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MST–001

POST GRADUATE DIPLOMA IN APPLIED STATISTICS/MASTER OF SCIENCE (RENEWABLE ENERGY AND ENVIRONMENT) (PGDAST/MSCRWEE)

Term-End Examination

December, 2025

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 (non-programmable) calculator is allowed.

(iv) Use of Formulae and Statistical Tables Booklet for PGDAST programme 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 : 5×2=10

   (a) $\lim_{x \to 2} \frac{x^2 - 4}{(x - 2)} = 4$.

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

   (c) The 10th term of sequence 1, 4, 7, ... is 48.

   (d) Number of patients visiting a hospital over a period of seven days is an example of discrete data.

   (e) If A = $\{x : 2x + 5 < 15, x > 3, x \in N\}$ and B = $\{x : x^2 - 9x + 20 = 0, x \in N\}$, then A = B.

2. (a) Find the sum of the following finite series : 2+2+2

   (i) 2 + 7 + 12 + ... + 5002

(ii) $\frac{2}{9} + \frac{2}{3} + 2 + 6 + \ldots\ldots\ldots + 486$

(iii) $3 + 7 + 11 + \ldots\ldots\ldots$ upto 101 terms

(b) Find the domain of the function $f : \mathrm{R} \to \mathrm{R}$ defined by :

$$f(x) = \sqrt{(x - 3)\,(5 - x)},\ x \in \mathrm{R}$$

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

3. (a) Find the derivative of the function :

$$f(x) = (x + 2)^2\,(x + 3)\,(x + 1)$$ 5

(b) Evaluate

$$\int \frac{x^9}{x^{10} + 1}\,dx$$ 5

4. (a) Solve the following system of equations by the matrix method : 6

$$2x + 3y = 5$$

$$4x + 6y = 10$$

(b) Using the properties of determinants, evaluate : 4

(i) $\begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix}$

(ii) $\begin{vmatrix} 1 & 3 & 9 \\ 3 & 9 & 27 \\ 9 & 27 & 1 \end{vmatrix}$

5. (a) Draw the suitable diagram for the following data : 4

Year	Sales (in '000)	Gross Profit (in '000)	Net Profit (in '000)
1990	100	30	10
1995	120	40	15
2000	130	45	25
2005	150	50	30
2010	200	70	30

(b) A company is started by four persons A, B, C and D. They distribute the profit or loss among themselves in the proportion of 4 : 3 : 2 : 1. In the year 2010, the company earned a profit of ₹ 14,400. Represent the share of their profits in a suitable diagram. 6

6. (a) How many 4-digit numbers are possible using 9 digits 1, 2, 3, ..., 9 such that : 5

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

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

(b) Evaluate : 5

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

7. (a) Write short notes on the following : 4

(i) Personnel Interview Method

(ii) Telephonic Interview Method

(b) Draw less than type Ogive from the following frequency distribution of marks of 90 students : 6

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

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