JK

Roll No. _____

Question Booklet Number

O.M.R. Serial No. :

BCA IV Semester (NEP) Examination, 2025-26

OPTIMIZATION TECHNIQUES

Paper Code						
B	C	A	4	0	0	4

Question Booklet Series
B

Time : 1 : 30 Hours] **[Maximum Marks : 75**

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. **All** questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.
4. Four alternative answers are mentioned for each question as – A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

(Remaining instructions on the last page)

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। **सभी** प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गये हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।
4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C तथा D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

(शेष निर्देश अन्तिम पृष्ठ पर)

Rough Work

1. Game with no saddle point is solved using:
   (A) Pure strategy
   (B) Mixed strategy
   (C) Graphical method
   (D) Both (B) and (C)
2. Value of game for fair game is:
   (A) Positive
   (B) Negative
   (C) Zero
   (D) Infinite
3. If supply = 80 and demand = 100, we should:
   (A) Subtract demand
   (B) Add dummy supply of 20
   (C) Add dummy demand of 20
   (D) Ignore
4. Each unit of X requires 2 hours, Y requires 3 hours. Total available = 12 hours Constraint is:
   (A) $2x + 3y \geq 12$
   (B) $x + y = 12$
   (C) $2x + 3y \leq 12$
   (D) $3x + 2y \leq 12$
5. If a constraint is written as $x + y \geq 10$, it means:
   (A) At most 10
   (B) At least 10
   (C) Exactly 10
   (D) Less than 10
6. Which method is considered better for finding the initial solution in terms of cost?
   (A) North-West Corner Rule
   (B) Matrix Minima Method
   (C) Vogel's Approximation Method (VAM)
   (D) MODI Method
7. MODI method is used for:
   (A) Obtaining an initial solution
   (B) Checking feasibility
   (C) Balancing the problem
   (D) Testing and improving optimality
8. Dominance rule applies to:
   (A) Only rows
   (B) Only columns
   (C) Both rows and columns
   (D) Only diagonal

9. If no row or column dominates another, we:
   (A) Stop
   (B) Use mixed strategy
   (C) Add dummy
   (D) Use VAM
10. Matrix becomes 2×2 after removing dominated row. Next step is:
   (A) Solve 2×2 game
   (B) Stop
   (C) Apply VAM
   (D) Use simplex
11. In a minimization transportation problem, a negative opportunity cost in MODI method indicates:
   (A) A basic variable
   (B) An optimal solution
   (C) A possibility of reducing total cost
   (D) An infeasible allocation
12. If minimum number of lines = order of matrix, solution is:
   (A) Not feasible
   (B) Optimal
   (C) Degenerate
   (D) Unbounded
13. Probability in PERT is based on:
   (A) Normal distribution
   (B) Poisson distribution
   (C) Binomial only
   (D) Uniform only
14. Slack or float is associated with:
   (A) Only critical activities
   (B) Non-critical activities
   (C) All activities
   (D) None of the above
15. The formula for expected time (TE) in PERT is:
   (A) (O + P + 4M)/6
   (B) (O + M + P)/3
   (C) (O + 4M + P)/6
   (D) (O + 2M + P)/4
16. Which one of the following is common in both PERT and CPM?
   (A) Time estimates
   (B) Cost analysis
   (C) Network diagram
   (D) Probabilistic approach
17. ε (epsilon) in degeneracy represents:
   (A) Infinite cost
   (B) Very small positive number
   (C) Zero demand
   (D) Large cost

