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

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

MARCH 2019

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. Define : (i) Relative error,

   (ii) Percentage error and Find the relative error if $\frac{2}{3}$ is approximated to 0.667.

2. Explain the method of false position.

3. Prove that (i) $\delta^2 E = \Delta^2$; (ii) $\nabla = E^{-1}\Delta$.

4. Find the missing term in the following.

x	0	1	2	3	4
y	1	3	9	T	81

5. Explain inverse interpolation.

6. Find f(0.2) from the data below, using Newton's interpolation formula.

x	0.1	0.3	0.5	0.7
$y = f(x)$	4	7	18	45

7. Explain Stirling's formula.

8. Explain Mullers Method.

Section *B* (5 × 10 = 50 Marks)

II. Answer ***ALL*** the questions.

Each question carries ***TEN*** marks.

9. (a) Using the Maclaurin's series expansion for e^x approximate e' correct upto 5 decimal places.

(Or)

(b) Obtain second degree polynomial approximation to $f(x) = (1 + x)^{1/2}$, $x \in [0, 0.1]$. Using Taylor series expansio about $x = 0$. Using the expansion to approximate $f(0.05)$ and find a bounded of the truncation error.

10. (a) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position.

(Or)

(b) Find a real root of the equation $x^3 - 3x - 4 = 0$ by th Newton-Raphson method.

11. (a) Prove the following

$$U_x = U_{x-1} + \Delta U_{x-2} + \Delta^2 U_{x-2} + \ldots\ldots + \Delta^{n-1} U_{x-n} + \Delta^n U_{x-n}.$$

(Or)

(b) Using difference operators prove that

(i) $\Delta = \frac{\delta^2}{2} + \delta\sqrt{1 + \frac{\delta^2}{4}}$

(ii) $\Delta - \nabla = \delta^2$

(iii) Find $\Delta^3 [x (x - 1) (2x - 1)]$.

12. (a) State and prove Newtons Forward Interpolation formula.

(Or)

(b) Using Gauss forward formula, interpolate at $x = 32$ given that $f(25) = 0.2707$, $f(30) = 0.3027$, $f(35) = 0.3386$, $f(40) = 0.3794$.

13. (a) Fit a cubic polynomial by using Lagrange's formula to the following data.

x	–2	–1	2	3
y	–12	–8	3	5

(Or)

(b) Using Newton's divided difference formula, obtain the value of y when $x = 2$ for the set of tabulated point (1, – 3), (3, 9), (4, 30) and (6, 132).