16. Solve the game graphically.

$$\begin{bmatrix} 1 & 3 & -1 & 4 & 2 & -5 \\ -3 & 5 & 6 & 1 & 2 & 6 \end{bmatrix}$$

PART C — (1 × 20 = 20 marks)

(Compulsory)

17. The activities of a project with normal and crash time are given below :

Activity	Normal		Crash	
	Time (Hrs.)	Cost (Rs.)	Time (Hrs.)	Cost (Rs.)
1–2	20	2000	15	3000
1–3	10	1500	7	2400
2–5	15	1000	10	1500
3–4	16	3000	12	4000
3–5	22	4500	16	5700
4–5	14	1500	10	2100

Find the optimum scheduling of the project which minimise the total cost.

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Time : Three hours Maximum : 100 marks

PART A — (5 × 6 = 30 marks)

Answer any FIVE questions.

All questions carry equal marks.

1. State the conditions for an unbounded solution of a LPP.

2. What is the use of MODI method?

3. How do you convert an unbalanced transportation problem into a balanced one?

4. Give an example of first come, last served. Also explain service system.

5. Distinguish between sequencing and scheduling.

6. What is the significance of float in CPU?

7. State the rule of dominance in game theory.

8. Explain the significance of simulation in model building.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

All questions carry equal marks.

9. Egg contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and cost 12 paise per gram. Milk contains 8 units of vitamin A per gram and 12 units of vitamin B per gram, and costs 20 paise per gram. The daily minimum requirement of vitamin A and vitamin B are 100 units and 120 units respectively. Find the optimal product mix.

10. Solve :

Max. $z = 5x_1 - 2x_2 + 3x_3$

Subject to $2x_1 + 2x_2 - x_3 \geq 2$

$3x_1 - 4x_2 \leq 3$

$x_2 + 3x_3 \leq 5$

$x_1, x_2, x_3 \geq 0.$

11. Solve the transportation problem

Source	Demand point 1	2	3	4	Supply
1	2	3	11	7	6
2	1	0	6	1	1
3	5	8	15	9	10
Demand	7	5	3	2	

12. Solve the travelling salesman problem for the given data :

$c_{12} = 20$; $c_{13} = 4$; $c_{14} = 10$; $c_{23} = 5$; $c_{34} = 6$

$c_{25} = 10$; $c_{35} = 6$; $c_{45} = 20$ where $c_{ij} = c_{ji}$ and there is no route between cities i and j if a value for c_{ij} is not shown above.

13. A taxi owner estimates from his past records that the cost per year for operating a taxi whose purchase price when new is Rs. 60,000 are as given :

Age :	1	2	3	4	5
Operating cost (Rs.) :	10,000	12,000	15,000	18,000	20,000

After 5 years, the operating cost is Rs. 6000 K where, K = 6, 7, 8, 9, 10 (K denoting age in years). If the resale value decreases by 10% of purchase price each year, what is the best replacement policy?

14. A company has a demand of 12,000 units/year for an item and it can produce 2000 such items per month. The cost of one set-up is Rs. 400 and the holding cost/unit/month is Rs. 0.15. Find the optimum lot size, maximum inventory and total time.

15. In a public telephone booth the arrivals are on the average 15 per hour. A call on the average takes 3 minutes. If there is a just one phone, find :
    (a) expected number of callers in the booth at any time,
    (b) proportion of the time the booth is expected to be idle?