18. Standard form of LPP requires:

(A) Only inequalities

(B) Only equalities

(C) All constraints as equations

(D) Random form

19. If all constraints are ≤ type, number of artificial variables is:

(A) 0

(B) 1

(C) 2

(D) Equal to constraint

20. Standard deviation in PERT is:

(A) (b - a)/3

(B) (b - a)/6

(C) (a + b)/2

(D) √variance

21. If optimistic = 3, most likely = 6, pessimistic = 9, TE =

(A) 5

(B) 6

(C) 7

(D) 8

22. Which step comes after subtracting row and column minimums in the Hungarian method?

(A) Make dummy row

(B) Multiply the matrix

(C) Add rows and columns

(D) Draw minimum number of lines to cover all zeros

23. PERT uses which type of time estimates?

(A) One time estimate

(B) Two time estimates

(C) Three time estimates

(D) Four time estimates

24. In mixed strategy, probabilities must:

(A) Be equal

(B) Sum to 1

(C) Be zero

(D) Be infinite

25. If maximin < minimax, then:

(A) Saddle point exists

(B) Game solved

(C) Pure strategy used

(D) No saddle point

26. In the simplex method, the variables which are not in the solution are called:

(A) Non-basic variables

(B) basic variables

(C) Slack variables

(D) Artificial variables

27. If all elements in a row are less than corresponding elements in another row, then:

(A) First row dominates

(B) Second row dominates

(C) No dominance

(D) Both dominate

28. Value of game represents:

(A) Profit of A

(B) Loss of B

(C) Both A and B (opposite sign)

(D) None

29. Value of a game represents:

(A) Total strategies

(B) Expected payoff to a player

(C) Number of players

(D) Number of move

30. After applying the dominance rule, the resulting matrix still has no saddle point. What should be done next?

(A) Apply duality

(B) Use graphical method

(C) Use the mixed strategy method

(D) Stop solving

31. Maximum idle time occurs when:

(A) Improper sequencing

(B) Perfect scheduling

(C) Minimum jobs

(D) Equal times

32. Find idle time of Machine 2 for sequence A $\rightarrow$ B:

Job A: M1=3, M2=5

Job B: M1=2, M2=4

(A) 1

(B) 2

(C) 3

(D) 4

33. First step in Hungarian method is:

(A) Row reduction

(B) Column reduction

(C) Assignment

(D) Optimality check

34. Column reduction means:

(A) Subtract smallest element from each column

(B) Subtract largest element

(C) Add values

(D) Multiply values

35. Hungarian method requires the matrix to be:

(A) Rectangular

(B) Square

(C) Triangular

(D) Diagonal

36. If one strategy is strictly better than another in all situations, it is called:

(A) Mixed strategy

(B) Pure strategy

(C) Dominating strategy

(D) Saddle point

37. Dominance rule is mainly applied in:

(A) Cooperative games

(B) Dynamic game

(C) Non-mathematical games

(D) Zero-sum games

38. Consider 3 jobs with processing times (in hours):

Job A: M1=2, M2=5

Job B: M1=4, M2=3

Job C: M1=6, M2=1

Optimal sequence:

(A) $A \rightarrow B \rightarrow C$

(B) $C \rightarrow B \rightarrow A$

(C) $A \rightarrow C \rightarrow B$

(D) $B \rightarrow A \rightarrow C$

39. In maximization problem, we convert it to minimization by:

(A) Subtracting from largest element

(B) Adding values

(C) Multiplying by zero

(D) Ignoring values

40. In the standard form of an LPP, if a constraint is of the form $x + y \geq 10$, it can be converted into an equality by:

(A) Adding a slack variable

(B) Subtracting a surplus variable

(C) Adding an artificial variable

(D) Subtracting a slack variable

41. Which rule is used for optimal sequence in 2-machine problem?

(A) Johnson's rule

(B) Hungarian method

(C) Simplex method

(D) MODI method

42. Which method requires LPP in standard form?
    (A) Graphical method
    (B) Simplex method
    (C) Hungarian method
    (D) Game theory
43. Artificial variables are added in case of:
    (A) Only ≤ constraints
    (B) Only = constraints
    (C) ≥ and = constraints
    (D) None
44. The standard form of an LPP requires:
    (A) All constraints to be inequalities
    (B) All constraints to be equalities
    (C) Only ≤ constraints
    (D) Only ≥ constraints
45. If a column is dominated, it is eliminated because:
    (A) It gives maximum payoff to player A
    (B) It gives minimum payoff to player A
    (C) Player B will never choose it
    (D) It is not feasible
46. Dominance rule is used to:
    (A) Find optimal strategy directly
    (B) Calculate propabilities
    (C) Solve linear programming problems
    (D) Reduce the size of payoff matrix
47. The Column Minima Method is primarily used in:
    (A) Linear programming problems
    (B) Assignment problems
    (C) Transportation problems
    (D) Integer programming problems
48. North-West Corner Rule is used to:
    (A) Find optimal solution
    (B) Find initial feasible solution
    (C) Check degeneracy
    (D) Balance problem
49. To balance an unbalanced transportation problem, we add:
    (A) Extra constraint
    (B) Artificial variable
    (C) New objective function
    (D) Dummy row or column
50. If the objective function is parallel to a constraint boundary, then:
    (A) Unique solution exists
    (B) No solution exists
    (C) Multiple optimal solutions may exist
    (D) Problem becomes infeasible

