



School: SET

Year: 1st

Course Code: 0542 20 Stat 1201

Total Marks: 60

Term: II

Khulna University

Discipline: Statistics

Examination Year: 2026

Course Title: Basic Statistics-II

Time: 03 Hours

Program: B.Sc. (Hon's)

Session: 2024-2025

Credit: 3.0

- The figures in the margin indicate full marks. The questions are of equal value.
- Use Separate answer script for each section.

Section A

There are **FOUR** questions in this section. Answer any **THREE** questions

- | | | Marks |
|----|---|-------|
| 1. | a) Explain how a scatter diagram helps in identifying the nature of correlation. [L2; CLO1] | 03 |
| | b) Distinguish between correlation and regression analysis with their practical applications. [L4; CLO2] | 04 |
| | c) What does a correlation coefficient measure? Prove that correlation coefficient always lies between -1 to +1. [L2; CLO1] | 03 |
| 2. | a) A teacher wants to understand how the number of hours students spend studying affects their exam performance. Data from 5 students is collected. | 07 |
-
- | | | | | | |
|-----------------|----|----|----|----|----|
| Study hours (X) | 2 | 3 | 5 | 7 | 9 |
| Score (Y) | 50 | 55 | 65 | 70 | 85 |
-
- | | | |
|----|--|----|
| | (i) Plot a scatter diagram; (ii) Measure the correlation between them and interpret; and (iii) Find the probable error and comment on it. [L5; CLO1] | |
| | b) Interpret the situations: $r = +1$, $r = 0$ and $r = -1$. Show graphically. [L2; CLO2] | 03 |
| 3. | a) Discuss the principles of least square method. Find the parameters of simple regression model using least square method. [L4; CLO2] | 05 |
| | b) An ice cream shop owner records daily temperature and sales to analyze how weather influences customer demand. | 05 |
-
- | | | | | | |
|-------------|-----|-----|-----|-----|-----|
| Temperature | 22 | 20 | 30 | 25 | 28 |
| Sales | 220 | 180 | 340 | 260 | 300 |
-
- | | | |
|----|---|----|
| | (i) Obtain the regression line of sales on temperature; (ii) Predict sales when the temperature is 27°C. [L5; CLO2] | |
| 4. | a) Define coefficient of multiple correlation with its properties. [L2; CLO2] | 02 |
| | b) A company analyzes how TV and online advertising jointly affect product sales. | 05 |

TV ads	10	25	15	30	10	20
Online ads	5	12	7	15	7	10
Sales	25	50	30	60	22	45

*Levels of Bloom's cognitive domain:

[L1=Remember; L2=Understand; L3=Apply; L4=Analyze; L5=Evaluate; L6=Create]



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- (i) Calculate the multiple correlation coefficients of sales on both advertising variables; (ii) Find the partial correlation between sales and TV ads when online ads is controlled. [L4; CLO2]
- c) Prove that under usual notation, $R_{1.23} = \frac{\sigma_1^2 - \sigma_{1.23}^2}{\sqrt{\sigma_1^2(\sigma_1^2 - \sigma_{1.23}^2)}}$. [L1; CLO2] 03

Section B

There are **FOUR** questions in this section. Answer any **THREE** questions.

- | | | Marks |
|----|---|--------------|
| 5. | a) Explain the following terms: (i) Order of class, (ii) Ultimate class. [L2; CLO3] | 04 |
| | b) In a survey of 100 persons, 60 persons like Tea (A), 50 persons like Coffee (B), and 30 persons like both Tea and Coffee (AB). Find the following frequencies: (i) $(A\bar{B})$; (ii) $(\bar{A}B)$; and (iii) $(\alpha\beta)$. [L4; CLO3] | 06 |
| 6. | a) What is meant by consistency of data? State the necessary and sufficient conditions of consistency for three attributes. [L1; CLO3] | 04 |
| | b) Examine the consistency of the following data. [L3; CLO3]
$N = 1000, (A) = 600, (B) = 500, (AB) = 50.$ | 02 |
| | c) In a series of houses actually invaded by smallpox, 70% of the inhabitants are attacked and 85% have been vaccinated. What is the lowest percentage of the vaccinated that must have been attacked? [L3; CLO3] | 04 |
| 7. | a) What is index number? Discuss different types of index number. [L1; CLO4] | 04 |
| | b) Mention the basic problems of constructing index numbers. [L1; CLO4] | 03 |
| | c) A worker's money wage increased by 20%, while the cost of living index is 140. Calculate the real wage index. Comment on it. [L3; CLO4] | 03 |
| 8. | a) Distinguish between Laspeyres, Paasche and Fisher's index numbers and point out their main advantages. [L3; CLO4] | 04 |
| | b) Find the cost of living index number using family budget method. [L1; CLO4] | 04 |

