

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086**  
**(For candidates admitted during the academic year 2011–12 & thereafter)**

**SUBJECT CODE : 11MT/ME/NA53**

**B. Sc. DEGREE EXAMINATION, NOVEMBER 2014**  
**BRANCH I - MATHEMATICS**  
**FIFTH SEMESTER**

**COURSE : MAJOR – ELECTIVE**  
**PAPER : NUMERICAL ANALYSIS**  
**TIME : 3 HOURS**

**MAX. MARKS : 100**

**SECTION – A**  
**ANSWER ALL THE QUESTIONS**

**(10X2=20)**

1. Write the order of convergence of Newton-Raphson method.
  2. State the condition for convergence of Gauss-Seidel method.
  3. State Stirling's formula of interpolation.
  4. Prove  $\Delta \nabla = \Delta - \nabla$ .
  5. Write the divided difference table given
- |      |   |   |   |   |
|------|---|---|---|---|
| x    | 1 | 2 | 7 | 8 |
| f(x) | 1 | 5 | 5 | 4 |
6. State Newton-Raphson formula for iteration.
  7. State Trapezoidal rule.
  8. State Simpson's  $\frac{1}{3}$  rule.
  9. Find  $y(0.1)$  given  $y' = \frac{x+y}{z}$ ,  $y(0) = 1$  by Euler method.
  10. Write down iteration formula for  $y$  in solving  $y' = f(x, y)$ ,  $y(x_0) = y_0$  due to picard.

**SECTION – B**  
**ANSWER ANY FIVE QUESTIONS**

**(5X8=40)**

11. Find the positive root of  $x - \cos x = 0$  by bisection method.
12. Solve the following system of equations by Gauss-Elimination method.  
 $2x + 3y - z = 5$ ,  $4x + 4y - 3z = 3$  and  $2x - 3y + 2z = 2$ .
13. Find a polynomial of degree four which takes values

x	2	4	6	8	10
y	0	0	1	0	0

14. Find the values of  $y$  at  $x = 21$  and  $x = 28$  from the following data.

x	20	23	26	29
y	0.3420	0.3907	0.4384	0.4848

15. Find the first, second derivatives of  $f(x)$  at  $x = 1.5$  if

x	1.5	2	2.5	3	3.5	4
f(x)	3.375	7	13.625	24	38.875	59

16. Evaluate  $\int_0^{10} \frac{dx}{1+x^2}$  by using (i) Simpson's  $1/3$  rule  
(ii) Simpson's  $3/8$  rule.
17. Using Taylor series method, find  $y$  at  $x = 0.1, 0.2$  given  $\frac{dy}{dx} = x^2 - y, y(0) = 1$   
(correct to 4 decimal places).

**SECTION – C**  
**ANSWER ANY TWO QUESTIONS**

**(2X20=40)**

18. (i) Solve the following systems of equations by using Gauss-Seidel method (correct to 3 decimal places):
- $$\begin{aligned} 28x + 4y - z &= 32 \\ x + 3y + 10z &= 24 \\ 2x + 17y + 4z &= 35 \end{aligned}$$
- (ii) Using Newton's method, find the root between 0 and 1 of  $x^3 = 6x - 4$  correct to 5 decimal places.

19. (i) Using Lagrange's formula of interpolation find  $y(9.5)$  given

x	7	8	9	10
y	3	1	1	9

- (ii) Given the following table find  $y(35)$  by using Stirling's formula.

x	20	30	40	50
y	512	439	346	243

20. (i) Obtain the values of  $y$  at  $x = 0.1, 0.2$  using R.K. method of fourth order for the equation  $y' = -y$  given  $y(0) = 1$ .
- (ii) Given the following data find the maximum value of  $y$

x	-1	1	2	3
y	-21	15	12	3

