

P. S. SCIENCE & H. D. PATEL ARTS COLLEGE, KADI

Internal Examination

B. Sc. Semester - III

Mathematics - 302

[Mark : 40

[2 Hours

23
26-9-2016]

1. [A] Show that n^{th} difference of a polynomial is

$P_n(x) = c_0x^n + c_1x^{n-1} + c_2x^{n-2} + \dots + c_{n-1}x + c_n$ then prove that $\Delta^n P_n(x) = c_0 \cdot n! \cdot h^n$

Where h is the interval of two successive values of x .

OR

- [A] Obtain Newton Gregory formula for Backward Interpolation.

- [B] Attempt any two.

- (i) Given x and y in the following table :

x	0	1	8	3	4
y	0	1	8	27	64

Find the appropriate value of y at $x = 3.5$ using proper interpolation

- (ii) Express $p(x) = x^3 + 4x^2 - 7x - 15$ in the form of

$(x-2)^{[r]}$ where $h = 2$

- (iii) A third degree polynomial passes through the points

$(0, 0)$, $(1, 1)$, $(2, 1)$ and $(3, -2)$. Find the polynomial

2. [A] Obtain Gauss-Backward interpolation formula

OR

- [A] Obtain Newton's divided difference interpolation formula.

[B] Attempt any two

- (i) Find the polynomial $f(x)$ of the lowest degree which assumes the values 3, 12, 15, -21 when x has the values 3, 2, 1, -1 respectively (using divided difference interpolation formula)
- (ii) Use Gauss forward formula to find the value of y when $x = 3.2$ from the following table.

x	1	2	3	4	5
y	2	9	28	65	126

- (iii) Use Lagrang's formula to find value of y when $x = 10$ from the following table.

x	5	6	9	11
y	12	13	14	16

3. [A] Obtain Simpson's one-third rule.

OR

- [A] Obtain picard's method of successive approximations.

[B] Attempt any two

- (i) Use picard's method to approximate y When $x = 0.1$

given that $y = 1$ when $x = 0$ and $\frac{dy}{dx} = \frac{y-x}{y+x}$

- (ii) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $\frac{1}{3}$ rule.

- (iii) If $f(x) = a + bx + cx^2$ then prove that

$$\int_1^3 f(x) dx = \frac{1}{12} [f(0) + 22 \cdot f(2) + f(4)].$$