LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – MATHEMATICS

SIXTH SEMESTER – APRIL 2010

MT 6605 - NUMERICAL METHODS

Date & Time: 20/04/2010 / 9:00 - 12:00   Dept. No.   Max. : 100 Marks

PART-A (10×2=20)

ANSWER ALL THE QUESTIONS

1. What are the advantages of iterative methods over direct methods of solving a system of linear equations?

2. Solve x + 2y = 1 and 3x – 2y =7 by Gauss-Elimination method.

3. State the Newton – Raphson iteration formula.

4. Explain Regula-Falsi method.

5. Define the first and second order divided differences.

6. State Lagrange's interpolation formula for unequal intervals.

7. State Gauss's forward interpolation formula.

8. State Everett's interpolation formula.

9. What do you mean by numerical integration?

10. Using Euler's method find y (0.2) given y' = x + y, y (0) = 1.

PART-B (5×8=40)

ANSWER ANY FIVE QUESTIONS

11. Solve the system of equations by Gauss elimination method
$3x + y - z = 3, 2x - 8y + z = -5, x - 2y + 9z = 8$.

12. Find a real root of the equation $x^3 - 2x - 5 = 0$ by Regular Falsi method.

13. Write a C program to interpolate using the given pairs of values of x and y by Newton's Forward interpolation formula.

14. Use Lagrange's interpolation formula to find the value of Y when X= 10, if the values of X and Y are given as below

X:	5	6	9	11
Y:	12	13	14	16

15. Find the first and second derivatives of the function tabulated below at x=1.5

X:	1.5	2.0	2.5	3.0	3.5	4.0
Y:	3.375	7.000	13.625	24.000	38.875	59.000

16. Use Laplace Everett's formula to obtain Y value at X=34 for the following table

X:	20	25	30	35	40
Y:	11.4699	12.7834	13.7648	14.4982	15.0463

17. Evaluate $\int_0^{\pi/2} \sin x \, dx$ by i) Trapezoidal rule ii) Simpson's 1/3 rule using 11 ordinates.

18. Solve $\dfrac{dy}{dx} = 1 - y$, y (0) =0 in the range $0 \le x \le 0.3$ using (i) Euler's method (ii) Improved

   Euler's method (iii) Modified Euler's method by choosing h = 0.1.

PART-C (2×20=40)

ANSWER ANY TWO QUESTIONS

19. (i) Solve by Gauss – Seidal method for the following system of equations
    $8x - 3y + 2z = 20, 6x + 3y + 12z = 35, 4x + 11y - z = 33$.

   (ii) Solve sin x = 1+x^3 using Newton – Raphson method.

20. (i) Using Newton's divided difference formula, Evaluate f (8) and f (15) given that

x:	4	5	7	10	11	13
f(x):	48	100	294	900	1210	2028

   (ii) The following are data from the steam table

Temp C^0(t):	140	150	160	170	180
Pressure kgf/cm^2 (P):	3.685	4.854	6.302	8.076	10.225

   Using Newton's formula, find the pressure of the steam for temperatures 142^0 and 175^0.

21. (i) Use Stirling's formula to find y_{35} given that y_{10}=600, y_{20}=512, y_{30}=439,y_{40}=346,y_{50}=243.

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

22. (i) Given y'= x^2-y, y(0)=1, find y(0.1),y(0.2) using Runge-Kutta methods of (i) second

      order, (ii) third order and (iii) fourth order.

   (ii) Develop a C program to implement Simpson's 3/8th rule.

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