MULTIPLE CHOICE QUESTIONS

DECISION SCIENCE

1. Decision Science approach is
   a. Multi-disciplinary
   b. Scientific
   c. Intuitive
   d. All of the above

2. For analyzing a problem, decision-makers should study
   a. Its qualitative aspects
   b. Its quantitative aspects
   c. Both a & b
   d. Neither a nor b

3. Decision variables are
   a. Controllable
   b. Uncontrollable
   c. Parameters
   d. None of the above

4. A model is
   a. An essence of reality
   b. An approximation
   c. An idealization
   d. All of the above

5. Managerial decisions are based on
   a. An evaluation of quantitative data
   b. The use of qualitative factors
   c. Results generated by formal models
   d. All of the above

6. The use of decision models
   a. Is possible when the variables value is known
   b. Reduces the scope of judgement & intuition known with certainty in decision-making
   c. Require the use of computer software
   d. None of the above

7. Every mathematical model
   a. Must be deterministic
   b. Requires computer aid for its solution
   c. Represents data in numerical form
   d. All of the above

8. A physical model is example of


a. An iconic model
b. An analogue model
c. A verbal model
d. A mathematical model

9. An optimization model
   a. Provides the best decision
   b. Provides decision within its limited context
   c. Helps in evaluating various alternatives
   d. All of the above

10. The quantitative approach to decision analysis is a
    a. Logical approach
    b. Rational approach
    c. Scientific approach
    d. All of the above

11. The qualitative approach to decision analysis relies on
    a. Experience
    b. Judgement
    c. Intuition
    d. All of the above

12. The mathematical model of an LP problem is important because
    a. It helps in converting the verbal description & numerical data into mathematical expression
    b. Decision-makers prefer to work with formal models
    c. It captures the relevant relationship among decision factors
    d. It enables the use of algebraic technique

13. Linear programming is a
    a. Constrained optimization technique
    b. Technique for economic allocation of limited resources
    c. Mathematical technique
    d. All of the above

14. A constraint in an LP model restricts
    a. Value of objective function
    b. Value of a decision variable
    c. Use of the available resources
    d. All of the above

15. The distinguishing feature of an LP model is
    a. Relationship among all variables is linear
    b. It has single objective function & constraints
    c. Value of decision variables is non-negative
    d. All of the above

16. Constraints in an LP model represents
    a. Limitations
    b. Requirements
c. Balancing limitations & requirements
d. All of the above

17. Non-negativity condition is an important component of LP model because
   a. Variables value should remain under the control of the decision-maker
   b. Value of variables make sense & correspond to real-world problems
   c. Variables are interrelated in terms of limited resources
   d. None of the above

18. Before formulating a formal LP model, it is better to
   a. Express each constrain in words
   b. Express the objective function in words
   c. Verbally identify decision variables
   d. All of the above

19. Maximization of objective function in an LP model means
   a. Value occurs at allowable set of decisions
   b. Highest value is chosen among allowable decisions
   c. Neither of above
   d. Both a & b

20. Which of the following is not a characteristic of the LP model
   a. Alternative courses of action
   b. An objective function of maximization type
   c. Limited amount of resources
   d. Non-negativity condition on the value of decision variables.

21. The best use of linear programming technique is to find an optimal use of
   a. Money
   b. Manpower
   c. Machine
   d. All of the above

22. Which of the following is not a characteristic of the LP
   a. Resources must be limited
   b. Only one objective function
   c. Parameters value remains constant during the planning period
   d. The problem must be of minimization type

23. Non-negativity condition in an LP model implies
   a. A positive coefficient of variables in objective function
   b. A positive coefficient of variables in any constraint
   c. Non-negative value of resources
   d. None of the above

24. Which of the following is an assumption of an LP model
   a. Divisibility
   b. Proportionality
   c. Additivity
   d. All of the above
25. Which of the following is a limitation associated with an LP model
   a. The relationship among decision variables in linear
   b. No guarantee to get integer valued solutions
   c. No consideration of effect of time & uncertainty on LP model
   d. All of the above

26. The graphical method of LP problem uses
   a. Objective function equation
   b. Constraint equations
   c. Linear equations
   d. All of the above

27. 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

28. Which of the following statements is true with respect to the optimal solution of an LP problem
   a. Every LP problem has an optimal solution
   b. Optimal solution of an LP problem always occurs at an extreme point
   c. At optimal solution all resources are completely used
   d. If an optimal solution exists, there will always be at least one at a corner