51. In game theory, a "player" refers to:

(A) Only a human participant

(B) Any decision-making entity

(C) Only firms in a market

(D) Only individuals

52. The feasible region is:

(A) Area satisfying all constraints

(B) Area outside constraints

(C) Only boundary lines

(D) Random region

53. If feasible region is unbounded, then:

(A) No solution exists

(B) Infinite solutions always

(C) Optimal solution may or may not exist

(D) Only one solution exists

54. A feasible region in an LPP is always:

(A) Circular

(B) Convex

(C) Triangular

(D) Irregular

55. A zero-sum game is one in which:

(A) All players lose

(B) Playoffs are always zero

(C) Everyone wins

(D) Total gains equal total losses

56. Simplex method is an:

(A) Graphical method

(B) Algebraic iterative method

(C) Numerical integration method

(D) Heuristic method

57. Initial solution in simplex method is:

(A) Optimal solution

(B) Infeasible solution

(C) Basic feasible solution

(D) Arbitrary solution

58. If a game has no saddle point, the solution is obtained using:

(A) Pure strategy

(B) Dominance rule only

(C) Mixed strategy

(D) Linear regression

59. Alternate optimal solution in Simple Method exists when:

(A) All values positive

(B) A non-basic variable has zero coefficient in objective row

(C) All variables basic

(D) No constraints

60. Big-M method is used to:

(A) Remove slack variables

(B) Reduce Matrix

(C) Solve dual problem

(D) Handle artificial variables

61. If critical path length = 20, project duration is:

(A) 10

(B) 15

(C) 20

(D) 25

62. If an activity is not on the critical path, then its slack is:

(A) Zero

(B) Positive

(C) Negative

(D) Infinite

63. If there are two critical paths, then:

(A) Project duration changes

(B) Project becomes shorter

(C) Both paths have equal duration

(D) One path is ignore

64. Primal:

Max $Z = 5x_1 + 4x_2$

Subject to:

$2x_1 + x_2 \leq 6$

Dual constraint is:

(A) $y \leq 5, y \leq 4$

(B) $y \geq 5, y \geq 4$

(C) $2y \geq 5, y \geq 4$

(D) $2y \leq 5, y \leq 4$

65. In a payoff matrix, rows represent:

(A) Strategies of player A

(B) Strategies of player B

(C) Payoffs only

(D) Constraints

66. In dominance principle, if all elements of a row are greater than or equal to the corresponding elements of another row, then:

(A) Dominated row can be removed

(B) Dominating row can be removed

(C) Both rows must be retained

(D) No action is taken

67. In a zero-sum game, if player A's gain is 5, then player B's loss is:
    (A) 0
    (B) 10
    (C) -5
    (D) 5

68. Replacement is required when:
    (A) Profit increases
    (B) Cost decreases
    (C) Maintenance cost increases with time
    (D) Demand decreases

69. If optimistic = pessimistic = most likely, then:
    (A) Variance = 1
    (B) Variance = 0
    (C) Variance = ∞
    (D) Cannot be determined

70. Maximize Z = 3x + 2y Subject to:
    $x + y \leq 4, x, y \geq 0$
    Optimal value of Z is:
    (A) 10
    (B) 6
    (C) 8
    (D) 12

71. Total float is:
    (A) Extra time without delaying project
    (B) Total project time
    (C) Minimum time
    (D) Idle time only

72. If slack of an activity becomes negative, it means:
    (A) Project is early
    (B) Project is delayed
    (C) No change
    (D) Activity removed

73. CPM is mainly used for:
    (A) Probabilistic projects
    (B) Uncertain activities
    (C) Random projects
    (D) Deterministic projects

74. Group replacement policy is generally more economical when:
    (A) Failure rate is low
    (B) Individual replacement is cheap
    (C) There is a high cost of individual failure
    (D) Items have a long life

75. If ES = 3 and LS = 3, float is:
    (A) 0
    (B) 3
    (C) 6
    (D) 1

76. The origin of Operations Research is traced back to:

(A) Space research programs

(B) Civil engineering projects

(C) World War II military operations

(D) Industrial Revolution

77. Free float is:

(A) Delay without affecting successors

(B) Total delay

(C) Project delay

(D) Zero time

78. If EF = 10 and LF = 10, activity is:

(A) Non-critical

(B) Critical

(C) Dummy

(D) Optional

79. The payoff value for which each player in a game always selects the same strategy is called the

(A) saddle point.

