LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – MATHEMATICS

SIXTH SEMESTER – APRIL 2013

MT 6605 - NUMERICAL METHODS

Date: 30/04/2013   Dept. No.   Max. : 100 Marks
Time: 1:00 - 4:00

PART – A

Answer ALL questions: **(10 x 2 = 20 marks)**

1. When the method of iteration will be useful?
2. Explain Cramer's rule of solving AX = B.
3. Derive Newton-Raphson formula to find the cube root of a positive number K.
4. State the sufficient condition for convergence of iterations.
5. Form the divided difference table for the following data:

x	2	5	10
y	5	29	109

6. State Newton's backward interpolation formula.
7. Write the relation between Bessel's and Laplace – Everett's formula.
8. Write the stirling's formula.
9. What is the geometrical interpretation of trapezoidal rule?
10. Solve $y' + y = 0$, $y(0)=1$ find y (0.01) using Euler's method.

PART – B

Answer any FIVE questions: **(5 x 8 = 40 marks)**

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

12. Compute the real root of $x\log_{10} x-1.2=0$ correct to three decimal places using Newton – Raphson method.

13. Write a C program to interpolate Newton's Backward interpolation formula.

14. Given $\log_{10} 654=2.8156, \log_{10} 658 = 2.8182, \log_{10} 659=2.8189$ and $\log_{10} 661=2.202$. Find the value of $\log_{10} 656$ using Newton's divided difference formula.

15. Given:

θ :	0°	5°	10°	15°	20°	25°	30°
tan θ :	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

    Using stirling's formula, find tan 16^0.

16. Given that $f(20) = 14$, $f(24) = 32$, $f(28) = 35$, $f(32) = 40$. Use Gauss forward formula Find $f(25)$.

17. Apply simson's $\frac{1}{3}$ rule, evaluate $\int_{0}^{1} \sqrt{\sin x + \cos x}\ dx$, correct to two places of decimals using seven ordinates.

18. Using Taylor series method, find y (1.1) and y (1.2) correct to four decimal places given
$\dfrac{dy}{dx} = xy^{\frac{1}{3}}$ and $y(1) = 1$.

PART – C

Answer any TWO questions: **(2 x 20 = 40 marks)**

19. a) Solve the system of equations $x + y - 3z + 6 = 0$, $8x - y + z = 18$, $2x + 5y - 2z - 3 = 0$, using Gauss – seidel iteration method.

   b) Solve for x from $\cos x - xe^x = 0$ by iteration method.

20. a) Derive the Newton's backward difference interpolation formula.

   b) By means of Lagrange's formula, prove that $y_1 = y_3 - 0.3(y_5 - y_{-3}) + 0.2(y_3 - y_{-5})$.

21. a) From the following table, estimate $e^{0.644}$ using Bessel's formula.

x:	0.61	0.62	0.63	0.64	0.65	0.66	0.67
e^x:	1.8404	1.8589	1.8776	1.8964	1.9155	1.9348	1.9542

   b) From the following table, estimate $f(337.5)$ using Laplace Everett's formula:

x:	310	320	330	340	350	360
$f(x)$:	2.49136	2.50515	2.51851	2.53147	2.54406	2.55630

22. a) Write a C program to find the value $\int_a^b y \, dx$ using Trapezpidal rule.

b) Using Runge – kutta method of fourth order solve $y'(y^2 + x^2) = y^2 - x^2$, $y(0) = 1$ at $x = 0.2$, $x = 0.4$.

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