

FOURTH SEMESTER B.Com. DEGREE EXAMINATION, APRIL 2024
HONOURS
GBCH4B18T: OPERATIONS RESEARCH

Time: 3 Hours

Maximum Marks: 80

PART A: Answer all the questions. Each carries one mark.**Choose the correct answer.**

1. Operations Research uses models to help the management to determine its scientifically.
a) Policies. b) Actions. c) Both A and B. d) None of the above.
2. The linear inequalities or equations or restrictions on the variables of a linear programming problem are called.....
a) A constraint. b) Decision variables.
c) Objective function. d) None of the above.
3. In linear programming, what do we call the equations or inequalities that must be satisfied?
a) Variables. b) Constraints.
c) Solutions. d) Objectives.
4. Objective function of an LP problem is.....
a) A constant. b) A function to be optimized.
c) An inequality. d) A quadratic equation.
5. If $M + N - 1 =$ Number of allocations in transportation, it means .(Where 'M' is number of rows and 'N' is number of columns)
a) There is no degeneracy b) Problem is unbalanced
c) Problem is degenerate d) Solution is optimal

Fill in the Blanks.

6. Maximisation objective function in LPP means
7. In activity 2 – 3, tail event is
8. In CPM, total float =
9. When the total demand is equal to supply then the transportation problem is said to be.....
10. The sequence of possible managerial decisions and their expected outcome under each set of circumstances can be represented and analyzed by using.....

(10 x 1 = 10 Marks)

(PTO)

PART B: Answer any eight questions. Each carries two marks.

11. How are the models classified?
12. Give any two applications of linear programming in industry and management.
13. Define surplus variables.
14. How do we represent activities and events on a network diagram?
15. Differentiate between feasible solution and basic feasible solution.
16. State the difference between the Transportation Problem and Assignment Problem.
17. Describe the unbalanced assignment problem.
18. What do you mean by decision making under uncertainty?
19. List out different criteria of decision making under risk.
20. What is saddle point?

(8 x 2 = 16 Marks)

PART C: Answer any six questions. Each carries four marks.

21. Mention any four advantages of model.
22. Write a note on models by function.
23. A home resourceful decorator manufactures two types of Lamps say A and B. Both lamps go through two technicians first a cutter and second a finisher. Lamp A requires 2 hours of the cutter's time and 1 hour of the finisher's time; Lamp B requires 4 hour of cutter's and 3 hours of finisher's time. The cutter has 104 hours and finisher has 76 hours of available time each month. Profit on the Lamp A is Rs 60 and on one B lamp is Rs 110. Formulate a mathematical model.
24. Solve the following problem using graphical method.

$$\begin{aligned} \text{Min: } Z &= 5x_1 - 7x_2 \\ \text{Subject to } x_1 + x_2 &\leq 2 \\ 5x_1 + 2x_2 &\leq 10 \\ 3x_1 + 8x_2 &\leq 12 \\ x_1, x_2 &\geq 0 \end{aligned}$$

25. Draw the network diagram to the following activities.

Activity (i - j)	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Time duration	2	4	3	1	6	5	7

26. Mean and standard deviation of a project duration are 300 and 100 days respectively. Find the probability for (a) completing the project within 183 days (b) not completing within 183 days.

27. Solve the following transportation problem for minimum cost.

	D1	D2	D3	D4	SUPPLY
O1	15	10	17	18	2
O2	16	13	12	13	6
O3	12	17	20	11	7
DEMAND	3	3	4	5	

28. Write notes on decision tree.

(6 x 4 = 24 Marks)

PART D: Answer any two questions. Each carries fifteen marks.

29. A project schedule has the following characteristics.

Activity (i - j)	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time duration	3	4	2	3	6	4	4	5	6	5	4

- Construct network diagram.
- Compute T_E and T_L for each event.
- Find EST, LST, EFT and LFT values of all activities.
- Find critical path and project duration.

30. Solve the transportation problem using MODI Method.

	A	B	C	Supply
1	2	2	3	10
2	4	1	2	15
3	1	3	1	40
Demand	20	15	30	

31. (a) A firm owner is seriously considering of drilling a farm well. In the past, only 70% of wells drilled were successful at 200 feet of depth in the area. More over on finding no water at 200 feet, some persons drilled it further up to 200 feet but only 20% struck water at 250 ft. The prevailing cost of drilling is Rs 50 per foot. The farm owner has estimated that in case he does not get his own wells he will have to pay Rs.15,000 over the next 10 year, in PV term, to buy water from the neighbour. The following decisions can be optimal.

i) Do not drill any well ii) drill up to 200ft iii) if no water is found at 200ft, drill further up to 250 feet.

Draw an appropriate decision tree and determine the farm owner's strategy under EMV approach.

(b) What is decision tree? List out and explain different nodes in decision tree with example.

(2 x 15 = 30 Marks)