) Find the maximum length simple path in the graph. (5 marks)
- e) Find one edge one could add to the graph that would increase the length simple path of the new graph to 6. (1 mark)
- f) Find the connected components of the graph. (2 marks)
- g) Identify the path involving the least number of nodes from E to C and the cost. (2 marks)

.../tez



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DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

**MODULE: Public Health Administration and
International Healthcare Systems**

PAPER NO: 609/23/M02

DURATION: 3 Hours

JUNE 2026 EXAMINATION

REQUIREMENTS

Blue or black pen, Ruler

INSTRUCTIONS TO CANDIDATE

1. This paper comprises of six (6) questions. Answer any five (5) questions. Each question carries twenty (20 marks)
2. Do not write your name on the answer booklet either outside or inside
3. Do not write anything on the question paper.

PAPER NO: 609/23/M02 – PUBLIC HEALTH ADMINISTRATION AND
INTERNATIONAL HEALTHCARE SYSTEMS

QUESTION 1

- a) Identify and explain the importance of key principles such as equity, efficiency and effectiveness in public health administration. (15 marks)
- b) Define and describe the core principles of public health administration. (5 marks)

QUESTION 2

- a) Describe the organisational structure of healthcare systems in Zimbabwe and outline the specific roles and responsibilities of different stakeholders within these systems. (10 marks)
- b) Compare and contrast the funding mechanisms utilised by healthcare systems globally examining the features and outcomes of tax-based funding, social health insurance and private insurance schemes. (10 marks)

QUESTION 3

Explore how cultural factors such as beliefs and attitudes towards healthcare services and health seeking behaviours. (20 marks)

QUESTION 4

Elaborate on the incorporation of new technologies or treatments supported by evidence-based research into policy implementation. (20 marks)

QUESTION 5

Discuss the extent to which globalisation has influenced the adoption and implementation of innovative healthcare technologies and practices globally (20 marks)

QUESTION 6

- a) Define and explain the core principles of health planning. (5 marks)
- b) Discuss the impact of social, economic and political factors on health planning principles. (15 marks)



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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

MODULE: Media Campaigns

PAPER NO: 609/23/M01

DURATION: 3 Hours

JUNE 2026 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

Answer any five (5) questions

PAPER NO: 609/23/M01-MEDIA CAMPAIGNS

QUESTION 1

Discuss five (5) importance of media campaigns in Public Health. (20 marks)

QUESTION 2

Evaluate five (5) major key components of an effective media campaign.
(20 marks)

QUESTION 3

- a) Define message framing? (2 marks)
- b) Explore the principles of message framing in public health. (18 marks)

QUESTION 4

Identify five factors that contribute to the success or failure of a media campaign in promoting behaviour change. (20 marks)

QUESTION 5

Critically evaluate the consequence of media campaign in terms of:

- a) Inaccuracy (5 marks)
- b) Unfairness (5 marks)
- c) Non-transparency (5 marks)
- d) Disrespect for privacy (5 marks)

QUESTION 6

Cite four (4) media channels used in media campaign and for each review two (2) advantages and two (2) disadvantages. (20 marks)

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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE & MODELLING

MODULE: Predictive modelling in Public Health PAPER NO: 609/23/M04

DURATION: 3 Hours

JUNE 2026 EXAMINATION

REQUIREMENTS

1. Non-programmable scientific calculator,
2. Graph paper

INSTRUCTIONS TO CANDIDATES

1. Answer five (5) questions.
2. Do not write on the question paper
3. Do not write your name on the answer booklet.

This paper consists of 4 printed pages.

QUESTION 1

a) Define the following terms:

- i) Hypothesis (2 marks)
- ii) Type 1 error (2 marks)
- iii) Critical path (2 marks)
- iv) Regression analysis (2 marks)

b) The manager of a factory would like to show that the mean daily output has improved from historic of 10 tonnes per day. The daily output figures from a randomly chosen days in the last month are:

7,8	10,9	10,6	11,5	9,6	9,4
10,0	10,6	10,5	8,9		

Test thus claim at the 5% level of significance. (12 marks)

QUESTION 2

a) State the four (4) components of a time series. (4 marks)

b) The following data gives the quarterly sales figures for a retail outlet for the period 2018 to 2020.

