Online Examinations (Even Sem/Part-I/Part-II Examinations 2020 - 2021

Course Name - –Mathematics-IV
Course Code - GEBS402

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Answer all the questions. Each question carry one mark.

9. 1. A shop can make two types of sweets (A and B). They use two resources – flour and sugar. To make one packet of A, they need 2 kg of flour and 5 kg of sugar. To make one packet of B, they need 3 kg of flour and 3 kg of sugar. They have 25 kg of flour and 28 kg of sugar. These sweets are sold at Rs 800 and 900 per packet respectively. Find the best product mixThe number of decision variables is _____

Mark only one oval.

- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4

10. 2. An investor has Rs 20 lakhs with her and considers three schemes to invest the money for one year.The expected returns are 10%, 12% and 15% for the three schemes per year. The third scheme accepts only up to 10 lakhs. The investor wants to invest more money in scheme 1 than in scheme 2.The investor assesses the risk associated with the three schemes as 0 units, 10 units and 20 units per lakh invested and does not want her risk to exceed 500 units. Which of the following is the correct decision variable

Mark only one oval.

- Amount of money invested in each scheme
- Amount of revenue obtained from each scheme
- Amount of risk through investment in each scheme
- Total amount that can be obtained from the investments

11. 3. A company makes two products (A and B) and both require processing on 2 machines. Product A takes 10 and 15 minutes on the two machines per unit and product B takes 22 and 18 minutes per unit on the two machines. Both the machines are available for 2640 minutes per week. The products are sold for Rs 200 and Rs 175 respectively per unit. Formulate a LP to maximize revenue? The market can take a maximum of 150 units of product .An appropriate objective function for this problem is to

Mark only one oval.

- 1
- 2
- 3
- 4

12. 4. Two tasks have to be completed and require 10 hours and 12 hours of work if one person does the tasks. If n people do task 1, the time to complete the task becomes 10/n and so on. Similarly if n people do task 2, the time becomes 12/n and so on. We have 5 people and they have to be assigned to the two tasks. We cannot assign more than three to task 1. Find the earliest time that both tasks are completed if they start at the same time. (Use ideas from the bicycle problem to write your objective function. At some point you may have to define a variable to represent the reciprocal of another variable). Formulate an LP problem and answer the following:The final objective function is

Mark only one oval.

- ◯ Maximization problem with one term in the objective function
- ◯ Minimization problem with one term in the objective function
- ◯ Maximization problem with two terms in the objective function
- ◯ Minimization problem with two terms in the objective function

13. 5. TV sets are to be transported from three factories to three retail stores. The available quantities are 300, 400 and 500 respectively in the three factories and the requirements are 250, 350 and 500 in the three stores. They are first transported from the factories to warehouses and then sent to the retail stores. There are two warehouses and their capacities are 600 and 700 units. The unit costs of transportation from the factories to warehouses and from the warehouses to retail stores are known. Formulate an LP and answer the following questions: The number of decision variables in the formulation is

Mark only one oval.

- ◯ 8
- ◯ 10
- ◯ 12
- ◯ 18

14. 6. Thousand answer papers have to be totaled in four hours. There are 10 regular teachers, 5 staff and 4 retired teachers who can do the job. Regular teachers can total 20 papers in an hour; staff can do 15 per hour while retired teachers can do 18 per hour. The regular teachers total the papers correctly 98% of the times while this number is 94% and 96% for staff and retired teachers. We have to use the services of at least one staff. You can assume that any person can work for a fraction of an hour also. Formulate a relevant LP problem and answer the following questions. A relevant objective function would be to

Mark only one oval.

- ◯ Maximize the papers totaled by all of them in four hours
- ◯ Minimize the papers totaled by staff and retired teachers
- ◯ Minimize the number of papers correctly totaled by all of them
- ◯ Minimize the number of papers incorrectly totaled by all of them

15. 7. A person is in the business of buying and selling items. He has 10 units in stock and plans for the next three periods. He can buy the item at the rate of Rs 50, 55 and 58 at the beginning of periods 1, 2 and 3 and can sell them at Rs 60, 64 and 66 at the end of the three periods. He can use the money earned by selling at the end of the period to buy items at the beginning of the next period. He can buy a maximum of 200 per period. He can borrow money at the rate of 2% per period at the beginning of each period. He can borrow a maximum of Rs 8000 per period and he cannot borrow more than Rs 20000 in total. He has to pay back all the loans with interest at the end of the third period.What is the correct objective function for this problem?

Mark only one oval.

