

No. of Printed Pages : 5

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

00808

June, 2015

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

Maximum Marks : 50

Note :

- (i) Attempt **all** questions. Questions no. 2 to 5 have internal choices.
- (ii) Use of scientific calculator is allowed.
- (iii) Use of Formulae and Table Booklet for PGDAST is allowed.
- (iv) Symbols have their usual meaning.

1. Which of the following statements are *True* or *False* ? Give reasons in support of your answer.

$$5 \times 2 = 10$$

- (a) Collection of good actors in India forms a set.
- (b) In a sport event (say cricket), the numbers allotted to the participants come under ordinal scale.
- (c) $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - 5x + 4} = -1$.
- (d) A demographer uses 2011 census data in his study; it is an example of primary data.
- (e) The sum $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$ to ∞ is 3.

2. (a) If 10^{th} and 21^{st} terms of an A.P. are 52 and 107, respectively, then find the A.P. 4
- (b) In a group of 500 persons, 400 can speak Hindi and 150 can speak English. How many can speak
- (i) Both Hindi and English,
- (ii) Only Hindi,
- (iii) Only English ? 2+2+2

OR

- (a) If $f(x) = |x| - 2^x + 3$, then evaluate $f(2)$, $f(-2)$ and $f(0)$. 3
- (b) Solve $(n-2)! = 12(n-4)!$ for n , where $n \in \mathbb{N}$. 3
- (c) In an examination, there are 10 multiple choice questions. The first five questions have 4 choices each and the last five questions have 5 choices each. How many sequences of the answers are possible ? 4

3. (a) Find the values of a and b , if the function f given below is continuous at $x = 2$. 5

$$f(x) = \begin{cases} 7, & x < 2 \\ ax + b, & x > 2 \\ a + 5, & x = 2 \end{cases}$$

(b) If $y = u^2$, $u = 3v$, $v = \frac{x}{x+1}$, then find $\frac{dy}{dx}$. 5

OR

(a) Evaluate the integral $\int \frac{(a^x - b^x)^2}{a^x b^x} dx$. 5

(b) Evaluate the integral $\int_1^6 x\sqrt{x+3} dx$. 5

4. The cost of 2 pens, 3 note-books and 1 book is ₹ 90. The cost of 1 pen, 4 note-books and 2 books is ₹ 120. The cost of 2 pens, 4 note-books and 5 books is ₹ 205. Find the cost of 1 pen, 1 note-book and 1 book by matrix method or by Cramer's rule. 10

OR

(a) Prove that
$$\begin{vmatrix} ab & 1 & c(a+b) \\ bc & 1 & a(b+c) \\ ca & 1 & b(c+a) \end{vmatrix} = 0$$

(without expanding). 5

(b) If $A = \begin{bmatrix} 3 & 5 \\ -2 & 4 \end{bmatrix}$, then show that $\frac{1}{2}(A - A')$ is skew symmetric. 5

5. (a) Construct a continuous frequency distribution for 50 students studying in a class having the following heights (in cm) : 5

146, 156, 152, 167, 178, 180, 172, 162, 148,
 153, 161, 173, 163, 174, 147, 179, 148, 151,
 168, 172, 165, 173, 172, 180, 175, 145, 153,
 154, 162, 164, 170, 172, 160, 161, 158, 152,
 163, 165, 170, 168, 158, 149, 155, 160, 150,
 149, 167, 176, 169, 159.

- (b) Draw a pie diagram to represent the expenditure of ₹ 100 of a family over different budget-heads as given below : 5

<i>Item</i>	<i>Expenditure</i> (in ₹)
Food	25
Clothing	15
Education	20
Transport	10
Outing	10
Miscellaneous	5
Saving	15

OR

- (a) Draw a frequency polygon for the following frequency distribution :

3

<i>Class Interval</i>	<i>Frequency</i>
40 – 50	4
50 – 60	10
60 – 70	11
70 – 80	13
80 – 90	18
90 – 100	14
100 – 110	11
110 – 120	5

- (b) Draw a box plot for the given data :

7

31, 42, 22, 27, 33, 27, 37, 28, 34, 44, 25, 39,
26, 31, 26, 33, 46, 48, 50.

No. of Printed Pages : 5

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

December, 2015

00389

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

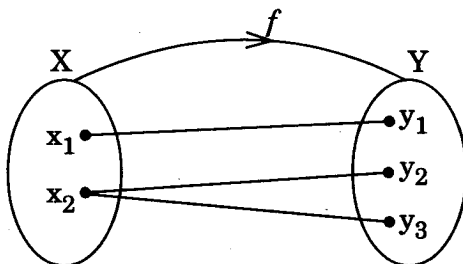
Maximum Marks : 50

Note :

- (i) Attempt **all** questions. Questions no. 2 to 5 have internal choices.
- (ii) Use of scientific calculator is allowed.
- (iii) Use of Formulae and Table Booklet for PGDAST is allowed.
- (iv) Symbols have their usual meaning.

1. State whether the following statements are *true* or *false* ? Give reasons in support of your answer. $5 \times 2 = 10$

- (a) The rule f shown in the following figure is a function :



- (b) If $A = \{2, 9, 7, 5\}$, $B = \{5, 2, 9, 7\}$, then $A = B$.

(c) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = 4.$

(d) Measurement of blood group comes under nominal scale of measurement.

(e) Caption refers to the row heading, and explains what information the row presents.

2. (a) Write the set $A = \{x : x^2 - 4x - 21 = 0, x^2 - 49 = 0, x \in \mathbb{N}\}$ by roster method. 5

(b) If $A = \{a, b, c\}$, then write the power set of A. 3

(c) If $U = \{x : x \text{ is an English alphabet}\}$ and $A = \{x : x \text{ is a vowel of English alphabet}\}$, then write A' keeping U as universal set. 2

OR

Find the following sums : 2+3+5

(a) $3 + 7 + 11 + \dots$ to 101 terms

(b) $2 + 7 + 12 + \dots + 5002$

(c) $\frac{2}{9} + \frac{2}{3} + 2 + 6 + \dots + 486$

3. (a) Evaluate $\lim_{x \rightarrow 2} \frac{\sqrt{3+x} - \sqrt{5}}{x - 2}$. 5

(b) Find the derivative of the function

$(x + 2)^2 (x + 3) (x + 1).$ 5

OR

Evaluate the following integrals :

2+3+5

(a) $\int 5^x 2^x dx$

(b) $\int \left[\frac{x}{3} + (5x - 3)^3 + x \sqrt{x} \right] dx$

(c) $\int \frac{x^9}{x^{10} + 1} dx$

4. Solve the following system of equations by the matrix method :

10

$$2x + 3y = 5$$

$$4x + 6y = 10$$

OR

(a) List five differences between primary and secondary data.

