Class – BA/B.Sc. III Sem. VI
Subject –Mathematics
Paper-II (Numerical Analysis)

Time Allowed : 3 Hours **Maximum Marks : 50**

Note: (1) Attempt any five questions selecting atleast two from each section.

(2) Students can use Non-Programmable Scientific Calculator.

SECTION-A

1. (a) Differentiate between absolute error and relative error.

(b) Use Crout's Method to solve

$3x_1 + 2x_2 + 7x_3 = 4$

$2x_1 + 3x_2 + x_3 = 5$

$3x_1 + 4x_2 + x_3 = 7$ 5,5

2. (a) Use Bisection Method to obtain a root of the following equation correct to three decimal places $x^3 + x^2 + x + 7 = 0$.

(b) Define factorial and prove that $\Delta[x]^n = n[x]^{n-1}$ 5,5

3. (a) Discuss the convergence of Newton Raphson Method.

(b) Obtain the function whose first difference is $9x^2 + 11x + 5$. 5,5

4. (a) If $u = 3V^7 - 6v$, find the percentage error in u at $v = 1$, if the error in v is 0.05.

Solve $5x_1 + 2x_2 + x_3 = 12$

$x_1 + 4x_2 + 2x_3 = 15$

$x_1 + 2x_2 + 5x_3 = 20$ using Jacobi's Method.

5,5

SECTION-B

5. (a) Find $\log_{10} 301$ for certain corresponding values of x and $\log_{10} x$ are (300, 2.4771), (304, 2.4829), (305, 2.4843) and (307, 2.4871) by using Lagrange's Interpolation formula.

(b) Describe Stirling formula. 5,5

6. (a) Evaluate $\int_0^1 \frac{dx}{x+1}$ correct to three decimal places by Trapezoidal Rule with h = 0.125.

(b) Apply the Gaussian, Integration formula when n=2 to evaluate $\int_{-1}^{1} \frac{dx}{x^2+1}$ 5,5

7. (a) Evaluate the integral $I = \int_{-1}^{1} (1-x^2)^{3/2} \cos x \, dx$ by using Gauss Chebyshev one point, two point rules.

(b) Find the divided differences of various order for the data in the table below:

x:	–3	–1	0	3	5
f(x):	–30	–22	–12	330	3458

5,5

8. (a) Find the cubic Polynomial which takes the following values:

$y(0) = 1$, $y(1) = 0$, $y(2) = 1$ and $y(3) = 10$

Hence obtain $y(4)$.

(b) Evaluate $\log e^2$ from $\int_0^1 \frac{x}{1+x^2} dx$ using

Simpson's 1/3 rule by dividing the range of integration into four parts. Find error also. 5,5

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