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Paper Code		
3	7	5

(To be filled in the OMR Sheet)

प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No. | | | | | | | | |

प्रश्नपुस्तिका सीरीज
Question Booklet Series
D

BCA (Fourth Semester) Examination, July-2022

BCA-404(N)

Optimization Techniques

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET) में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा किसी प्रश्न का एक से अधिक उत्तर दिया जाता है, तो उसे गलत उत्तर माना जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी ओ०एम०आर० शीट उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

K-375

Rough Work / रफ कार्य

1. Traffic intensity is given by:
   (A) Mean arrival rate/mean service rate
   (B) $\lambda \times \mu$
   (C) μ/λ
   (D) Number present in the queue/Number served
2. A feasible solution to an LP problem:
   (A) Must satisfy all of the problem's constraints simultaneously
   (B) Need not satisfy all of the constraints, only some of them
   (C) Must be a corner point of the feasible region
   (D) Must optimize the value of the objective function
3. Which of the following is not an inventory?
   (A) Machines
   (B) Raw material
   (C) Finished products
   (D) Consumable tool
4. The order cost per order of an inventory is Rs. 400 with an annual carrying cost of Rs. 10 per unit. The Economic Order quantity (EOQ) for an annual demand of 2000 units is :
   (A) 400
   (B) 440
   (C) 480
   (D) 500
5. The following classes of costs are usually involve in inventory decisions except:
   (A) Cost of ordering
   (B) Carrying cost
   (C) Cost of shortages
   (D) Machining cost
6. Which of the following is the correct assumption for replacement policy when money value does not change with time?
   (A) No capital cost
   (B) No scrap value
   (C) Constant scrap value
   (D) Zero maintenance cost

7. Replacement is said to be necessary if:
   (A) Failure rate is increasing
   (B) Failure cost is increasing
   (C) Failure probability is increasing
   (D) Any of these
8. If a machine becomes old, then the failure rate expected will be:
   (A) Constant
   (B) Increasing
   (C) Decreasing
   (D) We cannot say
9. Group replacement policy applies to:
   (A) Irreparable items
   (B) Reparable items
   (C) Items that fail partially
   (D) Items that fail completely and suddenly
10. A minimization problem can be converted into a maximization problem by changing the sing of
    coefficient in the
   (A) Constraints
   (B) Objective function
   (C) Both (A) and (B)
   (D) None of the above
11. The time required for two operations cutting and binding of 5 jobs are as follows:

Job No	1	2	3	4	5
Cutting (min)	8	6	2	5	7
Binding (min)	8	7	7	6	4

    What is the optimal sequence of scheduling the job?
   (A) 2-4-1-3-5
   (B) 3-4-2-1-5
   (C) 1-2-3-4-5
   (D) 3-5-2-4-1

12. Sequencing is a subset of:

(A) Routing

(B) Scheduling

(C) Expediting

(D) None of these

13. Priority queue may be classified as:

(A) Finite or infinite

(B) Limited or unlimited

(C) Pre-emptive and non-pre-emptive

(D) All of the above

14. Server mechanism in a queuing system is characterized by:

(A) Server Behaviour

(B) Customer behaviour

(C) Customer in the system

(D) All of the above

15. Customer behaviour in which the customer moves from one queue to another in a multiple channel, situation is

(A) Balking

(B) Reneging

(C) Jockeying

(D) alternating

16. Which of the following characteristics apply to the queuing system?

(A) Customer population

(B) Arrival process

(C) Both (A) & (B)

(D) Neither (A) nor (B)

17. Who is known as father of queuing theory?

(A) George Dantzig

(B) A. K. Erlang

(C) George Kendall

(D) Both (B) and (C)

18. Total time spend by a server with his customers is known as _____.

(A) Utilization Factor

(B) Waiting time

(C) Traffic Intensity

(D) Both (A) and (C)

19. Johnson's rule is used for:

(A) Queuing problem

(B) Sequencing problem

(C) Both (A) and (B)

(D) None of the above

20. The replacement policy that is imposed on an item irrespective of its failure is:

(A) Group replacement

(B) Individual replacement

(C) Repair spare replacement

(D) Successive replacement

21. In an assignment problem involving 5 workers and 5 jobs, total number of assignments possible are_____.

(A) 5

(B) 10

(C) 15

(D) 20

22. The optimum level of inventory is popularly referred to as the _____.
    (A) Minimum stock level
    (B) Re-order stock level
    (C) Economic order quantity
    (D) None of these
23. To resolve degeneracy at the initial solution, a very small quantity is allocated in_____.
    (A) Occupied
    (B) Unoccupied
    (C) No
    (D) Finite
24. In replacement analysis the maintenance cost is a function of:
    (A) Time
    (B) resale value
    (C) Initial investment
    (D) None of these
25. The following classes of costs are usually involved in inventory decisions except:
    (A) Cost of ordering
    (B) Carrying cost
    (C) Cost of shortages
    (D) machining cost
26. The time period between placing an order its receipt in stock is known as:
    (A) Lead time
    (B) Carrying time
    (C) Shortage time
    (D) Over time
27. Group replacement policy is most suitable for:
    (A) Trucks
    (B) Street light bulbs
    (C) Machines
    (D) New cars