29. An iso-profit line represents
   a. An infinite number of solutions all of which yield the same profit
   b. An infinite number of solution all of which yield the same cost
   c. An infinite number of optimal solutions
   d. A boundary of the feasible region

30. If an iso-profit line yielding the optimal solution coincides with a constraint line, then
   a. The solution is unbounded
   b. The solution is infeasible
   c. The constraint which coincides is redundant
   d. None of the above

31. While plotting constraints on a graph paper, terminal points on both the axes are connected by a straight line because
   a. The resources are limited in supply
   b. The objective function as a linear function
   c. The constraints are linear equations or inequalities
   d. All of the above

32. A constraint in an LP model becomes redundant because
   a. Two iso-profit line may be parallel to each other
   b. The solution is unbounded
   c. This constraint is not satisfied by the solution values
   d. None of the above

33. If two constraints do not intersect in the positive quadrant of the graph, then
a. The problem is infeasible
b. The solution is unbounded
c. One of the constraints is redundant
d. None of the above

34. Constraints in LP problem are called active if they
   a. Represent optimal solution
   b. At optimality do not consume all the available resources
   c. Both a & b
   d. None of the above

35. The solution space (region) of an LP problem is unbounded due to
   a. An incorrect formulation of the LP model
   b. Objective function is unbounded
   c. Neither a nor b
   d. Both a & b

36. While solving a LP model graphically, the area bounded by the constraints is called
   a. Feasible region
   b. Infeasible region
   c. Unbounded solution
   d. None of the above

37. Alternative solutions exist of an LP model when
   a. One of the constraints is redundant
   b. Objective function equation is parallel to one of the constraints
   c. Two constraints are parallel
   d. All of the above

38. While solving a LP problem, infeasibility may be removed by
   a. Adding another constraint
   b. Adding another variable
   c. Removing a constraint
   d. Removing a variable

39. If a non-redundant constraint is removed from an LP problem then
   a. Feasible region will become larger
   b. Feasible region will become smaller
   c. Solution will become infeasible
   d. None of the above

40. If one of the constraint of an equation in an LP problem has an unbounded solution, then
   a. Solution to such LP problem must be degenerate
   b. Feasible region should have a line segment
   c. Alternative solutions exist
   d. None of the above

41. 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

42. The dummy source or destination in a transportation problem is added to  
a. Satisfy rim conditions  
b. Prevent solution from becoming degenerate  
c. Ensure that total cost does not exceed a limit  
d. None of the above

43. 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

44. An alternative optimal solution to a minimization transportation problem exists whenever opportunity cost corresponding to unused route of transportation is:  
a. Positive & greater than zero  
b. Positive with at least one equal to zero  
c. Negative with at least one equal to zero  
d. None of the above

45. One disadvantage of using North-West Corner rule to find initial solution to the transportation problem is that  
a. It is complicated to use  
b. It does not take into account cost of transportation  
c. It leads to a degenerate initial solution  
d. All of the above

46. The solution to a transportation problem with ‘m’ rows (supplies) & ‘n’ columns (destination) is feasible if number of positive allocations are  
a. m+n  
b. m*n  
c. m+n-1  
d. m+n+1

47. If an opportunity cost value is used for an unused cell to test optimality, it should be  
a. Equal to zero  
b. Most negative number  
c. Most positive number  
d. Any value

48. During an iteration while moving from one solution to the next, degeneracy may occur when  
a. The closed path indicates a diagonal move  
b. Two or more occupied cells are on the closed path but neither of them represents a corner of the path.  
c. Two or more occupied cells on the closed path with minus sign are tied for lowest circled value
49. The large negative opportunity cost value in an unused cell in a transportation table is chosen to improve the current solution because
   a. It represents per unit cost reduction
   b. It represents per unit cost improvement
   c. It ensure no rim requirement violation
   d. None of the above

50. The smallest quantity is chosen at the corners of the closed path with negative sign to be assigned at unused cell because
   a. It improve the total cost
   b. It does not disturb rim conditions
   c. It ensure feasible solution
   d. All of the above

51. When total supply is equal to total demand in a transportation problem, the problem is said to be
   a. Balanced
   b. Unbalanced
   c. Degenerate
   d. None of the above

52. 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

53. The degeneracy in the transportation problem indicates that
   a. Dummy allocation(s) needs to be added
   b. The problem has no feasible solution
   c. The multiple optimal solution exist
   d. a & b but not c

54. An assignment problem is considered as a particular case of a transportation problem because
   a. The number of rows equals columns
   b. All \( x_{ij} = 0 \) or 1
   c. All rim conditions are 1
   d. All of the above

