36632

VI Semester B.Sc. Degree Examination, September/October 2020

MATHEMATICS

Paper XIII (6.2) – Numerical Analysis

(CBCS – New)

Time : 3 Hours Max. Marks : 70

Instructions : *1) Answer* ***all*** *the Sections.*

2) Non-programmable calculator may be used.

SECTION – A

1. Answer **any five** of the following : **(5 × 2 = 10)**

1. Find the number of trustworthy figures in $(0.318)^3$ assuming that 0.318 correct to the last figure.

2. State the Bisection Method.

3. Construct the Forward difference table from the following data and find $\Delta^2 f(1)$ and $\Delta^3 f(1)$.

x :	0	1	2	3	4
$f(x)$:	1.0	1.5	2.2	3.1	4.6

4. Prove that $E = (1 - \nabla)^{-1}$.

5. Using Weddle's rule evaluate $\int_3^6 y_x \, dx$ from the following data :

	x_0	x_1	x_2	x_3	x_4	x_5	x_6
x :	3.0	3.5	4.0	4.5	5.0	5.5	6.0
y_x :	0.4771	0.5440	0.6020	0.6532	0.6996	0.7404	0.7782
	y_0	y_1	y_2	y_3	y_4	y_5	y_6

6. Evaluate $\int_3^3 x^4\,dx$ by Trapezoidal rule by choosing $h = 1$.

7. Using Picard's method solve $\frac{dy}{dx} = x + y$, $y(0) = 1$, at $x = 0.1$ upto 2nd approximation.

SECTION – B

II. Answer **any five** of the following : **(5 × 6 = 30)**

8. Find the real positive root of the equation $x \log_{10} x = 1.2$ between 2 and 3. Correct to three decimal places by Regula-Falsi method.

9. Solve $x^3 - x^2 - 2 = 0$ over (1, 2) by Secant method.

10. Find the real positive root of the equation $x^4 - x - 10 = 0$ between (1.5, 2) correct to three decimal places by Newton-Raphson's method.

11. Solve by Gauss-Elimination method :

$5x_1 - x_2 - 2x_3 = 142$, $x_1 - 3x_2 - x_3 = -30$, $2x_1 - x_2 - 3x_3 = 5$.

12. Solve by Jacobi's method :

$20x + y - 2z = 17$, $3x + 20y - z = -18$, $2x - 3y + 20z = 25$.

13. The table gives the distance in Nautical miles of the visible horizon for the given heights in feet above the earth surface. Find the value of 'y' when $x = 218$ ft and 410 ft.

x = height	100	150	200	250	300	350	400
y = distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

14. Prove the identity

$u_x = u_{x-1} + \Delta u_{x-2} + \Delta^2 u_{x-3} + \cdots + \Delta^n u_{x-n}$

15. Express $f(x) = 3x^3 + 3x^2 - 5x - 5$ in Factorial Notation and also find its successive differences.

SECTION – C

III. Answer **any five** of the following : **(5 × 6 = 30)**

16. Find the real root of the equation $e^x = 5x$ that lies near $x = 0$ by using Aitken's Δ^2 method.

17. Use Gauss-Seidal Method to solve $5x - y = 9$, $x - 5y + z = -4$, $y - 5z = 6$.

18. Given :

x	1.96	1.98	2.00	2.02	2.04
y	0.7865	0.7739	0.7651	0.7563	0.7473

Find y' and y'' at 2.03.

19. Evaluate $\int_0^6 \frac{dx}{(1+x)^2}$ correct to 3 places of decimal in the step of 1 unit. Using Simpson's 1/3rd rule.

20. By using Simpson's 3/8th rule with $h = 0.2$ find the approximate area under the curve $y = \frac{x^2 - 1}{x^2 + 1}$ between the ordinates $x = 1$ and $x = 2.8$.

21. Use Taylor's series method to solve $\frac{dy}{dx} = x + y$, $y(0) = 1$, at $x = 0.2$ by choosing $h = 0.1$.

22. Given that $\frac{dy}{dx} = \log(x + y)$ with the initial condition $y = 1$ at $x = 0$. Use Euler's modified method to find 'y' at 0.2 and 0.5.

23. Solve $\frac{dy}{dx} = \frac{1}{x + y}$, $y(0) = 1$ for $x = 0.5(0.5)\,1$ using Runge-Kutta fourth order method.
