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SECOND SEMESTER (CUFYUGP) DEGREE EXAMINATION, APRIL 2025

BCA

BCA2CJ103 / BCA2MN102 - Numerical Analysis and Optimization Techniques

2024 Admission onwards

Maximum Time : 2 Hours | **Maximum Marks :70**

Section A

All Questions can be answered. Each Question carries 3 marks (Ceiling : 24 Marks)

1	State Simpson's (1/3)rd rule.
2	State the formula for bisection method
3	Write Newton Raphson formula.
4	Write the equation of Lagrange's interpolating polynomial through (x_0, y_0) and (x_1, y_1)
5	Using Trapezoidal rule find $\int_0^2 x^2\, dx$
6	Write Simpson's Three- Eighths Rule formula.
7	What are the functions of O.R?
8	What are unbalanced transportation problems?
9	What are slack and surplus variables?
10	Write short notes on LCM.

Section B

All Questions can be answered. Each Question carries 6 marks (Ceiling : 36 Marks)

11	Given $f(2) = 5, f(2.5) = 6$. Evaluate $f(2.2)$ using Lagrange's method
12	Use Newton-Raphson method to find a root of the equation $x^3 - 2x - 5 = 0$
13	Using Newton's forward interpolation formula find the cubic polynomial for the data X : 0 1 2 3 Y : 1 2 1 10
14	Find the approximate value of $\int_0^1 \frac{1}{1+x}\, dx$ using Trapezoidal rule
15	AB Ltd manufactures two products A and B. To manufacture one unit of A, two units of material X and 4 units of material Y are required. To manufacture one unit of B, three units of X and two units of Y is required. As the raw material X is in short supply, not more than 16 units of X can be used. At least 16 units of material Y must be used in order to meet

	committed sales of A and B. Cost per unit of material X and Y are Rs. 2.5 and Rs. 25 respectively. You are required to formulate mathematical model
16	Solve the linear programming problem graphically $$Max\ z = 4x_1 + 3x_2$$ Subject to the constraints $$2x_1 + x_2 \leq 1000$$ $$x_1 + x_2 \leq 800$$ $$x_1 \leq 400, x_2 \leq 700$$ $$x_1 \geq 0, x_2 \geq 0$$
17	Distinguish between Assignment problem and Transportation problem.
18	Find the initial solution of the following Transportation problem using Vogel's Approximation method

	D_1	D_2	D_3	D_4	Supply
O_1	190	300	500	100	70
O_2	700	300	400	600	90
O_3	400	100	600	200	180
Demand	50	80	70	140	

Section C

Answer any ONE .Each Question carries 10 marks (1x10=10 Marks)

19	Use the simplex method to solve LPP $$Max\ z = 3x_1 + 2x_2$$ Subject to the constraints : $$x_1 + x_2 \leq 4$$ $$x_1 - x_2 \leq 2$$ $$x_1\ , x_2 \geq 0$$
20	Solve the following assignment problem for minimizing cost

	I	II	III	IV
A	32	26	35	38
B	27	24	26	32
C	28	22	25	34
D	10	10	16	16