Year	Q1	Q2	Q3	Q4
2018	14	32	33	6
2019	16	35	36	7
2020	15	38	41	8

Calculate the centred four (4) point moving averages and seasonal ratios. (16 marks)

QUESTION 3

The following table shows the age in years and corresponding prices for a fleet of cars belonging to Botha Car Sales.

Age (Year)	10	4	6	9	3	5	8	2
Price (\$000)	45	25	30	42	22	27	40	20

- Draw a scatter diagram for the data. (4 marks)
- Estimate the least squares regression equation. (7 marks)
- Predict the price of a 7-year-old car. (2 marks)
- Calculate Pearson's product moment correlation coefficient. (5 marks)
- Calculate the coefficient of determination. (2 marks)

QUESTION 4

Use the continuous SIR model (Susceptible -Infected Removed model) by Norman Bailey to investigate the model.

$$\begin{cases} x^1 = \frac{-bxy}{x+y} \\ y^1 = \frac{bxy}{x+y} - cy \\ z^1 = cy \end{cases}$$

With initial conditions $x(t_0) = x_0 > 0, y_0 > 0, Z(t_0) = Z_0 \geq 0$ where $x, y, z; IR \rightarrow IR_0^t$ and that $b, c \in IR_0^t$.

x = Represents the grouping of susceptible
 y = The infected population
 z = The removed population

(20 marks)

QUESTION 5

Distinguish between quantitative and qualitative data.

(20 marks)

QUESTION 6

a) Articulate any four (4) advantages of data collection. (4 marks)

b) The heights of ten (10) randomly selected patients are given below:

1,63; 1,65; 1,71; 1,92; 1,47; 1,71; 1,75; 1,64; 1,71; 1,64

Calculate a 95% confidence interval for the heights of the patient. (8 marks)

c) A part of dietary-instruction program thirty-six, 25–34-year-old female report on average daily intake of saturated fat of 12g with a standard deviation of 11g while on a vegetarian diet. If the average intake of saturated fat among 25–34-year-old female in the general population is 24g. Test the hypothesis that the intake of saturated fat in the group is less than that in the general population. (8 marks)

.../tez



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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

MODULE: Media Campaigns

PAPER NO: 609/23/M01

DURATION: 3 Hours

JUNE 2026 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

Answer any five (5) questions

QUESTION 1

Discuss five (5) importance of media campaigns in Public Health. (20 marks)

QUESTION 2

Evaluate five (5) major key components of an effective media campaign.
(20 marks)

QUESTION 3

- a) Define message framing? (2 marks)
- b) Explore the principles of message framing in public health. (18 marks)

QUESTION 4

Identify five factors that contribute to the success or failure of a media campaign in promoting behaviour change. (20 marks)

QUESTION 5

Critically evaluate the consequence of media campaign in terms of:

- a) Inaccuracy (5 marks)
- b) Unfairness (5 marks)
- c) Non-transparency (5 marks)
- d) Disrespect for privacy (5 marks)

QUESTION 6

Cite four (4) media channels used in media campaign and for each review two (2) advantages and two (2) disadvantages. (20 marks)

..../fk



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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

MODULE: Network Theory in Public Health

PAPER NO: 609/23/M08

DURATION: 3 Hours

JUNE 2026 EXAMINATION

REQUIREMENTS

Scientific Calculator

Graph paper

INSTRUCTIONS TO CANDIDATE

- 1. Answer any five (5) questions.**
- 2. Do not write anything on the question paper.**
- 3. Do not write your name on the answer booklet.**

QUESTION 1

Compare and contrast internal and external data source.

(20 marks)

QUESTION 2

If $f(x) = |x|$

a) Draw the graph of x . Perform the following transformations on the graph of $f(x)$

i) $f(x) + 1$

(6 marks)

ii) $f(x - 2)$

(4 marks)

iii) $2f(x)$

(4 marks)

b) Disapprove the statement that if n is an integer and n^2 is divisible by 4 then n is divisible by 4 also.

(6 marks)

QUESTION 3

a) Define sampling

(2 marks)

b) Explain two (2) probability sampling techniques and two (2) non-probability sampling techniques.