28. In converting a less-than-or-equal constraint for use in a simplex table, we must add:

(A) A surplus variable

(B) A slack variable

(C) An artificial variable

(D) Both a surplus and a slack variable

29. In the simplex method, the slack, surplus and artificial variables are:

(A) Multiplied

(B) Negative

(C) Non-negative

(D) Divided

30. An LPP is defined as

Minimize Z=$15x_1 + 12x_2$

subject to

$x_1 + 2x_2 \leq 3$

$2x_1 - 4x_2 \leq 5$

$x_1, x_2 \geq 0$

The objective function of the dual of this LPP is :

(A) Maximize w = $y_1 + y_2$

(B) Maximize w = $y_1 + 2y_2$

(C) Maximize w = $2y_1 - 4y_2$

(D) Maximize w = $3y_1 + 5y_2$

31. In n job and two machines (say M1 and M2) sequencing problems with order of processing the jobs is M1 M2 _____.

(A) Job having minimum time on machine M2 is processed in the first

(B) Job having minimum time on machine M2 is processed in the last

(C) Job having minimum time on machine M1 is processed in the last

(D) Job having maximum time of machine M2 is processed in the last

32. 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

33. In the standard form of LPP all constraints are of _____ type.

(A) Less than or equal to

(B) Greater than or equal to

(C) Equal to

(D) None of the above

34. Dual of the dual is:

(A) Primal

(B) Dual

(C) Either dual or primal

(D) None of these

35. Graphical method is used of there are only _____ variables.

(A) Four

(B) Three

(C) Two

(D) None of the above

36. The total time required to complete all the jobs in a job sequencing problem is known as:

(A) Processing time

(B) Waiting time

(C) Elapsed time

(D) Idle time

37. In the Hungarian method of solving an assignment problem, the row reduction is obtained by:

(A) Dividing each row by the elements of the row above it

(B) Subtracting the elements of the row from the elements of the row above it

(C) Subtracting the smallest element from all other elements of the row

(D) Subtracting all the elements of the row from the highest element in the matrix

38. When the total allocations in a transportation model of m × n size do not equal to m + n – 1 the situation is known as?

(A) Unbalanced situation

(B) Tie situation

(C) Degeneracy

(D) None of the above

39. In a transportation problem where the demand or requirement is equal to the available resource is known as:

(A) Balanced transportation problem

(B) Regular transportation problem

(C) Resource allocation transportation problem

(D) Simple transportation model

40. The Penalty of a row in a transportation problem is obtained by:

(A) Deducting the smallest element in the row from all other elements of the row

(B) Adding the smallest element in the row to all other elements of the row

(C) Deducting the smallest element in the row from the next highest element in that row

(D) Deducting the smallest element in the row from the highest element in that row

41. In the North-West corner method allocations are made:

(A) Starting from the left-hand side top corner

(B) Starting from the right-hand side top corner

(C) Starting from the lowest cost cell

(D) Starting from the lowest requirement and satisfying first

42. The assignment matrix is always a:

(A) Rectangular matrix

(B) Square Matrix

(C) Identity matrix

(D) None of the above

43. The Assignment Problem is solved by:

(A) Complex method

(B) graphical Method

(C) Vector method

(D) Hungarian method

44. The column which is introduced in the matrix to balance the rim requirements, is known as?

(A) Key column

(B) Idle column

(C) Slack column

(D) Dummy column

45. The transportation problem is basically:

(A) Maximization model

(B) Minimization model

(C) Transshipment problem

(D) Iconic model

46. In transportation problem VAM stands for:

(A) Value addition method

(B) Vogel approximation method

(C) Virgenean approximation method

(D) None of these

47. Maximize Z = 11x + 8y subject to $x \leq 4, y \leq 6, x + y \leq 6, x \geq 0, y \geq 0$.

(A) 44 at (4, 2)

(B) 60 at (4, 2)

(C) 62 at (4, 0)

(D) 48 at (4, 2)

48. A set of values of decision variable which satisfies the linear constraints and non-negativity condition of a L.P.P. is called its

(A) Unbounded solution

(B) Optimum solution

(C) Feasible solution

(D) None of these

49. Objective function of a linear programming problem is:

(A) A constraint

(B) Function to be optimized

(C) A relation between the variables

(D) None of these

50. Feasible region in the set of points which satisfy?

(A) The objective functions

(B) Some of the given constraints

(C) All of the given constraints

(D) None of these

51. To resolve degeneracy at the initial solution, a very small quantity is allocated in _____ cell.

(A) Occupied

(B) Basic

(C) Non-basic

(D) Unoccupied

52. _____ method is an alternative method of solving a Linear Programming Problem involving artificial variables.

