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.*

Lot-I   **P. T. O.**

1. State whether the following statements are True *or* False. Give reason in support of your answer : $5 \times 2 = 10$
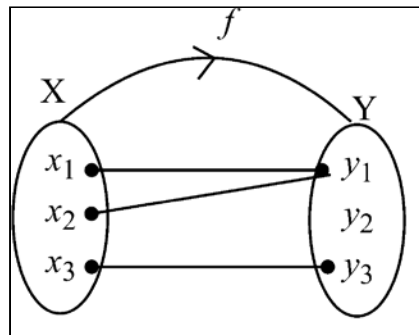
    (a) 42th term of the A. P. :

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

    is the first negative term.

    (b) $\lim\limits_{x \to a} \dfrac{x^2 - a^2}{x - a} = a$.

    (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.

(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

increases, reaches the highest point and then falls off. This pattern of total revenue is described by the relation :   3 + 2

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

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

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

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

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

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

(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

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