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Question Bank

Subject- BTCVE605B Operation Research

1. Define optimization. State the necessary and sufficient conditions for the minimum or maximum of an unconstrained function of several variables.
2. Write the general form of optimization model.
3. Define operation research. Write the necessary and sufficient conditions for the relative maximum of a function of a single variable.
4. Summarize the general procedure used to formulate and solve operation research.
5. Explain the classification of optimization problems.
6. Explain the applications of optimization in civil engineering.
7. Explain use of operation research in Civil Engineering.
8. Explain basic components of an optimization problem.
9. Write the standard format of operation research.
10. Discuss the origin and development of OR and What are the limitations of OR?
11. What is the role of decision making in OR. Explain its scope.
12. What are the main characteristics of OR? Explain with suitable examples.
13. Write the advantages and disadvantages of Operation Research.
14. Trace the history of Operations Research.
15. Discuss the various steps used in solving Operations Research problems.
16. What is linear programming?

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17. Write the steps involved in solving LPP Using Graphical method? And also write the applications of Operations Research.

18. A Manufacturer produces two types of models M1 and M2. Each model of the type M1 requires 4 hours of grinding and 2 hours of polishing, whereas each model of the type M2 requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works 40 hours a week and each polisher works for 60 hours a week. Profit on M1 model is Rs. 3.00 and on model M2 is Rs.4.00. whatever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the two types of models, so that he may make the maximum profit in a week? Write a suitable LPP for the above question.

19. A small manufacturer employs 5 skilled men and 10 semi skilled men and makes an article in two qualities, a deluxe model and an ordinary model the making of deluxe model requires 2 hours work by a skilled man and 2 hours work by a semi-skilled man. The ordinary model requires 1 hour work by a skilled man and 3 hour work by a semi-skilled man. By union rules no

man can work more than 8 hours per day. The manufacturer's clear profit of the deluxe model is Rs.10 and of ordinary model Rs.8.Formulate the model of the problem.

20. Old hens can be bought for Rs.2 each but young one cost Rs.5 each. The old hens lay 3 eggs per week, and young one 5 eggs per week, each egg being worth 30 paise. A hen cost Re.1 per week to feed. If a person has only Rs.80 to spend on hens, how many of each kind should he buy to get a profit of more than Rs.6 per week assuming that he can't house more than 20 hens?

21. A firm can produce three types of clothes say, A, B and C. Three kinds of wool are required for it say, red, green and blue. One unit length of type A cloth needs 2 yard of red wool and 3 yards of blue; one unit length of type B cloth needs 3 yards of red wool, 2yards of green and 2 yards of blue; and one unit length of type C needs 5 yards of green and 4 yards of blue wool. The firm has a stock of only 8 yards of red wool, 10 of green15 of blue. It is assumed that the income obtained from one unit length of type A is Rs.3,of type B cloth is Rs.5 and of type C cloth is Rs.4. Formulate LPP.

22. A company produces two types of Hats. Each hat of the first type requires twice as much labour time as the second type. If all hats are of the second type only, the company can produce a total of 500 hats a day. The market limits daily sales of the first and second type to 150 and 250 hats. Assuming that the profits per hat are Ra. & for type A and Rx. 5 for type B. formulate the problem as a linear programming model in order to determine the number of hats to be produced of cock type's as to maximize the profit.

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23. A Manufacturer produces two types of models M1 and M2. Each model of the type M1 requires 4 hours of grinding and 2 hours of polishing, whereas each model of the type M2 requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works 40 hours a week and each polisher works for 60 hours a week. Profit on M1 model is Rs. 3.00 and on model M2 is Rs.4.00. whatever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the two types of models, so that he may make the maximum profit in a week? Write a suitable LPP for the above question.

