B.A., / B.Sc. DEGREE EXAMINATION

(Examination at the end of Third Year-Sixth Semester)

SEPTEMBER 2020

Part II : MATHEMATICS

Paper VI(B) : **Numerical Analysis**

Time : 3 Hours] [Max : 75 Marks

Section *A* (5 × 5 = 25 Marks)

Answer any ***FIVE*** of the following questions.

Each question carries ***FIVE*** marks.

1. Find the percentage error if 625.483 is approximated to three significant figures.
2. Find a root of the equation $x^3 - 5x + 1 = 0$ using the bisection method is 5 stages.
3. Find a positive root of the equation of iteration method $3x = \cos x + 1$.
4. Find the missing term in the following data :

x	0	1	2	3	4
y	1	3	9	–	81

5. Prove that $E\nabla = \Delta = \nabla E$.
6. Using Newton's forward interpolation formula and the given table of values :

x	1.1	1.3	1.5	1.7	1.9
$f(x)$	0.21	0.69	1.25	1.89	2.61

Obtain the value of $f(x)$ when $x = 1.4$.

7. State and prove Newton backward interpolation formula.
8. Find third divided difference of $f(x)$ with arguments 2, 4, 9, 10 when $f(x) = x^3 - 2x$.

Section B $(5 \times 10 = 50$ Marks)

Answer *ALL* the questions.

Each question carries *TEN* marks.

9. (a) If $R = \frac{4x^2y^3}{z^4}$ and errors in x, y, z be 0.001. Compute the relative maximum error in R when $x = y = z = 1$.

(Or)

(b) Define absolute and relative errors and find the absolute and relative error in y for $x = 0.5 \pm 0.1$ if $y = \frac{0.31x + 2.73}{x + 0.35}$.

10. (a) Apply Newton-Raphson method to find an approximate root, correct to three decimal places of the equation $x^3 - 3x - 5 = 0$, which lies near $x = 2$.

(Or)

(b) Find out the root of the equation $x^3 - 3x - 4 = 0$ by the Rgula-Falsi method.

11. (a) (i) Prove that $u^2 = 1 + \frac{\delta^2}{4}$.

(ii) Solve : $(1 + \Delta)(1 - \nabla) = 1$.

(Or)

(b) Construct a forward difference table from the following data.

x	0	1	2	3	4
y_x	1	1.5	2.2	3.1	4.6

Evaluate $\Delta^3 y_1$, y_x and y_5.

12. (a) Using Gauss Forward interpolation formula to find $f(3.3)$ from the following table.

x	1	2	3	4	5
$y = f(x)$	15.30	15.10	15.00	14.50	14.00

(Or)

(b) Using Stirling's formula to evaluate $f(25)$ from the following data.

x	10	20	30	40
$f(x)$	1.1	2	4.4	7.9

13. (a) State and prove Lagrange's interpolation formula.

(Or)

(b) Using Newton's divided difference formula, find the value of $f(2)$, $f(8)$ and $f(15)$ given the following table.

x	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2028