

**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. $5 \times 2 = 10$

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

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

- (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 10th 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.