Group	Price (2007)	Price (2008)	Quantity
Food	45	60	25
Clothing	40	45	20
Fuel	20	35	15
House rent	25	20	30
Miscellaneous	16	48	10

- c) Why is Fisher's index ideal? [L5; CLO4] 02

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School: SET
Year: 1st
Course Code: 0542 20 Stat 1203
Total Marks: 60

Khulna University
Discipline: Statistics
Examination Year: 2026
Time: 03 Hours

Program: B.Sc. (Hon's)
Session: 2024-2025
Course Title: Discrete Probability Distribution
Credit: 3.0

- The figures in the margin indicate full marks. The questions are of equal value.
- Use Separate answer script for each section.

Section A

There are **FOUR** questions in this section. Answer any **THREE** questions

	Marks
1. a) Define Convergence in Probability and provide its formal notation. [L1; CLO1]	03
b) State and prove Chebyshev's Inequality. [L2; CLO1]	04
c) Using the weak law of large numbers (WLLN), if $n = 100$, $\mu = 50$ and $\sigma^2 = 25$, find an upper bound for $P(\bar{X} - 50 \geq 5)$. Also comment on your finding. [L3; CLO1]	03
2. a) Distinguish between Convergence in Distribution and Almost Sure Convergence. [L2; CLO1]	03
b) State Slutsky's Theorem and its requirements for convergence. [L1; CLO1]	03
c) Show that, Poisson distribution has equal mean and variance. [L5; CLO2]	04
3. a) Distinguish between Bernoulli and Poisson distributions with a suitable example. [L4,5; CLO1]	04
b) The number of defects per meter of cloth follows a Poisson distribution with mean 2. Find the probability of obtaining exactly 3 defects. [L6; CLO2]	02
c) A random variable X follows a Rectangular (Uniform) distribution over (2,8). Find: (i) the probability density function; (ii) $P(3 < X < 6)$. [L4; CLO2]	04
4. a) 'Multinomial distribution is the generalization of the Binomial distribution.' Justify the statement. [L5; CLO2]	02
b) Find the mean and variance of Poisson distribution truncated at $X = 0$. [L4; CLO2]	04
c) Find the first four moments from the characteristics function of the geometric distribution. [L4; CLO2]	04

Section B

There are **FOUR** questions in this section. Answer any **THREE** questions

5. a) Define the Generalized Power Series Distribution (GPSD). State its probability function and the requirements for its generating function $f(\theta)$. [L1; CLO2]	03
b) Prove that, the Binomial distribution is a particular case of the GPSD. [L3; CLO2]	04
c) Briefly describe the form of an inflated power series distribution at zero. Define the role of the inflation parameter α . [L2; CLO2]	03

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School: SET

Year: 1st

Term: II

Course Code: 0542 20 Stat 1203

Total Marks: 60

Khulna University

Discipline: Statistics

Examination Year: 2026

Course Title: Discrete Probability Distribution

Time: 03 Hours

Program: B.Sc. (Hon's)

