GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Basic Sciences

Bachelor of Science Honours in Mathematics
Semester End Examination - May 2024

Duration : 180 Minutes
Max Marks : 100

Sem VI - C1UC602B - Numerical Analysis and Operation Research

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Explain the geometrical interpretation of Regula-Falsi method. K1 (3)

2) Solve the following transportation problem to maximize profit using Least Cost Method: K2 (4)

	D1	D2	D3	D4	Supply
S1	3	7	6	4	5
S2	2	4	3	2	2
S3	4	3	8	5	3
Demand	3	3	2	2	

3) Find the solution of the system of equations: K2 (6)
$28x+4y-z=32$, $x+3y+10z=24$, $2x+17y+4z=35$
Perform 3 iterations, using the Gauss-Seidel iteration method.

4) Find the cubic polynomial which takes the following values: K3 (6)

X	0	1	2	3
f(x)	1	2	1	10

Hence evaluate f(4).

5) Solve the following transportation problem to maximize profit using Vogels Approximation method: K3 (6)

	D1	D2	D3	D4	Supply
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

6) Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows: K3 (9)

Jobs					
Person	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

7) Solve the following assignment problem to find the maximum total expected sale: K3 (9)

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

8) Solve the following LPP problem using simplex method: K4 (8)

$$Max\ Z = 100x_1 + 90x_2 + 28x_3$$
$$Subject\ to\ constraints : 50x_1 + 45x_2 + 42x_3 \leq 1000; x_1 \leq 6; 0 \leq x_1; 0 \leq x_2; 0 \leq x_3.$$

9) A firm can produce three types of cloth, say: A, B, and C. Three kinds of wool are required for it, say red wool, green wool and blue wool. One unit length of type A cloth needs 2 yards of red wool and 3 yards of blue wool; on unit length of type B cloth needs 3 yards of red wool, 2 yards of green wool and 2 yards of blue wool and one unit length of type C cloth needs 5 yards of green wool and 4 yards of blue wool. The firm has only a stock of 8 yards of red wool, 10 yards of green wool and 15 yards of blue wool. It is assumed that the income obtained from the one unit length of type A cloth is Rs. 3, of type B cloth is Rs. 5 and of type C cloth is Rs. 4. Formulate this problem as a linear programming model to maximize the income from the finished cloth and solve it by simplex method. K4 (12)

10) A resourceful home decorator manufactures two types of lamps say A and B. Both lamps go through technicians, first a cutter, second a finisher. Lamp A requires 2 hours of the cutter's time and 1 hours of finisher's time. Lamp B requires 1 hour of cutter's and 2 hours of finisher's time. The cutter has 104 hours and finisher's has 76 hours of time available each month. Profit of the lamp A is Rs. 6 and on the Lamp B is Rs. 11. Assuming that he can sell all that he produces, how many of each type of lamps should he manufacture per month to obtain the best returns. Solve it by graphical method. K5 (10)

11) In the table below, the values of y are consecutive terms of a series of which -0.540 is the 6th term. Find the first and tenth terms of the series: K5 (15)

X	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6
Y	1.590	1.392	0.954	0.324	-0.540	-1.320	-2.238	-3.156

OR

In the table below, the values of y are consecutive terms of a series of which 23.6 is the 5th term. Find the first and ninth terms of the series: K5 (15)

x	3	4	5	6	7	8	9
Y	4.8	8.4	14.5	23.6	36.2	52.8	73.9

12) Solve the following LPP using Big-M method: K6 (12)

$Max\ z = 5x_1 + 8x_2$

$Subject\ to\ constraints : 3x_1 + 2x_2 \geq 3;\ x_1 + 4x_2 \geq 4; x_1 + x_2 \leq 5;\ x_1\ and\ x_2 \geq 0.$

OR

Solve the following LPP using Big-M method: K6 (12)

$Max\ z = 5x_1 - 2x_2 + 3x_3$

$Subject\ to\ constraints : 2x_1 + 2x_2 - x_3 \geq 2; 3x_1 - 4x_2 \leq 3; x_2 + 3x_3 \leq 5; x_1, x_2\ and\ x_3 \geq 0.$