24. A person requires at least 10 and 12 units of chemicals A and B respectively, for his garden. A liquid product contains 5 and 2 units of A and B respectively per bottle. A dry product contains 1 and 4 units of A and B respectively per box. The liquid products are sold for Rs. 30 per bottle, dry products are sold for Rs. 40 per box. How many of each should be purchased in order to minimize the cost and meet the requirements? Formulate the L.P.P.

25. Use Graphical method to solve the following LP problem

Maximize $Z= 15x_1+10x_2$

Subject to the constraints:

$4x_1 + 6x_2 \leq 360$

$3x_1 + 0x_2 \leq 180$

$0x_1 + 5x_2 \leq 200;$

$x_1, x_2 \geq 0$

26. Use Graphical method to solve the following LP problem

Minimize $Z = 3x_1 + 2x_2$.
Subject to $5x_1 + x_2 \geq 10$
$x_1 + x_2 \geq 6$
$x_1 + 4x_2 \geq 12$
$X_1, x_2 \geq 0$

27. Use Graphical method to solve the following LP problem
Minimize $Z= 20x_1+10x_2$
Subject to the constraints:
$x_1 + 2x_2 \leq 40$
$3x_1 + x_2 \geq 30$
$4x_1 + 3x_2 \geq 60$;
$x_1, x_2 \geq 0$
28. Use Graphical method to solve the following LP problem
Minimize $Z=3x_1+2x_2$.
Subject to
$8x_1 + x_2 \geq 8$
$2x_1+x_2 \geq 6$
$x_1+3x_2 \geq 6$
$x_1+6x_2 \geq 8$
$x_1, x_2 \geq 0$

29. Use Graphical method to solve the following LP problem
Maximize $Z= 5x_1+3x_2$
Subject to the constraints: $3x_1+5x_2 \leq 15$
$5x_1+2x_2 \leq 10$
;
$x_1, x_2 \geq 0$

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30. Solve the following LP problem by graphical method:
Maximize $Z= 2x_1+3x_2$
Subject to the constraints: $x_1+x_2 \leq 1$
$3x_1+x_2 \leq 4$
;
$x_1, x_2 \geq 0$

31. Use simplex method to solve the following problem:

Maximize $Z=3x_1+2x_2+5x_3$

Subjected to: $x_1+x_2+x_3\leq 9$

$2x_1+3x_2+5x_3\leq 30$

$2x_1-x_2-x_3\leq 8$

$x_1, x_2, x_3\geq 0$

32. Use simplex method to solve the following problem:

Maximize $Z=2x_1+4x_2+x_3+x_4$

Subjected to: $x_1+3x_2+x_4\leq 4$

$2x_1+x_2\leq 3$

$x_4+x_2+4x_3\leq 3$

$x_1, x_2, x_3, x_4\geq 0$

33. Use simplex method to solve the following problem:

Maximize $Z=2x_1+3x_2+x_3+7x_4$

Subjected to: $8x_1+3x_2+4x_3+x_4\leq 6$

$2x_1+6x_2+x_3+5x_4\leq 3$

$x_1+4x_2+5x_3+2x_4\leq 7$

$x_1, x_2, x_3, x_4\geq 0$

34. Use simplex method to solve the following problem:

Maximize $Z=6x_1+7x_2+9x_3$

Subjected to: $3x_1+7x_2+6x_3\leq 245$

$25x_1+8x_2+9x_3\leq 424$

$11x_1+6x_2+8x_3\leq 235$

$x_1, x_2, x_3\geq 0$

35. Use simplex method to solve the following LP problem

Maximize $Z= x_1+x_2+3x_3$

Subject to $3x_1+2x_2+x_3\leq 3$

$2x_1+x_2+2x_3\leq 2$

$x_1, x_2, x_3\geq 0$

36. Solve by using simplex method

Maximize $Z= 4x_1+10x_2$

Subject to $2x_1+x_2\leq 10$

$2x_1+5x_2\leq 20$

$2x_1+3x_2\leq 18$

$X_1, x_2\geq 0$

37. Use simplex method to solve the following LP problem

Maximize $Z= 6x_1+8x_2$

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Subject to $x_1+x_2+x_3 \leq 10$
$2x_1+3x_2+x_3 \leq 25$
$x_1+5x_2+x_3 \leq 35$
$x_1, x_2, x_3 \geq 0$

