

Roll. No.

Question Booklet Number

O.M.R. Serial No.

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403195

BCA (SEM.-IV) (NEP) EXAMINATION, 2024
COMPUTER APPLICATION
(Optimization Techniques)

[BCA-4004]

Paper Code							
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Question Booklet
Series

C

Time : 1 : 30 Hours

Max. 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 last page)

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपमें कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 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 गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, उसे तुरन्त बदल लें।
4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

(शेष निर्देश अन्तिम पृष्ठ पर)

1. In the context of the assignment problem, what does the term "assignment" refer to?
 - (A) The process of distributing tasks to resources
 - (B) The evaluation of resource performance
 - (C) The estimation of task completion time
 - (D) The optimization of resource utilization
2. Optimal solution in LPP is ____
 - (A) which maximizes or minimizes the objective function
 - (B) which maximizes the objective function
 - (C) which minimizes the objective function
 - (D) which satisfies the non-negativity restrictions
3. In graphical solution the feasible region is :
 - (A) where all the constraints are satisfied simultaneously
 - (B) any one constraint is satisfied
 - (C) only the first constraint is satisfied
 - (D) any one of the above condition
4. Linear programming is ____
 - (A) constraint optimization model
 - (B) constraint decision making model
 - (C) mathematical programming model
 - (D) All of the above
5. ____ is the point in time that marks the beginning or ending of an activity.
 - (A) Event
 - (B) Node
 - (C) Activity
 - (D) Dummy activity
6. What do we apply in order to determine the optimum solution?
 - (A) LPP
 - (B) VAM
 - (C) MODI Method
 - (D) None of the above
7. A mixed strategy can be solved by :
 - (A) algebraic method
 - (B) matrix method
 - (C) graphical method
 - (D) All of the above
8. In a network diagram activity is denoted by :
 - (A) node
 - (B) arrow
 - (C) triangle
 - (D) none of these

9. A minimization problem can be converted into a maximization problem by changing the sign of coefficients in the :
 - (A) Constraints
 - (B) Objective Functions
 - (C) Both (A) and (B)
 - (D) None of the above
10. Which of the following is a type of linear programming problem?
 - (A) Diet Problem
 - (B) Manufacturing Problem
 - (C) Transportation Problem
 - (D) All of the above
11. In simplex method the LPP has unbounded solution if the variable in the key column is :
 - (A) maximum
 - (B) minimum
 - (C) positive
 - (D) negative
12. In the standard form of an LPP if the objective function is of maximization type then the right hand side of the constraints should be :
 - (A) positive
 - (B) negative
 - (C) non-negative
 - (D) zero
13. If an activity has zero slack, it implies that :
 - (A) it lies on the critical path
 - (B) it is a dummy activity
 - (C) the project is progressing well
 - (D) none of the above
14. Float or slack analysis is useful for ____
 - (A) Projects behind the schedule only
 - (B) Projects ahead of the schedule only
 - (C) Both (A) and (B)
 - (D) None of the above
15. PERT is a tool for ____ and control time.
 - (A) Delaying
 - (B) Planning
 - (C) Both (A) and (B)
 - (D) None of the above
16. Transportation problem is a special case of _____.
 - (A) LPP
 - (B) assignment problem
 - (C) None of the above
 - (D) Both (A) and (B)
17. In assignment problem if the number of column is greater than row then :
 - (A) dummy column is added
 - (B) dummy row is added
 - (C) row with cost 1 is added
 - (D) column with cost 1 is added

18. For a minimisation Transportation Problem, the objective is to minimise:
- Profit
 - Cost
 - Solution
 - None of these
19. Replacement is said to be necessary if :
- failure rate is increasing
 - failure cost is increasing
 - failure probability is increasing
 - any of these
20. _____ is an event oriented network diagram.
- CPM
 - PERT
 - Histogram
 - Ogive
21. Activities that cannot be started until one or more of the other activities are completed, are called _____.
- Dummy activities
 - Initial activities
 - Successor activities
 - Predecessor activities
22. _____ is activity oriented network diagram.
- CPM
 - PERT
 - Histogram
 - Ogive
23. A LPP model does not contain :
- Decision
 - Constraints
 - Feasible solution
 - Spread Sheet
24. The EST + activity duration = _____
- Earliest Finish Time
 - Latest Start Time
 - Latest Finish Time
 - None of these
25. _____ is the latest time by which an activity can be finished without delaying the completion of the project?
- LST
 - LFT
 - EFT
 - EST
26. Network models have advantages in terms of project :
- planning
 - scheduling
 - controlling
 - All of the above
27. The another term commonly used for activity slack time is :
- total float
 - free float
 - independent float
 - All of the above