5

(b) Express the matrix $A = \begin{bmatrix} 3 & 5 \\ -2 & 4 \end{bmatrix}$ as the sum

of symmetric and skew symmetric matrices.

5

5. (a) A frequency distribution of marks of 50 students in a subject is as given below :

Class (Marks)	Frequency
0 – 10	6
10 – 20	10
20 – 30	14
30 – 40	18
40 – 50	2

Prepare relative and percentage frequency distributions.

5

- (b) Draw the multiple bar diagram for the following data :

5

Year	Sales (in 1000 ₹)	Gross rofit (in 1000 ₹)	Net Profit (in 1000 ₹)
1990	100	30	10
1995	120	40	15
2000	130	45	25
2005	150	50	30
2010	200	70	30

OR

- (a) Draw less than ogive from the following frequency distribution of marks of 90 students :

6

Marks	No. of students
0 – 9	7
10 – 19	11
20 – 29	19
30 – 39	8
40 – 49	20
50 – 59	14
60 – 69	8
70 – 79	3

- (b) Draw a stem-and-leaf display for the following data :

4

31, 42, 22, 27, 33, 57, 67, 58, 64, 44, 65,
59, 46, 61, 35, 26, 63.

No. of Printed Pages : 6

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

June, 2016

00947

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

Maximum Marks : 50

Note :

- (i) Attempt **all** questions. Questions no. 2 to 5 have internal choices.
- (ii) Use of scientific calculator is allowed.
- (iii) Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.
- (iv) Symbols have their usual meaning.

1. State whether the following statements are *true* or *false*. Give reasons in support of your answers.

$5 \times 2 = 10$

- (a) If $A = \{x : 2x + 5 < 17, x > 4, x \in \mathbb{N}\}$ and $B = \{x : x^2 - 11x + 30 = 0, x \in \mathbb{N}\}$, then $A = B$.
- (b) Median is a permissible statistical tool in nominal scale data.

$$(c) \int_0^1 x^2 dx = 1$$

- (d) On the basis of ways for obtaining the data, it may be classified as : Primary data and Secondary data.

$$(e) \lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - 5x + 4} = 0$$

2. (a) Out of 50 students in a class, 24 play cricket, 15 play hockey, 18 play football, 6 play cricket and hockey, 8 play cricket and football, 5 play hockey and football and 10 students do not play any of the three games. Then how many play

- (i) all the three games,
- (ii) hockey but not football, and
- (iii) cricket and football but not hockey ? 5

- (b) Show that $A = \{5, 25, 125, 625, \dots\}$ is an enumerable set. 5

OR

- (a) Find the sum of the series

$$\frac{2}{9} + \frac{2}{3} + 2 + 6 + \dots + 486. \quad 5$$

(b) How many 5-letter words are possible using 8 letters a, b, c, d, e, f, g, h such that

(i) two letters a, b are always included

(ii) three letters a, c, d are always excluded ?

5

3. (a) Evaluate :

5

$$\lim_{x \rightarrow 3} \frac{\sqrt{5x-6} - \sqrt{x+6}}{x^2 - 9}$$

(b) Find the local maximum and minimum values of the function $f(x) = 2x^3 - 15x^2 + 36x + 9$.

5

OR

(a) Evaluate :

3

$$\int \frac{2x}{(1+x^2) \log(1+x^2)} dx$$

(b) Evaluate :

7

$$\int_0^2 \frac{2x+7}{(x-3)(x+1)(x-4)} dx$$

4. (a) If $3X + 2Y = \begin{bmatrix} 4 & 13 \\ 18 & 13 \end{bmatrix}$ and

$2X - 3Y = \begin{bmatrix} 7 & 0 \\ -1 & -13 \end{bmatrix}$, then find the

matrices X and Y.

5

- (b) The cost of 2 pens, 3 notebooks and 1 book is ₹ 90. The cost of 1 pen, 4 notebooks and 2 books is ₹ 120. The cost of 2 pens, 4 notebooks and 5 books is ₹ 205. Find the cost of 1 pen, 1 notebook and 1 book by the matrix method.

5

OR

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- (a) Explain measurement scales, namely, nominal scale, ordinal scale, interval scale and ratio scale. Also give one example of each.

5

- (b) Explain five points that should be taken care of for preparing a questionnaire or a schedule.

5

5. (a) The frequency distribution of marks of 50 students in a subject is given below :

Class (Marks)	Number of Students
0 – 10	7
10 – 20	11
20 – 30	15
30 – 40	12
40 – 50	5

Form both types of cumulative frequency distributions. Also prepare relative and percentage frequency distributions.

5

- (b) Represent the following data by subdivided bar diagram :

5

Category	Cost per chair (in ₹) year-wise		
	1990	1995	2000
Cost of Raw Material	15	20	30
Labour Cost	15	18	25
Polish	5	6	15
Delivery	5	6	10
Total	40	50	80

OR

- (a) Draw two ogives from the following data :

Class	Frequency
0 – 10	3
10 – 20	6
20 – 30	10
30 – 40	13
40 – 50	20
50 – 60	18
60 – 70	15
70 – 80	9
80 – 90	6

Hence find the median.

5

- (b) Draw a stem-and-leaf display for the given data :

141, 137, 105, 139, 107, 144, 110, 135,
117, 125, 147, 113, 109, 120, 132, 110,
130, 112.

Also find sixty-seventh percentile.

5

No. of Printed Pages : 5

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

01154

December, 2016

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

Maximum Marks : 50

Note :

- (i) Attempt **all** questions. Questions no. 2 to 5 have internal choices.
- (ii) Use of scientific calculator is allowed.
- (iii) Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.
- (iv) Symbols have their usual meaning.

1. State whether the following statements are *True* or *False*. Give reasons in support of your answers.

$5 \times 2 = 10$

- (a) Allotment of license number plates to different cars comes under the ordinal scale of measurement.
- (b) The 10th term of the sequence 1, 4, 7, ... is 28.

