

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 style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">X :</td> <td style="padding-right: 20px;">0</td> <td style="padding-right: 20px;">1</td> <td style="padding-right: 20px;">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	<p>Solve the linear programming problem graphically</p> $\text{Max } z = 4x_1 + 3x_2$ <p>Subject to the constraints</p> $2x_1 + x_2 \leq 1000$ $x_1 + x_2 \leq 800$ $x_1 \leq 400, x_2 \leq 700$ $x_1 \geq 0, x_2 \geq 0$																														
17	Distinguish between Assignment problem and Transportation problem.																														
18	<p>Find the initial solution of the following Transportation problem using Vogel's Approximation method</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>D_1</th> <th>D_2</th> <th>D_3</th> <th>D_4</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <th>O_1</th> <td>190</td> <td>300</td> <td>500</td> <td>100</td> <td>70</td> </tr> <tr> <th>O_2</th> <td>700</td> <td>300</td> <td>400</td> <td>600</td> <td>90</td> </tr> <tr> <th>O_3</th> <td>400</td> <td>100</td> <td>600</td> <td>200</td> <td>180</td> </tr> <tr> <th>Demand</th> <td>50</td> <td>80</td> <td>70</td> <td>140</td> <td></td> </tr> </tbody> </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	<p>Use the simplex method to solve LPP</p> $\text{Max } z = 3x_1 + 2x_2$ <p>Subject to the constraints :</p> $x_1 + x_2 \leq 4$ $x_1 - x_2 \leq 2$ $x_1, x_2 \geq 0$																														
20	<p>Solve the following assignment problem for minimizing cost</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>I</th> <th>II</th> <th>III</th> <th>IV</th> </tr> </thead> <tbody> <tr> <th>A</th> <td>32</td> <td>26</td> <td>35</td> <td>38</td> </tr> <tr> <th>B</th> <td>27</td> <td>24</td> <td>26</td> <td>32</td> </tr> <tr> <th>C</th> <td>28</td> <td>22</td> <td>25</td> <td>34</td> </tr> <tr> <th>D</th> <td>10</td> <td>10</td> <td>16</td> <td>16</td> </tr> </tbody> </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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