(12 marks)

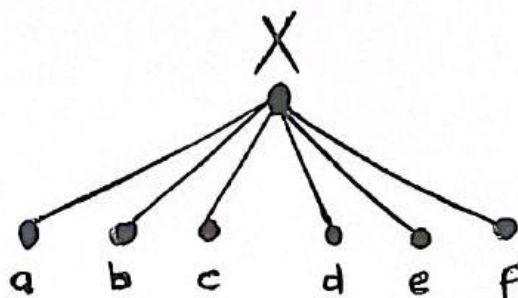
c) For the following undirected graph find the

i) Degree of x

(3 marks)

ii) Degree of all other nodes

(3 marks)



QUESTION 4

Compare and contrast qualitative and quantitative research methods.

(20 marks)

QUESTION 5

a) Prove by induction that

$$1 + 3 + 5 + \dots + (2n - 1) = n^2 \text{ for every natural number.}$$

(10 marks)

b) Prove by contradiction that $\sqrt{6}$ is irrational.

(10 marks)

QUESTION 6

a) Outline 10 steps in disease outbreak investigation.

(10 marks)

b) Define eigen value of a square matrix.

(3 marks)

c) Find eigen values of the square matrix.

$$A = \begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$$

(7 marks)

.../dk



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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

**MODULE: Decision Theory in Public
Health Strategies**

PAPER NO: 609/23/M03

DURATION: 3 Hours

JUNE 2026 EXAMINATION

REQUIREMENTS

1. Non programmable calculator.
2. Graph paper.

INSTRUCTIONS TO CANDIDATE

1. Answer any five (5) questions.
2. Do not write your name on the answer.
3. Do not write anything on the question paper.

QUESTION 1

a) Define the following terms;

i) Linear programming (2 marks)

ii) Basic solution (2 marks)

iii) Feasible solution (2 marks)

b) Consider the LPP model below;

Objective function Max; $Z(x) = 3x_1 + 2x_2$

Subject to constraints;

$$2x_1 + x_2 \leq 100$$

$$x_1 + x_2 \leq 80$$

$$x_1 \leq 40$$

$$x_1, x_2 \geq 0$$

Use the graphical method to find the optimal solution to the problem. (14 marks)

QUESTION 2

Table below shows payoff that can result from decisions under various states of nature.

	Possible Future Demands		
	Low	Medium	High
Small facilities	\$10	\$10	\$10
Medium facilities	7	12	12
Large facilities	-4	2	16

The decision is being made concerning which facility should be constructed using the present value (in millions) for each alternative under each states of nature as expressed in the body of the above payoff table. Find which facility must be constructed under the following.

a) max min (4 marks)

b) Max Max (4 marks)

c) Laplace (4 marks)

d) Mini max regret (8 marks)

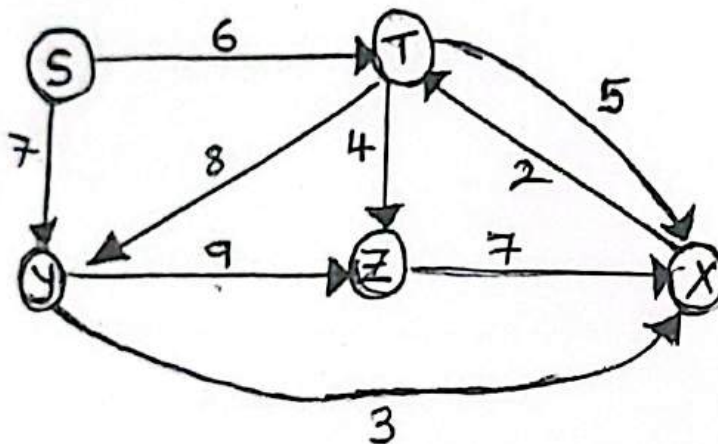
QUESTION 3

Examine any five (5) importance of contact tracing in public health disease and surveillance. (20 marks)