- (c) Caption refers to the row heading, and explains what information the row presents.
- (d) Number of patients visiting a hospital over a period of seven days is an example of discrete data.
- (e) $\lim_{x \rightarrow -1} (1 + x + x^2 + x^3 + \dots + x^{100}) = 101.$

2. (a) If $A = \{1, 3, 5\}$, $B = \{3, 5, 7, 9\}$, $C = \{2, 6, 8, 9\}$ are subsets of the universal set

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\},$$

then verify De-Morgan's laws.

5

- (b) Find the domain of the function $f : \mathbb{R} \rightarrow \mathbb{R}$, defined by $f(x) = \sqrt{(x-3)(5-x)}$, $x \in \mathbb{R}$.

Also evaluate $f(3)$, $f(4)$ and $f(5)$.

5

OR

- (a) Find the sum of the G.P. $-1 + \frac{2}{3} - \frac{4}{9} + \dots$

up to 8 terms.

5

- (b) How many 4-digit numbers are possible using 9 digits 1, 2, 3, ..., 9 such that

(i) Three digits 1, 6, 8 are always included ?

(ii) Two digits 3, 8 are always excluded ?

5

3. (a) Discuss the continuity of the function

$$f(x) = |x - 3| \text{ at } x = 3. \quad 5$$

- (b) Find the derivative of the function $\sqrt{\frac{x^2 + 1}{x + 1}}$. 5

OR

- (a) Evaluate : 5

$$\int \frac{(a^x - b^x)^2}{a^x b^x} dx$$

- (b) Evaluate : 5

$$\int_0^3 \frac{x - 5}{(x + 1)(x + 2)^2} dx$$

4. (a) Using the properties of determinants evaluate

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}. \quad 5$$

- (b) Solve the following system of equations using the matrix method : 5

$$4x + 2y = 6$$

$$6x + 3y = 8$$

OR

- (a) Distinguish between quantitative and qualitative data, and discrete and continuous data. Also give an example in each case. 5
- (b) Write the five differences between primary and secondary data. 5

5. (a) Present the following information in a suitable tabular form : 5

In 2009, out of a total 2000 employees in a company, 1550 were members of a trade union. The number of women employees was 250, of which 200 did not belong to any trade union. In 2010, the number of union employees was 1725, out of which 1600 were men. The number of employees who did not belong to any trade union was 380, of which 155 were women.

- (b) A company is started by four persons A, B, C and D and they distribute the profit or loss among themselves in the proportion 4 : 3 : 2 : 1. In the year 2010, the company earned a profit of ₹ 14,400. Represent the shares of their profits in a pie chart. 5

OR

(a) Draw a histogram for the following data :

4

<i>Class</i>	<i>Frequency</i>
0 – 10	20
10 – 20	32
20 – 30	8
30 – 40	2
40 – 70	60
70 – 80	35
80 – 100	10

(b) Draw a box plot for the following data :

6

31, 42, 22, 27, 33, 27, 37, 28, 34, 44, 25, 39,
26, 31, 26, 33, 46, 48, 50.

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No. of Printed Pages : 5

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

00822

June, 2017

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

Maximum Marks : 50

Note :

- (i) Attempt **all** questions. Questions no. 2 to 5 have internal choices.
- (ii) Use of scientific calculator is allowed.
- (iii) Use of *Formulae and Statistical Tables Booklet* is allowed.
- (iv) Symbols have their usual meaning.

1. State whether the following statements are *True* or *False*. Give reasons in support of your answer.

$5 \times 2 = 10$

- (a) In exclusive method of classification, upper limit of a class is included in the same class.
- (b) $\frac{d}{dx} (4x - 6)^4 = 16x$.
- (c) Collection of good teachers in India forms a set.

- (d) The heading of the rows given in the first column of a table are called captions.
- (e) A researcher used 2011 census data in her study. It is primary data for her.

2. (a) Find the sum of the series $-1, -\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, \dots$
to 14 terms. 2

(b) If the 4th and the 7th terms of a G.P. are 24 and 192, respectively, find the G.P. 3

(c) There are 16 cricket players including 8 batsmen, 6 bowlers and 2 wicket keepers. In how many ways can 11 players be selected having 6 batsmen, 4 bowlers and 1 wicket keeper? 5

OR

(a) If $A = \{1, 2, 3, 4, 5\}$, $B = \{4, 5, 6, 7, 8\}$, then find $(A - B)$ and $(A \cap B)$. 2

(b) If $f(x) = 4 - |x - 3|$, then find $f(2)$ and $f(-2)$. 2

(c) In a group of 400 typists, 300 can type in English and 150 can type in Hindi. Then how many can type in

(i) both Hindi and English?

(ii) only Hindi?

(iii) only English? 6

3. (a) Find the local maximum and minimum values of the function

$$f(x) = 2x^3 - 15x^2 + 36x + 5. \quad 5$$

- (b) Evaluate : 5

$$\int_0^2 \frac{x-3}{(x+1)(x+2)} dx$$

OR

- (a) Find $\lim_{x \rightarrow 2} f(x)$, where $f(x) = \begin{cases} x^2 + 2 & x \leq 2 \\ 2 - x^2 & x > 2 \end{cases}$

Check whether the above function is continuous at $x = 2$. 5

- (b) Evaluate : 5

$$\int xe^{-ax} dx.$$

4. (a) Identify whether the following data are discrete or continuous : 2

- (i) Time in hours of completing the question paper of MST-001.
- (ii) Number of students present in the examination of the paper MST-001.

- (iii) Marks of students in the paper MST-001.
- (iv) Number of students who passed in the paper MST-001.
- (b) Identify which scale is used in the classification of the people of a society based on : 2
- (i) religion
- (ii) income
- (iii) education
- (iv) height
- (c) Prove that 6

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$$

$$= (a + b + c)(ab + bc + ca - a^2 - b^2 - c^2).$$

OR

- (a) List any four differences between primary and secondary data. 4
- (b) Solve the following system of linear equations using the matrix method : 6

$$4x - 3y = 5$$

$$x + y = 3$$

5. The marks (out of 50) of 30 students of PGDAST programme in MST-001 are given below :

10, 15, 32, 27, 40, 36, 47, 08, 29, 10, 46, 35, 42,
07, 15, 20, 42, 49, 36, 25, 40, 40, 45, 28, 43, 05,
22, 48, 50, 19

- (a) Construct a continuous frequency distribution by taking suitable class width.
(b) Draw the histogram.
(c) Draw less than ogive.

