

Exam. Code : 103206

Subject Code : 1193

B.A./B.Sc. 6th Semester

MATHEMATICS

Paper—II

(Numerical Analysis)

Time Allowed—2 Hours]

[Maximum Marks—50

Note :— Attempt any **FOUR** questions. All questions carry equal marks.

1. (a) Explain the graphical reason why the Bisection method is not able to estimate the roots in case of quadratic equation with repeated roots. 6½
(b) Evaluate $(28^{-1/4})$ using Newton-Raphson method. 6
2. (a) Find the order of convergence of Newton's method. 6½
(b) Find the condition under which the iteration method converges. 6
3. Solve the system of equations $10x_1 - 2x_2 - x_3 - x_4 = 3$;
 $-2x_1 + 10x_2 - x_3 - x_4 = 15$; $-x_1 - x_2 + 10x_3 - 2x_4 = 27$;
 $-x_1 - x_2 - 2x_3 + 10x_4 = 9$ by Gauss-Seidal iteration method 12½

4. (a) Use Gauss elimination method to solve the system of equations $x + 4y - z = -5$; $x + y - 6z = -12$; $3x - y - z = 4$. 6½

- (b) Construct the table of differences for the data :

x	0	1	2	3	4
f(x)	1.0	1.5	2.2	3.1	4.6

Evaluate $\Delta^3 f(2)$. 6

5. (a) Find the missing values in the following table :

x	0	1	2	3	4	5	6
f(x)	5	11	22	40	—	140	—

6½

- (b) Employ Stirling's formula to compute $y_{12.2}$ from the following table :

x	10	11	12	13	14
y	23,967	28,060	31,788	35,209	38,368

6

6. (a) The following table gives the viscosity of an oil as a function of temperature. Use Lagrange's formula to find viscosity of oil at a temperature of 140° :

Temperature	110	130	160	190
Viscosity	10.8	8.1	5.5	4.8

6½

(b) Find $y'(0)$ and $y''(0)$ from the following table :

x	0	1	2	3	4	5
y	4	8	15	7	6	2

6

7. Solve the differential equations $\frac{dy}{dx} = 1 + xz$, $\frac{dz}{dx} = -xy$ for $x = 0.3$, using fourth order Runge-Kutta method. Initial values are $x = 0$, $y = 0$, $z = 1$. 12½
8. Use Milne's predictor-corrector method to obtain the solution of the equation $\frac{dy}{dx} = x - y^2$ at $x = 0.8$, given that $y(0) = 0.0000$, $y(0.2) = 0.0200$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$. 12½