- ◯ Maximize the total money available at the end of the third period
- ◯ Maximize the total money at the end of the third period less total money borrowed
- ◯ Maximize the total money at the end of the third period less total money paid back
- ◯ Maximize the number of items sold at the end of the third period

16. 8. A person is in the business of buying and selling items. He has 10 units in stock and plans for the next three periods. He can buy the item at the rate of Rs 50, 55 and 58 at the beginning of periods 1, 2 and 3 and can sell them at Rs 60, 64 and 66 at the end of the three periods. He can use the money earned by selling at the end of the period to buy items at the beginning of the next period. He can buy a maximum of 200 per period. He can borrow money at the rate of 2% per period at the beginning of each period. He can borrow a maximum of Rs 8000 per period and he cannot borrow more than Rs 20000 in total. He has to pay back all the loans with interest at the end of the third period.How many constraints are in the formulation

Mark only one oval.

- 6
- 9
- 12
- 13

17. 9. A food stall sells idlis, dosas and poories. A plate of idli has 2 pieces, a plate of dosa has 1 piece while a plate of poori has 2 pieces. They also sell a “combo” which has 2 idlis and 2 poories. A kg of batter costs Rs 60 and contains twelve spoons of batter. Each piece of idli requires 1 spoon of batter and each dosa requires 1.5 spoons of batter. Each poori piece requires 1 ball of wheat dough and a kg of wheat dough that costs Rs 60 can make 20 balls of dough. The selling prices of the items are Rs 40,60, 60 and 90 per plate respectively. The owner has Rs 800 with her and estimates the demand for the four items (in plates) as 50, 30, 20 and 10 respectively. There is a penalty cost of Rs 10 for any unmet plate of demand of an item. Idli being the most commonly consumed item, the owner wishes to meet at least 80% of the demand. Formulate an LP problem and answer the following questions: How many decision variables are in the formulation

Mark only one oval.

- 3
- 4
- 5
- 8

18. 10. Consider the maximum flow problem with n nodes and m arcs. You are writing a formulation with f as the maximum flow.The objective function has _____ terms

Mark only one oval.

- 1
- 2
- 3
- 4

19. 11. Consider the maximum flow problem with n nodes and m arcs. You are writing a formulation with f as the maximum flow.The total number of constraints is _____

Mark only one oval.

- m
- n
- m+n
- m.n

20. 12. Consider the napkins problem where the requirement is for 20 days. There are two types of laundries – fast and slow. The fast laundry takes 2 days (napkins sent at the end of day 1 can be used on day 3) and the slow laundry takes 3 days (napkins sent at the end of day 1 can be used on day 4).The costs of the new napkins and the two laundries are known. The total number of variables in the formulation is _____

Mark only one oval.

- 58
- 57
- 55
- 53

21. 13.Consider the napkins problem where the requirement is for 20 days. There are two types of laundries – fast and slow. The fast laundry takes 2 days (napkins sent at the end of day 1 can be used on day 3) and the slow laundry takes 3 days (napkins sent at the end of day 1 can be used on day 4).The costs of the new napkins and the two laundries are known. The constraint to meet the demand of day 10 will have _____ terms

Mark only one oval.

- 20
- 25
- 30
- 35

22. 14. Consider the media selection problem with n possible things to invest in. Examples could be TV, radio, newspaper etc. There is a total budget restriction and limit on investment in each.The objective function has _____ terms

Mark only one oval.

- n
- n+1
- n+2
- n-1

23. 15.

Consider the LP problem:
Maximize $7X_1 + 6X_2$
subject to
$X_1 + X_2 \leq 4$
$2X_1 + X_2 \leq 6$
$X_1, X_2 \geq 0$
The objective function corresponding to the optimum solution is.....
Mark only one oval.

- 24
- 26
- 28
- 30

24. 16.

Consider the LP problem:
Maximize $5X_1 + 8X_2$
subject to
$4X_1 + 5X_2 \leq 20$
$3X_1 + 2X_2 \leq 12$
$X_1 + 2X_2 \geq 3$
$X_1, X_2 \geq 0$. The number of corner points in the graphical solution is_____
Mark only one oval.

- 4
- 5
- 6
- No corner point

25. 17.

Consider the LP problem:
Maximize $5X_1 + 8X_2$
subject to
$2X_1 + 3X_2 \leq 8$
$2X_1 + 3X_2 \geq -1$
$X_1, X_2 \geq 0.$
The corner point that gives the optimum solution is

Mark only one oval.

- (0,8/3)
- (8/3,0)
- (0,3/8)
- (3/8,0)

26. 18.

Consider the LP problem:
Maximize $5X_1 + 8X_2$
subject to
$2X_1 + 3X_2 \leq 8$
$2X_1 + 3X_2 \leq -1$
$X_1, X_2 \geq 0.$
Which of the following is true

Mark only one oval.

- The LP is unbounded
- The LP is infeasible
- The corner point (0,0) is optimum
- The corner point (4,0) is optimum

27. 19.

