

2014

(5th Semester)

STATISTICS

FIFTH PAPER

(Numerical Methods)

Full Marks : 55

Time : 2 hours

(PART : B—DESCRIPTIVE)

(Marks : 35)

The questions are of equal value

UNIT—1

1. Estimate the missing terms in the following table :

x	1	2	3	4	5	6	7	8
$y = f(x)$	1	8	—	64	—	216	343	512

Or

Define differences of zero. Prove that n th difference of a polynomial of the n th degree is constant when the values of variables are not equal intervals.

G15—100/158a

(Turn Over)

UNIT—2

2. Define divided difference. Derive Newton's divided difference formula.

Or

Derive Newton-Gregory forward interpolation formula.

UNIT—3

3. Explain inverse interpolation. Describe the method of successive of approximation for inverse interpolation.

Or

Derive Gauss backward central difference formula.

UNIT—4

4. What is quadrature formula? Derive Weddle's rule to evaluate $I = \int_a^b f(x) dx$, where $a < b$.

Or

Derive Simpson's $\frac{3}{8}$ th rule to evaluate

$$I = \int_a^b f(x) dx$$

where $a < b$.

UNIT—5

5. Explain Picard's method of successive approximation. Use Picard's method to approximate y , when $x = 0.1$.

Or

Derive the method of Milne's predictor-correctors.

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STATISTICS

FIFTH PAPER

(**Numerical Methods**)

(PART : A—OBJECTIVE)

(Marks : 20)

The figures in the margin indicate full marks for the questions

SECTION—A

(Marks : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided for it : 1×5=5

1. The relation between forward difference operator Δ and shift operator E is

(a) $\Delta = E + 1$ ()

(b) $E = 1 + \Delta$ ()

(c) $E = 1 - \Delta$ ()

(d) None of the above ()

2. The differences defined by taking into consideration the changes in the values of arguments are known as

- (a) backward difference ()
- (b) divided difference ()
- (c) Newton's divided difference ()
- (d) forward difference ()

3. The term containing 9th order differences in Gauss's first form is

(a)
$$\frac{u(u-1)(u+1)(u-2)(u+2)(u-3)(u+3)(u-4)(u+4)}{9!} \times \Delta^9 y_{-4}$$
 ()

(b)
$$\frac{u(u^2-1)(u^2-4)(u^2-9)}{9!} \times \Delta^9 y_{-3}$$
 ()

(c)
$$\frac{u(u^2-1)(u^2-4)(u^2-9)(u^2-16)(u^2-25)}{9!} \times \Delta^9 y_{-5}$$
 ()

(d) None of the above ()

4. The difference of zero, $\Delta^4 O^3$ is

(a) 1 ()

(b) 3 ()

(c) 12 ()

(d) None of the above ()

5. If the values of x_0 are not equally spaced, we use — formula to get required values of the derivatives.

(a) Bessel's and Stirling's ()

(b) Newton's backward interpolation ()

(c) Newton's divided difference and Lagrange's interpolation ()

(d) None of the above ()

SECTION—B

(Marks : 15)

Answer the following questions in brief : 3×5=15

1. Find the sum of n terms of a series whose general term is the first-order difference of another function.

2. How is Stirling's central interpolation formula derived? Write its formula.

(a) $f(x) = f_0 + p \Delta f_0 + \frac{p^2}{2!} \Delta^2 f_0 + \frac{p^3}{3!} \Delta^3 f_0 + \dots$

(b) $f(x) = f_0 + p \Delta f_0 + \frac{p^2}{2!} \Delta^2 f_0 + \frac{p^3}{3!} \Delta^3 f_0 + \dots$

(c) $f(x) = f_0 + p \Delta f_0 + \frac{p^2}{2!} \Delta^2 f_0 + \frac{p^3}{3!} \Delta^3 f_0 + \dots$

(d) None of the above

5. If the values of x_0 are not equally spaced, we use _____ formula to get required values of the derivatives.

(a) Bessel's and Stirling's

(b) Newton's backward interpolation

(c) Newton's divided difference and Lagrange's interpolation

(d) None of the above

3. Differentiate between interpolation and extrapolation. Give examples.

Answer the following questions in brief: 3×5=15

1. Find the sum of n terms of a series whose general term is the first-order difference of another function.

4. Define factorial notation. Obtain the function whose first difference is $9x^2 + 11x + 5$.

(5th Semester)

STATISTICS

FIFTH PAPER

(Numerical Methods)

(PART - A—OBJECTIVE)

(Marks : 20)

The figures in the margin indicate full marks for the questions

SECTION - A

(Marks : 4)

Put a Tick (✓) mark against the correct answer in the brackets provided for it.

1. The relation between forward difference operator Δ and shift operator E is

(a) $\Delta = E - 1$ ()

(b) $E = 1 + \Delta$ ()

(c) $E = 1 - \Delta$ ()

(d) None of the above ()

5. What is central difference formula? Write the advantages and disadvantages of it.

- (a) Backward difference
- (b) Divided difference
- (c) Newton's divided difference
- (d) Forward difference

3. The term containing 9th-order difference in Gauss's first form is

- (a)
$$\frac{(u-1)(u+1)(u-2)(u+2)(u-3)(u+3)(u-4)(u+4)}{9!} \Delta^9 y_{1/2}$$
- (b)
$$\frac{(u^2-1)(u^2-4)(u^2-9)}{9!} \Delta^9 y_{1/2}$$
- (c)
$$\frac{u(u^2-1)(u^2-4)(u^2-9)(u^2-16)(u^2-25)}{9!} \Delta^9 y_{1/2}$$
- (d) None of the above