(A) Simplex method

(B) Big-M

(C) Dual simplex

(D) Graphical

53. If the primal problem has n constraints and m variables then the number of constraints in the dual problem is:

(A) mn

(B) m+n

(C) m-n

(D) m/n

54. The assignment problem is a special case of transportation problem in which?

(A) Number of origins are less than the number of destinations

(B) Number of origins are greater than the number of destinations

(C) Number of origins are greater than or equal to the number of destinations

(D) Number of origins equals the number of destinations

55. The transportation problem deals with the transportation of _____.

(A) A single product from a source to several destinations

(B) A single product from several sources to several destinations

(C) A single product from several sources to a destination

(D) A multi-product from several sources to several destination

56. Cells in the transportation problem having positive allocation will be called:

(A) Cells

(B) Occupied

(C) Unoccupied

(D) Table

57. If primal linear programming problem has a finite solution, then dual linear programming problem should have _____.

(A) Finite solution

(B) Infinite solution

(C) Bounded solution

(D) Alternative solution

58. The right hand side constant of a constraint in a primal problem appears in the corresponding. Dual as _____.

(A) Coefficient in the objective function

(B) A right hand side constant of a function

(C) An input output coefficient

(D) A left hand side constraint coefficient variable

59. If all C_{ij} values in the entering variable column of the simplex table are negative, then _____.

(A) There are multiple solutions

(B) There exist no solution

(C) Solution is degenerate

(D) Solution is unbounded

60. The _____ variable is used for the greater than or equal to ($\geq$) type of constraint.

(A) Only slack

(B) Surplus and Artificial

(C) Only Artificial

(D) Basic

61. Graphical method is also known as _____.

(A) Simplex method

(B) Dual simplex method

(C) Big-M method

(D) Search-Approach method

62. Which among the following costs is the expense of storing inventory for a specified period of time?

(A) Purchasing cost

(B) Carrying cost

(C) Financial cost

(D) Storing cost

63. When a doctor attends to an emergency case leaving his regular service is called:

(A) Reneging

(B) Balking

(C) Pre-emptive queue discipline

(D) Non Pre-Emptive queue discipline

64. The system of loading and unloading of goods usually follows:

(A) LIFO

(B) FIFO

(C) SIRO

(D) SBP

65. Cars arrive at a service station according to Poison's distribution with mean rate of 5 per hour. The Service time per car is exponential with a mean of 10 minutes. At steady state, the average waiting time in the queue is:

(A) 10 minutes

(B) 25 minutes

(C) 25 minutes

(D) 50 minutes

66. The term jockeying in queuing theory refers to:

(A) Not entering the long queue

(B) Leaving the queue

(C) Shifting form one queue to another parallel queue

(D) None of the above

67. Cost of goods available for sale can be calculated be:

(A) Opening stock + purchases

(B) Closing stock + purchases

(C) Opening stock + purchases – closing stock

(D) None

68. The unused material are returned to stores with a material and _____ note.

(A) Acceptance

(B) Transfer

(C) Return

(D) None

69. In the formula of Economic Order Quantity, the alphabet 'O' stands for_____.

(A) Ordering level

(B) Ordering cost

(C) Ordering & carrying cost

(D) None

70. Replacement is said to be necessary if:

(A) Failure rate is increasing

(B) Failure cost is increasing

(C) Failure probability is increasing

(D) Any of these

71. A machine is replaced when an average running cost?

(A) Is not equal to the current running cost

(B) Till the current period is greater than that of next period

(C) Of the current period is greater than that of the next period

(D) of the current period is less than that of next period

72. If the order quantity (size of order) is increased, _____.

(A) Holding costs decrease and ordering costs increase

(B) Holding costs increase and ordering costs decrease

(C) The total costs increase and then decrease

(D) Storage cost as well as stock out cost increases

73. 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) Modified distribution method

(D) All of the above

74. The initial solution of a transportation problem can be obtained by applying any known method. However, the only condition is that:

(A) The solution be optimal

(B) The rim conditions are satisfied

(C) The solution not be degenerate

(D) All of the above

75. The purpose of dummy source or dummy destination in a transportation problem is to:

(A) Prevent the solution from becoming degenerate

(B) Obtain a balance between total supply and total demand

(C) Make certain that the total cost does not exceed some specified figure

(D) Provide a means of representing a dummy problem

76. Minimize Z = _____.

(A) -maximize (Z)

(B) -maximize(-Z)

(C) Maximize(-Z)

(D) None of the above

77. Which technique is used in finding a solution for optimizing a given objective, such as profit maximization or cost reduction under certain constraints?

