First Year Examination of the
Three Year Degree Course, 2001

(For Science and Commerce)

Paper III

(Official Statistics and Numerical Methods)

Time : 3 Hours
[Maximum Marks :50]

SECTION - A

1. Write a note on area and Yield statistics. **9**

2. Write a note on Trade Statistics. **9**

3. Explain the following in the context of LPP : **3+3+3**
   (i) Slack and Surplus variable.
   (ii) feasible solution and Basic Feasible solution.
   (iii) Mathematical Form of Linear Programming Problem.

4. (a) Solve the following LPP by Simplex method.

   Maximize $z = 2x_1 + x_2$

   s.t. $x_1 - x_2 \leq 10$

   $2x_1 - x_2 \leq 40$

   and $x_1, x_2 \geq 0.$

   (b) Write the dual form of the following LPP :

   Minimize $z = 15x_1 + 10 x_2$

   s.t. $3x_1 + 5x_2 \geq 5$

   $-5x_1 - 2x_2 \leq - 3$

   and $x_1, x_2 \geq 0.$ **5+4**

SECTION – B

5. (a) Define the operators Δ, E and ∇ and establish the relationship among them.

(b) Determine Δ^3 { 1 + x) (1 - 3x) (1 + 5x)}, unity being the interval of differencing. **5+4**

6. (a) Express the following function and its differences in the fraction notation :

$$f(x) = x^4 - 12x^3 + 42x^2 - 30x + 9.$$

(b) Prove that

$$\Delta \log f(x) = \log\left[1 + \frac{\Delta f(x)}{f(x)}\right].$$ **5+4**

7. (a) Obtain the estimate of missing figures in the following table :

x	:	1	2	3	4	5	6	7	8
y_x	:	2	4	8	-	32	-	128	256

Explain why the result differs from 16 and 64.

(b) Prove the following :

$\Delta^n U_x = U_{x+n} - {}^nC_1 U_{x+n-1} + \ldots\ldots\ldots\ldots + (-1)^n U_x.$ **5+4**

SECTION – C

8. Prepare a divided difference table for the following data:

x	:	1	2	4	7	12
u_x	:	22	30	82	106	216

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9. State and prove Newton's divided difference formula for interpolation. What is the necessity of such formula? **9**

10. If $f(x) = 1/x$; x = a, b, c, d, obtain divided differences of all possible orders. **9**