(B) equilibrium point

(C) Both (A) and (B)

(D) None of these

80. The first step in formulating an LPP is:

(A) Solving the model

(B) Defining the decision variables

(C) Writing constraints

(D) Graphical solution

81. If all constraints are ≤ type, feasible region lies:

(A) Towards origin

(B) Away from origin

(C) Random

(D) Infinite

82. Feasible region is:

(A) Area satisfying all constraints

(B) Only objective function

(C) Outside region

(D) Random region

83. If feasible region is unbounded and Z keeps increasing, then:

(A) Unique solution

(B) Finite solution

(C) Unbounded solution

(D) Infeasible

84. Subject to:

$x + y \leq 4, x,y \geq 0$

Optimal value is:

(A) 8

(B) 10

(C) 12

(D) 6

85. Group replacement is suitable when:

(A) One item fails

(B) Many items fail randomly

(C) Only machines

(D) No failure

86. Initial feasible solution can be obtained by:

(A) North-West Corner Rule

(B) Least Cost Method

(C) Vogel's Approximation Method

(D) All of these

87. In MODI, $u_i + v_j = c_{ij}$ is used for:

(A) Basic cells

(B) Non - basic cells

(C) Dummy cells

(D) All cells

88. Closed loop is used in:

(A) Initial solution

(B) Optimality test

(C) Assignment

(D) Graph

89. If highest penalty row has tie, then choose:

(A) Random

(B) Highest cost

(C) Lowest cost cell in that row

(D) Ignore row

90. If allocations $< m + n - 1$, the solution is:

(A) Balanced

(B) Optimal

(C) Degenerate

(D) Unbounded

91. A basic feasible solution in transportation problem must satisfy:

(A) $m + n - 1$ allocations

(B) $m \times n$ allocations

(C) Only cost condition

(D) Infinite allocations

92. Number of constraints in dual equals:

(A) Number of variables in primal

(B) Number of constraints in primal

(C) Sum of both

(D) None

93. If primal is unbounded, dual is:

(A) Feasible

(B) Infeasible

(C) Optimal

(D) Finite

94. Primal:

Max $Z = 3x_1 + 2x_2$

Subject to:

$x_1 + x_2 \leq 4$

Dual objective function is:

(A) Max W = 4y

(B) Min W = 3y

(C) Max W = 3y

(D) Min W = 4y

95. Penalty in VAM is defined as:

(A) Sum of costs

(B) Difference between two smallest costs

(C) Maximum cost

(D) Minimum cost

96. If supply equals demand for a cell, we:

(A) Delete both row and column

(B) Delete only row

(C) Delete only column

(D) Keep both

97. Strategy means:

(A) Random decision

(B) Complete plan of action

(C) One move

(D) Constraint

98. Maximin value is:

(A) Maximum of row minima

(B) Minimum of row maxima

(C) Maximum of column maxima

(D) Minimum of column minima

99. Minimax value is:

(A) Minimum of column maxima

(B) Maximum of row minima

(C) Maximum of column minima

(D) Minimum of row minima

100. If payoff matrix has saddle point, then:

(A) Mixed strategy used

(B) Pure strategy used

(C) No strategy

(D) Infinite solution

Rough Work

Example :

Question :

Q. 1 (A) (●) (C) (D)

Q. 2 (A) (B) (●) (D)

Q. 3 (A) (●) (C) (D)

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question booklet, then after showing it to the invigilator, get another question booklet of the same series.

उदाहरण :

प्रश्न :

प्रश्न 1 (A) (●) (C) (D)

प्रश्न 2 (A) (B) (●) (D)

प्रश्न 3 (A) (●) (C) (D)

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ.एम.आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ.एम.आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्न-पुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्न-पुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।