3+3+4

OR

- (a) Draw a suitable diagram for the given monthly expenditure of a family over different heads as given below :

6

<i>Head</i>	<i>Expenditure (in Rupees)</i>
Food	4,000
Education	2,000
Clothing	1,000
Rent	2,000
Miscellaneous	1,000

- (b) Draw a stem-and-leaf display for the given data :

4

41, 42, 22, 33, 27, 57, 64, 67, 58, 44, 65, 26,
63, 35, 61, 46, 59, 50, 42, 60

No. of Printed Pages : 5

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

00682

December, 2017

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

Maximum Marks : 50

Note :

- (i) *Attempt **all** questions. Questions no. 2 to 5 have internal choices.*
- (ii) *Use of scientific calculator is allowed.*
- (iii) *Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.*
- (iv) *Symbols have their usual meanings.*

1. State whether the following statements are *True* or *False*. Give reasons in support of your answer.

$5 \times 2 = 10$

- (a) The function $f(x) = |x|$ is an even function.
- (b) The ogive of less-than-type and more-than-type of a distribution intersect at mode.

(c) If $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $B = [1 \ 2 \ 3]$, then

$$AB = [1 \ 4 \ 9].$$

(d) If $f(x) = \begin{cases} 2 - x^2, & x \neq 1 \\ 2 + x^2, & x = 1 \end{cases}$, then $\lim_{x \rightarrow 1} f(x) = 1$.

(e) The data of number of cars on the roads of Delhi at an even date under the Even-Odd scheme of Delhi Government, is continuous.

2. (a) How many terms are there in the sequence

$$-1, -\frac{1}{4}, \frac{1}{2}, \dots, 14? \quad 2$$

(b) Show that $4^{1/4} \cdot 4^{1/8} \cdot 4^{1/16} \cdot \dots \cdot \infty = 2$. 3

(c) If $A = \{2, 4, 6\}$, $B = \{1, 2, 3, 4, 5\}$ are the subsets of the universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, then verify De Morgan's law $(A \cup B)' = A' \cap B'$. 5

OR

(a) Find the total number of ways of selecting 11 players out of 15 players such that

(i) two particular players are always included,

(ii) two particular players are always excluded. 3+3

(b) Define one-one function and onto function with examples. 2+2

3. (a) Find the derivative of the function

$$y = (3x + 2)^4 (6x + 3)^6 \text{ w.r.t. } x. \quad 5$$

- (b) Evaluate : 5

$$\int_0^1 \frac{2x + 5}{(x^2 + 5x + 7)^5} dx$$

OR

- (a) Check the continuity of the following function at point $x = 2$: 4

$$f(x) = \begin{cases} x^2 + 1, & x \leq 2 \\ 3 + x, & x > 2 \end{cases}$$

- (b) Find $\frac{dy}{dx}$ if $x = 2 + 4t^2$, $y = 9t^2 + 4t + 1$. 3

- (c) Find the points of local maxima or minima of the function $f(x) = 2x^3 - 15x^2 + 36x + 9$. 3

4. (a) Draw the histogram for the following data : 6

<i>Class Interval</i>	<i>Frequency</i>
0 – 10	3
10 – 20	8
20 – 30	10
30 – 50	12
50 – 70	20
70 – 100	15

- (b) The marks (out of 50) of 20 students in MST-001 are given below :

21, 02, 18, 33, 40, 06, 50, 40, 46, 15

40, 28, 17, 35, 26, 32, 21, 46, 32, 50

Draw a simple stem-and-leaf display by taking stem width at 10.

4

OR

- (a) Draw a suitable diagram for the data of monthly expenditure (in ₹) of two families given below :

6

<i>Item</i>	<i>Family A</i>	<i>Family B</i>
Food	4,000	5,000
Clothing	2,000	2,000
Education	2,800	2,000
Miscellaneous	1,200	1,000

- (b) The wages (in ₹) per day of 25 workers in a factory are given below :

100, 250, 120, 340, 500, 250, 150, 300, 460,

350, 400, 200, 150, 150, 180, 400, 220, 340,

160, 500, 430, 250, 300, 200, 350

- (i) Construct a continuous frequency distribution of the above data by taking suitable class width, and

2

- (ii) Prepare the relative frequency distribution.

2

5. (a) Identify, giving reasons, which scale is used in the classification of soldiers of India based on their

(i) region,

(ii) performance,

(iii) education, and

(iv) height. 4

(b) Solve the following system of equations by using Cramer's rule : 6

$$3x + 5y = -11$$

$$2x - 3y = 18$$

OR

(a) Show that

$$\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x - y)(y - z)(z - x). \quad 5$$

(b) What do you mean by Primary data and Secondary data ? Also give an example for each. 5

No. of Printed Pages : 4

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

June, 2018

01825

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

Maximum Marks : 50

Note :

- (i) Question no. 1 is **compulsory**. Questions no. 2 to 5 have internal choices.
- (ii) Use of scientific calculator is allowed.
- (iii) Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.
- (iv) Symbols have their usual meanings.

1. State whether the following statements are *True* or *False*. Give reasons in support of your answers.

5×2=10

- (a) Collection of intelligent students enrolled in PGDAST programme of IGNOU, is a set.

(b) $\lim_{x \rightarrow -1} \frac{x^3 + 1}{x + 1} = 3$

MST-001

1

P.T.O.

- (c) Quarterly profit of a company for last eight quarters is an example of cross-sectional data.
- (d) In inclusive method of classification each upper class limit is excluded from the class interval.
- (e) If $2k + 1$, $3k + 3$, $5k + 2$ are in A.P, then $k = 3$.

2. (a) If $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8\}$,

$C = \{2, 3, 5, 7, 11, 13, 17, 19, 23\}$,

$D = \{5, 10, 15, 20, 25\}$, then what will be the smallest universal set ?

2

(b) If $A = \{1, 3, 5\}$, $B = \{3, 5, 7, 9\}$ are subsets of the universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, then verify the De-Morgan's laws.

4

(c) Let $f: N \rightarrow N$ be defined by

$$f(n) = 3n, n \in N$$

Express the function diagrammatically. Also write domain, range and co-domain of the function.