Solve the LP problem using Simplex algorithm
Minimize $2X_1 + 3X_2$
subject to
$X_1 + X_2 \geq 4$
$X_1 \leq 1$
$X_1, X_2 \geq 0$ using the simplex algorithm.
If we add the constraint $2X_1 + 3X_2 \leq 11$

Mark only one oval.

- The optimum solution remains the same
- The problem becomes infeasible
- The problem becomes unbounded
- The optimum solution changes
- Option 5

28. 20.In a fair game the value of the game is

Mark only one oval.

- Positive
- 0
- Negative
- Can't say anything

29. 21. The point of intersection of pure strategies in a game is called

Mark only one oval.

- Value of the game
- Saddle point
- Mixed strategy
- Optimal strategy

30. 22. In game theory, a choice that is optimal for a firm no matter what its competitors do is referred to as

Mark only one oval.

- the dominant strategy.
- the game-winning choice
- super optimal.
- a gonzo selection

31. 23. In game theory, a situation in which one firm can gain only what another firm loses is called a

Mark only one oval.

- nonzero-sum game.
- prisoners' dilemma.
- zero-sum game.
- cartel temptation.

32. 24. Game theory is concerned with

Mark only one oval.

- predicting the results of bets placed on games like roulette.
- the choice of an optimal strategy in conflict situations.
- utility maximization by firms in perfectly competitive markets.
- the migration patterns of caribou in Alaska.

33. 25. Which of the following is a zero-sum game?

Mark only one oval.

- Prisoners' dilemma
- Chess
- A cartel member's decision regarding whether or not to cheat
- All of these

34. 26. Which of the following is a nonzero-sum game?

Mark only one oval.

- Prisoners' dilemma
- Chess
- A cartel member's decision regarding whether or not to cheat
- All of these

35. 27. In game theory, the outcome or consequence of a strategy is referred to as the

Mark only one oval.

- payoff
- penalty
- reward
- end-game strategy

36. 28. Each player should follow the same strategy regardless of the other player's strategy in which of the following games?

Mark only one oval.

- Constant strategy
- Mixed strategy
- Pure strategy
- Dominance strategy

37. 29. In a mixed strategy, each player should optimize the

Mark only one oval.

- maximum payoffs
- lower value of the game
- minimum loss
- expected gain.

38. 30.

Considering the following two-person game, what percentage of the time should Y play strategy Y_1?

	Y_1	Y_2
X_1	6	3
X_2	2	8

Mark only one oval.

- 1/3
- 2/3
- 4/9
- 5/9

39. 31.

Given the following two-person game, which strategy can be eliminated by use of dominance?

	Y_1	Y_2
X_1	9	13
X_2	12	8
X_3	6	14

Mark only one oval.

X_1

Option 1

X_2

Option 2

X_3

Option 3

None of these

Option 4

40. 32. In a zero sum game

Mark only one oval.

- The sum of the payoffs for any given strategy pair is zero.
- The gain of one of the players is equal to the loss of the other player.
- It is impossible for both players to earn positive profits for a given strategy pair.
- All of these are true for zero sum games.

41. 33.Suppose that player B is allowed to move first, followed by player A. In this case the outcome will be:

Mark only one oval.

- Both players will play strategy 1.
- Player A will play strategy 1 while player B plays strategy 2.
- Player A will play strategy 2 while player B plays strategy 1.
- Both players will play strategy 2.

42. 34. Full form of PERT is

Mark only one oval.

- Program Estimation & Review Technique
- Project Evaluation & Review Technique
- Project Estimation & Research Technique
- Program Evaluation & Review Technique

43. 35. In a PERT network, the starting vertex is a

Mark only one oval.

- burst node
- merge node
- root
- none of these

44. 36. The full form of CPM is

Mark only one oval.

- Crash project management
- Critical path management
- Critical path method
- None of these

45. 37. If a primal constraint is an equation, the corresponding dual variable is

Mark only one oval.

- bounded
- unbounded
- unrestricted
- None of these

46. 38. What is the traveling salesman problem equivalent to in graph theory?

Mark only one oval.

- Any circuit.
- A Hamilton circuit in a non-weighted graph.
- A round trip airfare.
- A Hamilton circuit in a weighted graph.

47. 39.A weighted graph has what associated with each edge?

Mark only one oval.

- A cost
- Nothing
- Direction
- Size

48. 40. Consider a transportation problem with 3 supply points and 4 demand points. The number of constraints in the formulation is

Mark only one oval.

- 3
- 6
- 7
- 10

49. 41. The initial solution to a transportation problem can be generated in any manner, so long as

Mark only one oval.

- ◯ it minimizes cost
- ◯ it ignores cost
- ◯ all supply and demand are satisfied
- ◯ degeneracy does not exist

50. 42.In transportation model analysis the stepping-stone method is used to

Mark only one oval.