Session: 2024-2025

Credit: 3.0

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6. a) Derive the Beta Binomial distribution as a compound distribution. Explain the concept of the Binomial parameter p being a random variable following a Beta distribution. [L1; CLO2] 04
- b) Find the mean and variance of Beta-Binomial distribution [L4; CLO2] 04
- c) If X and Y is a bivariate binomial distribution with $n = 8, p_1 = \frac{5}{10}, p_2 = \frac{3}{10}$. Find the probability at $X=5$ and $Y=2$. [L3; CLO2] 02
7. a) Find the moment generating function of Power series distribtuion. [L4; CLO2] 02
- b) Distinguish between family of hypergeometric and Binomial distribution. [L2; CLO2] 03
- c) What are the types, merits and demerits of family of Hypergeometric distribution? [L1; CLO2] 03
- d) Outline the major properties of a generalized negative Binomial distribution. [L1; CLO2] 02
8. a) Define a truncated distribution. Derive the probability mass function of the zero-truncated Poisson distribution when the original Poisson distribution has parameter λ . [L1,4; CLO4] 05
- b) If $X \sim \text{Binomial}(n, p)$, obtain the probability mass function of the zero-truncated Binomial distribution. Explain how it differs from the ordinary Binomial distribution. [L5; CLO3] 05

Best of Luck

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School: SET

Year: 1st

Course Code: 0541 20 Math 1251

Total Marks: 60

Khulna University

Discipline: Statistics

Examination Year: 2026

Course Title: Advanced Calculus

Time: 03 Hours

Program: B.Sc. (Hons.)

Session: 2024-2025

Credit: 3.0

- The figures in the margin indicate full marks. The questions are of equal value.
- Use Separate answer script for each section.

Section A

There are **FOUR** questions in this section. Answer any **THREE** questions

	Marks
1. a) Define a function of several variables. Sketch the level curve $z = k$ for the specified values of k , where $z = x^2 + y^2$; $k = -2, -1, 0, 1, 2$. [L1; CLO1]	03
b) Suppose $z = 3x^2 - y^2$. Estimate all points where $\ \nabla z\ = 6$. [L5; CLO4]	04
c) Verify that the mixed second-order partial derivatives of $f(x, y)$ are equal. [L5; CLO2]	03
2. a) Show that $f(x, y) = \begin{cases} \frac{x^2 - y^2}{x^2 + y^2}; & (x, y) \neq (0, 0) \\ 0; & (x, y) = (0, 0) \end{cases}$ is continuous at every point except the origin. [L2; CLO1]	05
b) Suppose $w = \ln(x^2 + y^2 + z^2)$ and $x = r \cos t$, $y = r \sin t$, $z = 4r\sqrt{t}$. Use the appropriate form of Chain rule to find $\frac{\partial w}{\partial r}$ and $\frac{\partial w}{\partial t}$. [L1; CLO2]	05
3. a) Develop an equation for the tangent plane and parametric equations for the normal line to the surface $z = 4x^3y^2 + 2y$ at the point $P(1, -2, 12)$. [L6; CLO4]	05
b) The temperature (in degrees Celsius) at a point (x, y, z) in a metal solid is $T(x, y, z) = \frac{xyz}{1 + x^2 + y^2 + z^2}$	
(i) Evaluate the direction in which temperature rises most rapidly at $(1, 1, 1)$; and	05
(ii) Evaluate the directional derivative of $T(x, y, z)$ at $(1, 1, 1)$ in the direction of the vector at $\vec{a} = 2\hat{i} + \hat{j} - 2\hat{k}$. [L5; CLO4]	
4. a) Explain relative extrema at a point. Also, identify all relative extrema and saddle points of $f(x, y) = 3x^2 + 2xy + y^2$. [L5; CLO5]	05
b) The temperature at a point (x, y) on a metal plate is $T(x, y) = 4x^2 - 4xy + 4y^2$. An ant, walking on the plate, traverses a circle of radius 5 centered at the origin. What are the highest and lowest temperatures encountered by the ant? (using lagrange multipliers). [L6; CLO5]	05

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Khulna University
Discipline: Statistics **Program: B.Sc. (Hons.)**
Year: 1st **Term: II** **Examination Year: 2026** **Session: 2024-2025**
Course Code: 0541 20 Math 1251 **Course Title: Advanced Calculus**
Total Marks: 60 **Time: 03 Hours** **Credit: 3.0**

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- Use Separate answer script for each section.

