

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

00808 **June, 2015**

**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 Table Booklet for PGDAST is allowed.*
- (iv) *Symbols have their usual meaning.*

1. Which of the following statements are *True* or *False* ? Give reasons in support of your answer.

$5 \times 2 = 10$

- (a) Collection of good actors in India forms a set.
- (b) In a sport event (say cricket), the numbers allotted to the participants come under ordinal scale.
- (c) $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - 5x + 4} = -1.$
- (d) A demographer uses 2011 census data in his study; it is an example of primary data.
- (e) The sum $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$ to ∞ is 3.

2. (a) If 10^{th} and 21^{st} terms of an A.P. are 52 and 107, respectively, then find the A.P. 4
- (b) In a group of 500 persons, 400 can speak Hindi and 150 can speak English. How many can speak
- (i) Both Hindi and English,
- (ii) Only Hindi,
- (iii) Only English? 2+2+2

OR

- (a) If $f(x) = |x| - 2^x + 3$, then evaluate $f(2)$, $f(-2)$ and $f(0)$. 3
- (b) Solve $(n - 2)! = 12(n - 4)!$ for n , where $n \in \mathbb{N}$. 3
- (c) In an examination, there are 10 multiple choice questions. The first five questions have 4 choices each and the last five questions have 5 choices each. How many sequences of the answers are possible? 4
3. (a) Find the values of a and b , if the function f given below is continuous at $x = 2$. 5

$$f(x) = \begin{cases} 7, & x < 2 \\ ax + b, & x > 2 \\ a + 5, & x = 2 \end{cases}$$

(b) If $y = u^2$, $u = 3v$, $v = \frac{x}{x+1}$, then find $\frac{dy}{dx}$. 5

OR

(a) Evaluate the integral $\int \frac{(a^x - b^x)^2}{a^x b^x} dx$. 5

(b) Evaluate the integral $\int_1^6 x\sqrt{x+3} dx$. 5

4. The cost of 2 pens, 3 note-books and 1 book is ₹ 90. The cost of 1 pen, 4 note-books and 2 books is ₹ 120. The cost of 2 pens, 4 note-books and 5 books is ₹ 205. Find the cost of 1 pen, 1 note-book and 1 book by matrix method or by Cramer's rule. 10

OR

(a) Prove that $\begin{vmatrix} ab & 1 & c(a+b) \\ bc & 1 & a(b+c) \\ ca & 1 & b(c+a) \end{vmatrix} = 0$

(without expanding). 5

(b) If $A = \begin{bmatrix} 3 & 5 \\ -2 & 4 \end{bmatrix}$, then show that $\frac{1}{2}(A - A')$ is skew symmetric. 5

5. (a) Construct a continuous frequency distribution for 50 students studying in a class having the following heights (in cm) : 5

146, 156, 152, 167, 178, 180, 172, 162, 148, 153, 161, 173, 163, 174, 147, 179, 148, 151, 168, 172, 165, 173, 172, 180, 175, 145, 153, 154, 162, 164, 170, 172, 160, 161, 158, 152, 163, 165, 170, 168, 158, 149, 155, 160, 150, 149, 167, 176, 169, 159.

- (b) Draw a pie diagram to represent the expenditure of ₹ 100 of a family over different budget-heads as given below : 5

<i>Item</i>	<i>Expenditure</i> (in ₹)
Food	25
Clothing	15
Education	20
Transport	10
Outing	10
Miscellaneous	5
Saving	15

OR

- (a) Draw a frequency polygon for the following frequency distribution :

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<i>Class Interval</i>	<i>Frequency</i>
40 – 50	4
50 – 60	10
60 – 70	11
70 – 80	13
80 – 90	18
90 – 100	14
100 – 110	11
110 – 120	5

- (b) Draw a box plot for the given data :

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31, 42, 22, 27, 33, 27, 37, 28, 34, 44, 25, 39,
26, 31, 26, 33, 46, 48, 50.
