



THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

MAS 2431

OPERATIONS RESEARCH

Time: 3 Hrs

Marks: 75

Answer any Five questions (5×15=75)

1. Use simplex method to solve the LPP

$$\text{Max } z = 2x_1 + 3x_2$$

$$x_1 + x_2 \leq 4, \quad -x_1 + x_2 \leq 1, \quad x_1 + 2x_2 \leq 5 \quad x_1, x_2 \geq 0.$$

2. Find an initial basic feasible solution to the following transportation problem using the Vogel's Approximation method. Also find the optimum solution.

	D	E	F	G	Available
A	23	27	16	18	30
B	12	17	20	51	40
C	22	28	12	32	53
Requirement	22	35	25	41	

3. Solve the following 2×2 game graphically

$$\begin{matrix} & \text{Player B} \\ \text{Player A} & \begin{pmatrix} 2 & 1 & 0 & -2 \\ 1 & 0 & 3 & 2 \end{pmatrix} \end{matrix}$$

4.

Activity	Predecessor	Duration		
		O	M	P
A	-	5	6	7
B	-	1	3	5
C	-	1	4	7
D	A	1	2	3
E	B	1	2	9
F	C	1	5	9
G	C	2	2	8
H	E,F	4	4	10
I	D	2	5	8
J	H,G	2	2	8

(i) Draw PERT network and find the duration, mean, variance.

(ii) Find the critical path.

- 5.(a) Solve the assignment problem
- | | | | | |
|---|---|---|----|---|
| | A | B | C | D |
| 1 | 1 | 4 | 6 | 3 |
| 2 | 9 | 7 | 10 | 9 |
| 3 | 4 | 5 | 11 | 7 |
| 4 | 8 | 7 | 8 | 5 |
- (b) Solve the assignment problem
- | | | | | |
|---|----|----|----|----|
| | E | F | G | H |
| A | 18 | 26 | 17 | 11 |
| B | 13 | 28 | 14 | 26 |
| C | 38 | 19 | 18 | 15 |
| D | 19 | 26 | 24 | 10 |

6. A small project consists of seven activities for which the relevant data are given below

Activity	Predecessor	Activity Duration
A	-	4
B	-	7
C	-	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

Draw the network and find the project completion time.

- 7.(a) A company has three operational departments (weaving, processing and packing) with capacity to produce three different types of clothes namely suiting's, shirtings and wollens yielding a profit of Rs 2, Rs 4, and Rs 3 per metre respectively. One metre of suiting requires 3 minutes in weaving, 2 minutes in processing and 1 minute in packing. Similarly one metre of shirting requires 4 minutes in weaving, 1 minute in processing and 3 minutes in packing. One metre of wollen requires 3 minutes in each department. In a week, total run time of each department is 60, 40 and 80 hours for weaving, processing and packing respectively. Formulate the linear programming problem.

- (b) Using graphical method solve the LPP $\text{Max } z = 50x_1 + 60x_2$

$$2x_1 + 3x_2 \leq 1500, \quad 3x_1 + 2x_2 \leq 1500, \quad 0 \leq x_1 \leq 400 \quad 0 \leq x_2 \leq 400 \quad x_1, x_2 \geq 0.$$