Section B

There are **FOUR** questions in this section. Answer any **THREE** questions

5. a) Define the derivative of a vector-valued function. Find the derivative of $\mathbf{r}(t) = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$, where $x = \cos^2 t$, $y = \sin^2 t$, $z = t$ at the point $t = \frac{\pi}{2}$. [L1; CLO5] 03
- b) If $\mathbf{r}(t) = t^2\mathbf{i} + e^t\mathbf{j} - 2\cos t\mathbf{k}$, evaluate $\int_0^1 \mathbf{r}(t)dt$. [L5; CLO5] 03
- c) Find the arc length of the graph of that portion the circular helix $x = 3\cos t$, $y = 3\sin t$, $z = 2t$, from $t = 0$ to $t = \pi$. [L1; CLO5] 04
6. a) Evaluate $\iint_R xy dA$ over the region R enclosed between $y = \frac{x}{2}$, $y = \sqrt{x}$, $x = 2$, and $x = 4$. [L5; CLO6] 05
- b) Integrate $\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_0^{\sqrt{4-x^2-y^2}} z^2 \sqrt{x^2 + y^2 + z^2} dz dy dx$ by using spherical coordinates system. [L4; CLO7] 05
7. a) Evaluate the volume of the solid bounded by the paraboloid $z = x^2 + y^2$ and the plane $z = 9$, using cylindrical co-ordinate system. [L5; CLO8] 05
- b) Measure the volume of the solid enclosed by the paraboloids $z = 5x^2 + 5y^2$ and $z = 6 - 7x^2 - y^2$. [L5; CLO8] 05
8. a) Show that $\iiint \frac{dx dy dz}{(x+y+z+1)^3} = \frac{1}{2} \log 2 - \frac{5}{16}$ the integral being taken throughout the volume bounded by $x = 0$, $y = 0$, $z = 0$, $x + y + z = 1$. [L2; CLO8] 05
- b) Evaluate the surface integral $\iint_S x^3 dy dz + y^3 dx dz + z^3 dx dy$, where S is the surface of the sphere $x^2 + y^2 + z^2 = a^2$ that has upward orientation. [L5; CLO9] 05

*** Best of Luck***

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School: SET

Year: 1st

Course Code: 0541 20 Math 1253

Total Marks: 60

Khulna University

Discipline: Statistics

Examination Year: 2026

Course Title: Matrix Algebra in Statistics

Time: 3.0 Hours

Program: B.Sc. (Hon's)

Session: 2024-2025

Credit: 3.0

- The figures in the margin indicate full marks. The questions are of equal value.
- Use Separate answer script for each section.

Section A

There are **FOUR** questions in this section. Answer any **THREE** questions

- | | Marks |
|---|-------|
| 1. a) Define matrix and classify it. Show that the product of any two diagonal matrices of order n is a diagonal matrix of order n . [L1, 4; CLO1, 3] | 04 |
| b) What do you mean by distance and projection of a vector? Find the distance and angles between the given parallel planes:
$2x - y - z = 7$ and $-4x + 2y + 2z = 14$. [L1; CLO1, 2] | 06 |
| 2. a) Define vector space and subspace. Explain the meaning of orthogonality of a vector? Show that u and v are orthogonal, where $u = (a, b)$ and $v = (-b, a)$. Also, find the angle between these vectors. [L1, 2; CLO2, 3] | 05 |
| b) Illustrate linear independence and dependence of a vector? Let W be the subspace of R^5 spanned by the vectors:
$w_1 = (2, 2, -1, 0, 1)$; $w_2 = (-1, -1, 2, -3, -1)$, $w_3 = (1, 1, -2, 0, -1)$ and $w_4 = (0, 0, 1, 1, 1)$
Find a basis for the orthogonal component of W . [L2; 2, 4] | 05 |
| 3. a) Define the following matrix with an example: (a) Square matrix; (b) Skew-symmetric; (iii) Idempotent matrix; (iv) Involuntary matrix; and (v) Transpose of matrix. [L1; CLO2, CLO5] | 05 |
| b) Define orthogonal matrix with an example. Show that the product of orthogonal matrices is also an orthogonal matrix. [L1; CLO3] | 05 |
| 4. a) Define adjoint matrix. Find the determinant of the following matrix using minor and cofactor expansion: $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 0 & 0 \\ 1 & 4 & 1 \end{bmatrix}$. [L1, 4; CLO3, 4] | 05 |
| b) What is the maximum possible rank of an $m \times n$ matrix A that is not square? Find the canonical form, rank and nullity of the given matrix: | 05 |

