B.A. /B.Sc. Part-III (General) Examination, 2020 (1+1+1)

Subject: Mathematics

Paper: IV

(Linear Programming, Numerical Analysis, Computer Programming)

Time: 2 Hours Full Marks: 50

The figures in the margin indicate full marks.
Candidates are required to write their answers in their own words as far as practicable.
[Notation and Symbols have their usual meaning]

1. Answer any four questions from the following: 4 × 5 = 20

(a) Show that the set of all feasible solutions of a linear programming problem is a convex set. 5

(b) Solve the system of linear equations by Gaussian elimination method

$3x+2y+z=10,\ 2x+3y+2z=14,\ x+2y+3z=14$ 5

(c) Write a program in C to find the L.C.M. of two given positive integers. 5

(d) Distinguish between 'if-else' statement and 'else if' statement in C. 5

(e) Solve the following assignment problem. 5

	a	b	c	d
1	18	26	17	11
2	13	28	14	26
3	38	19	18	15
4	19	26	24	10

(f) (i) Prove that $\Delta \log f(x) = \log\left\{1 + \frac{\Delta f(x)}{f(x)}\right\}$.

(ii) Find the relation between forward difference operator Δ and shift operator E 3+2

2. Answer any three questions from the following: 3 × 10 = 30

(a) (i) Discuss the Gauss – Seidel method for the solution of system of linear equations. State the condition of convergence for this method.

(ii) Obtain the Lagrange's interpolation formula. (5+1)+4

(b) Use Big-M method to solve the following LPP:

Maximize z = 3 x_1 - x_2

subject to 2 x_1+x_2≥ 2, x_1+ 3 x_2≤ 3, x_2≤ 4 and x_1, x_2≥ 0 10

(c) (i) Write a program in C to find the roots of a quadratic equation with real coefficients.

(ii) Find the binary equivalent of $(8)_{10}$ and $(12.5)_{10}$ and hence obtain the addition, subtraction and multiplication of these two numbers in binary form. 5+5

(d) Describe the Trapezoidal method for numerical integration. Find the error of this formula. Compute the integral $\int_0^2 x^3$ dx using Trapezoidal rule by taking n=5. 4+2+4

(e) (i) If a transportation problem has *m* origin and *n* destinations $(m, n \geq 2)$, then prove that the number of basic variables in that transportation problem is at most (m+n-1).

(ii) When is 'do while loop' used in C ? Write down its working principle. Mention the difference between 'break' and 'continue' statements with examples. 4+(1+2+3)