SN – 475

III Semester B.C.A. Degree Examination, November/December 2013
(Y2K8 Scheme) (F+R)
BCA 306 : NUMERICAL ANALYSIS AND LINEAR PROGRAMMING

Time : 3 Hours Max. Marks : 60/70

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

SECTION – A

I. Answer **any five** : **(5×2=10)**

1) Define floating point number.

2) Define truncation error.

3) Find a real root of the equation $xe^x - 2 = 0$ using Secant method. Carryout one iteration.

4) Construct a forward difference table :

x	0.00	0.10	0.20	0.30	0.40
y	1.000	1.2214	1.4918	1.8221	2.255

5) Write the formula to evaluate $\int_{x_0}^{x_0+nh} f(x)dx$ using Simpson's $1/3^{rd}$ rule.

6) Explain Gauss elimination method.

7) Write the formula to solve $\frac{dy}{dx} = f(x,y)$ with $y(x_0) = y_0$ using Taylor's series method.

8) Define Slack variable.

SECTION – B

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

9) Find a real root of the equation $x^3 - 2x - 5 = 0$ correct to four decimal places using Newton-Raphson method.

P.T.O.

10) Find $f'(0.1)$ from the following table :

x	0.2	0.4	0.6
y	0.12	0.49	1.12

11) Evaluate $\int_0^1 \frac{x^2}{1+x^3} dx$ by taking seven ordinates using Simpson's $\frac{3}{8}^{th}$ rule.

12) Solve the system of equations using the method of partial pivoting

$3x + 2y - 5z = 0$, $2x - 3y + z = 0$,

$x + 4y - z = 4$.

13) Solve $\frac{dy}{dx} = x - y^2$ with $y(0) = 1$ correct to 4 decimal places using Taylor's series method. Find $y(0.1)$.

SECTION – C

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

14) Determine the double precision machine representation of the decimal number 52.234375.

15) Find a real root of the equation $x - \cos x = 0$ using Bisection method correct to four decimal places.

16) Find $f(11)$ from the following :

x	4	7	9	12
y	– 43	83	327	1053

17) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using trapezoidal rule by dividing the interval (0, 1) into 6 equal parts. Hence find an approximate value of π .

18) Solve $5x + 2y + z = 12$, $x + 4y + 2z = 15$, $x + 2y + 5z = 0$ using Gauss Seidal iteration method.

19) Solve $\frac{dy}{dx} = \frac{y - x}{y + x}$ with y (0) = 1, taking h = 0.1 for x = 0.2 using Runge Kutta 4^{th} order method.

20) Solve the LPP using graphical method

Max z = 300 x + 400 y

Subject to $5x + 4y \leq 200$

$3x + 5y \leq 150$

$5x + 4y \geq 100$

$8x + 4y \geq 80$

where $x, y \geq 0$.

21) Solve the LPP using Simplex method

Max $z = x_1 - x_2 + 3x_3$

Subject to $x_1 + x_2 + x_3 \leq 10$

$2x_1 - x_3 \leq 2$

$2x_1 - 2x_2 + 3x_3 \leq 0$

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

SECTION – D

IV. Answer **any one** of the following. **Each** question carries **10** marks. **(10×1=10)**

22) a) Find a real root of the equation $x \log_{10} x - 102 = 0$ correct to three decimal places using Bisection method. Carryout 5 iterations.

b) Find the number of students whose weight is less than 70

Weight	0 – 40	40 – 60	60 – 80	80 –100	100 – 120
No. of students	250	120	100	70	50

23) a) Find the largest eigen value of $A = \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$ using power method.

b) A firm produces three products A, B, C. These products are processed on three different machines M_1, M_2, M_3. The time required to manufacture one unit of each product is given below.

Machine	Time per unit			Machine Capacity
	A	B	C	
M_1	2	3	2	410
M_2	4	–	3	440
M_3	2	5	–	400

The profit per unit of products A, B, C are respectively Rs. 5, Rs. 4 and Rs. 7. Formulate the LPP.