4

OR

- (a) Find the sum $3 + 7 + 11 + \dots + 79$. 4
- (b) Find the 10^{th} term of the G.P. 128, 32, 8, 2, ... 2
- (c) How many signals can be formed by taking at least one flag from 4 flags, each of different colour ? 4

3. (a) Discuss the continuity of the function at $x = 0$

$$f(x) = \begin{cases} \frac{x}{|x|}, & x \neq 0 \\ 0, & x = 0 \end{cases} \quad 5$$

- (b) Evaluate: 5

$$\int \frac{8x}{(x+1)(x-3)^2} dx$$

OR

- (a) Find local maximum and local minimum values of the function : 5

$$f(x) = \frac{x^4}{4} + \frac{x^3}{3} - 2x^2 + 4x + 5$$

- (b) Evaluate: 5

$$\int_2^3 \frac{\sqrt{x}}{\sqrt{x} + \sqrt{5-x}} dx$$

4. (a) Prove that

$$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ 1+x^3 & 1+y^3 & 1+z^3 \end{vmatrix} = (x-y)(y-z)(z-x)(1+xyz) \quad 5$$

- (b) Solve the following system of equations the using concept of matrices. 5

$$3x + 6y - 4z = 3$$

$$3x - z = 0$$

$$12x - 6y = -3$$

OR

- (a) Identify whether the data is discrete or continuous in the following cases : 5
- (i) Number of people present in a party
 - (ii) Length of the leaves of a plant
 - (iii) Lifetime in hours of an electrical bulb
 - (iv) Number of cars standing in a showroom over a period of 7 days
 - (v) Number of dengue patients who visited a hospital on a particular day
- (b) Explain any two methods of collection of primary data with their merits and demerits. 5

5. (a) Explain any 5 components of a good table. 5
- (b) Draw a circle diagram for the following data : 5

Year	1980	1990	2000	2010
Number of colonies in city A	16	25	65	150

OR

- (a) Arrange the numbers 47, 35, 37, 20, 43, 15, 15, 26, 46, 25, 29, 12, 39, 44, 21, 24, 16, 40, 19, 46, 30, 34, 17, 39, 16, 40, 31, 21, 14, 42, 16, 43, 22, 11, 24, 25, 31, 27, 40, 33 in a stretched stem-and-leaf display that has single digit starting parts and leaves, but has stem width of 5. 5
- (b) Draw a box plot for the given data : 5
- 31, 42, 22, 27, 33, 27, 37, 28, 34, 44, 25, 39, 26, 31, 26, 33, 46, 48, 50.

No. of Printed Pages : 5

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

01182

December, 2018

**MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**

Time : 3 hours

Maximum Marks : 50

Note :

- (i) Question no. 1 is **compulsory**. Questions no. 2 to 5 have internal choices.
- (ii) Use of scientific calculator is allowed.
- (iii) Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.
- (iv) Symbols have their usual meanings.

1. State whether the following statements are *True* or *False*. Give reasons in support of your answers.

$$5 \times 2 = 10$$

- (a) If $A = \{a, b, a, b, d\}$, $B = \{5, 6, 7, 7, 9\}$ then $A \sim B$.
- (b) $\lim_{x \rightarrow 5} \frac{x^2 - 25}{x - 5} = 10$

- (c) The number of hits on IGNOU website on a given day for 30 days is an example of continuous data.
- (d) In exclusive method of classification, each upper class limit is included in the class interval.

(e) $\int_2^6 8 \, dx = 32.$

2. (a) In a group of 500 persons, 400 can speak Hindi and 150 can speak English. Then how many can speak

(i) both Hindi and English ?

(ii) Hindi only ?

5

- (b) If $f(x) = 5 - |x - 3|$, then evaluate $f(2)$, $f(-2)$, $f(6)$, $f(-5)$, $f(12)$.

5

OR

- (a) Prove that $5^{\frac{1}{3}} \cdot 5^{\frac{1}{9}} \cdot 5^{\frac{1}{27}} \dots \text{to } \infty = \sqrt{5}.$

2

- (b) Find the number of terms in the following series :

$$-1, -\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, \dots, 14.$$

2

(c) In how many ways can 3 prizes be distributed among 5 students when

(i) No student gets more than one prize ?

(ii) No student gets all the prizes ?

(iii) A student may get any number of prizes ?

6

3. (a) Find the relation between "a" and "b" if the function $f(x)$ is given to be continuous at $x = 0$, where

$$f(x) = \begin{cases} 2x - a, & x \geq 0 \\ ax + b + 3, & x < 0 \end{cases} \quad 5$$

(b) Find local maximum and minimum values of the function

$$f(x) = 4x^3 - 21x^2 + 18x + 9 \quad 5$$

OR

(a) Evaluate :

5

$$\int x^2 e^{-x} dx$$

(b) Evaluate :

5

$$\int_{-3}^3 e^{|2x|} dx$$

4. Solve the following system of equations by Cramer's rule :

10

$$x + 3y + 2z = 6$$

$$-x + 4y + 5z = 8$$

$$2x + 5y + 3z = 10$$

OR

- (a) Explain four levels of measurement scales in detail with one example in each case.

6

- (b) What are the differences between primary and secondary data ?

4

5. (a) Draw a percentage bar diagram for the following data :

5

Category	Cost per unit 1990	Cost per unit 2000
Material	20	32
Labour	25	36
Delivery	5	12
Total	50	80

- (b) Draw a suitable diagram to represent the expenditure of ₹ 100 over different budget heads given as follows, of a family :

5

Item	Expenditure (in ₹)
Food	25
Clothing	15
Education	20
Transport	10
Outing	10
Miscellaneous	5
Savings	15

OR

- (a) Draw a histogram to the following frequency distribution :

5

Class Interval	Frequency
0 – 10	20
10 – 20	32
20 – 30	8
30 – 40	2
40 – 70	60
70 – 80	35
80 – 100	10

- (b) Draw a box plot for the given data :

17, 15, 17, 20, 13, 15, 15, 16, 16, 15, 19, 12,
 19, 14, 11, 14, 16, 10, 19, 18, 20, 14, 17, 19,
 16, 22, 21, 23, 14, 12, 18, 13, 12, 25, 14, 15,
 31, 17, 10, 21.

5

No. of Printed Pages : 5

MST-001

**POST GRADUATE DIPLOMA IN APPLIED
STATISTICS (PGDAST)****Term-End Examination****02921****June, 2019****MST-001 : FOUNDATION IN MATHEMATICS
AND STATISTICS**Time : 3 hoursMaximum Marks : 50**Note :** (i) Question no.1 is compulsory.

(ii) Attempt any four questions from the remaining questions no. 2 to 7.

(iii) Use of scientific calculator (non-programmable) is allowed.

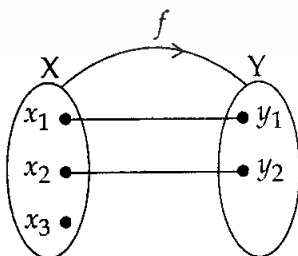
(iv) Use of Formulae and statistical tables booklet for PGDAST is allowed.