$$A = \begin{bmatrix} -1 & 2 & 0 & 4 & 5 & -3 \\ 3 & -7 & 2 & 0 & 1 & 4 \\ 2 & -5 & 2 & 4 & 6 & 1 \\ 4 & 9 & 2 & 4 & -4 & 7 \end{bmatrix} \quad [L2, 5; CLO3]$$

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Khulna University
School: SET **Discipline: Statistics** **Program: B.Sc. (Hon's)**
Year: 1st **Term: II** **Examination Year: 2026** **Session: 2024-2025**
Course Code: 0541 20 Math 1253 **Course Title: Matrix Algebra in Statistics**
Total Marks: 60 **Time: 3.0 Hours** **Credit: 3.0**

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Section B

There are **FOUR** questions in this section. Answer any **THREE** questions

5. a) Define inverse of a matrix. A square matrix A is invertible if and only if $\det(A) \neq 0$. [L2, 4; CLO1, 4] 05
 b) Find the inverse of the given matrix using minors' and cofactor expansion: 05

$$A = \begin{bmatrix} 2 & 3 & 8 \\ 4 & 0 & 0 \\ 8 & 9 & 10 \end{bmatrix}$$
 [L1; CLO3]
6. a) What is quadratic form? Show that any quadratic form can be expressed by symmetric matrix. [L5; CLO1, CLO4] 04
 b) What is signature of a matrix? Explain the nature of the following general quadratic form: $ax_1^2 + bx_2^2 + cx_3^2 + 2dx_1x_2 + 2ex_2x_3 + 2fx_3x_1$. [L2; CLO4] 03
 c) Define the rank of a matrix. Reduce the quadratic form $12x_1^2 + 4x_2^2 + 6x_3^2 + 8x_1x_2 - 16x_2x_3 - 6x_3x_1$ to canonical form and find its rank. [L3, 6; CLO3, 5] 03
7. a) Suppose the augmented matrix of the system of linear equations is 05

$$X = \begin{bmatrix} 1 & 3 & -2 & 2 & 0 \\ 2 & 6 & -5 & -2 & 4 & -3 & -1 \\ & & 5 & 10 & 15 & 5 \\ 2 & 6 & 8 & 4 & 18 & 6 \end{bmatrix}$$

 Find the solution of the matrix X using reduced row echelon form and elementary row operation. [L2, 5; CLO5]
 b) What do you mean by characteristic roots and characteristic vectors of a matrix? Show that characteristic roots of a diagonal matrix are equal to the diagonal element of the matrix. [L1; CLO4] 05
8. a) What do you mean by homogeneous and non-homogeneous solutions of a simultaneous equation? Solve the equations: $2x_1 - x_2 + x_3 = 0$; $3x_1 - x_2 + x_3 = 0$; $x_1 - 3x_2 + 5x_3 = 0$. [L1, 4; CLO6] 05
 b) Find the eigen values and eigen vectors of the following matrix: 05

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 2 \end{bmatrix}$$
 [L1; CLO6]

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Khulna University
Discipline: Statistics **Program: B.Sc. (Hon's)**
Year: 1st **Term: II** **Examination Year: 2026** **Session: 2024-2025**
Course Code: 0714 20 CSE 1255 **Course Title: Computer Programming**
Total Marks: 60 **Time: 03 Hours** **Credit: 3.0**

- The figures in the margin indicate full marks. The questions are of equal value.
- Use Separate answer script for each section.