28. Critical method is good for :
 (A) small project only
 (B) large project only
 (C) small and large project equally
 (D) neither small nor large projects
29. In a network diagram event is denoted by the symbol :
 (A) arrow
 (B) circle
 (C) curve
 (D) straight line
30. ____ is used for non-repetitive jobs.
 (A) Queue
 (B) Replacement
 (C) CPM
 (D) PERT
31. Which of the following methods is used to verify the optimality of the current solution of the transportation problem ?
 (A) Least cost method
 (B) Vogel's Approximation method
 (C) Row minima method
 (D) Modified Distribution method
32. This is not allowed in sequencing of n jobs on two machines :
 (A) Passing
 (B) Repeating the job
 (C) Loading
 (D) One loaded on the machine it should be completed before removing from the machine.
33. The occurrence of degeneracy while solving a transportation problem means that :
 (A) Total supply equals total demand
 (B) The solution so obtained is not feasible
 (C) The few allocations become negative
 (D) None of the above
34. To convert assignment problem into maximization problem :
 (A) Deduct smallest element in the matrix from all other elements
 (B) All elements of the matrix are deducted from the highest elements in the matrix
 (C) Deduct smallest element in any row from all other elements of the row
 (D) Deduct all elements of the row from highest element in that row
35. If there are 'm' original variables and 'n' introduced variables, then there will be columns in the simplex table :
 (A) $M + n$
 (B) $M - n$
 (C) $3 + m + n$
 (D) $M + n - 1$

36 Operations research is the application of _____ methods to arrive at the optimal solutions to the problems.

- (A) economical
- (B) scientific
- (C) Both (A) and (B)
- (D) artistic

37 Feasible solution satisfies _____

- (A) Only constraints
- (B) Only non-negative restriction
- (C) Both (A) and (B)
- (D) [A], [B] and Optimum solution

38 Minimize $Z =$ _____

- (A) $-\text{maximize}(Z)$
- (B) $-\text{maximize}(-Z)$
- (C) $\text{maximize}(-Z)$
- (D) None of the above

39 Operations research was known as an ability to win a war without really going in to _____

- (A) Battle field
- (B) Fighting
- (C) The opponent
- (D) Both (A) and (B)

40 If there exists a saddle point for a given problem it, implies that the players are using _____ strategies.

- (A) Pure
- (B) Mixed
- (C) Optimal
- (D) Pure and Mixed

41. The size of the payoff matrix of a game can be reduced by using the principle of :

- (A) game inversion
- (B) rotation reduction
- (C) dominance
- (D) game transpose

42. Find Strategy of the player in the given pay-off matrix.

Player-A/Player-B	B1	B2	B3
A1	-2	14	-2
A2	-5	-6	-4
A3	-6	20	-8

- (A) A2, B1
- (B) A1, B3
- (C) A1, B1
- (D) A3, B2

43. Find Solution of game theory problem using saddle point

Player-A/Player-B	B1	B2	B3	B4
A1	20	15	12	35
A2	25	14	8	10
A3	40	2	10	5
A4	-5	4	11	0

- (A) 20
- (B) 12
- (C) 18
- (D) 16

44. The Penalty in VAM represents difference between _____ cost of respective row/column.
- (A) Two largest
 - (B) Largest and Smallest
 - (C) Smallest Two
 - (D) None of the above
45. In maximization case of transportation problem, we convert into minimization by subtracting all the elements from :
- (A) zero
 - (B) one
 - (C) highest element
 - (D) lowest element
46. Pessimistic time optimistic time of completion of an activity are given as 10 days and 4 days respectively, the variance of the activity will be :
- (A) 1
 - (B) 6
 - (C) 12
 - (D) 18
47. An LPP deals with problems having only :
- (A) single objective
 - (B) multiple objective
 - (C) two objective
 - (D) none of these
48. In transportation problem the preferred method of obtaining either optimal or very close to the optimal solution is :
- (A) north west corner
 - (B) lowest cost
 - (C) vogel approximation method
 - (D) simplex method
49. In north west corner rule if the demand in the column is satisfied one must move to the :
- (A) left cell in the next column
 - (B) right cell in the next column
 - (C) left cell in the next row
 - (D) right cell in the next row
50. In transportation problem the improved solution of the initial basic feasible solution is :
- (A) basic solution
 - (B) optimal solution
 - (C) degenerate solution
 - (D) non-degenerate solution
51. The group replacement policy is suitable for identical low cost items which are likely to _____
- (A) Fail over a period of time
 - (B) Fail suddenly
 - (C) Fail completely and suddenly
 - (D) None of the above
52. If u_i and v_j are row and column numbers respectively, then the implied cost is given by:
- (A) $u_i + v_j$
 - (B) $u_i - v_j$
 - (C) $u_i \times v_j$
 - (D) u_i / v_j