38. Solve the following problem by simplex method
Maximize $Z=3x_1+5x_2+4x_3$
Subjected to: $2x_1+3x_2 \leq 8$
$2x_1+5x_3 \leq 10$
$3x_1+2x_2+4x_3 \leq 15$
$x_1, x_2, x_3 \geq 0$

39. Use simplex method to solve the following LP problem
Minimization $Z=2x_1-3x_2+6x_3$
Subject to $3x_1-x_2+2x_3 \leq 7$
$2x_1+4x_2 \geq -12$
$-4x_1+3x_2+8x_3 \leq 10$
$x_1, x_2, x_3 \geq 0$

40. Use simplex method to solve the following LP problem Minimization $Z=x_1-3x_2+2x_3$
Subject to $3x_1-x_2+3x_3 \leq 7$
$-2x_1+4x_2 \leq 12$
$-4x_1+3x_2+8x_3 \leq 10$
$x_1, x_2, x_3 \geq 0$

41. Convert the prime to its dual
Maximize $Z= 60x_1+30x_2+20x_3$
Subject to $8x_1+6x_2+x_3 \leq 48$
$4x_1+2x_2+1.5x_3 \leq 20$
$2x_1+1.5x_2+0.5x_3 \leq 8$
$x_1, x_2, x_3 \geq 0$

42. Find the dual of the following LPP.
Max $Z=X_1+2X_2+X_3$
Subject to Constraints,
$2X_1+X_2-X_3 \leq 2$
$-2X_1+X_2-5X_3 \geq -6$
$4X_1+X_2+X_3 \leq 6$
Where, $X_1, X_2, X_3 \geq 0$

43. Obtain the dual of the following primal problem
Minimize $z=3x_1-2x_2+ x_3$

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Subject to: $2x_1-3x_2+ x_3 \leq 5$

$4x_1-2x_2 \geq 9$

$-8x_1+4x_2+3x_3=8$

$x_1, x_2, x_3 \geq 0$, x_3 is unrestricted.

44. Convert the prime to its dual

Minimize $z=15x_1+12x_2$

Subject to:

$x_1+2x_2 \geq 3$

$2x_1-4x_2 \leq 5$

$x_1, x_2 \geq 0$

45. Construct the duality of following LLP: Maximize $z=8x_1+10x_2$

Subject to: $5x_1+3x_2 \geq 120$

$x_1-3x_2 \geq 30$

$x_1, x_2 \geq 0$

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46. Consider the problem of assigning five operators to five machines. The assignment costs are given below.

Machines	Operators				
	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	3	6
C	10	7	2	2	2
D	5	11	9	7	12
E	7	9	10	4	12

Assign the operators to different machines so that total cost is minimized.

47. Solve the following assignment problem. The matrix entries are processing times in hours.

Machines	Operators				
	1	2	3	4	5
1	20	22	35	22	18
2	4	26	24	24	7
3	23	14	17	19	19
4	17	15	16	18	15
5	16	19	21	19	25

48. A project work consist of four jobs for which four contractors have submitted tenders. Find the assignment which minimizes the total cost of the project when each contractor is to be assigned one job.

Contractors	J ob			
	1	2	3	4
1	10	24	30	15
2	16	22	28	12
3	12	20	32	10
4	9	26	34	16

49. A team of 5 horses and 5 riders has entered a jumping show contest . the number of penalty points to be expected when each riders rides any horse is shown below.

