

QP Code: D 123075		Total Pages: 2		Name:											
				Register No.											
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 <table border="0"> <tr> <td>X :</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>Y :</td> <td>1</td> <td>2</td> <td>1</td> <td>10</td> </tr> </table>					X :	0	1	2	3	Y :	1	2	1	10
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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 <table><tr><td></td><td>D_1</td><td>D_2</td><td>D_3</td><td>D_4</td><td>Supply</td></tr><tr><td>O_1</td><td>190</td><td>300</td><td>500</td><td>100</td><td>70</td></tr><tr><td>O_2</td><td>700</td><td>300</td><td>400</td><td>600</td><td>90</td></tr><tr><td>O_3</td><td>400</td><td>100</td><td>600</td><td>200</td><td>180</td></tr><tr><td>Demand</td><td>50</td><td>80</td><td>70</td><td>140</td><td></td></tr></table>		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	
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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 <table><tr><td></td><td>I</td><td>II</td><td>III</td><td>IV</td></tr><tr><td>A</td><td>32</td><td>26</td><td>35</td><td>38</td></tr><tr><td>B</td><td>27</td><td>24</td><td>26</td><td>32</td></tr><tr><td>C</td><td>28</td><td>22</td><td>25</td><td>34</td></tr><tr><td>D</td><td>10</td><td>10</td><td>16</td><td>16</td></tr></table>		I	II	III	IV	A	32	26	35	38	B	27	24	26	32	C	28	22	25	34	D	10	10	16	16					
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