SO – 442

III Semester B.C.A. Degree Examination, October/November 2011
(Y2K8 Scheme)
Computer Science
BCA 306 : NUMERICAL ANALYSIS AND LINEAR PROGRAMMING

Time : 3 Hours Max. Marks : 60

Instruction : *Mention the question numbers* ***correctly.***

SECTION – A

Answer **any five** : **(5×2=10)**

1. Mention four types of errors.

2. Explain partitioned floating-point double precision computer word.

3. Write the formula for Secant method.

4. Write the Newton's form of interpolating polynomials.

5. Define Pivotal Condensation.

6. Write the formulas for Runge-Kutta of order 4.

7. Write an expression for y_1, 1^{st} approximation to solve

$$\frac{dy}{dx} = f(x,y) \text{ with } y(x_0) = y_0 \text{ using Taylor's method.}$$

8. Define Optimum basic feasible solution.

SECTION – B

(3×5=1

Answer **any three** :

9. Derive the criterion for the convergence in Newton-Raphson method.

10. Find x when y = 7 from the following table

x	1	3	4
y	4	12	19

11. Solve $\int_{-1}^{1} (5x^3 - 3x^2 + 2x + 1)\,dx$ with b = 1 using Simpson's $\frac{1}{3}$ rule.

12. Explain Crout's LU decomposition method of solving linear equations in 3 unknown.

13. Given $y^1 = x^2 - y$, $y(0) = 1$ find y (0.1) using RK-IV method.

SECTION – C

(5×7

Answer **any five** :

14. Determine the machine representation of the decimal number –52. 234375 i both single precision and double precision.

15. Solve the system of non-linear equations by Newton's method : $x^2 - y^2 = 4$ $x^2 + y^2 = 16$.

16. Use Lagrange's Interpolation formula to calculate f(3) from the followin table

x	0	1	2	4	5	6
f(x)	1	14	15	5	6	19

17. Find an approximate value of $\int_{0}^{5} \frac{dx}{4x+5}$ with 10 equal parts by Trapezoi

18. Solve the tridiagonal system

$$4x_1 - x_2 = 1$$
$$-x_1 + 4x_2 - x_3 = 1$$
$$-x_2 + 4x_3 - x_4 = 1$$
$$-x_3 + 4x_4 = 1$$

19. Using Runge-Kutta 4th order, find y(0.1) and y(0.2) given that

$$\frac{dy}{dx} = 1 + xy; y(0) = 2.$$

20. a) Solve the following graphically,

maximize $z = 10x_1 + 6x_2$

subject to $5x_1 + 3x_2 \leq 30$

$x_1 + 2x_2 \leq 18$

where $x_1, x_2 \geq 0$ 4

b) A firm produces three products. These products are processed on three different machines. The time required to manufacture one unit of each of the product and daily capacity of the three machines are given below

Machine	Time per unit (minutes)			Machine capacity (minutes/day)
	Product 1	Product 2	Product 3	
M_1	2	3	2	440
M_2	4	–	3	470
M_3	2	5	–	430

It is required to determine the daily number of units to manufactured for each product. The profit per unit for product 1, 2, 3 is Rs. 4, Rs. 3, Rs. 6 respectively.

Formulate LPP.

21. Solve by Simplex method

maximize $Z = 4x_1 + x_2 + 3x_3 + 5x_4$

subject to $4x_1 - 6x_2 - 5x_3 - 4x_4 \geq -20$

$-3x_1 - 2x_2 + 4x_3 + x_4 \leq 10$

$-8x_1 - 3x_2 + 3x_3 + 2x_4 \leq 20$

where $x_1, x_2, x_3, x_4 \geq 0$
