UN – 321

III Semester B.C.A. Degree Examination, Nov./Dec. 2015
(Y2K8 Scheme) (Repeaters)
COMPUTER SCIENCE
BCA 306 : Numerical Analysis and Linear Programming
70 – 12-13 and Onwards
60 – Prior to 12-13

Time : 3 Hours Max. Marks : 60/70

Instructions : *i) Answer **all** Sections.*
*ii) Section **D** is applicable **only 70** marks for the students of **2012-13** and onwards.*
*iii) **60** marks for **Repeater** students prior to **2012-13**.*

SECTION – A

I. Answer **any five** of the following : **(5×2=10)**

1) Define error.
2) Write the formula for Newton Raphson method.
3) Define interpolation.
4) Add .6434E3 to .4845E3.
5) Explain Gauss Elimination method.
6) Write the formula for Runge-Kutta Fourth order.
7) Define Surplus variable.
8) Define initial value problems.

SECTION – B

II. Answer **any three** of the following : **(3×5=15)**

9) Find a real root of the equation $f(x) = x^3 - 5x + 1 = 0$. which lies in the interval (0, 1). Perform 4 iterations using secant method.

10) From the following data find θ at x = 84 using Newton's forward interpolating method.

X	40	50	60	70	80	90
θ	184	204	226	250	276	304

11) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's $\frac{1}{3}^{rd}$ rule.

12) Solve $2x + 3y - z = 5$; $4x + 4y - 3z = 3$; $2x - 3y + 2z = 2$ using Gauss Elimination method.

13) Solve $\frac{dy}{dx} = y - x^2$, $y(0) = 1$ by Picard's method. Hence find the value of y(0.1) and y(0.2).

P.T.O.

SECTION – C

III. Answer **any five** of the following : **(5×7=35)**

14) Determine the single-precision machine representation of the decimal number 52.234375 in both single precision and double precision.

15) Find the root between 2 and 3 of the equation $x^3 - 2x - 5 = 0$ using bisection method in 5 stages.

16) Using Lagrange interpolation formula find f(2) from the following data.

x	0	1	3	4
f(x)	-12	0	6	12

17) Evaluate $\int_0^1 \frac{dx}{1+x}$ using trapezoidal rule taking $h = \frac{1}{6}$.

18) Solve by Gauss Seidel method
$x + y + 54z = 110$, $27x + 6y - z = 85$, $6x + 15y + 2z = 72$.

19) Solve $\frac{dy}{dx} = x + y^2$; $y(0) = 1$ find approximate value at $x_1 = 0.2$ taking $h = 0.2$.

20) a) A firm produces 3 products A, B, C. These products are processed on 3 different machines M_1, M_2, M_3. The time required to manufacture on unit of each of the three products and the daily capacity of the three machines are given in the table below.

Machine	Time per unit (minutes)			Machine Capacity (minutes/day)
	A	B	C	
M_1	2	3	2	410
M_2	4	-	3	440
M_3	2	5	-	400

The profit per unit for product A, B and C is Rs. 5, Rs. 4 and Rs. 7 respectively. Formulate the LPP. **4**

b) Solve using graphical method
Max $z = 2x + 3y$
Subject to $x + y \leq 1$
$3x + y \leq 4$, $x, y \geq 0$. **3**

21) Solve by simplex method

Max $z = 10x_1 + 6x_2 + 4x_3$

Subject to $x_1 + x_2 + x_3 \leq 100$

$10x_1 + 4x_2 + 5x_3 \leq 600$

$2x_1 + 2x_2 + 6x_3 \leq 300$

$x_1, x_2, x_3 \geq 0$

SECTION – D

IV. Answer **any one** of the following : **(1×10=10)**

22) a) Write the dual of the following LPP

Max $z = 2x_1 + 3x_2$

Subject to $4x_1 + 5x_2 \leq 6$

$7x_1 + 8x_2 \leq 9$

$10x_1 + 11x_2 \leq 12, x_1, x_2 \geq 0$ **5**

b) Use Newton Raphson method to find the real root of the equation $x^3 - 37 = 0$. Which is near to x = 3, using 5 stages. **5**

23) a) Construct the divided difference table from the given data.

x	0	1	3	2	5
f(x)	2	1	5	6	-183

5

b) Use Taylor's series method to find y at x = 4.1 given that $\frac{dy}{dx} = \frac{1}{x^2 + y}$, y(4) = 4. **5**