


 B.Tech - Odd Sem : End Semester Exam  
Academic Year:2020-2021

**19CS2104A - MATHEMATICAL PROGRAMMING-I**

Set No: 4

Time:		Max.Marks: 100																																						
S.NO	Answer All Questions	Choice	Options	Marks	CO																																			
1.	A shop has asked a manufacturer to supply pants and shirts. For materials, the manufacturer has 750 m <sup>2</sup> of cotton textile and 1,000 m <sup>2</sup> of polyester. Every pair of pants (1 unit) wishes 1 m <sup>2</sup> of cotton and 2 m <sup>2</sup> of polyester. Every shirt needs 1.5 m <sup>2</sup> of cotton and 1 m <sup>2</sup> of polyester. The charge of the pants is fixed at 50 and the shirt is at 40. How much number of pants and shirts that the producer ought to give to the shops in order that these gadgets achieve a maximum sale? Formulate the hassle the use of mathematical modeling of LPP and define the objective function. Solve the Linear programming graphically?	choice Q-2		10Marks	CO1																																			
2.	A firm chemical; corporation makes two sorts of business solvents, S1 and S2. Each solvent is a mixture of 3 chemicals. Each KL of S1 requires 12 L of chemical A, 9L of chemical B, and 30L of chemical C. Each KL of S2 requires 24L of chemical A, 5L of chemical B, and 30L of chemical C. The profit in keeping with Kl of S1 is \$100, and the profit consistent with Kl of S2 is \$85. The stock of the corporation indicates 480L of chemical A, one hundred eighty L of chemical B and 720 L of chemical C. Assuming the enterprise can promote all of the solvent it makes, discover the range of Kl of every solvent that the organization ought to make to maximize profit. Let X1=the # of KL of S1 and X2= the # of KL of S2. Solve LPP using simplex method.			10Marks	CO1																																			
3.	Solve the following L.P.P. by simplex method. Maximize $z = 2x_1 + 3x_2$ subject to $-x_1 + 2x_2 \leq 4$ , $x_1 + x_2 \leq 6$ , $x_1 + 3x_2 \leq 9$ , $x_1, x_2$ are unrestricted in sign.	choice Q-4		15Marks	CO1																																			
4.	Minimize $z = 4x_1 + 3x_2$ subject to the constraints : $2x_1 + x_2 \geq 10$ , $-3x_1 + 2x_2 \leq 6$ , $x_1 + x_2 \geq 6$ , $x_1 \geq 0$ and $x_2 \geq 0$ . Solve using BigM method and check whether optimized feasible solution is attained or not?			15Marks	CO1																																			
5.	Solve using Dual Simplex method Min $z = 2x_1 + x_2$ Subject to: $3x_1 + x_2 \geq 3$ , $4x_1 + 3x_2 \geq 6$ , $x_1 + 2x_2 \leq 3$ , $x_1 \geq 0$	choice Q-6		10Marks	CO2																																			
6.	Elaborate on the concept of sensitivity analysis by giving some examples on it.			10Marks	CO2																																			
7.	Use two-phase simplex method to solve the L.P.P. Minimize $z = 4x_1 + x_2$ subject to $x_1 + 2x_2 \leq 3$ , $4x_1 + 3x_2 \geq 6$ , $3x_1 + x_2 = 3$ , $x_1, x_2 \geq 0$ .	choice Q-8		15Marks	CO2																																			
8.	A manufacturer of food makes two secret elements that is going into their food, coded as ABC and XYZ. Each kg of ABC incorporates 300 g of vitamins, 400 g of protein, and 100 g of carbohydrate. Each kg of XYZ contains 100 g of vitamins, 300 g of protein, and 200 g of carbohydrate. Minimum nutritional tips require that a combination made from these elements contain at least 900 g of vitamins, 2200 g of protein, and 800 g of carbohydrate. ABC costs Rs2.00 per kg to produce and XYZ costs Rs1.25 per kg to produce. Find the number of kgs of each element that ought to be produced in order to minimize cost. {suppose X1=the # of kg ABC, and X2=the # of kg of XYZ}. Solve the problem graphically. Solve LPP by using Dual method using python.			15Marks	CO2																																			
9.	Give the mathematical formulation and write an algorithm for an assignment problem in Hungarian method.	choice Q-10		10Marks	CO3																																			
10.	Write short notes on the following a)Degeneracy, b)Alternative optima, c)Unbounded solutions and d)Non-existing (or infeasible) solutions			10Marks	CO3																																			
11.	A cement factory manager is considering the most economical schedule to transport cement from his three manufacturing centers Hyderabad, Bangalore and Chennai to depots Guntur, Vijayawada, Vuyyuru, Tenali and Kakinada. The weekly production and demand along with the transportation cost per ton are given below. a)Solve, using the Matrix minimum method to find an initial feasible solution(Refer Solution of Question Number:3) b) Write the algorithm and python code to find optimal solution for the above problem.	choice Q-12		15Marks	CO3																																			
	<table border="1"> <thead> <tr> <th>Centers/Depots</th> <th>Guntur</th> <th>Vijayawad</th> <th>Vuyyuru</th> <th>Tenali</th> <th>Kakinada</th> <th>SUPPLY</th> </tr> </thead> <tbody> <tr> <td>Hyderabad</td> <td>4</td> <td>1</td> <td>3</td> <td>4</td> <td>4</td> <td>60</td> </tr> <tr> <td>Bangalore</td> <td>2</td> <td>3</td> <td>2</td> <td>2</td> <td>3</td> <td>35</td> </tr> <tr> <td>Chennai</td> <td>3</td> <td>3</td> <td>2</td> <td>4</td> <td>4</td> <td>40</td> </tr> <tr> <td>Demand</td> <td>22</td> <td>45</td> <td>20</td> <td>18</td> <td>30</td> <td></td> </tr> </tbody> </table>	Centers/Depots	Guntur	Vijayawad	Vuyyuru	Tenali	Kakinada	SUPPLY	Hyderabad	4	1	3	4	4	60	Bangalore	2	3	2	2	3	35	Chennai	3	3	2	4	4	40	Demand	22	45	20	18	30					
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12.	A city corporation has decided to carry out road repairs on four main arteries of the city. The government has agreed to make a special grant of 50 lakh towards the cost with a condition that the repairs must be done at the lowest cost and quickest time. If conditions warrant, a supplementary token grant will also be considered favorably. The corporation has floated tenders and five contractors have sent in their bids. In order to expedite work, one road will be awarded to only one contractor. a) Find the best way of assigning the repairs to the contractors and the associated cost. b) Which of the five contractors will be unsuccessful in his bid?			15Marks	CO3																																			
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13.	What is integer linear programming? Explain the merits and demerits of 'rounding-off' a continuous optimal solution to an LP problem in order to obtain an integer solution.	choice Q-14		10Marks	CO4																																			
14.	Discuss the advantages and disadvantages of solving integer programming problems by cutting plane method and branch and bound method			10Marks	CO4																																			
15.	Describe dynamic programming with forward and backward induction methods.	choice Q-16		15Marks	CO4																																			

16.	Solve the following by using Branch Bound technique $Maximize z = 2x_1 + 2x_2$ Subject to $5x_1 + 3x_2 \leq 8$ $x_1 + 2x_2 \leq 4$ $x_1, x_2 \geq 0$ <i>are integers</i>			15Marks	CO4
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