



PBK-1603220001010200 Seat No. \_\_\_\_\_

**B. Sc. (Bioinformatics) (Sem. I) (CBCS) Examination**  
**November / December - 2018**  
**Paper - BI - 102 : Mathematics & Statistics-I**  
**(New Course)**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

**1 (A) Answer the following questions in brief. 4**

1. If  $z = 2 + 3i$  then find  $|z|$
2. Find the value of  $(i)^{25}$ .
3. Define: Difference set
4. Represent the set  $A = \{x / 0 \leq x < 4, x \in N\}$  using Roster method.

**(B) Attempt any one. 2**

1. Find  $A \cap B$  for  $A = \{x / 1 \leq x < 6, x \in N\}$  and  $B = \{-4, 2, 3, 7, 9\}$ .
2. Find the value of  $z = (1 + 3i)(2 + 3i)$ .

**(C) Attempt any one. 3**

1. Find the value of  $(3 + 4i)^{-1}$ .
2. Let  $A = \{1, 3\}$  and  $B = \{3, 6\}$  then find  $A \times B, B \times A$  and  $A \times A$ .

**(D) Attempt any one. 5**

1. In usual notations prove that  $|z_1 + z_2| \leq |z_1| + |z_2|$
2. Let  $A = \{0, 1, 2, 4, 5\}, B = \{3, 4, 6, 8\}$  and  $C = \{1, 4, 6, 9, 10\}$   
Then prove that (i)  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$   
(ii)  $A \cup (B \cup C) = (A \cup B) \cup C$

**2 (A) Answer the following questions in brief. 4**

1. If  $\begin{vmatrix} x & 3 \\ 4 & 1 \end{vmatrix} = 0$  then find the value of  $x$ .
2. Let  $A = \begin{bmatrix} -7 & 8 \\ 2 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 2 \\ 3 & -1 \end{bmatrix}$  then find  $A + 2B$ .
3. Define: Triangular Matrix
4. Define: Inverse of Matrix

**(B) Attempt any one. 2**

1. Find the cofactor matrix of  $A = \begin{bmatrix} 4 & 6 \\ -5 & 2 \end{bmatrix}$

2. Prove that  $\begin{vmatrix} a & a & a \\ 2a & 2a & 2a \\ 3a & 2a & a \end{vmatrix} = 0$

**(C) Attempt any one.**

3

1. Solve the system of linear equations using matrix method.

$$5x - 3y = 4 \text{ and } 2x + 3y = 10$$

2. Let  $A = \begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 2 \\ 0 & 5 \end{bmatrix}$  then verify that  $AB = BA$ .

**(D) Attempt any one.**

5

1. Find the inverse of matrix  $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$

2. Solve the system of linear equations using Cramer's rule.

$$3x + y - z = 3, 2x - 8y + z = -5, x - 2y + 9z = 8$$

3 (A) 1. Evaluate  $\lim_{x \rightarrow 0} x^2 - 3x + 2$

2. Evaluate  $\lim_{x \rightarrow \frac{\pi}{2}} \cos x$

4

3. Find  $\frac{dy}{dx}$  for  $y = e^{2x}$

4. Find  $\frac{dy}{dx}$  for  $y = \log_e x$

**(B) Attempt any one.**

2

Find  $\frac{dy}{dx}$ .

1.  $y = x^3 - 2x^2 + 4x - 1$

2.  $y = \cos(2x + 2)$

**(C) Attempt any one.**

3

1. Find  $\frac{dy}{dx}$  for  $y = x^x$

2. Evaluate  $\lim_{x \rightarrow 2} \frac{x^4 - 16}{x^3 - 3x^2 + 3x + 2}$

**(D) Attempt any one.**

5

1. Find  $\frac{dy}{dx}$  for  $x^2 + y^2 - 4x - 6y = 25$

2. Evaluate  $\lim_{x \rightarrow 2} \frac{x^3 - 5x^2 + 8x - 4}{2x^3 - 9x^2 + 12x - 4}$

**4 (A) Answer the following questions in brief.** **4**

1. Raw data as they are at the time of collection without any treatment are called Ungrouped or Grouped data?
2. Data collected for specific purpose are known as primary or secondary data?
3. Mode is also be derived graphically by using which graph?
4. Less than and more than curve is also known as \_\_\_\_\_.

**(B) Attempt any one.** **2**

1. State any three Uses of Statistics.
2. What is meant by classification?

**(C) Attempt any one.** **3**

1. A group of 60 values has a mean 10. A subgroup of this has  $n_1 = 40, \bar{X}_1 = 11$ . Find the mean of other group.
2. Draw a frequency curve for the given data.

Class	100 – 200	200 – 300	300 – 400	400 – 500	500 – 600
Frequency	12	15	16	18	20

**(D) Attempt any one.** **5**

1. Represent the following data in form of Histogram and Frequency Polygon on the same graph paper.

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Frequency	5	18	20	22	25	18	16	15

2. What is Tabulation? Which important points should kept in mind while preparing a good statistical table?

**5 (A) Answer the following questions in brief.** **4**

1. Define Median.
2. Write the formula for the empirical relationship between mean, median and mode.
3. If constant value 5 is added to each value of series whose mean is 21, then what is revised mean?
4. Which is the best measure of central tendency?

**(B) Attempt any one.** **2**

1. Find the median of -16, 16, -14, 15, 18, -12, 11.
2. If Mean = 20, Median = 18 then find the value of Mode.

**(C) Attempt any one.** **3**

1. Find the mean, median and mode for the following data.

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	5	12	15	12	5

2. Find the mean deviation from mean for the following data.

X	1	5	7	8	10
f	2	4	7	9	10

**(D) Attempt any one.**

5

1. Find the median of 100 observations for the following data

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	12	18	0	32	26	12

2. Find the Standard Deviation for the following data of marks of the students.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
No. of Students	5	12	30	45	50	37	21