HDP-1603220001010200 Seat No. _____

B. Sc. (Bioinformatics) (Sem. I) (CBCS) Examination

November/December – 2017

BI - 102 : Mathematics & Statistics - 1

Time : **2 ½** Hours] [Total Marks : **70**

1 (a) Answer the following questions in short : **4**

(1) Find the value of $(i+1)^2$.

(2) Find the $\text{Im}\left[(2+i)(1+i)\right]$.

(3) Define : Sub set.

(4) Define : Complement of a set.

(b) Answer the following in brief : (any 1 out of 2) **2**

(1) Simplify $z = (5+2i)(3+5i)$.

(2) Find $A \cup B$ for $A = \{1, 4, 5\}$ and $B = \{4, 6, 7\}$.

(c) Answer the following in detail : (any 1 out of 2) **3**

(1) Express $\dfrac{(2-i)(5+2i)}{1-i}$ into $a+ib$.

(2) For $A = \{1, -1\}$ and $B = \{2, 6\}$ find $A \times B$, $B \times A$ and $A \times A$.

(d) Answer the following in detail : (any 1 out of 2) **5**

(1) Find the argument, modulus of $z = \sqrt{3} + i$ and convert it into polar form.

(2) For $U = \{1, 2, ...9\}$, $A = \{1, 2, 4, 5\}$ and $B = \{3, 4, 6, 8\}$

(i) Prove that $A \cup B = B \cup A$

(ii) Verify $(A \cap B)' = A' \cup B'$

2 (a) Answer the following questions in short : **4**

(1) If $\begin{vmatrix} a & 5 \\ 5 & -1 \end{vmatrix} = 0$ then $a =$_____.

(2) Find $2A + B$ for $A = \begin{bmatrix} -7 & 8 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 \\ 3 & -1 \end{bmatrix}$.

(3) Define : Square matrix.

(4) Define : Transpose of matrix.

(b) Answer the following in brief : (any 1 out of 2) **2**

(1) Find the co-factor matrix of $A = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$.

(2) Find the value of $A = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$.

(c) Answer the following in detail : (any 1 out of 2) **3**

(1) Show that every square matrix can be written as the sum of symmetric and skew symmetric matrix.

(2) Verify $(AB)' = B'A'$ for $A = \begin{bmatrix} 5 & 3 \\ 1 & 5 \end{bmatrix}$ and

$B = \begin{bmatrix} -1 & 3 \\ 1 & 5 \end{bmatrix}$.

(d) Answer the following in detail : (any 1 out of 2) **5**

(1) Find the inverse of the matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 4 & 1 & 1 \\ -1 & 2 & 3 \end{bmatrix}$.

(2) If $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 5 & 6 \\ 1 & 1 & 1 \end{bmatrix}$ then find $A^2 + 2A - I$.

3 (a) Answer the following questions in short : **4**

(1) Find $\lim\limits_{x \to 0} x^2 - x - 2$

(2) Find $\lim\limits_{x \to \frac{\pi}{2}} \sin x$

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

(4) Find $\frac{dy}{dx}$ for $y = 3x^3 - 2x^2 + 5$

(b) Answer the following in brief : (any 1 out of 2) **2**

(1) Find $\lim_{x \to 2} \frac{x^3 - 8}{x - 2}$

(2) Find $\frac{dy}{dx}$ for $y = e^{2x} - \cos x + x^2$

(c) Answer the following in detail : (any 1 out of 2) **3**

(1) Find $\frac{dy}{dx}$ for $x + y = xy$

(2) Find $\lim_{x \to 0} \frac{x^3 - 3x^2 + x}{4x^3 - 5x^2 + 3x}$

(d) Answer the following in detail : (any 1 out of 2) **5**

(1) Find $\lim_{x \to 1} \frac{x^{18} - 1}{x^{16} - 1}$

(2) Find $\frac{dy}{dx}$ for $y = \left(2x^3 + \tan x - e^{3x}\right)^3$

4 (a) Answer the following questions in short : **4**

(1) If the point of intersection of the "less than" and "more than" ogives corresponds to which mean ?

(2) One dimension diagrams are drawn on the basis of height or width ?

(3) Data collected for specific purpose are known as primary or secondary data ?

(4) In histogram the width of the bar is equal or unequal?

(b) Answer the following in brief : (any 1 out of 2) **2**

(1) Draw a frequency curve for the given data

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f	12	15	16	12	7

(2) What is meant by classification ?

(c) Answer the following in detail : (any 1 out of 2) **3**

(1) Draw appropriate bar diagram for the given data.

Item	*City A*	*City B*
Food	40	35
Fuel	20	26
Clothes	08	09
Cosmetics	14	15
Others	18	15

(2) There were 1000 students in a school. The number of students in std. 8^{th}, 9^{th} and 10^{th} were in proportion 2:2:1, the number of boys in 8^{th} is 25% of the total students. The numbers of boys were 3 times the number of girls in 9^{th}. The number of boys and girls are equal in 10^{th}.

Represent the given data in tabular form.

(d) Answer the following in detail : (any 1 out of 2) **5**

(1) Draw the histogram and frequency polygon on the same graph paper for the following data.

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) According to one report conducted by a company there were 1250 skilled and 400 unskilled workers in a private company in the year 2011. 220 of them were female workers of whom 140 were unskilled. In the year 2012 the numbres of skilled workers were 1475 of whom 1300 were males. Out of 250 unskilled workers 200 were males. In 2013 there were 1700 skilled and 50 unskilled workers, 250 were females of whom 240 were skilled. In the year 2014 there were 2000 workers of whom 2% were unskilled. Out of total workers 300 were female of whom 10 were unskilled.

Represent the given data in a tabular form.

5 (a) Answer the following questions in short : **4**

(1) Define median.

(2) Define standard deviation.

(3) Find mean of x where x : 1.3, 4.3, 4.2, 3.4, 2.9.

(4) What is formula to find the coefficient of variation ?

(b) Answer the following in brief : (any 1 our of 2) **2**

(1) Find the median of –6, 6, –4, 5, 8, –2, 1.

(2) If $\bar{x} = 20$, $M = 18$ then find Z.

(c) Answer the following in detail : (any 1 out of 2) **3**

(1) Find the mean for the following data.

Class	0 – 100	100 – 200	200 – 300	300 – 400	400 – 500
Frequency	5	15	12	8	9

(2) Find the median deviation from mean for the following data.

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

(d) Answer the following in detail : (any 1 out of 2) **5**

(1) Find mean and standard deviation for the following data.

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

(2) The mean and standard deviation marks obtained by 2 group of student, consisting of 50 each are given below. Calculate the coefficient of variation for each group. Which group performed better ?

Group	*Mean*	*S.D.*
I	64	8
II	35	7