



**JLOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Sc., DEGREE EXAMINATION – MATHEMATICS**

**SIXTH SEMESTER – NOVEMBER 2013**

**MT 6605 – NUMERICAL METHODS**

Date : 11/11/2013  
Time : 1:00 - 4:00

Dept. No.

Max. : 100 Marks

**PART – A**

**Answer ALL questions:**

**(10 x 2 = 20 marks)**

1. When Gauss elimination method is used to solve  $AX=B$ , A is transferred in a \_\_\_\_\_ matrix.
2. Under what condition can we use Cramer's rule of solving simultaneous equations?
3. What is the order of convergence of Newton-Raphson method?
4. Which method is also called as method of chords?
5. Write the Newton's Backward interpolation formula.
6. Construct a divided difference table for the following data:  

$x$ :	2	4	9	10
$y$ :	4	56	711	980
7. Bessel's interpolation formula gives better results when  $u$  lies between \_\_\_\_\_.
8. Laplace-Everette's formula truncated after \_\_\_\_\_ differences.
9. For What degree polynomial, Simpson's 1/3 rule gives exact result?
10. Write the formula for Rungekutta method of IV order.

**PART – B**

**Answer any FIVE questions:**

**(5 x 8 = 40 marks)**

11. Solve the system by Gauss-Elimination method  
 $2x + 3y - z = 5$ ,  $4x + 4y - 3z = 3$  and  $2x - 3y + 2z = 2$ .
12. Solve for  $x$  from  $\cos x - xe^x = 0$  by successive approximation method, perform upto five iterations.
13. Using bisection method, find the negative root of  $x^3 - 4x + 9 = 0$ .
14. Given that  $f(0) = 8$ ,  $f(1) = 68$ , and  $f(5) = 123$ , find  $f(2)$ .
15. Find a cubic polynomial which takes the following set of values (0,1), (1, 2), (2,1) and (3, 10).
16. From the following table:  

$x$ :	20	25	30	35	40
$f(x)$ :	11.4699	12.7834	13.7648	14.4982	15.0463

  
Find  $f(34)$  using Everett's formula.

17. Write a C program to find the value of  $\int_1^2 \frac{1}{x} dx$  using Simpson's 1/3 rule.

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

**PART – C**

**Answer any TWO questions:**

**(2 x 20 = 40 marks)**

19. Solve, by Gauss-Seidel method, the following system

a)  $28x + 4y - z = 32$ ,  $x + 3y + 10z = 24$ ,  $2x + 17y + 4z = 35$ .

b) Find an iterative formula to find the reciprocal of a given number N and hence find the value of  $\frac{1}{19}$ .

20. a) Using Lagrange's formula, prove  $y_1 = y_3 - 0.3(y_5 - y_{-3}) + 0.2(y_{-3} - y_{-5})$  nearly.

b) From the following table, using Stirling's formula, estimate the value of  $\tan 16^\circ$ .

x:	0°	5°	10°	15°	20°	25°	30°
tanx:	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

21. a) Find the first and second derivative of the function tabulated below at  $x=0.6$

x:	0.4	0.5	0.6	0.7	0.8
y:	1.5836	1.7974	2.0442	2.3275	2.6511

b) Derive Simpson's 3/8 rule for numerical Integration.

22. a) Apply Simpson's 1/3 rule, Compute  $\int_2^{1.4} (\sin x - \log e^{x+e^x}) dx$ , by taking  $h = 0.1$ .

b) Using Runge-Kutta method of IV order solve  $y' = \frac{y^2 - x^2}{y^2 + x^2}$  with  $y(0) = 1$  at  $x = 0.2$ .

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