**Reg. No. \_\_\_\_\_\_\_\_**

**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination - June 2011**

**Subject Title: NUMERICAL METHODS Time: 3 hours**

**Subject Code: MA223 Maximum Marks: 100**

#### **Answer ALL questions**

**PART – A (10 x 1 = 10 MARKS)**

1. Convert the equation  to a linear form.

2. Write down the normal equations to be used for finding  and , when fitting a straight line  by the method of least squares.

3. What is the condition for the convergence of the iteration method?

4. Crout’s method is a direct method. (True / False)

5. Write  in terms of .

6. State Gregory-Newton forward interpolation formula.

7. State Newton’s divided difference formula.

8. Write down the Newton’s backward formula at  for .

9. State the algorithm of Euler method to solve.

10. State Liebmann’s iteration process.

**PART – B (5 x 3 = 15 MARKS)**

11. Write down the three observation equations to be used for finding  and , when fitting a parabola  by the method of moments.

12. Solve the following system of equations by Gauss elimination method.

13. Express  in terms of factorial polynomial taking .

14. Evaluate  by using Trapezoidal rule.

15. Solve  given  and get  by Taylor series method.

**PART – C (5 x 15 = 75 MARKS)**

16. A curve given by the equation of the form  to be fitted to the following data. Determine the values of a, b and c.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | 0.2 | 0.5 | 1.0 | 2.0 | 3.0 | 4.0 |
| y | 3.2 | 3.2 | 4.1 | 8.1 | 13.7 | 22.6 |

(OR)

17. Fit a parabola, by the method of least squares, to the following data. Also estimate y at x = 6.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 1 | 2 | 3 | 4 | 5 |
| y | 5 | 12 | 26 | 60 | 97 |

[P.T.O]

18. a. Find a positive root of  by the method of False position. (7)

b. Solve, by Triangularization method, the following system:

. (8)

(OR)

19. a. Using Newton’s method, find the root between 0 and 1 of . (7)

b. Solve, by Gauss-Seidel method, the following system:

. (8)

20. a. Prove that . (5)

b. Find the value of  at  from the following data. (10)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 20 | 23 | 26 | 29 |
| y | 0.3420 | 0.3907 | 0.4384 | 0.4848 |

(OR)

21. a. Evaluate. (5)

b. Apply Gauss’s forward formula to obtain  at  from the table below. (10)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 2 | 3 | 4 | 5 |
| y | 2.626 | 3.454 | 4.784 | 6.986 |

22. a. Using Lagrange’s formula of interpolation find  given (7)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 7 | 8 | 9 | 10 |
| y | 3 | 1 | 1 | 9 |

b. The population of a certain town is given below. Find the rate of growth of the population in 1931. (8)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year x | 1931 | 1941 | 1951 | 1961 | 1971 |
| Population in  thousand y | 40.62 | 60.80 | 79.95 | 103.56 | 132.65 |

(OR)

23. a. Evaluate  by Simpson’s  rule. (7)

b. Solve . (8)

24. Using Runge-Kutta method of fourth order, find  correct to 4 decimal places if. Taking step size .

(OR)

25. Solve  given  assuming. Find the values of  up to .