MST-001

POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)

Term-End Examination

00947

June, 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.   *5×2=10*

   (a)   If $A = \{x : 2x + 5 < 17, x > 4, x \in N\}$ and $B = \{x : x^2 - 11x + 30 = 0, x \in N\}$, then $A = B$.

   (b)   Median is a permissible statistical tool in nominal scale data.

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

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

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

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 $A = \{5, 25, 125, 625, ...\}$ is an enumerable set. 5

OR

(a) Find the sum of the series

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

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

(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

(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

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