D4BHC2304 (PAGES 3) **Reg. No.....**

Name: .....

FOURTH SEMESTER UG DEGREE EXAMINATION, APRIL 2025
(Regular/Improvement/Supplementary)
B.COM. 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. The optimal value of the objective function is attained at the points:
   (a) Given by intersection of lines representing inequations with axes only.
   (b) Given by intersection of lines representing inequations with X-axis only.
   (c) Given by corner points of the feasible region.
   (d) At the origin.
2. When Minimax and Maximin criteria matches, then:
   (a) A fair game exists. (b) Unfair game exists.
   (c) Mixed strategy exists. (d) Saddle point exists.
3. When the total of allocations of a transportation problem match with supply and demand values, the solution is called _____ solution.
   (a) non-degenerate (b) degenerate
   (c) feasible (d) infeasible
4. Essential characteristics of a decision model are:
   (a) States of nature (b) Decision alternatives
   (c) Payoff (d) All of these
5. Game theory models are classified by the:
   (a) Number of players (b) Sum of all payoffs
   (c) Number of strategies (d) All of these

Fill in the blanks.

6. A situation in which a decision maker knows all of the possible outcomes of a decision and also knows the probability associated with each outcome is referred to as ____.
7. A saddle point exists when _____value = _____value.
8. For finding an optimum solution in transportation problem _____ method is used.
9. In a project network diagram, an activity is represented by _____.
10. The first step in solving Operations Research problem is _____.

(10 x 1 = 10 Marks)

(PTO)

SECTION B: Answer any *eight* questions. Each carries *two* marks.

11. Give any two uses of network techniques.
12. State the maximin value.
13. Define the pessimistic time estimate.
14. Give the mathematical formulation of a transportation problem.
15. State the maximization in assignment problem.
16. Why is game theory used?
17. Define an assignment Problem.
18. List out different criteria of decision making under uncertainty.
19. Define Laplace Criterion.
20. Mention any two limitations of Queuing theory.

(8 x 2 = 16 Marks)

Part C: Answer any *six* questions. Each carries *four* marks.

21. Explain the different components of decision problem.
22. Mean and standard deviation of a project duration are 300 and 100 days respectively. Within how many days would you expect to complete the project for which chance is:
    (a) 87.9 % (b) 12.1%.
23. Draw the network diagram to the following activities.

Activity	Preceding activities
A	--
B	A
C	--
D	C
E	C
F	C
G	B, D
H	F
I	E
J	G, H, I

24. Differentiate between transportation and assignment problem.
25. Explain the meaning and origin of operations research with the help of definitions and examples.
26. List out the characteristics of a model.
27. Explain the different criteria of decision making under uncertainty.

28. Given the payoff table:

	S1	**S2**	**S3**
N1	6000	4000	-500
N2	5000	2000	1500
N3	400	1000	3000

Use the Hurwicz decision criterion with α = 0.7 to find optimal decision.

(6 x 4 = 24 Marks)

Part D: Answer any *two* questions. Each carries *fifteen* marks.

29. Solve the following problem using simplex method

$$\text{Max: } Z = 5x_1 + 3x_2$$
$$\text{Subject to } x_1 + x_2 \leq 2$$
$$5x_1 + 2x_2 \leq 10$$
$$3x_1 + 8x_2 \leq 12$$
$$x_1 , \ x_2 \geq 0$$

30. Assuming that the expected time are normally distributed, find the critical path and project duration.

	Days		
Activity (i - j)	t_0	t_m	t_p
1 – 2	2	6	15
1 – 6	2	5	14
2 – 3	6	12	30
2 – 4	2	5	8
3 – 5	5	11	17
4 – 5	3	6	15
6 – 7	3	9	27
5 – 8	1	4	7
7 – 8	4	19	28

31. a) Solve the assignment problem:

Men/Job	A	B	C	D
1	7	5	8	4
2	5	6	7	4
3	8	7	9	8

b) Write down the steps involved in solving Assignment problem using Hungarian method.

(2 x 15 = 30 Marks)