

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.

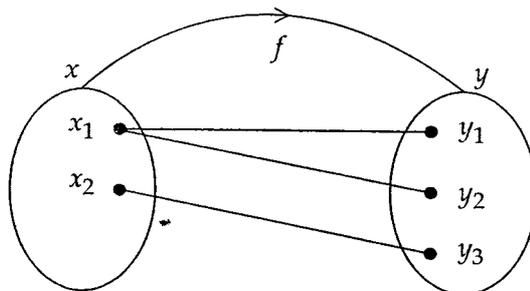
(iv) Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.

(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 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 6
- (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 company : 2+6+2
- | | | | | | |
|-------|-------|------|-------|-------|------|
| 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.