SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - III
21UCGAT3003 - Operations Research

Total Duration : 2 Hrs 30 Mins. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Quote the scientific features of OR.
2. Solve the following LPP by graphical method:
   Maximize $Z = 2x_1 + 3x_2$
   subject to the constraints
   $x_1 + 3x_2 \leq 3$, $x_1 + 2x_2 \leq 6$, $x_1 \geq 5$, x_1 , $x_2 \geq 0$
3. Find a solution to the Assignment problem with the following data:

	D	**E**	**F**	**G**
A	1	2	3	7
B	11	13	14	16
C	21	2	4	6

4. Prepare a solution to the following transportation problem by Least Cost Method:

	1	**2**	**3**	**4**	**5**	**Availability**
I	50	80	60	60	30	800
II	40	70	70	60	50	600
III	80	40	60	60	40	1100
Requirements	400	400	500	400	800	2500

5. There are 5 jobs, each of which has to go through the machines A and B in the order AB. The processing times (in hours) are given as

Job :	**J1**	**J2**	**J3**	**J4**	**J5**
Machine A :	2	4	5	7	1
Machine B :	3	6	1	4	8

   Determine a sequence of these jobs that will minimize the total elapsed time T. Also obtain: i) the minimum elapsed time; and ii) the idle time for each of the machines.
6. Two player A and B match coins. If the coins match, then A wins two units of value, if the coin does not match, then B win 2 units of value. Determine the optimum strategies for the players and the value of the game.
7. Distinguish between CPM and PERT.
8. Construct a critical path and find the project duration for the following data

Activity	1- 2	1 - 3	1 - 4	2 - 5	3-6	3 -7
Time in weeks	2	2	1	4	8	5
Activity	4-6	5-8	6-9	7-8	8-9	
Time in Weeks	3	1	5	4	3	

Contd...

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Compute the following LPP by Simplex method:
   Maximize $Z = 2x_1 + 3x_2$
   subject to the constraints
   $x_1 + x_2 \leq 4$, $-x_1 + x_2 \leq 1$, $x_1 + 2x_2 \leq 5$, $x_1, x_2 \geq 0$

10. Analyse the optimum solution for the transportation problem.

	D1	**D2**	**D3**	**D4**	**Supply**
S1	3	7	6	4	5
S2	2	4	3	2	2
S3	4	3	8	5	3
Demand	3	3	2	2	

11. A machine shop has five machines A, B, C, D and E. Two jobs must be processed through each of these machines. The time (in hours) taken on each of these machines and the necessary sequence of jobs through the shops are given below:

	Sequence	**A**	**B**	**C**	**D**	**E**
Job 1	Time	2	4	3	6	6
Job 2	Sequence	C	A	D	E	B
	Time	4	6	3	3	6

    Use the graphical method to discriminate the total minimum elapsed time.

12. Solve the following 2x2 game using algebraic method

    Player A

    Player B $\begin{bmatrix} 2 & 5 \\ 7 & 3 \end{bmatrix}$

13. A project consists of eight activities with the following relevant information

Activity	**Immediate Predecessor**	**Estimated Duration(days)**		
		Optimistic	**Most Likely**	**Pessimistic**
A	-	1	1	7
B	-	1	4	7
C	-	2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	3	5	8
G	D,E	3	6	13
H	F,G	1	2	3

    Draw the PERT network and find out the expected project completion time. What duration will have 95% confidence for project completion? If the average duration for activity F increased to 14 days, What will be its effect on the expected project completion time which will have 95% confidence?

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