

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE
B.Sc(H) Sem – III , INTERNAL ASSESSMENT-1st , 2018-19
Sub: MATHEMATICS, Course – C7

Full Marks: 10

Time: 30 m.

Answer any five questions:

(2 × 5 = 10)

1. Define the significant digits. Determine the number of significant digits of the following number
 $x = 0.00265970023$
2. Explain the **Rounding – off Error**. Round – off the following number up to 4 places of decimal
 $x = 0.00275698$
3. Determine the number of correct significant digits in the given number x given that the relative error $E_r = 0.2 \times 10^{-2}$ where $x = 0.4785$
4. Define the operators Δ and ∇ . Prove that $\Delta \cdot \nabla = \Delta - \nabla$.
5. Find a polynomial $f(x)$ which satisfies the following table –

x	0	1	2	3	4	5
$f(x)$	0	5	34	111	260	505

and hence find the value $f(1.5)$.

6. State and verify the “**Fundamental Theorem of Difference Calculus**”.
7. Define the Shift operator. Prove that $\Delta = E - 1$.
8. Prove that $\Delta^n x^{(n)} = n! h^n$, h is the constant step length.

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE

B.Sc (Honours) Sem - III , 2nd INTERNAL ASSESSMENT, 2018-19

Sub: MATHEMATICS, Paper- C7

Full Marks: 10

Time: 30 m.

Answer any five of the following questions:

(5 × 2 = 10)

- 01.** Find a polynomial of least degree which attains the prescribed values at the given points –

x:	-2	-1	0	1	2
$f(x)$:	6	0	2	0	6

- 02.** Define the 1st order forward difference operator (Δ) and the shift operator (E).
Establish the relation between them. Hence or otherwise prove that $\left(\frac{\Delta^2}{E}\right)x^3 = 6x$.

- 03.** Find $f(1.02)$ given that –

x:	1.00	1.10	1.20	1.30
$f(x)$:	0.8415	0.8912	0.9320	0.9636

- 04.** Prove that the 3rd order divided difference of a polynomial of degree 3 is constant.

- 05.** Evaluate the 4th order divided difference for equispaced set of arguments.

- 06.** Evaluate $\int_0^5 \frac{dx}{1+x}$, by “Trapezoidal Rule” taking the constant step length as 1.

- 07.** “**Bisection Method**” for determination of the root of a *non – linear or transcendental equation* is a “**Root Bracketing Method**”. Explain.

- 08.** When a system of linear algebraic n equations is said to be “**Diagonally Dominant**”?

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE

B.Sc. (Honours) Sem. - III, 1st INTERNAL ASSESSMENT, 2019-20
Sub: MATHEMATICS, Paper- C 7 T

Full Marks: 10

Time: 30 m.

Answer any five of the following questions:

(5 × 2 = 10)

- 01.** Define the significant digits. Determine the number of significant digits of the following number

$$x = 0.00265970023$$

- 02.** Explain the **Rounding – off Error**. Round – off the following number up to 4 places of decimal

$$x = 0.00275698$$

- 03.** Determine the relative error in computation of $x - y$ for $x = 9.05$ and $y = 6.56$ have absolute errors $\Delta x = 0.001$ and $\Delta y = 0.003$ respectively.

- 04.** Define the operators Δ and ∇ . Prove that $\Delta \cdot \nabla = \Delta - \nabla$.

- 05.** Estimate the missing term in the following table –

x	0	1	2	3	4	5
$f(x)$	1	3	9	?	81	243

- 06.** State and verify the “**Fundamental Theorem of Difference Calculus**”. Also derive the relation between the 1st order difference operator Δ and $D = \frac{d}{dx}$ of differential calculus.

- 07.** Define the Shift operator. Prove that $\nabla = 1 - E^{-1}$.

- 08.** Prove that $\Delta^n x^{(n)} = n! h^n$, h is the constant step length.

- 09.** Explain the convergence criterion of the **Method of Fixed Point Iteration** for numerical approximation of the solution of the non – linear or transcendental equation.

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE
B.Sc.(H) Sem. – III , INTERNAL ASSESSMENT-2nd , 2019-20
Sub: MATHEMATICS, Course – C7

Full Marks: 10

Time: 30 m.

Answer any five questions:

(2 × 5 = 10)

1. Find a polynomial of least degree which attains the prescribed values at the given points -

x	-2	-1	0	1	2
$f(x)$	6	0	2	0	6

2. Define the 1st order forward difference operator (Δ) and the sift operator (E). Establish the relation between them. Hence or otherwise prove that $(\frac{\Delta^2}{E})x^3 = 6x$.

3. Find $f(1.02)$ given that-

x :	1.00	1.10	1.20	1.30
$f(x)$	0.8415	0.8912	0.9320	0.9636

3. Prove that the 3rd order divided difference of a polynomial of degree 3 is constant.
4. Evaluate the 4th order divided difference for equispaced set of arguments.
5. Evaluate $\int_0^5 \frac{dx}{1+x}$, by Trapezoidal Rule taking the constant step length as 1.
6. “Bisection **Method**” for determination of the root of a non-linear or transcendental equation is a “**Root Bracketing Method**”. Explain.
7. When a system of linear algebraic n equation is said to be “**Diagonally Dominant**”?
8. Prove that $\Delta^n x^{(n)} = n! h^n$, h is the constant step length.