



B.Sc. VI - Semester Degree Examination, May - 2018

MATHEMATICS

Mathematics - XII (Numerical Analysis)

Paper No. 6.1

(Old)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) Answer ALL the sections.
- 2) Non - programmable scientific calculator may be used.

Section - A

Answer any TEN of the following.

(10×2=20)

1. Define absolute error and relative error.
2. Find the interval in which the real root lies for the equation $x^3 - 9x - 12 = 0$.
3. The absolute error of the number 205.2687 is 0.3. Find out which digit is valued and round off the number correct to valid digits.
4. Prove $E^{-1} = (I - \nabla)$.
5. Evaluate $\Delta \tan^{-1}(ax)$.
6. State Newton's forward interpolation formula.
7. Prove $\Delta^3 y_0 = y_3 - 3y_2 + 3y_1 - y_0$.
8. State Newton's Divided Difference formula for unequal intervals.
9. Construct forward difference table for $f(x) = 2^x$, for $x = 0, 1, 2, 3$ and 4.
10. Express $3x^3 + x^2 + x + 1$ into factorial notation, Taking $h = 1$.
11. State Weddle's rule for numerical Integration.
12. Find by Taylor's series method the value of y at $x = 0.2$ if $y(x)$ satisfies $\frac{dy}{dx} = x - y^2$ and $y(0) = 1$ (consider upto 2^{nd} order derivatives).

Section - B

Answer any FIVE of the following :

(5×6=30)

13. Approximate values of $\frac{2}{3}$ and $\frac{1}{7}$ correct to 4 decimal places are 0.6667 and 0.1429 respectively. Find the possible relative error and absolute error in the sum of the approximate values.
14. Solve $x^3 - 9x + 1 = 0$ for the root lying between $[2, 4]$ by the Regula - Falsi method.

[P.T.O]



15. Find the real root of the equation $x^4 - x - 10 = 0$ by Newton's - Raphson method. Starting with $x_0 = 1.8$.
16. Find the real root $x^3 - x - 1 = 0$ by Bisection method upto three decimal place.
17. Solve by Gauss elimination method

$$2x + y + z = 10$$

$$3x + 2y + 3z = 18$$

$$x + 4y + 9z = 16$$

18. Using Lagrange's interpolation formula to find the value of y at $x = 10$ from the table.
- | | | | | |
|-------|----|----|----|----|
| x : | 5 | 6 | 9 | 11 |
| y : | 12 | 13 | 14 | 16 |
19. Find polynomial of degree 2 which passes through (1,0), (2,2) (3,4) and (4,8).

Section - C

Answer any FIVE of the following :

(5×6=30)

20. Estimate the weight of the baby at the age 7 months from the table.

Age in months x :	0	2	5	8
Weight in pounds $f(x)$:	6	10	12	16

21. Find $f'(x)$ and $f''(x)$ from the table

x :	-1	1	2	3
$f(x)$:	-21	15	12	3

22. Evaluate $\int_0^2 (x^4 + x) dx$ with $n = 6$ by Trapezoidal rule.

23. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ rd rule, taking $h = 0.25$.

24. By Euler's method, find $y(0.5)$ given $\frac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$ take $h = 0.1$.

25. Solve $\frac{dy}{dx} = 1 + y^2$. Using Picards method of successive approximation upto $e=3^{rd}$ approximation with $y(0) = 0$. Find $y(0.2)$.

26. Apply Runge - Kutta 4th order to solve $y' = x^2 + y$ with $y(0) = 1$. Find $y(0.1)$ by taking $h = 0.1$.