Section A

There are **FOUR** questions in this section. Answer any **THREE** questions

	Marks
1. a) Explain why the C programming language is called a structured programming language. [L2; CLO1]	03
b) What is a translator program? Explain the difference between a compiler and an interpreter. [L1; CLO1]	03
c) Design an algorithm, flowchart, and pseudocode to determine the type of ticket discount a customer receives in a movie theater. Conditions: i) Children under aged 12 years get 50% discount; ii) Senior citizens aged 60 years or above get 40% discount; iii) Students aged 12-25 years with a valid student card get 30% discount; iv) If the show time is before 12 PM, everyone gets an additional 10% Morning discount; v) Otherwise, no discount. [L6; CLO2, 6]	04
2. a) Determine whether the following variable names are valid or invalid in C. Give reasons for your answers. i) printf; ii) total-sum; iii) float and iv) @value. [L5; CLO2, 3]	02
b) Write a C program to find all roots of a quadratic equation. [L3; CLO4, 5]	04
c) Write a C program to input electricity unit charge and calculate the total electricity bill according to the given condition: i) For first 50 units Tk.0.50/unit; ii) For next 100 units Tk.0.75/unit; iii) For next 100 units Tk. 1.20/unit; iv) For unit above 250 Tk.1.50/unit and v) An additional surcharge of 20% is added to the bill. [L3; CLO2, 4]	04
3. a) Why is the use of the goto statement discouraged in programming? [L1; CLO2]	02
b) Write a C program to print Fibonacci series up to n terms. [L3; CLO4]	04
c) Convert the following loop into an equivalent while loop. What will be the output of this code? <div style="text-align: center;">for(int i=5; i>0; i--) print("%d", i*i) [L4; CLO2, 3]</div>	04
4. a) Write a C program that takes a number as input and checks whether it is a prime number or not using a loop. [L5; CLO2, 4]	05
b) Write a C program to calculate the mean, median and mode of n numbers entered by user. [L5; CLO2, 4]	03
c) What is the difference between ++X and X++? Explain with an example. [L3; CLO2]	02

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School: SET
Year: 1st
Course Code: 0714 20 CSE 1255
Total Marks: 60

Term: II
Examination Year: 2026
Course Title: Computer Programming
Time: 03 Hours

Program: B.Sc. (Hon's)
Session: 2024-2025
Credit: 3.0

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- Use Separate answer script for each section.

Section B

There are **FOUR** questions in this section. Answer any **THREE** questions

- | | | | |
|----|----|---|----|
| 5. | a) | Write a C program to read 10 integers into an array and then print the sum and average of all elements. [L5, 6; CLO4, 5] | 05 |
| | b) | What is recursion? Write a recursive function in C to calculate the factorial of a positive integer. [L2, 5; CLO6] | 05 |
| 6. | a) | What happens if the break statement is omitted from a switch statement in C programming? [L2; CLO2] | 02 |
| | b) | Write a C program to check whether a string is a palindrome or not. [L3; CLO4] | 04 |
| | c) | Write a C program to input n elements into an array and sort the elements in ascending order. [L3; CLO4, 5] | 04 |
| 7. | a) | Define a structure named student with members: name(string), id(integers), and cgpa(float). Then write a code segment to declare a variable of this type and initialize it. [L1, 4; CLO4] | 04 |
| | b) | Write a C program to perform matrix multiplication for two matrices entered by the user. [L3; CLO4, 6] | 04 |
| | c) | Discuss the use of break and continue statements in loop control. [L3; CLO2] | 02 |
| 8. | a) | What is function in C programming language? Explain the difference between call by value and call by reference in C with suitable examples. [L1, 2; CLO4] | 05 |
| | b) | Write a C program that takes two integers as input and swaps their values using as function (without using a third variable). [L5; CLO4] | 05 |

*** Best of Luck***

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Khulna University
Discipline: Statistics **Program: B.Sc. (Hon's)**
Year: 1st **Term: II** **Examination Year: 2026** **Session: 2024-2025**
Course Code: 0314 20 Soc 1257 **Course Title: Population Studies**
Total Marks: 60 **Time: 03 Hours** **Credit: 3.0**