(A) Quailing theory

(B) Waiting Line

(C) Both (A) and (B)

(D) Linear Programming

78. Or has a characteristic that it is done by a team of:

(A) Scientists

(B) Mathematicians

(C) Academics

(D) All of the above

79. 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)

80. In operations research, the _____ are prepared for situations.

(A) Mathematical models

(B) Physical models diagrammatic

(C) Diagrammatic models

(D) None of these

81. In marking assignments, which of the following should be preferred?

(A) Only row having single zero

(B) Only column having single zero

(C) Only row/column having single zero

(D) Column having more than one zero

82. Maximization assignment problem is transformed into a minimization problem by_____.

(A) Adding each entry in a column from the maximum value in that column

(B) Subtracting each entry in a column form the maximum value in that column

(C) Subtracting each entry in the table from the maximum value in that table

(D) Adding each entry in the table from the maximum value in that table

83. While solving an assignment problem, an activity is assigned to a resource with zero opportunity cost because objective is to _____.

(A) Minimize total cost of assignment

(B) Reduce total cost of assignment to zero

(C) Reduce cost of that assignment to zero

(D) Maximize total cost of assignment

84. Given arrival rate = 15/hr., service rate = 20/hr., the value of traffic intensity is _____.

(A) 3/4

(B) 4/3

(C) 3/5

(D) 4/5

85. When D = 18000, holding cost = Rs. 1.20, set-up cost = Rs. 400, EOQ = _____.

(A) 3465

(B) 3750

(C) 3500

(D) 4000

86. In the optimal simplex table, $Z_j - C_j = 0$ value indicates _____.

(A) Alternative solution

(B) Bounded solution

(C) Infeasible solution

(D) Unbounded solution

87. The process that performs the services to the customer is known as _____.

(A) Queue

(B) Service channel

(C) Customers

(D) Server

88. The coefficient of an artificial variable in the objective function of penalty method are always assumed to be _____.

(A) 0

(B) 1

(C) M

(D) -M

89. The average arrival rate in a single server queuing system is 10 customers per hour and average service rate is 15 customers per hour. The average time that a customer must wait before it is taken up for service shall be _____ minutes.

(A) 6

(B) 8

(C) 10

(D) 12

90. The assignment problem will have alternate solutions when the total opportunity cost matrix has:

(A) At least one zero in each row and column

(B) When all rows have two zero

(C) When there is a tie between zero opportunity cost cells

(D) If two diagonal elements are zeros

91. Linear Programming Problem is a technique of finding the:

(A) Optimal value

(B) approximate value

(C) Initial value

(D) Infeasible value

92. Which of the following is true in case of simplex method?

(A) The constants of constraints may be positive or negative

(B) Inequalities are not converted into equations

(C) It cannot be used for two variable problems

(D) It is an iterative procedure

93. The simplex method is the basic method for:

(A) Value analysis

(B) Operation research

(C) Linear programming

(D) Model analysis

94. In simplex, a maximization problem is optimal when $C_j - Z_J$ values are?

(A) Either zero or positive

(B) Either zero or negative

(C) Only positive

(D) Only negative

95. The Intersection value of key column and key row is called:

(A) Vital element

(B) Important element

(C) key element

(D) Basic element

96. The Cj row in a simplex table for maximization represents:

(A) Profit per unit

(B) Constraints

(C) Gross profit

(D) Net profit

97. The method used to solve LPP with use of artificial variables is called:

(A) Dual simplex

(B) Graphical

(C) Big-M

(D) Transportation Problem

98. In simplex method slack variables are assigned zero coefficients because:

(A) No contribution in objective function

(B) High contribution in objective function

(C) Divisor contribution in objective function

(D) Base contribution in objective function

99. Which of the following is a type of Linear programming problem?

(A) Manufacturing problem

(B) Diet problem

(C) transportation problems

(D) All of the above

100. The maximum value of $Z = 3x + 4y$ subjected to constraints $x + y \leq 4$, $x \geq 0$ and $y \geq 0$ is:

(A) 12

(B) 14

(C) 16

(D) None of the above

******

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1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the answer will be marked as wrong.**
3. Every question has same marks. Every question you attempt correctly, marks will be given according to that.
4. Every answer should be marked only on Answer Booklet **(O.M.R ANSWER SHEET).** Answer marked anywhere else other than the determined place will not be considered valid.
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