53. Which of the following method cannot be used to solve transportation problem?
- (A) North-West corner rule
(B) Matrix minima method
(C) Vogel's Approximation method
(D) Graphical method
54. In _____ method consider the least cost and next to least cost for solving transportation problem.
- (A) North-west corner
(B) Matrix minima
(C) Vogel's Approximation
(D) Row Minima method
55. The minimum number of line covering all zeros in a reduced cost matrix of order n can be ____.
- (A) At least n
(B) At most n
(C) $n - 1$
(D) $n + 1$
56. The term idle time is used in ____.
- (A) LPP
(B) Assignment Problem
(C) Sequencing Problem
(D) Transportation Problem
57. If a primal LP problem has finite solution, then the dual LP problem should have :
- (A) Finite solution
(B) Infeasible solution
(C) Unbounded solution
(D) None of these
58. The objective of network analysis is :
- (A) Minimize total project duration
(B) Minimize total project cost
(C) Minimize product delays, interruption and conflicts
(D) All of the above
59. If the feasible region of a LPP is empty, the solution is :
- (A) Infeasible
(B) Unbounded
(C) Alternative
(D) None of the above
60. Any column or row of a simplex table is called a :
- (A) Vector
(B) Key column
(C) Key Row
(D) None of these

61. In simplex method, we add variables in the case of '='
 (A) Slack Variable
 (B) Surplus Variable
 (C) Artificial Variable
 (D) None of the above
62. Dual of the dual is :
 (A) Primal
 (B) Dual
 (C) Alternative
 (D) None of the above
63. In replacement analysis the maintenance cost is a function of :
 (A) time
 (B) resale value
 (C) initial investment
 (D) None of these
64. The shortest possible completion time of an activity in PERT is called ____ time.
 (A) pessimistic
 (B) optimistic
 (C) most likely
 (D) expected
65. The longest possible completion time of an activity in PERT is called ____ time.
 (A) pessimistic
 (B) optimistic
 (C) most likely
 (D) expected
66. If a is the optimistic time, b is the pessimistic time and m is most likely time of an activity, the expected time of the activity, is :
 (A) $a + m + b$
 (B) $a + 2m + b$
 (C) $a + 4m + b$
 (D) $a + 5m + 2b$
67. If a job is having minimum processing time under both the machines, then the job is placed in :
 (A) any one position
 (B) available position
 (C) available first position
 (D) both first and last position
68. In graphical solution of solving LPP to convert inequalities into equations, we :
 (A) use slack variables
 (B) use surplus variables
 (C) use artificial variables
 (D) simply assume them to equations
- 69.

JOB	A	B	C	D	E	F
MACHINE (M1)	2	9	8	10	4	11
MACHINE (M2)	5	7	12	3	9	1

Using the Johnson rule find the right sequence of the job :

- (A) AECFBD
 (B) ABCDEF
 (C) DBFCEA
 (D) ADBCEF

70. A game is said to be fair if :
- both upper and lower values of the game are the same and zero
 - upper and lower values of the game are not equal
 - upper value is more than the lower value of the game
 - None of these
71. What happens when maximin and minimax values of the game are same?
- no solution exists
 - solution is mixed
 - saddle point exist
 - None of these
72. Operations research was known as an ability to win a war without really going in to ____.
- Battle field
 - Fighting
 - The opponent
 - Both (A) and (B)
73. In a pure strategy game :
- any strategy may be selected arbitrarily
 - a particular strategy is selected by each player
 - both players select their optimal strategy
 - None of these
74. What is the rule for the earliest start time?
- It compares the activity's start time to that of a successor activity
 - It compares the activity's end time to that of a previous activity
 - It specifies when a project may begin
 - It establishes the start date for a project
75. What is the definition of a critical path?
- It's a path that connects the starting and ending nodes
 - It combines all of the paths
 - It is the shortest route
 - It is the most direct route
76. What is the primary objective of job sequencing with two machines?
- Minimizing the total processing time
 - Maximizing the number of jobs completed
 - Equalizing the workload on both machines
 - Prioritizing high-priority jobs

