K23U 3605

Reg. No. : .....

Name : .....

III Semester B.Sc. Honours in Mathematics Degree (C.B.C.S.S. – O.B.E.– Regular/Supplementary/Improvement) Examination, November 2023
(2021 and 2022 Admissions)
3B13 BMH : NUMERICAL ANALYSIS

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **any 4** questions out of 5 questions. **Each** question carries **1** mark :

1. Write the Newton Raphson formula.
2. Define Central difference operator.
3. Define Gauss' backward formula.
4. Define inverse interpolation.
5. Define Simpson's $\frac{1}{3}$ rule. **(4×1=4)**

SECTION – B

Answer **any 6** questions out of 9 questions. **Each** question carries **2** marks :

6. Use Newton Raphson method to find a root of the equation $x^3 - 2x - 5 = 0$ $(x_0 = 2)$.
7. Find a real root of the equation $f(x) = x^3 - x - 1 = 0$ by using bisection method.
8. Define forward and backward difference operators.
9. Show that $e^x\left(u_0 + x\Delta u_0 + \frac{x^2}{2!}\Delta^2 u_0 + \ldots\right) = u_0 + u_1 x + u_2\frac{x^2}{2!} + \ldots.$
10. Show that the first difference of a polynomial of the n^{th} degree is a polynomial of degree $(n - 1)$.

P.T.O.

24. Using Lagrange's interpolation formula, find the form of the function y(x) from the following table :

x	0	1	3	4
y	– 12	0	12	24

25. Using Newton's forward difference formula, find the sum $S_n = 1^3 + 2^3 + 3^3 + \ldots + n^3$.
26. Using Gauss's backward formula, find the value of $\sqrt{12516}$ given that $\sqrt{12500} = 111.803399$, $\sqrt{12510} = 111.848111$, $\sqrt{12520} = 111.892806$, $\sqrt{12530} = 111.937483$. **(8×4=32)**

SECTION – D

Answer **any 2** questions out of 4 questions. **Each** question carries **6** marks :

27. Using Ramanujan's method, find the smallest root of the equation $f(x) = x^3 - 9x^2 + 26x - 24 = 0$.
28. From the following table, find the value of $e^{1.17}$ using Gauss' forward formula :

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
e^x	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

29. Find tan 0.26 from the following table, using Newton's backward interpolation formula :

x	0.10	0.15	0.20	0.25	0.30
tan x	0.1003	0.1511	0.2027	0.2553	0.3093

30. From the following table of values of x and y, obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x = 1.6 :

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

(2×6=12)