(v) Symbols have their usual meanings.

1. State whether the following statements are **True** or **False**. Give reasons in support of your answer.

5x2=10

- (a) The rule f shown in the following figure is a function :



- (b) A function $f(x)$ is said to be continuous at point $x = a$ if $\text{LHL} = \text{RHL}$ at that point.

- (c) In football game, the number allotted to a participant comes under ordinal scale.
- (d) If $A = \begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}$, then $(A')' = \begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}$.
- (e) If a coordinator of PGDAST programme classifies the data of learners in the programme on the basis of gender of the learners, then this classification comes under quantitative classification.

2. (a) Find the sum of the series :

3

$$5, 5+\sqrt{3}, 5+2\sqrt{3}, \dots, 5+20\sqrt{3}$$

(b) If $f: \mathbb{N} \rightarrow \mathbb{N}$ defined by

$$f(x) = (2+x)^{x-1}, x \in \mathbb{N}$$

(i) Express the function diagrammatically,

(ii) Write domain, co-domain and range of the function.

(iii) Is the function one to one ? If yes, explain it. 1+2+2

(c) If $A = \{1, 3, 5\}$, $B = \{2, 3, 4, 5\}$ are the subsets of the universal set $U = \{1, 2, 3, 4, 5, \dots, 10\}$, then verify $(A \cup B)' = A' \cap B'$. 2

3. (a) A function $f(x)$ is defined as follows : 3

$$f(x) = \begin{cases} \frac{1}{2} - x ; & \text{when } 0 < x < \frac{1}{2} \\ 0 ; & \text{when } x = \frac{1}{2} \\ \frac{3}{2} - 3x ; & \text{when } \frac{1}{2} < x < 1 \end{cases}$$

Is $f(x)$ continuous at $x = \frac{1}{2}$?

- (b) Find : $\int \frac{x+5}{(x+1)(x+2)^2} dx$ 5

- (c) If $A = \begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 6 & 4 \end{bmatrix}$, then show 2
that $(A+B)' = A' + B'$.

4. (a) Show that 5

$$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$$

- (b) Find derivative of the function : 3

$$y = (6x+5)^4 (4x+8)^3.$$

- (c) Write four differences between primary data 2
and secondary data.

5. A company has conducted a market survey with a sample of size 50 regarding acceptability of a new product which the company wants to launch. The scores of the respondents on the appropriate scale are as follows. 3+3+4

40	35	40	42	30	39	8	47	25	20
36	19	26	44	25	48	15	20	40	26
48	45	44	39	41	6	22	25	16	38
27	32	28	25	40	35	18	35	30	30
40	37	15	20	18	35	21	27	40	10

- (i) Prepare a frequency distribution with class interval of width 10.
- (ii) Draw histogram of obtained frequency distribution.
- (iii) Prepare less than and more than frequency distributions.

6. (a) The cooking oil preferences of 100 families in two regions I, and II were recorded by a researches in the following table : 5

Cooking Oil	Number of families	
	I	II
Sun flower	13	13
Soybean	15	20
Mustard	40	35
Ghee	20	22
Other	12	10
Total	100	100

Draw a suitable diagram for the above data.

- (b) Draw box plot for the following data. 5
 Score of 16 boys out of 50 are given as follows :
 17, 19, 20, 24, 26, 27, 18, 25, 29, 30, 31, 28,
 19, 22, 22, 27

7. (a) A cricket team of 11 players is to be formed from 16 players including 4 bowlers and 2 wicket-keepers. In how many different ways can a team be formed so that the team contains. 4

- (i) exactly 3 bowlers and 1 wicket-keeper
 (ii) at least 3 bowlers and 2 wicket-keepers.

- (b) A researcher collected the following data about different points of households survey. Determine whether the data thus obtained come under nominal, ordinal, interval or ratio scale. If the data come under the interval or ratio scale, determine whether the data are discrete or continuous. 4

- (i) The caste of a family.
 (ii) Number of members in a family.
 (iii) Age of the oldest person in a family.
 (iv) Education of the family members.
 (v) Monthly income of a family.

- (c) Show that sum of the series : 2

$$\sqrt{2}, \frac{1}{\sqrt{2}}, \frac{1}{2\sqrt{2}}, \dots, \infty \text{ is } 2\sqrt{2}.$$

No. of Printed Pages : 3

MST-001

POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)

Term-End Examination

December, 2019

MST-001 : FOUNDATION IN MATHEMATICS AND STATISTICS

Time : 3 hours

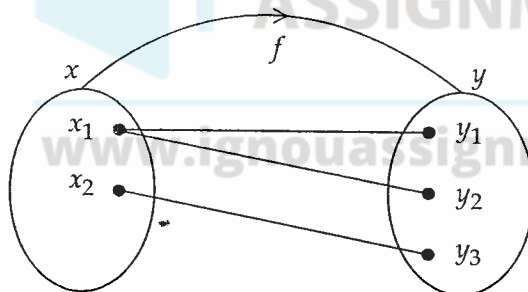
Maximum Marks : 50

*Note : (i) Question no. 1 is compulsory.**(ii) Attempt any four questions from the remaining questions no. 2 to 7.**(iii) Use of Scientific calculator (non-programmable) is allowed.**(iv) Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.**(v) Symbols have their usual meanings.*

1. State whether the following statements are True or False. Give reasons in support of your answers.

5x2=10

- (a) The rule f shown in the following figure is a function :



(b) $\lim_{x \rightarrow 3} \frac{x^2 + 2x - 15}{x^2 - 9} = \frac{4}{3}$

- (c) The pollution level in Delhi is a discrete variable.
- (d) If a coordinator of PGDAST programme of IGNOU collects the data of the registered learners in the programme from Student Registration Division (SRD) of IGNOU then the collected data are primary data.
- (e) Stem-and-leaf display shows more information than histogram.

