

LOYOLA COLLEGE (AUTONOMOUS) CHENNAI 600 034
B. Sc DEGREE EXAMINATION-Mathematics
Fifth Semester-November 2014
MT 5409- Numerical Methods

Time: Forenoon/Afternoon

Max: 100 Marks

Date: / /2014

PART A

Answer ALL the questions

(10 x 2 =20)

1. Solve $x + 2y = 1$ and $3x - 2y = 7$ by Gauss elimination method.
2. Explain the condition for convergence in Gauss Seidel method.
3. State the Newton Raphson iteration formula.
4. Find an iterative formula for $x = \sqrt{N}$.
5. Define Extrapolation.
6. Construct the divided difference table for the following data

	4	5	7	10	11	13
	48	100	294	900	1210	2028

7. Write the relation between Bessel's and the Laplace Everett's formulae.
8. Define Numerical Differentiation.
9. Distinguish between Simpson's 1/3 rule and Simpson's 3/8 rule.
10. Write the Newton Cote's Quadrature formula.

PART B

Answer any FIVE questions

(5 x 8 =40)

11. Solve $x + y + z = 1$; $x - y + z = 2$ and $2x + y - z = 1$ by Cramer's rule.
12. Solve the system of equations $28x + 4y - z = 32$; $x + 3y + 10z = 24$ and $2x + 17y + 4z = 35$ using Gauss Elimination method.
13. Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position correct to three decimal places.
14. Find a real root of the equation $x^3 + x^2 - 1 = 0$ by successive approximation method.
15. Find a polynomial which takes the following values and hence compute y at $x = 2$.

x	1	3	5	7	9	11
y	3	14	19	21	23	28

16. Apply Bessel's formula to obtain y_{25} given that $y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$.

17. Obtain the value of $f'(90)$ using Stirling's formula to the following data

	60	75	90	105	120
	28.2	38.2	43.2	40.9	37.7

18. Solve $\frac{dy}{dx} = y - \frac{2x}{y}$, $y(0) = 1$ in the range $0 \leq x \leq 0.2$ using modified Euler's method taking $h = 0.1$.

PART C

Answer any TWO questions (2 x 20 =40)

19. (a) Solve the equations $28x + 4y - z = 32$; $x + 3y + 10z = 24$ and $2x + 17y + 4z = 35$ by Gauss Seidel iteration method up to three decimal places.

(b) Solve $x^3 + 2x^2 + 10x - 20 = 0$ by Newton Raphson method. (12+8)

20. (a) From the following data, estimate the number of persons having income in between (i) 1000 – 1700 and (ii) 3500 – 4000.

Income	Below 500	500 – 1000	1000 – 2000	2000 – 3000	3000 – 4000
No. of persons	6000	4250	3600	1500	650

(b) Use Lagrange's formula to find the form of y , given

	0	2	3	6
	648	704	729	792

(12+8)

21. (a) Using Gauss's forward interpolation formula, find the value of $\log 337.5$ from the following table:

	310	320	330	340	350	360
$\log x$	2.4914	2.5051	2.5185	2.5315	2.5441	2.5563

(b) Use Laplace Everett's formula to obtain $f(1.15)$ given that $f(1) = 1.000$, $f(1.10) = 1.049$, $f(1.20) = 1.096$, $f(1.30) = 1.140$. (12+8)

22. (a) Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule (ii) Simpson's 1/3 rule and (iii) Simpson's 3/8 rule.

(b) If $y' = x^2 - y$, $y(0) = 1$, find $y(0.1)$, $y(0.2)$ using Runge-Kutta method of second order. (12+8)
