School of Business
Backlog Examination, June 2023
[Programme: BBA] [Semester: IV   ] [Batch: All]

Course Title: Operations Research	Max Marks: 100
Course Code: BBAD2013	Time: 3 Hrs.

Instructions:	1. *All questions are compulsory.*
	2. *Assume missing data suitably, if any.*

		K Level	COs	Marks
SECTION-A (15 Marks)		**5 Marks each**		
1.	Differentiate slack variable & surplus variable in Linear Programming Problem	K2	CO1	5
2.	Explain Restricted assignment problem and how it can be resolved	K2	CO3	5
3.	Differentiate CPM and PERT	K2	CO5	5
SECTION-B (40 Marks)		**10 Marks each**		

4.	Solve the LPP with Simplex Algorithm
	Maximize $Z = 10x_1 + 5x_2$
	  Subject to the linear constraints
	    $4x_1 + 5x_2 \leq 100$
	    $5x_1 + 2x_2 \leq 80$ and
	          $X_1, x_2 \geq 0$
		K3	CO2	10

5.

Determine the initial transportation cost by Vogal's Approximation Method

Origins	Destinations			Supply
	D1	**D2**	**D3**	
O1	2	7	4	**5**
O2	3	3	1	**8**
O3	5	4	7	**7**
O4	1	6	2	**14**
Demand	**7**	**9**	**18**	

K3   CO2   10

6.

Evaluate the following pay off and find the strategies of both players. Also calculate value of the game and interpret the result

Player A	Player B				
	B1	**B2**	**B3**	**B4**	**B5**
A1	2	-4	6	-3	5
A2	-3	4	-4	1	0

K5   CO4   10

7.	Illustrate various rules of Principle of Dominance with an appropriate example OR Illustrate the various game theory methods to solve mixed strategy games and pure strategy games	K2	CO4	10

SECTION-C (45 Marks)		**15 Marks each**

8.	A company producing two products A & B. To manufacture a product A, certain machine has to be utilized for 1.5 hrs and a labor time of 2 hrs. To manufacture a product B, the machine has to be utilized for 2.5 hrs and labor time of 1.5 hrs. In a week the factory can avail 80 hrs of machine hrs and 70 hrs of labor time. The profit on each product A is Rs 5/- and that of product B is Rs 4/-. The manager wishes to his maximize the profit by considering all the constraints. Determine the solution of LPP by Graphical Method	K5	CO1	15

9. Analyze the given assignment problem and calculate the optimum assignment and cost

	M1	M2	M3	M4
W1	12	3	6	-
W2	4	11	-	5
W3	8	2	10	9

K4 · CO3 · 15

10. Based on the following information construct the network diagram and select the critical path and total project duration. Also Estimate:

(i)   Total Float
(ii)   Free Float
(iii) Independent float

Activity	Duration(days)	Activity	Duration(days)
1-2	2	4-6	3
1-3	2	5-8	1
1-4	1	6-9	5
2-5	4	7-8	4
3-6	8	7-9	3
3-7	5		

OR

Following table gives the activities in a construction project and other relevant information.

(i)   Draw the network diagram for the project
(ii)   Select the critical path and critical activity
(iii) Estimate the Project duration
(iv)   Estimate the Earliest & Latest time

Activity	Duration (Days)
1-2	20
1-3	25
2-3	10
2-4	12
3-4	6
4-5	10

K5 · CO5 · 15