QUESTION 4

Simulating Dijkstra's

Consider the following graph



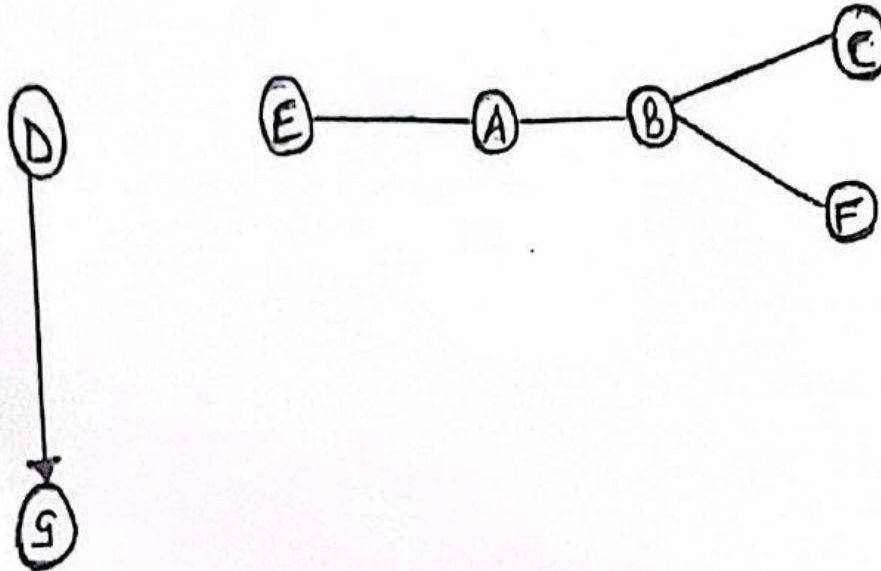
- a) Run Dijkstra's algorithms on this graph starting from vertex S, use the table below to keep track of each step in the algorithm. (10 marks)

Vertex	Distance	Predecessor	Processed
S			
T			
X			
Y			
Z			

Draw the resulting SPT (shortest path tree) after the algorithm has terminated. (10 marks)

QUESTION 5

Consider the undirected, unweighted graph below and answer the questions below.



- a) Find V , E , $|V|$ and $|E|$ (6 marks)
- b) Calculate the maximum degree of the graph. (2 marks)
- c) Locate the cycles if they are any (4 marks)
- d) Find the maximum length simple path in the graph. (5 marks)
- e) Find the connected components of the graph. (3 marks)

QUESTION 6

- a) Define the following terms
 - i) Payoff (2 marks)
 - ii) Duality (2 marks)
 - iii) Node (2 marks)
 - iv) Degeneracy (2 marks)
- b) Consider expected value of the likelihood below and answer the following questions. (12 marks)

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NATIONAL CERTIFICATE

IN

PUBLIC HEALTH

MODULE: Disease Surveillance; Prevention And Control

PAPER NO: 395/22/M04

DURATION: 3 Hours

JUNE 2026 EXAMINATION

REQUIREMENTS

Scientific Calculator

Graph paper

INSTRUCTIONS TO CANDIDATE

- 1. Answer all questions in section A and choose any three from section B.**
- 2. Do not write anything on the question paper.**
- 3. Do not write your name on the answer booklet.**

QUESTION 1

- a) Define the following terms
- i) Epidemiology (2 marks)
 - ii) Health (2 marks)
 - iii) Case reports (2 marks)
 - iv) Immunisation (2 marks)
 - v) Infectious disease (2 marks)
- b) Identify any two (2) examples of infectious disease caused by each of the following pathogens.
- i) Bacteria (2 marks)
 - ii) Fungi (2 marks)
 - iii) Virus (2 marks)
- c) Differentiate between population and sample. (4 marks)

QUESTION 2

The disease surveillance unit at Changu local health department recorded the symptoms for 28 randomly selected patients with influenza like illness. The data is shown below.

No of days with symptoms	1	2	3	4	5	6	7
Frequency	2	3	4	5	9	3	2

Use of frequency distribution to find

- a) Range (2 marks)
- b) Mode (2 marks)
- c) Median (4 marks)
- d) Mean (4 marks)
- e) Standard deviation (8 marks)

SECTION B: Answer any three (3) questions.