2. (a) For a series $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$, obtain T_{100} . 2
- (b) Express the following set by roster method 2
 $A = \{x : x^2 - 4x - 21 = 0, x^2 - 49 = 0, x \in \mathbb{N}\}$
- (c) In a survey, conducted on 200 clerks in an office, it was found that 48% prefer to 6
 Coffee, 54% like tea and 64% smoke. Of the total, 28% prefer to Coffee and tea,
 32% tea and smoke and 30% Coffee and smoke. Only 6% prefer to none of these.
 Find the number of clerks who prefer to
 (i) all the three
 (ii) tea and smoke but not Coffee.
3. (a) Evaluate $\lim_{x \rightarrow 0} \frac{\sqrt{a+x^2} - \sqrt{a-x^2}}{x^2}$ 5
- (b) If $y = (3t+2)^2$ and $x = \frac{4t^2+5}{(t+2)}$, then find $\frac{dy}{dx}$. 5
4. (a) Find the solution of the following set of linear equations by matrix method : 5
 $x - 2y + 3z = 4$
 $2x + y - 3z = 5$
 $-x + y + 2z = 3$
- (b) For $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 4 \\ 5 & -2 \end{bmatrix}$, verify the result $(AB)^{-1} = B^{-1}A^{-1}$ 5
5. The following table shows life (in days) of a sample of 30 LED bulbs produced by a 2+6+2
 company :
- | | | | | | |
|-------|-------|------|-------|-------|------|
| 684, | 1097, | 620, | 821, | 931, | 650, |
| 859, | 750, | 909, | 870, | 1000, | 1030 |
| 710, | 833, | 988, | 1020, | 945, | 740 |
| 1040, | 752, | 890, | 680, | 960, | 1000 |
| 910, | 950, | 880, | 710, | 890, | 1010 |
- (a) Form a frequency distribution, using the class intervals 600 - 650,
 650 - 700, _____.
- (b) Form cumulative distributions and plot both cumulative frequency curves on the
 graph paper.
- (c) Find median of the life of LED bulbs graphically.

6. (a) Show that $A = \left\{1, \frac{1}{2}, \frac{1}{3}, \dots\right\}$ is a countable set. 2
- (b) The cost C of manufacturing a certain article is given by $C = 5 + \frac{48}{x} + 3x^2$ 4
Where x is the number of articles manufactured. Find Minimum value of C .
- (c) Find $\int \log x dx$ 4
7. (a) The Prime Minister of India calls a meeting of 15 Chief Ministers of the certain states to discuss the problem of unemployment. In how many ways can they sit on chairs around a round table if : 4
- (i) anyone can sit on any chair ?
- (ii) the Prime Minister and Gujarat Chief Minister sit together ?
- (b) Identify whether the data are nominal, ordinal, interval or ratio scale in the following cases : If data come under interval or ratio scale mention whether these are discrete or continuous ? 2
- (i) Grade obtained by a student in a subject.
- (ii) Temperature in Celsius ($^{\circ}\text{C}$).
- (iii) Lifetime of an electric bulb.
- (iv) Number of cars on road in a particular day.
- (c) A company has conducted a market survey with a sample size 15 regarding the acceptability of a new product which the company wants to launch. The scores of the respondents on the appropriate scale are as follows : 4
- 26, 9, 24, 37, 26, 25, 32, 28
- 24, 30, 25, 32, 25, 8, 29
- Draw a box plot for the scores of the respondents.

No. of Printed Pages : 8

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

June, 2020

**MST-001 : FOUNDATION IN MATHEMATICS AND
STATISTICS**

Time : 3 Hours

Maximum Marks : 50

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any four questions from the
remaining Question nos. 2 to 7.*

(iii) *Use of Scientific calculator (non-
programmable) is allowed.*

(iv) *Use of Formulae and Statistical Tables
Booklet for PGDAST is allowed.*

(v) *Symbols have their usual meanings.*

[2]

MST-001

1. State whether the following statements are True or False. Give reason in support of your answer :

$$5 \times 2 = 10$$

- (a) If $A = \{0, 1, 2, 3, 4\}$, $B = \phi$, then $A \cup B = \{\phi, 0, 1, 2, 3, 4\}$.

- (b) The function $f(x) = x^2 - 6x + 2$ is minimum at $x = 3$.

- (c) If $A = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}$, then

$$AB = \begin{bmatrix} 16 & 25 & 36 \end{bmatrix}.$$

- (d) The time in which an examinee completes the MST-001 paper come under discrete data.

- (e) By using a histogram, one can find quartiles.

2. (a) Which term of the series 12, 9, 6, is equal to - 30 ?

2

- (b) If the third term of a G. P. series is square of the first term and the fifth term is 64, find the series.

4

[3]

MST-001

- (c) If $A = \{1, 2, 3\}$, $B = \{2, 3, 4, 5\}$ and $C = \{2, 4, 6, 8\}$, then verify that : 2

$$A \cap (B - C) = (A \cap B) - (B \cap C)$$

- (d) Find domain and range of the function

$$\left| x - \frac{1}{2} \right|. \quad 2$$

3. (a) Show that $\lim_{x \rightarrow 1} f(x)$ exists and is equal to $f(1)$, where : 3

$$f(x) = \begin{cases} x+1 & \text{for } x \leq 1 \\ 3-x^2 & \text{for } x > 1 \end{cases}$$

- (b) Prove that : 3

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

- (c) Check the continuity of the function

$$\frac{|x-3|}{x-3} \text{ at } x=3. \quad 4$$

[4]

MST-001

4. (a) A company has examined its cost structure of manufacturing a certain article and has determined that the total cost (C) and the number of articles (x) manufactured are related as :

$$C = 5 + \frac{48}{x} + 3x^2$$

Find minimum value of C

4

- (b) Given the matrices A, B, and C, where :

3

$$A = \begin{bmatrix} 2 & 3 & -1 \\ 3 & 0 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix} \text{ and } C = [1 - 2]$$

Verify that :

$$(AB)C = A(BC)$$

- (c) A sample of 40 PGDAST learners answered the following questions asked in a survey :

- (i) What is your gender ?
- (ii) What is your age ?
- (iii) What is your current major area of study ?
- (iv) What is your percentage of marks in graduation ?

[5]**MST-001**

(v) What is your current employment status ?

(vi) How many different jobs have you held in the past 10 years ?

For each of the question mentioned above determine whether the data thus obtained come under nominal, ordinal, interval and ratio scale. Give reason in support of your answer.