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Section A

There are **FOUR** questions in this section. Answer any **THREE** questions

	Marks
1. a) Explain demography. [L2; CLO1]	02
b) Distinguish between micro demography and macro demography. [L2; CLO1]	03
c) Describe in details the major sources of demographic data and comment on their quality in Bangladesh. [L3; CLO1]	05
2. a) What are the usual measures of population change? How do you distinguish absolute change from a relative change? [L2, 5; CLO2, 3]	03
b) How is proportion different from a ratio in the context of demographic data. [L4, 5; CLO2]	04
c) A population of a city 550,000 with an annual growth rate of 2.2%. Estimate the population after 5 years assuming exponential population growth. [L2; CLO2, 3]	03
3. a) Distinguish between coverage error and content error with examples. Which error is most prevalent in census count? [L1, 2; CLO2]	05
b) What is the dependency ratio? How is it related to age-sex composition? [L3, 5; CLO3, 5]	03
c) In a town, crude birth rate = 28 per 1000 and crude death rate = 9 per 1000. Determine the natural growth rate. [L3; CLO3]	02
4. a) The population of a town was 95,000 in 2018 and became 1,12,500 in 2023. Calculate the population growth rate. [L2; CLO3]	03
b) How does a population pyramid help you in understanding the population dynamics? [L4; CLO3]	03
c) The following age distribution was observed in a survey:	04

Age (in years)	Population
0-14	4,200
15-59	7,800
60+	1,500

Calculate the dependency ratio. [L4; CLO3]

*Levels of Bloom's cognitive domain:

[L1=Remember; L2=Understand; L3=Apply; L4=Analyze; L5=Evaluate; L6=Create]



School: SET

Year: 1st

Term: II

Course Code: 0314 20 Soc 1257

Total Marks: 60

Khulna University

Discipline: Statistics

Examination Year: 2026

Course Title: Population Studies

Time: 03 Hours

Program: B.Sc. (Hon's)

Session: 2024-2025

Credit: 3.0

- The figures in the margin indicate full marks. The questions are of equal value.
- Use Separate answer script for each section.

Section B

There are **FOUR** questions in this section. Answer any **THREE** questions

5. a) Briefly discuss the major sources of data for fertility measurement. [L1; CLO3, 5] 04
- b) How does NRR differ from GRR? How do you interpret the NRR in the following situations: (i) NRR=1, (ii) NRR>1 and (iii) NRR<1. [L4, 5; CLO3, 6] 03
- c) Establish the inter-relationship between the infant mortality rate, post-neonatal mortality rate, and neonatal mortality rate. [L2; CLO3] 03
6. a) Differentiate between incidence and prevalence as measures of morbidity. [L1; CLO1, 3] 04
- b) Explain how standardization removes age structure bias in mortality comparisons. [L2, 3; CLO5, 6] 03
- c) The following age-specific fertility rates (ASFRs) per 1000 women were recorded for a district. If the proportion of female births is 0.48, calculate the TFR and GRR. [L4, 5; CLO5] 03

Age (in years)	15-19	20-24	25-29	30-34	35-39	40-44	45-49
ASFR	45	130	165	110	75	30	10

7. a) Define a life table. Distinguish between the cohort life table and the current life table. [L1, 2; CLO6, 7] 03
- b) Calculate Gross Reproduction (GRR) rate from the following information: Total fertility rate = 3.2 and Proportion of female births = 0.49. [L4; CLO5] 04
- c) In a population, 1,800 births occurred in one year among 24,000 married women aged 15–49 years. Calculate the General Marital Fertility (GMF) rate. [L5; CLO5] 03
8. a) Define the force of mortality. Interpret the meaning of a high force of mortality at older ages versus younger ages. [L1, 2; CLO7] 02
- b) Establish the relationship between survival probability and death probability in a life table: ${}_n p_x + {}_n q_x = 1$. [L5; CLO5] 04
- c) In a certain life table $l_x = 100,000 - 500x - x^2$. (i) What is the ultimate age in the life table; (ii) Find μ_x and q_x ; and (iii) Find ${}_5 q_{50}$. [L4, 5; CLO5, 7] 04

Best the Best

*Levels of Bloom's cognitive domain:

[L1=Remember; L2=Understand; L3=Apply; L4=Analyze; L5=Evaluate; L6=Create]