QUESTION 3

- a) Differentiate communicable and non-communicable diseases. (6 marks)
- b) Identify any four (4) roles of adjuvants (4 marks)
- c) Outline any five (5) importance of epidemiology in public health. (10 marks)

QUESTION 4

- a) Briefly explain the following observational studies.
 - i) Cross sectional studies (4 marks)
 - ii) Case controlled studies (4 marks)
 - iii) Cohort studies (4 marks)
- b) Describe any four (4) disease controlling methods. (8 marks)

QUESTION 5

Examine any five (5) methods of randomisation that can be applied in public health. (20 marks)

QUESTION 6

Explore any ten (10) key elements of a target product profile (TPP). (20 marks)

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(HEXCO)**

NATIONAL DIPLOMA

IN

**PUBLIC HEALTH MONITORING AND EVALUATION/PUBLIC HEALTH DISEASE
SURVEILLANCE AND MODELLING**

MODULE: Health Education and Promotion PAPER NO: 609/23/M06

DURATION: 3 hours

JUNE 2026 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

Answer any five (5) questions.

This paper consists of 3 printed page.



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PAPER NO: 609/23/M06 – HEALTH EDUCATION AND PROMOTION

QUESTION 1

- a) Define the terms:
- i) Survey (3 marks)
 - ii) Focus group (2 marks)
- b) Delineate on the five (5) key targets of health promotion. (15 marks)

QUESTION 2

Analyse five (5) major objectives of health education and promotion as a field of study. (20 marks)

QUESTION 3

- a) Explain the following communication barriers highlighting the strategies that can be implemented to address the issue.
- i) Literacy levels (4 marks)
 - ii) Language barriers (4 marks)
 - iii) Cultural preferences ((4 marks)
- b) Write concise notes on the following:
- i) Persuasion approach (4 marks)
 - ii) Informed decision-making approach (4 marks)

QUESTION 4

Discuss five (5) barriers to health communication highlighting possible solutions. (20 marks)

QUESTION 5

Analyse any five (5) dimensions of health. (20 marks)

QUESTION 6

Explore the step-by-step stages in development of strategies for implementing health education and promotion. (20 marks)

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NATIONAL DIPLOMA

IN

**PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING, PUBLIC HEALTH
MONITORING AND EVALUATIONS**

SUBJECT: Health Education and Promotion

PAPER NO: 609/23/M06

DURATION: 3 hours

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

1. Answer any five (5) questions of your choice.
2. Do not write your name on the answer booklet.
3. Do not write anything on the question paper.



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QUESTION 1

- a) State any five (5) targets for health education. (5 marks)
- b) Outline any five (5) basic principles of health education. (10 marks)
- c) State any five (5) data collection tools used in public health. (5 marks)

QUESTION 2

Explore any five (5) dimensions of health. (20 marks)

QUESTION 3

Discuss the impact of globalisation in promoting health. (20 marks)

QUESTION 4

Analyse five (5) factors you would consider when designing a health related messaging targeting the elderly. (20 marks)

QUESTION 5

Evaluate any four (4) social determinants of health and how they impact overall health outcomes. (20 marks)

QUESTION 6

Discuss strategies used to deliver health education in the following setting:

- a) Urban setting (5 marks)
- b) Rural setting (5 marks)
- c) Primary level education (5 marks)
- d) Work place (5 marks)

QUESTION 7

Using relevant examples, analyse five (5) women's health issues that are topical in sub-Saharan Africa and how they can be addressed. (20 marks)

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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

MODULE: Predictive Modelling in Public Health PAPER NO: 609/23/M04

DURATION: 3 hours

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

1. Graph paper
2. Non-programmable scientific calculator

INSTRUCTIONS TO CANDIDATE

1. Answer five (5) questions.
2. Do not write your name on the answer booklet.
3. Do not write anything on the question paper.