3

5. (a) Represent the following information of the

average marks of PGDAST learners by a

suitable diagram :

4

Year	Average marks			
	MST-001	MST-002	MST-003	MST-004
2016	78	65	70	60
2017	82	60	72	62

[6]

MST-001

- (b) The data given below represents the total fat (in grams per serving) for a sample of 16 chicken sandwiches from fast-food chains :

7, 8, 4, 5, 16, 20, 20, 24, 19, 30, 23, 20, 19, 30, 35, 6

Construct a box plot for the above data. 6

6. (a) In an examination of statistics, a candidate has to select 7 questions from three different groups A, B and C, which contains 3, 4, 4 questions respectively. In how many different ways can a candidate select at least 2 questions from each group ? 5

[7]

MST-001

- (b) How many different signals are possible with 3 red, 4 white and 2 green flags by using all at a time in a queue ? 3

- (c) Find $\frac{dy}{dx}$, where : 2

$$y = \frac{x^2 - 1}{x^2 + 1}$$

7. (a) Find : $\int_0^6 f(x) dx$ 4

$$\text{where } f(x) = \begin{cases} x^2 + 3 & 0 \leq x < 3 \\ 2\sqrt{x} & 3 \leq x < 4 \\ e^{-x} - e^{-2x} & 4 \leq x \leq 6 \end{cases}$$

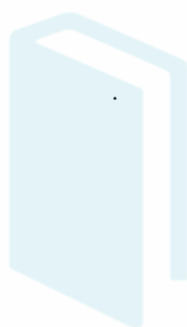
- (b) The following data represent the electricity bill (in ₹) during July 2017 for a random sample of 25 one-bedroom apartments in a metro city : 6

696, 660, 890, 780, 1000, 1150, 900, 660,
850, 800, 1100, 700, 740, 820, 970, 900,
750, 780, 600, 700, 750, 1010, 690, 760, 800

[8]

MST-001

- (i) Form a frequency distribution by taking class intervals as 600-700, 700-800,
- (ii) Construct a histogram.
- (iii) Construct ogives.
- (iv) Find median with the help of ogives.



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No. of Printed Pages : 8

MST-001

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

December, 2020

**MST-001 : FOUNDATION IN MATHEMATICS AND
STATISTICS**

Time : 3 Hours

Maximum Marks : 50

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **four** questions from the
remaining Question nos. 2 to 7.*

(iii) *Use of scientific calculator (non-
programmable) is allowed.*

(iv) *Use of Formulae and Statistical Tables
Booklet for PGDAST is allowed.*

(v) *Symbols have their usual meanings.*

1. State whether the following statements are True or False. Give reason in support of your answer :

$$5 \times 2 = 10$$

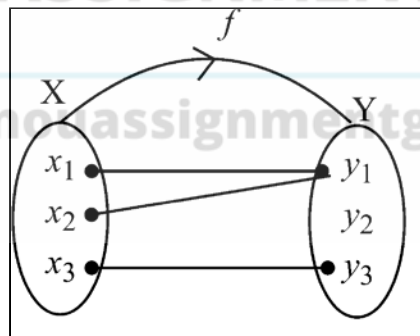
- (a) 42th term of the A. P. :

$$20, 19\frac{1}{2}, 19, 18\frac{1}{2}, \dots$$

is the first negative term.

(b) $\lim_{x \rightarrow a} \frac{x^2 - a^2}{x - a} = a$.

- (c) The rule f shown in the following figure is a function :



- (d) If a news channel collects reports through local agents, then the collected reports come under the secondary data.

[3]

MST-001

(e) Stem-and-leaf display is better than histogram.

2. (a) If a learner has five routes for journey from his/her house to the study centre, then in how many different ways can he/she go from his/her house to the study centre and return, if for returning :

3

(i) any of the routes is taken.

(ii) the same route is taken.

(iii) the same route is not taken.

- (b) How many terms in the following series :

80, 75, 70,

are required to make the sum equal to zero ?

2

- (c) A company notices that higher sales of a particular item which it produces are achieved by lowering the price charged. As a result the total revenue from the sales at first rises as the number of units sold

P. T. O.

[4]

MST-001

increases, reaches the highest point and then falls off. This pattern of total revenue is described by the relation :

$$y = 4600000 - (x - 2300)^2$$

where y is the total revenue and x is the number of units sold.

Find :

- (i) what number of units sold that maximizes total revenue ?
- (ii) what is the amount of the maximum revenue ?

3. (a) Find :

5

$$\int \frac{2x + 1}{(x - 2)(x - 4)} dx$$

(b) Find :

2

$$\int_0^2 (x + 1)(x - 1) dx$$

(c) Find $\frac{dy}{dx}$, if :

3

$$y = \log(1 + x^2)$$

[5]

MST-001

4. Solve the following system of linear equations using matrix method : 10

$$5x - 6y + 4z = 15$$

$$7x + 4y - 3z = 19$$

$$2x + y + 6z = 46.$$

5. A company organised a training programme. After the first week, the company officers evaluated the training programme. The scores (out of 100) of 30 employees are presented below :

32	36	31	67	65
42	39	56	78	61
34	78	75	78	61
30	65	45	48	78
43	75	64	73	87
41	56	71	81	85

- (i) Construct a frequency distribution by taking suitable width. 3
- (ii) Construct histogram and stem-and-leaf diagrams. 7

P. T. O.

6. (a) The following data represents the payment method used by young adults : 4

Payment Method	Percentage
Cash	32
Cheque	10
Credit Card	15
Debit Card	30
Others	13

Construct a suitable diagram of the above data.

- (b) Test scores (out of 50) of 20 students of PGDAST programme are as follows : 4

31, 42, 22, 27, 33, 27, 37, 28, 34, 44, 50, 25,
39, 26, 31, 26, 33, 46, 48, 50

Draw a box plot of the test scores.

- (c) If $f(x) = 5 - |x - 4|$, then find $f(6)$ and $f(-2)$. 2

7. (a) A researcher collected the following data about different points of mobile phone

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MST-001

survey of households. Determine whether the data thus obtained come under nominal, ordinal, interval and ratio scale. Give reasons in support of your answer : 3

- (i) Number of members in a household.
- (ii) Monthly income of a household.
- (iii) Whether there is a landline telephone in a household.
- (iv) Number of mobile phones in a household.
- (v) Whether there is a high-speed internet in a household.
- (vi) Monthly mobile phone bill of a household.

- (b) Differentiate between primary and secondary data. Provide an example of each.

2

P. T. O.

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- (c) A question paper of statistics is divided into two groups consisting of 3 and 4 questions respectively. In how many different ways a candidate can select 5 questions, if he/she has to select at least 2 questions from each group ? 3

- (d) If $A = \{1, 2, 3, 5\}$, $B = \{2, 3, 4, 6\}$ and $C = \{1, 2, 4, 5, 7\}$ are three sets, then verify : 2

$$A - (B \cup C) = (A - B) \cap (A - C)$$

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