- ◯ obtain an initial optimum solution
- ◯ obtain an initial feasible solution
- ◯ evaluate empty cells for potential solution improvements
- ◯ evaluate empty cells for possible degeneracy

51. 43. A transportation problem has a feasible solution when

Mark only one oval.

- ◯ all of the improvement indexes are positive
- ◯ all the squares are used
- ◯ the solution yields the lowest possible cost
- ◯ all demand and supply constraints are satisfied

52. 44. How many feasible solutions does a 5 x 5 assignment problem have?

Mark only one oval.

- 5!
- 4!
- 3!
- 2!

53. 45. How many variables does the dual of 5 x 5 assignment problem have?

Mark only one oval.

- 9
- 10
- 11
- 12

54. 46. Which of the following is not a step in Hungarian algorithm?

Mark only one oval.

- Subtract row minimum from every row
- Subtract column minimum from every column
- Draw lines through ticked rows and unticked columns
- Tick unassigned rows

55. 47.In a 4 x 4 assignment problem where 4 jobs are assigned to 4 machines, job 1 isAssigned to M2, job 2 to M4, Job 3 to M3. What is the fourth assignment?

Mark only one oval.

- Job 4 to M2
- Job 4 to M1
- Job 4 to M3
- Job 4 to M4

56. 48.

Consider the following assignment problem. When you solve it by hand, the number of assignments that you get in the first iterations is ____.

20	17	22	16
32	29	33	26
26	27	29	28
40	30	35	37

Mark only one oval.

- 2
- 3
- 4
- 5

57. 49.

Consider the 3 job 4 machine assignment problem:

1	3	5
6	7	6
2	4	3
7	8	9

The objective function value at the optimum is _____

Mark only one oval.

- 9
- 10
- 11
- 12

58. 50.

Solve the 4 x 4 maximization assignment problem. The maximum profit is

1	1	4	8
6	7	2	7
8	4	3	6
5	6	7	8

Mark only one oval.

- 20
- 30
- 32
- 40

59. 51.

Consider the assignment problem with 4 jobs and 3 machines. The job that is not assigned to any machine is

1	1	4
6	7	2
8	4	3
5	6	7

Mark only one oval.

- Job 1
- Job 2
- Job 3
- Job 4

60. 52.

The minimum cost for the following 3 x 3 assignment problem is

1	1	4
6	7	2
8	4	3

Mark only one oval.

- 6
- 7
- 8
- 9

61. 53.

A TP has 2 supply points and 3 destination points. The dummy is added to ___ and the quantity is ____

5	6	3	40
7	5	8	40
30	25	35	

Mark only one oval.

- Row, 10
- Column, 10
- Row, 20
- Column, 20

62. 54.

Consider the following balanced TP with 2 supplies and 3 destinations. The solution is found using Vogel's approximation method. The cost is

5	6	3	50
7	5	8	40
30	25	35	

Mark only one oval.

- 310
- 410
- 315
- 415

63. 55.

Consider the following balanced TP with 2 supplies and 3 destinations. The solution is found using Minimum cost method. The cost is

5	6	3	50
7	5	8	40
30	25	35	

Mark only one oval.

- 405
- 410
- 415
- 420

64. 56.

The maximum profit for the following 3 x 3 assignment problem is

1	1	4
6	7	2
8	4	3

Mark only one oval.

- 15
- 18
- 19
- 23

65. 57.

Consider a two variable LP problem with a minimization objective function and three constraints all of the ≥ type. The first constraint cuts the X_1 and X_2 axes at 2 and 7 respectively. The second constraint cuts the two axes at 3 and 5 respectively and the third constraint at 4 and 4 respectively. The objective function is $3X_1 + 2X_2$.

The dual has _____ variables

Mark only one oval.

- 1
- 2
- 3
- 4

66. 58.

Write the LP dual to the problem.

Minimize $2X_1 + 3X_2$

subject to

$X_1 + X_2 \geq 4$

$2X_1 + 4X_2 \geq 10$

$X_1, X_2 \geq 0.$

The shadow price of the second resource is _____

Mark only one oval.

- 0.4
- 0.5
- 0.6
- 0.8

67. 59.

Write the LP dual to the problem.
Minimize $2X_1 + 3X_2$
subject to
$X_1 + X_2 \geq 4$
$2X_1 + 4X_2 \geq 10$
$X_1, X_2 \geq 0.$

The shadow price of the first resource is_____

Mark only one oval.

- 1
- 2
- 3
- 4

68. 60.

Given the LP problem
Maximize $3X_1 + 5X_2 + 9X_3$
subject to $X_1 + X_2 + 2X_3 \leq 6$
$2X_1 + 3X_2 + X_3 \leq 8$
$X_1, X_2, X_3 \geq 0$

The dual has _____ variables

Mark only one oval.

- 1
- 2
- 3
- 4