QUESTION 1

a) Define the following terms:

- i) Critical value (2 marks)
- ii) Null hypothesis (2 marks)
- iii) Type I error (2 marks)
- iv) Type II error (2 marks)
- v) Significance level (2 marks)

b) At Gabi hospital, there is an average of 3 accidents per week. Assuming that the number of accidents per week follow a Poisson distribution. Calculate the probability that in a given week:

- i) There is no accident (3 marks)
- ii) There are exactly 2 accidents (3 marks)
- iii) Six or more accidents (4 marks)

QUESTION 2

A sample of medical records was examined and the following results were obtained:

Smoking Status	CAUSE OF DEATH	
	TB	Other
Smokers	20	50
Non-smokers	32	98

- a) Test at 5% level of significance whether there is a relationship between smoking and cause of death. (10 marks)
- b) Outline five (5) assumptions to consider on regression analysis. (10 marks)

QUESTION 3

a) The data below were drawn from the life assurance premium contribution by client to Shingi Life Assurance Company for the month of March 2021 for sample of 12 clients in (\$).

Client	A	B	C	D	E	F	G	H	I	J	K	L
Contribution	1800	2000	1600	1800	2000	1500	1800	2000	1900	1800	1800	2000

- i) Calculate the point estimators of the population mean and standard deviation of the data. (8 marks)
- ii) Construct a 95% confidence interval for the population mean of the data and interpret. (6 marks)

- iii) Test the Life Assurance Premium contributions has changed at 5% level of significance. (6 marks)

QUESTION 4

- a) Describe the main steps in carrying out a hypothesis. (10 marks)
- b) With the aid of relevant examples, outline five (5) levels of measurement as applied in public health. (10 marks)

QUESTION 5

Distinguish between qualitative and quantitative data. (20 marks)

QUESTION 6

- a) Distinguish between regression and correlation. (4 marks)
- b) The following data relates to annual premium contributions by employees of Nkate Hospital towards pension benefit of the attainment of the pensionable age of 65.

Years of service	20	25	35	30	40	50	60	65
Premium (US\$)	750	1000	1250	1750	2000	2400	3000	3600

- i) Demonstrate the data on a scatter plot and comment on the distribution. (5 marks)
- ii) Calculate the least square modal connecting the two variables. (6 marks)
- iii) Calculate Pearson;s product moment correlation coefficient and content. (5 marks)

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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

MODULE: Game Theory and Prevention

PAPER NO: 609/23/M05

DURATION: 3 Hours

NOVEMBER/ DECEMBER 2025 EXAMINATION

REQUIREMENTS

Scientific calculator

INSTRUCTIONS TO CANDIDATE

- 1. Answer five (5) questions**
- 2. Do not write anything on the question paper**
- 3. Do not write your name on the answer booklet**

PAPER NO: 609/23/M05 - GAME THEORY AND PREVENTION

QUESTION 1

Define the following terms as applied in game theory

- a) Game (4marks)
- b) Game theory (4marks)
- c) Pay-offs (4marks)
- d) Zero-sum game (4marks)
- e) Nash equilibrium (4marks)

QUESTION 2

- a) Describe any four (4) criteria used to classify games. (8marks)
- b) Assume a rock-paper-scissors game is being played for one dollar. Draw up the payoff matrix for the game. (12marks)

QUESTION 3

With the aid of relevant examples, analyse four (4) ways on how the Nash equilibrium can be applied to the field of public health. (20marks)

QUESTION 4

Evaluate (five) (5) intervention methods for disease prevention in public health. (20marks)

QUESTION 5

- a) Define the term Nash equilibrium (2marks)
- b) The famous prisoners Dilemma Chidhumo and Masendeke have robbed a bank and have been arrested. They are interrogated separately. The two have the option to confess (move C) or to remain silent (move). The police have little evidence and if both remain silent, they will be sentenced to one year on minor charges. Therefore, interrogators propose a deal, if one confesses while the other one remain silent the confessing goes free, while the other is sentenced to three (3) years. However, if both confess still will be sentenced to 2 years. If each player pays off is 3 minus the number of years served in jail.

PAPER NO: 609/23/M05 - GAME THEORY AND PREVENTION

- i) Draw up the expected bimatrix pay off tables. (8marks)
- ii) Examine the prisoners -dilemma scenario for the 2 robbers. (10marks)

QUESTION 6

The table below shows pay offs that can result from decisions under various states of nature.