Horse	Rider				
	R_1	R_2	R_3	R4	R5
H_1	5	3	4	7	1
H_2	2	3	7	6	5
H_3	4	1	5	2	4
H_4	6	8	1	2	3
H_5	4	2	5	7	1

How should the horses be allotted to the riders so as to minimize the expected loss of the team?

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50. Find the minimum cost solution for the 5*5 assignment problem whose cost coefficients are as given below.

	1	2	3	4	5
1	-2	-4	-8	-6	-1
2	0	-9	-5	-5	-4
3	-3	-8	-9	-2	-6
4	-4	-3	-1	0	-3
5	-9	-5	-8	-9	-5

51. Solve the following assignment problem

	A	B	C	D	E	F
1	13	13	16	23	19	9
2	11	19	26	16	17	18
3	12	11	4	9	6	10
4	7	15	9	14	147	13
5	9	13	12	8	14	11

52. Solve the following assignment problem so as to minimize the time (in day) required to complete all the task.

Person	task				
	1	2	3	4	5

A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	16

53. An automobile dealer wishes to put four repairmen to four different jobs. The repairmen have somewhat different kinds of skills and they exhibit different levels of efficiency from one job to another. The dealer has estimated the number of manhours that would be required for each job man combination. This is given in the matrix form. Find the optimum assignment that will result in minimum manhours needed.

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

54. A city corporation has decided to carry out road repairs on main four arteries of the city. The government has agreed to make a special grant of Rs 50 lakh towards the cost with a condition that repairs are done at the lowest cost and quickest time. If the conditions warrant, a supplementary token grant will also be considered favourably. The corporation has floated tenders and five contractors have sent in their bids. In order to expedite work, one road will be awarded to only one contractor.

Contractors	Cost of Repairs (Rs in lakh)				
	R1	R2	R3	R4	R5
C1	9	14	19	15	13
C2	7	17	20	19	18
C3	9	18	21	18	17
C4	10	12	18	19	18
C5	10	15	21	16	15

Find the best way of assigning the repair work to the contractors and the costs. If it is necessary to seek supplementary grants, what should be the amount sought?

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55. Find the assignment of salesmen to various districts which will result minimum cost.

Salesmen	Di strict			
	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

56. Four job are to be done on four different machines. Assign the jobs so as to maximize the total profit.

Job	Machine			
	M_1	M_2	M_3	M_4

J_1	15	11	13	15
J_2	17	12	12	13
J_3	14	15	10	14
J_4	16	13	11	17

57. A company has team for 4 salesmen and there are 4 district. Where company wants to start its business. After taking into account the capabilities of salesmen and nature of district company estimates that the profit per day in Rs. For each salesman in each districts is as given below.

Salesmen	Di strict			
	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

Find the assignment of salesmen to various districts which will yield maximum profit.

58. Find the assignment problem to maximum sales

Salesmen	Terr itories			
	1	2	3	4
A	45	38	30	22
B	35	29	20	14
C	35	29	20	14
D	27	20	15	10

59. Find the assignment of mechanics to the job that will result in maximum profit.

mechanics	Job				
	1	2	3	4	5
A	62	78	50	111	82
B	71	84	61	73	59
C	87	92	111	71	81
D	48	64	87	77	80

60. Find the assignment of operator to job that will result in a maximum profit. Which job should be declined.

operator	Job				
	1	2	3	4	5
A	6.2	7.8	5	10.1	8.2
B	7.1	8.4	6.1	7.3	5.9
C	8.7	9.2	11.1	7.1	8.1
D	4.8	6.4	8.7	7.7	8

61. Determine the initial basic feasible solution for the following transportation model.

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To->Form	Delhi	Ahmedabad	Madras	Capacity
A	5	10	2	100
B	3	7	5	25
C	6	8	4	75
Requirement	80	30	90	200

Use Vogel's Approximation Method.