77. To formulate a problem for solution by the simplex method, we must add artificial variable to :
- (A) only equality constraints
 - (B) only $>$ constraints
 - (C) Both (A) and (B)
 - (D) None of these
78. In Degenerate solution value of objective function _____.
- (A) increases infinitely
 - (B) basic variables are nonzero
 - (C) decreases infinitely
 - (D) One or more basic variables are zero
79. Consider the linear equation $2x_1 + 3x_2 - 4x_3 + 5x_4 = 10$ How many basic and non-basic variables are defined by this equation?
- (A) One variable is basic, three variables are non-basic
 - (B) Two variables are basic, two variables are non-basic
 - (C) Three variables are basic, one variable is non-basic
 - (D) All four variables are basic
80. In the optimal simplex table $c_j - z_j = 0$ value indicates :
- (A) unbounded solution
 - (B) cycling
 - (C) alternative solution
 - (D) None of these
81. If all incoming variable column is negative then the solution is :
- (A) Unbounded solution
 - (B) Infeasible solution
 - (C) Feasible Solution
 - (D) None of the options
82. In the simplex method the variable enters the basis if _____.
- (A) $Z_j - C_j \geq 0$
 - (B) $Z_j - C_j < 0$
 - (C) $Z_j - C_j \leq 0$
 - (D) $Z_j - C_j = 0$
83. For the constraint of greater than equal to type we make use of _____ variable.
- (A) slack
 - (B) artificial
 - (C) surplus
 - (D) basic
84. If all x_{ij} values in the incoming variable column of the simplex table are negative, then :
- (A) solution is unbounded
 - (B) there exist no solution
 - (C) there are multiple solution
 - (D) None of these
85. Operation research approach is :
- (A) Multi-disciplinary
 - (B) Intuitive
 - (C) Artificial
 - (D) All of the above

86. In graphical method the LPP has unbounded solution if the solution space has :
- no upper boundary
 - no lower boundary
 - no boundary in the first quadrant
 - None of the above
87. While drawing the network diagram for each activity project we should look :
- What activities precede this activity
 - What activities follow this activity
 - What activity can concurrently take place with this activity
 - All of the above
88. A transportation problem is said to be balanced if _____
- quantity demanded $<$ quantity supplied
 - quantity demanded $>$ quantity supplied
 - quantity demanded $\neq$ quantity supplied
 - quantity demanded = quantity supplied
89. In the transportation problem if the current supply of the warehouses exceeds the current demand of the markets then,
- fictitious warehouse is introduced
 - fictitious market is introduced
 - decrease the supply of existing warehouse
 - the demand of existing market
90. In transportation problem if total supply $>$ total demand we add :
- dummy row with cost 0
 - dummy column with cost 0
 - dummy row with cost 1
 - dummy column with cost 1
91. In least cost method the allocation is done by selecting _____
- upper left corner
 - upper right corner
 - middle cell in the transportation table
 - cell with the lowest cost
92. An assignment problem is considered as a particular case of a transportation problem because :
- the number of rows equals columns
 - all $x_{ij} = 0$ or 1
 - Both (A) and (B)
 - None of these

93. Which of the following is a characteristic of a dual problem :
- (A) Dual of a dual is primal
 - (B) If dual has a finite optimal solution, then the primal also has finite optimal solution
 - (C) If dual has no feasible solution, then the primal also has no feasible solution
 - (D) All of the above
94. When all the players of the game follow their optimal strategies, then the expected pay off of the game is called _____
- (A) Gain of the game
 - (B) Loss of the game
 - (C) Value of the game
 - (D) None of these
95. Before formulating a formal L P model, it is better to :
- (A) Verbally identify decision variables
 - (B) Express the objective function in words
 - (C) Express each constraint in words
 - (D) All of the above
96. What is the primary objective of job sequencing with two machines?
- (A) Minimizing the total processing time
 - (B) Maximizing the number of jobs completed
 - (C) Equalizing the workload on both machines
 - (D) Prioritizing high-priority jobs
97. In _____ models, everything is defined and the results are certain.
- (A) Probabilistic
 - (B) Deterministic
 - (C) Both (A) and (B)
 - (D) None of these
98. The key column indicates :
- (A) outgoing variable
 - (B) incoming variable
 - (C) independent variable
 - (D) dependent variable
99. If a machine becomes old then the failure rate expected will be :
- (A) constant
 - (B) increasing
 - (C) decreasing
 - (D) we cannot say
100. The two forms of LPP are :
- (A) standard form and canonical form
 - (B) standard form and general form
 - (C) matrix form and canonical form
 - (D) matrix form and standard form

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.

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 ओ०एम०आर० 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. ओ०एम०आर० 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: प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।

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