Code No: D-6614

FACULTY OF SCIENCE

B.A /B. Sc.(CBCS) VI – Semester (Regular) Examination, June / July 2022

Subject: MATHEMATICS

Paper- VI(A) : Numerical Analysis

Time: 3 Hours **Max. Marks: 80**

PART – A

Note: Answer any eight questions. **(8 x 4 = 32 Marks)**

1. Define absolute, relative and percentage errors.
2. If $u = \frac{5xy^2}{z^3}$ find the relative error at $x = y = z = 1$ when the errors in each of x, y, z *is* 0.001.
3. Give the geometrical meaning of method of false position.
4. Define the operators Δ, ∇ and E show that $\Delta = \nabla E = \delta E^{1/2}$.
5. Find the missing term in the following table:

x:	0	1	2	3	4
y:	1	3	9	-	81

6. Find (i) $\Delta[(x+1)(x+2)]$ (ii) $\Delta^2(cosx)$.
7. What are the various errors in numerical differentiation?
8. Obtain the error term in trapezoidal rule.
9. Evaluate $\int_0^1 \frac{1}{1+x} dx$ with h= $\frac{1}{4}$ using Simpson's $\frac{1}{3}rd$ rule.
10. Derive iterative formula for Picard's method to solve the IVP $y' = f(x,y), y(x_0) = y_0$.
11. Find two approximations for the IVP $\frac{dy}{dx} = x + y^2$, $y(0) = 1$ using Picard's method.
12. Obtain Taylor series for $y(x)$ if $y' = 1 + xy, y(0) = 1$.

PART – B

Note: Answer all the questions. **(4 x 12 = 48 Marks)**

13. a) Show that Newton- Raphson method has quadratic convergence.

(OR)

b) Find a root of $sinx = 10(x-1)$ correct to three decimal places using iterative method.

14. a) Derive Lagrange interpolation formula for unequal intervals.

(OR)

b) Find the cubic polynomial $y(x)$ if $y(1) = 24$, $y(3) = 120$, $y(5) = 336$, $y(7) = 720$.

15. a) Derive Simpson's $\frac{1}{3}rd$ rule.

(OR)

b) Using divided difference find $f(x)$ as a polynomial in x from the following table:

x	-1	0	3	6	7
$f(x)$	3	-6	39	822	1611

16. a) From modified Euler's method find $y(0.1)$ if $y' = x^2 + y$, $y(0) = 1$ and $h = 0.05$.

(OR)

b) Using Runge-Kutta fourth order method to find $y(0.2)$ and $y(0.4)$ if $y' = 1 + y^2, y(0) = 0$.

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