62. Use VAM for IBFS and find an optimal solution for the following transportation matrix.

	W1	W2	W3	W4	Availability
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Requirement	5	8	7	14	

63. Solve by Least Count Method and obtain an optimal solution for the following transportation matrix:

	W1	W2	W3	Availability
F1	50	30	220	1
F2	90	45	170	3
F3	250	200	50	4
Requirement	4	2	2	

64. A firm owns facilities at three places. It has manufacturing plants at three places A, B and C with daily output of 500, 300 and 200 units of an item respectively. It has warehouses at places P, Q, R and S with daily requirements of 180, 150, 350 and 320 units respectively. Per unit shipping charges for different routes are given below.

To	P	Q	R	S
Form A	12	10	12	13
Form B	7	11	8	14
Form C	6	16	11	7

The firm want to sent the outputs form various plants to warehouses involving minimum transportation cost. How should it route the product so as to achieve the objective?

65. Following allocations are made by VAM. Obtain an optimal solution using MODI method.

	Warehouses			
Plant	I	II	III	IV
A	6	35 1	9	35 3
B	5 11	5	50 2	8
C	80 10	12	4	10 7

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66. Solve by Using VAM Method

Origin/Destination	D1	D2	D3	D4	Supply
O1	11	13	17	14	250
O2	16	18	14	10	300
O3	21	24	13	10	400
Demand	200	225	275	250	950

67. Solve using Vogel's Approximation Method and perform optimality Test using MODI method

	D1	D2	D3	D4	Supply
O1	2	3	11	7	6
O2	1	0	6	1	1
O3	5	8	15	9	10
Demand	7	5	3	2	17

68. Determine the initial basic feasible solution using Vogel's approximation method.

	A	B	C	Supply
1	5	4	3	100
2	8	4	3	300
3	9	7	5	300
Demand	300	200	200	

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69. Find the following transportation matrix IBFS by

NWCR Method

LCM Method

Source	Destination				
	A	B	C	D	Supply
1	3	1	7	4	300
2	2	6	5	9	400
3	8	3	3	2	500
Demand	8	3	3	2	

70. Find the following transportation matrix IBFS by

NWCR Method

LCM Method

Source	Destination					Supply
	A	B	C	D	E	
1	5	1	8	7	5	15
2	3	9	6	7	8	25
3	4	2	7	6	5	42
4	7	11	10	4	9	35
Demand	30	20	15	10	20	

71. Determine the initial basic feasible solution using Vogel's approximation method.

Source	Destination					Supply
	A	B	C	D	E	
1	5	1	8	7	5	15
2	3	9	6	7	8	25
3	4	2	7	6	5	42
4	7	11	10	4	9	35
Demand	30	20	15	10	20	

72. Determine the initial basic feasible solution using Vogel's approximation method.

Source	Destination				
	A	B	C	D	Supply
1	3	1	7	4	300
2	2	6	5	9	400
3	8	3	3	2	500
Demand	8	3	3	2	

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73. A company has factories at F_1, F_2 and F_3 which supply warehouses any W_1, W_2 and W_3 weekly factory capacities are 200, 160 and 90 units Resp. weekly warehouses requirement are 180,120,150 units Resp. units shipping costs (in rupees) are as follows:

Factory	W1	W2	W3	Supply
F1	16	20	12	200
F2	14	8	18	160
F3	26	24	16	90
Demand	180	120	150	450

Determine the optimum distribution for this company to minimize the shipping cost.

74. Find the optimum solution by using UV method:

Source	Destination					Supply
	A	B	C	D	E	
1	10	2	3	15	9	35
2	5	10	15	2	4	40
3	15	5	14	7	15	20
4	20	15	13	25	8	30
Demand	20	20	40	10	35	

75. Solve using Vogel's Approximation Method and perform optimality Test using MODI method.

Source	Destination	Supply

	A	B	C	D	E	
1	5	8	6	6	3	800
2	4	7	7	6	6	500
3	8	4	6	6	4	900
Demand	400	400	500	400	800	

76. Define Decision Tree with elements of graphical representation of decision tree.
77. Define Decision making under certainty.
78. Assume you have a lottery ticket with a 45% chance of paying $ 10 and a 55% chance of paying $0. Your friend has a lottery ticket that has a 20% chance of paying $ 25 and an 80% chance of paying nothing and he will trade it with you for your ticket and a dollar. Should you trade? Draw decision tree for EMV for each option.
79. A decision Maker has three alternative plans with two possible states of nature and respective monitory profits (in thousand rupees) mentioned in following matrix.

