



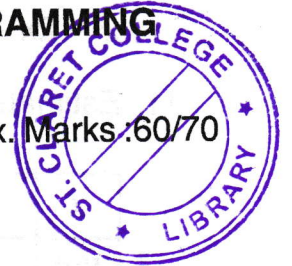
SN – 672

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III Semester B.C.A. Degree Examination, Nov./Dec. 2017  
(Repeaters) (Y2K8 Scheme)  
BCA 306 : NUMERICAL ANALYSIS AND LINEAR PROGRAMMING

Time : 3 Hours

Max. Marks : 60/70



- Instructions :**
- 1) Answer **all** questions.
  - 2) Section – **D** is applicable to **only** students of **2012** and **2013** and onwards.
  - 3) **60** marks for **prior** to **2012-13**.

SECTION – A

I. Answer **any five** of the following :

(5×2=10)

1. Define :
  - i) Round off error
  - ii) Truncation error.
2. Subtract .9432 E – 4 from .5452 E – 3.
3. Write the formula for Newton-Raphson method.
4. Write Lagrange's inverse interpolation formula.
5. Write the formula for Trapezoidal rule for integration.
6. Define linear programming problem.
7. What is a feasible solution in LPP ?
8. Define a degenerate solution of a LPP.

SECTION – B

II. Answer **any three** of the following :

(3×5=15)

9. Find a root of the equation  $x^3 - 4x - 9 = 0$  using bisection method in the interval (2, 3) in 4 stages.

P.T.O.



10. Use Newtons-Raphson method to find a real root of the equation :

$$x^3 - 2x - 5 = 0 \text{ correct to three decimal places at } x = 2, \text{ in 4 stages.}$$

11. Estimate  $f(7.5)$  from the table.

x	1	2	3	4	5	6	7	8
f(x)	1	8	27	64	125	216	343	512

12. Find x when  $y = 7$  from the following data :

x	1	3	4
y	4	12	19

13. Evaluate  $\int_0^6 \frac{1}{1+x^2} dx$  by using Trapezoidal rule by taking the step length = 1.

### SECTION - C

III. Answer **any five** of the following :

(5×7=35)

14. Find the equation of the cubic curve which passes through the points (4, -43), (7, 83), (9, 327) and (12, 1053). Hence find  $f(10)$ .

15. Solve the system of equation by Gauss elimination method

$$x + 2y + z = 3, 2x + 3y + 3z = 10, 3x - y + 2z = 13.$$

16. Solve using Crout's LU decomposition method

$$x_1 + x_2 + x_3 = 1, 4x_1 + 3x_2 - x_3 = 6, 3x_1 + 5x_2 + 3x_3 = 4.$$

17. Solve by Gauss Jacobi method

$$10x + 2y + z = 9, x + 10y - z = -22, -2x + 3y + 10z = 22.$$



18. Using Runge-Kutta 2<sup>nd</sup> order find  $y(0.2)$  for the equation

$$\frac{dy}{dx} = \frac{y-x}{y+x}; y(0) = 1 \text{ by taking } h = 0.2.$$

19. Find  $y$ , at  $x = 0.1$  correct to 4 decimal places given  $\frac{dy}{dx} = x - y^2; y(0) = 1$ .  
Apply Taylor's series method upto fourth degree term.

20. a) A diet for a sick person must contain atleast 4000 units of Vitamins, 50 units of minerals and 1400 calories. Two foods A and B available at a cost of Rs. 5 and Rs. 4 per unit respectively. If one unit of A contains 200 units of Vitamin, 1 unit of mineral and 40 calories and one unit of food B contains 100 units of Vitamins, 2 units of minerals and 40 calories. Formulate the LPP (minimum).

b) Solve using Graphical method :

$$\text{Max } Z = 50x + 100y$$

$$\text{Subject to constraints } 10x + 5y \leq 2500$$

$$4x + 10y \leq 2000$$

$$\text{and } x, y \geq 0.$$

21. Solve by simplex method :

$$\text{Max } Z = 10x + 5y$$

$$\text{Subject to the constraints } 4x + 5y \leq 100$$

$$5x + 2y \leq 80$$

$$x, y, \geq 0.$$



## SECTION - D

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

22. a) Find a real root of the equation  $x^3 - 5x + 1 = 0$  lies in the interval (0, 1).  
Perform four iterations only by Secant method.

b) Develop the divided difference table from the given data. Write down the interpolation polynomial.

<b>x</b>	0	1	3	2	5
<b>f(x)</b>	2	1	5	6	-183

23. a) Evaluate  $\int_0^3 \frac{dx}{(1+x)^2}$  by Simpson's  $\frac{3}{8}$ <sup>th</sup> rule by taking  $h = 1$ .

b) Maximize by Simplex method :

$$\text{Max } Z = x_1 - x_2 + 3x_3$$

Subject to the constraints

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

$$2x_1 - x_3 \leq 2$$

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

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