	Possible future demands		
	LOW	MEDIUM	HIGH
Small facilities	\$20	\$20	\$20
Medium facilities	\$14	\$24	\$24
Large facilities	-8	4	32

A decision is being made on which facilities should be constructed using the present value (in millions) for each alternative under each state of nature as expressed in the body of the above payoff table.
Find the facility which must be constructed under the following decision criteria

- a) Maxmin (4marks)
- b) Max max (4marks)
- c) Laplace (4marks)
- d) Min max regret (8marks)

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**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AD MODELLING

**MODULE: Public Health Administration
and International healthcare**

PAPER NO: 609/23/M02

DURATION: 3 Hours

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

Answer any five (5) questions.

PAPER NO: 609/23/M02 – PUBLIC HEALTH ADMINISTRATION AND
INTERNATIONAL HEALTHCARE

QUESTION 1

Analyse any five (5) key principles of public health administration. (20 marks)

QUESTION 2

(a) Define the terms as applied in public health and international healthcare

- (i) equity (2 marks)
- (ii) collaboration (2 marks)
- (iii) prevention (2 marks)
- (iv) administration (2 marks)
- (v) population focus (2 marks)

(b) Outline five (5) roles of government in healthcare access. (10 marks)

QUESTION 3

Explore five (5) health determinants according to World Health Organisation (WHO). (20 marks)

QUESTION 4

Examine any five (5) ethical considerations in public health administration that are crucial in ensuring policies and programs promotes the well being of individuals. (20 marks)

QUESTION 5

Explain five (5) ways by which technology can be applied in improving health system governance. (20 marks)

QUESTION 6

Evaluate five (5) key strategies used by healthcare systems to prevent and control diseases. (20 marks)



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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

MODULE: Media Campaigns

PAPER NO: 609/23/M01

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

Answer any five (5) questions.

QUESTION 1

Examine the role of media campaigns on public health outcomes.

(20 marks)

QUESTION 2

a) Define the following terms as applied in public health:

- i) Target audience
- ii) Demographics
- iii) Psychographics
- iv) Behaviours

(2 marks)
(2 marks)
(2 marks)
(2 marks)

b) Evaluate four (4) key roles of digital and social media in modern marketing strategies. (12 marks)

QUESTION 3

Examine five (5) key components of an effective media campaign.

(20 marks)

QUESTION 4

Discuss some common challenges faced in media campaigns.

(20 marks)

QUESTION 5

Analyse any five (5) major ethical considerations that can affect a media campaign program. (20 marks)

QUESTION 6

a) Define media campaign.

(2 marks)

b) Explore any five (5) principles of message framing.

(15 marks)

c) List three (3) common media channels.

(3 marks)

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NATIONAL DIPLOMA

IN

PUBLIC HEALTH DISEASE SURVEILLANCE AND MODELLING

MODULE: Health Survey Methods

PAPER NO: 609/23/M07

DURATION: 3 Hours

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

Answer any five (5) questions.



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PAPER NO: 609/23/M07 – HEALTH SURVEY METHODS

QUESTION 1

Write concise notes on the following survey designs

- (a) observational design (10 marks)
- (b) experimental design (10 marks)

QUESTION 2

- (a) Define the term survey? (2 marks)
- (b) Describe the steps to be followed in the execution of a survey. (18 marks)

QUESTION 3

- (a) Define the following terms:
 - (i) Sampling frame (2 marks)
 - (ii) sampling technique (2 marks)
 - (iii) target population (2 marks)
 - (iv) questionnaire (2 marks)
- (b) Evaluate any four (4) types of survey errors in health survey execution, highlight the best solution to the errors mentioned? (12 marks)

QUESTION 4

Examine four (4) probability sampling methods used in public health. (20 marks)

QUESTION 5

- (a) Outline any five (5) uses of a health survey. (10 marks)
- (b) Highlight five (5) major characteristics of a good survey sample. (10 marks)

QUESTION 6

- (a) Analyse the term "response rate" as used in health survey highlight if there is anything called acceptable response rate? (4 marks)
- (b) Explore any five (5) methods that can be used to increase response rate to postal and electronic questionnaire. (10 marks)

PAPER NO: 609/23/M07 – HEALTH SURVEY METHODS

- (c) Overall, 3319 phone call attempts were done of which 978 respondents were found to be eligible to participate in the study. Out of the eligible respondents 589 respondents completed the survey which corresponded to the 100% following the survey calculate the response rate. (6 marks)

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