Alternatives	State o f Nature	
	Favorable	Unfavorable
Purchase water	20	18
Dig well	10	-2
Do nothing	0	0

80. A decision Maker has three alternative plans with two possible states of nature and respective monitory (in rupees) mentioned in following matrix.

Alternatives	State Of Nature	
	Favorable market	Unfavorable Market
Construct Large Plant	200000	-180000
Construct Small Plant	100000	-20000
Do nothing	0	0

Determine the decisions by maximax, maximin And Laplace equally likely approach. What will be the expected value of perfect information?

OR

Prepare a decision tree for the above mentioned decision making problem. Advise a correct decision. (Assume the possible states of nature with equal probability of occurrence.

81. The Investor Mic Risky has just purchased a textile factory and now he is considering three possible decisions:

Expand the factory to produce army uniforms.
Still produce the same cotton textiles (Status Quo), but there are a lot of competitors.
Sell the factory immediately.
In the case of the first and second alternatives the factory will be sold after one year. The profit will depend on the conditions on the market, which are either good (state of nature θ1) or poor (state of nature θ 2). Mic estimates that the probabilities of good and poor market conditions are 0.7 and 0.3 respectively. Payoff table summarizes the

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data for Mic's decision problem. Prepare a decision tree and state the optimal decision.

Action	State of nature	
	Good conditions in the market	Poor condition in the market
Expand	$800000	$500000
Status quo	$1300000	$-150000
Sell	$320000	$320000
Prior Probability	0.7	0.3

82. Mr. Soham has to decide. Whether or not to drill a well on his farm. in this village only 40% of wells drilled where successful at 200ft of dept. some of the farmers who did not get water at 200ft, drilled further up to 250ft but only 20% of sucks water 250 ft. cost of drill is Rs.50 per ft.

Mr. Soham he paid Rs.18000 during a 5 years period in the present value term around he continues to buy the water from the neighbour gathered than go for the well which will would have a live of 5 years Mr. Soham has 3 decision to make:

should be drilled up to 200ft

if no water found at 200ft should be drill will up to 250ft

should he continue buy water from his neighbour.

83. In glass factory specialised in crystal is developing a substantial backlog and a management is considering three courses of action

Arranged for sub-contracts begin overtime production, construct new facilities. 2. the correct choice depends largely upon future demand which market will low medium and high and having probably probability 0.1,0.5,0.4 respectively.

analysis is having effect upon the profit which given in the following table. Draw the decision tree and chose best of state of nature.

alternative	State of nature		
	Low (0.1)	Medium (0.5)	High (0.4)
Sub-contract	10	-20	-150
Over time production	50	60	20
New facility	50	100	200

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84. A company has two options: either invest in a large plant (investment 30 lakhs or in a small plant (outlay 25 lakhs). In the latter option, after year 1, depending on market response it can expand by investing 30 lakhs further. Market survey puts the market response into two categories: good and bad. The chances of good response initially are 0.6 and of bad response are 14. However, if the initial response is good, subsequent response will be good with probability of 19. Similarly, if initial response is bad, subsequent response is likely to be bad with probability f09. The estimated payoffs are given below:

	Small plant		Large plant	
	Good	Bad	Good	Bad
Initial year	15	5	20	5
Subsequent years	60	20	80	20

(Cumulative)				

Advise the company the option it should adopt.

