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

SUBJECT CODE : 11MT/ME/NA53

B. Sc. DEGREE EXAMINATION, NOVEMBER 2013
BRANCH I - MATHEMATICS
FIFTH SEMESTER

COURSE : MAJOR – ELECTIVE
PAPER : NUMERICAL ANALYSIS
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A **(10X2=20)**
ANSWER ALL THE QUESTIONS

1. State the criterion for the convergence of Newton-Raphson method.
2. Explain Gauss-Elimination method for solving a system of equations.
3. Find the sixth term of the sequence 8, 12, 19, 29, 42, …..
4. Prove that $E = (1 - \nabla)^{-1}$.
5. Form the divided difference table for

X	1	3	6	11
F(x)	4	32	224	1344

6. State Gause forward central difference formula.
7. State the general quadrature formula.
8. State the trapezoidal rule.
9. State Picard's formula.
10. State Runge-Kutta formula for the second order.

SECTION – B **(5X8=40)**
ANSWER ANY FIVE QUESTIONS

11. Evaluate $\sqrt{12}$ to four decimal places by Newton-Raphson method.

12. Solve by Gauss Elimination method.
$3x + 4y + 5z = 18$, $2x - y + 8z = 13$, $5x - 2y + 7z = 20$

13. Using Lagrange's interpolation formula find $Y(10)$ from the following table.

x	5	6	9	11
y	12	13	14	16

14. Apply Newton's backward formula to fit a polynomial of degree 3.

x	3	4	5	6
y	6	24	60	120

15. The population of a certain town is shown in the following table.

Year	1971	1981	1991	2001	2011
Population in thousands	40.6	60.8	79.9	103.6	132.7

..2

16. Find the value of $\log 2^{1/3}$ from $\int_0^1 \frac{x^2}{1+x^3}\,dx$ using Simpson's $1/3$ rule with $h = 0.25$.

17. Using Taylor's series method, find correct to four decimal places, the value of $y(0.1)$ given $\frac{dy}{dx} = x^2 + y^2$ where $y(0) = 1$.

SECTION – C **(2X20=40)**

ANSWER ANY TWO QUESTIONS

18. a) Find a real root of the equation $x^3 - 2x - 5 = 0$, using bisection method.

b) Find the missing values in the following data.

x	0	5	10	15	20	25
y	6	10	-	17	-	31

19. a) Using Stirling's formula find y(1.22)

x	1.0	1.1	1.2	1.3	1.4	1.5
y	0.84147	0.89121	0.93204	0.96356	0.98545	0.99749

b) Using Euler's method solve $y' = x + y, y(0) = 1, x = 0.0$ to $x = 1.0$ with $h = 0.2$ check your result with the exact solution.

20. a) By applying the fourth order Runge-Kutta method find $y(0,2)$ from $y' = y - x, y(0) = 2$ taking $h = 0.1$

b) When a train is moving at 30 metres per second steam is shut off and brakes are applied. The speed of the train v in metres per second after $'t'$ seconds is given by

t	0	5	10	15	20	25	30	35	40
v	30	24	19.5	16	13.6	11.7	10.0	8.5	7.0

Using Simpson's rule determine the distance moved by the train in 40 secs.