LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SIXTH SEMESTER – **APRIL 2018**

MT 6605– NUMERICAL METHODS

Date: 10-05-2018   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART – A
ANSWER **ALL** QUESTIONS   **(10 X 2 = 20 marks)**

1. Explain Cramer's Rule for solving system of equations of the form AX =B.

2. Distinguish between Gauss elimination and Gauss Seidel methods.

3. What do you mean by transcendental equation?

4. State the condition for convergence in Newton Raphson method.

5. Write the formula to estimate the error in Newton's Backward interpolation Formula.

6. State any two properties of divided differences.

7. Write the relation between Bessel's formula and Laplace – Everett's formula.

8. Write the first and second derivative formulae obtained from Newton's forward difference formula at any value of x.

9. State Newton – Cote's Quadrature formula.

10. Give the formula to evaluate $\int_{x_0}^{x_0+nh} f(x)dx$ using weddle's rule.

PART – B
ANSWER ANY **FIVE** QUESTIONS   **(5 X 8 = 40 marks)**

11. Solve $x + 2y + z = 3; 2x + 3y + 3z = 10; 3x - y + 2z = 13$ by Gauss elimination method.

12. Using bisection method, find the negative root of $x^3 - 4x + 9 = 0$ correct to 2 decimal places.

13. Find an approximate root of $x\log_{10}x - 1.2 = 0$ by Regula Falsi method correct to 2 decimal places.

14. Find an iterative formula to find $\sqrt{N}$, where N is a positive number and hence find $\sqrt{5}$.

15. Write a C program to interpolate the value of y at x by Lagrange's interpolation formula.

16. Find the value of $\cos 51°42'$ by using Gauss's backward central difference formula from the table given below.

x	50°	51°	52°	53°	54°
$y = \cos x$	0.6428	0.6293	0.6157	0.6018	0.5878

17. Using Taylor series method, find $y(0.1)$, given $\frac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$ correct to five decimal places.

18. Solve numerically $y' = y + e^x, y(0) = 0$ for $x = 0.2, 0.4$ by Modified Euler method.

ANSWER ANY **TWO** QUESTIONS   **(2 X 20 = 40 marks)**

19. (a) Solve $28x + 4y - z = 32; x + 3y + 10z = 24; 2x + 17y + 4z = 35$ by Gauss

    Seidel method correct to 3 decimal places.

   (b) Solve the equation $x^3 + x^2 - 1 = 0$ for the positive root by iteration method.

20. (a) From the data given below, find the number of students whose weight is between 60 and 70.

Weight in lbs	0 – 40	40 – 60	60 –80	80 –100	100 –120
No. of students	250	120	100	70	50

   (b) Find the equation $y = f(x)$ of degree three, passing through thepoints $(-1,$

   $-21), (1, 15), (2, 12), (3, 3)$ using divided difference formula. Find also the value of $y$at $x = 0$.

21. (a) Given the following table, find $y(35)$ by using Stirling's formula.

x:	20	30	40	50
y:	512	439	346	243

   (b) Obtain the value of $f'(0.04)$ using Bessel's formula for the following table.

x	0.01	0.02	0.03	0.04	0.05	0.06
$f(x)$	0.1023	0.1047	0.1071	0.1096	0.1122	0.1148

22. (a) Write a C program to evaluate the definite integral between two given limits and   the X – axis

    by Simpson's one third rule.   **(8)**

   (b) Using Runga - Kutta method of fourth order, find $y(0.8)$ correct to 4 decimal places if

   $y' = y - x^2, y(0.6) = 1.7379$taking$h = 0.1$.   **(12)**

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