85. The following matrix gives the pay off the different strategy (alternatives) S_1, S_2, S_3 And S_4 against condition (Event) N_1, N_2, N_3 and N_4.

Alternative	Ev ent			
	N_1	N_2	N_3	N_4
S_1	1000	1500	750	0
S_3	250	2000	3750	3000
S_3	-500	1250	3000	4750
S_4	-1250	500	2250	4000

Calculate 1) Laplace Criteria
Optimistic Criteria
Pessimistic Criteria
Minimax Regret Criteria
Hurwitz Criteria

86. The following matrix gives the cost of the different strategy (alternatives) S_1, S_2, S_3 And S_4 against condition (Event) N_1, N_2, N_3 and N_4.

Alternative	Ev ent			
	N_1	N_2	N_3	N_4
S_1	1000	1500	750	0
S_2	250	2000	3750	3000
S_3	-500	1250	3000	4750
S_4	-1250	500	2250	4000

Calculate 1) Laplace Criteria
Optimistic Criteria
Pessimistic Criteria
Minimax Regret Criteria
Hurwitz Criteria

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87. The following matrix gives the pay off the different Course of action (alternatives) S_1, S_2, S_3 against State of nature (Event) N_1, N_2, N_3 .

Course of action	State of nature		
	N_1	N_2	N_3
S_1	65	0	45
S_2	0	55	60
S_3	76	-15	80

Calculate 1) Bayes Criteria
Optimistic Criteria
Pessimistic Criteria
Savage Criteria
Hurwitz Criteria

88. Pay off the three acts A, B and C. the state of nature P, Q and R are given below table.

State of Nature	Acts		
	A	B	C
P	-35	120	-100
Q	250	-350	200
R	550	650	700

The probabilities of state of nature are 0.5, 0.1 and 0.4 Resp. as state which act can be select as the best act.

89. Solve by using EMV analysis. State of nature N_1, N_2, N_3 and N_4. And alternative are given S_1, S_2, S_3 And S_4

Alternative	State of nature			
	N_1	N_2	N_3	N_4
S_1	2	1	4	2
S_2	3	4	2	1
S_3	3	5	4	1
S_4	4	2	1	3
Probability	0.8	0.125	0.05	0.025

90. A newspaper boy has the following probability of selling a magazine number of copies sold.

No. of copies sold	10	11	12	13	14
Probability	0.10	0.15	0.20	0.25	0.30

Cost of copy is 30 paise and sale price is 50 paise he cannot return unsold copies. How many copies should be order also calculate E.V.P.I.

91. Following table gives various strategy its corresponding state of nature assigned the probability select the alternative using E.M.V. analysis.

Alternative	State of nature				
	N_1	N_2	N_3	N_4	N_5
S_1	1500	1500	1500	1500	1500
S_2	-1000	3000	3000	3000	3000
S_3	-3500	500	4500	4500	500
S_4	6000	-2000	2000	6000	6000
S_5	8500	4500	-500	3500	7500
Probability	0.2	0.35	0.25	0.125	0.75

92. National Outdoors School (NOS) is preparing a summer campsite in the heart of Alaska to train individuals in wilderness survival. NOS estimates that attendance can fall into one of four categories: 200, 250, 300, and 350 persons. The cost of the campsite will be the smallest when its sire meets the demand exactly. Deviations above or below the ideal demand levels incur additional costs resulting from constructing more capacity than needed or losing income opportunities when the demand is not met. Letting a_1 to a_4 represent the sizes of the campsites

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(200, 250, 300, and 350 persons) and s_1 to s_4 the level of attendance, the following table summarizes the cost matrix (in thousands of dollars) for the situation:

	S_1	S_2	S_3	S_4
a_1	5	10	18	25
a_2	8	7	12	23
a_3	21	18	12	21
a_4	30	22	19	15

The problem is analysed using all five criteria.

Note: This question bank is only for reference.

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