55. An optimal assignment requires that the maximum number of lines that can be drawn through squares with zero opportunity cost be equal to the number of
   a. Rows or columns
   b. Rows & columns
   c. Rows + columns – 1
   d. None of the above
56. While solving an assignment problem, an activity is assigned to a resource through a square with zero opportunity cost because the objective is to
   a. Minimize total cost of assignment
   b. Reduce the cost of assignment to zero
   c. Reduce the cost of that particular assignment to zero
   d. All of the above

57. The method used for solving an assignment problem is called
   a. Reduced matrix method
   b. MODI method
   c. Hungarian method
   d. None of the above

58. The purpose of a dummy row or column in an assignment problem is to
   a. Obtain balance between total activities & total resources
   b. Prevent a solution from becoming degenerate
   c. Provide a means of representing a dummy problem
   d. None of the above

59. Maximization assignment problem is transformed into a minimization problem by
   a. Adding each entry in a column from the maximization value in that column
   b. Subtracting each entry in a column from the maximum value in that column
   c. Subtracting each entry in the table from the maximum value in that table
   d. Any one of the above

60. If there were n workers & n jobs there would be
   a. n! solutions
   b. (n-1)! solutions
   c. (n!)^n solutions
   d. n solutions

61. An assignment problem can be solved by
   a. Simplex method
   b. Transportation method
   c. Both a & b
   d. None of the above

62. For a salesman who has to visit n cities which of the following are the ways of his tour plan
   a. n!
   b. (n+1)!
   c. (n-1)!
   d. n

63. The assignment problem
   a. Requires that only one activity be assigned to each resource
   b. Is a special case of transportation problem
   c. Can be used to maximize resources
   d. All of the above

64. An assignment problem is a special case of transportation problem, where
a. Number of rows equals number of columns
b. All rim conditions are 1
c. Values of each decision variable is either 0 or 1
d. All of the above

65. Every basic feasible solution of a general assignment problem, having a square pay-off matrix of order, n should have assignments equal to
   a. 2n+1
   b. 2n-1
   c. m+n-1
   d. m+n

66. To proceed with the MODI algorithm for solving an assignment problem, the number of dummy allocations need to be added are
   a. n
   b. 2n
   c. n-1
   d. 2n-1

67. The Hungarian method for solving an assignment problem can also be used to solve
   a. A transportation problem
   b. A travelling salesman problem
   c. A LP problem
   d. Both a & b

68. An optimal solution of an assignment problem can be obtained only if
   a. Each row & column has only one zero element
   b. Each row & column has at least one zero element
   c. The data is arrangement in a square matrix
   d. None of the above

69. Customer behavior in which the customer moves from one queue to another in a multiple channel situation is
   a. Balking
   b. Reneging
   c. Jockeying
   d. Altering

70. Which of the following characteristics apply to queuing system
   a. Customer population
   b. Arrival process
   c. Both a & b
   d. Neither a nor b

71. Which of the following is not a key operating characteristics apply to queuing system
   a. Utilization factor
   b. Percent idle time
   c. Average time spent waiting in the system & queue
   d. None of the above
72. Priority queue discipline may be classified as
   a. Finite or infinite
   b. Limited & unlimited
   c. Pre-emptive or non-pre-emptive
   d. All of the above

73. The calling population is assumed to be infinite when
   a. Arrivals are independent of each other
   b. Capacity of the system is infinite
   c. Service rate is faster than arrival rate
   d. All of the above

74. Which of the cost estimates & performance measures are not used for economic analysis of a queuing system
   a. Cost per server per unit of time
   b. Cost per unit of time for a customer waiting in the system
   c. Average number of customers in the system
   d. Average waiting time of customers in the system

75. A calling population is considered to be infinite when
   a. All customers arrive at once
   b. Arrivals are independent of each other
   c. Arrivals are dependent upon each other
   d. All of the above

76. The cost of providing service in a queuing system decreases with
   a. Decreased average waiting time in the queue
   b. Decreased arrival rate
   c. Increased arrival rate
   d. None of the above

77. Service mechanism in a queuing system is characterized by
   a. Server’s behavior
   b. Customer’s behavior
   c. Customers in the system
   d. All of the above

78. Probabilities of occurrence of any state are
   a. Collectively exhaustive
   b. Mutually exclusive
   c. Representing one of the finite numbers of states of nature in the system
   d. All of the above

79. In a matrix of transition probability, the probability values should add up to one in each
   a. Row
   b. Column
   c. Diagonal
   d. All of the above

80. In a matrix of transition probability, the element $a_{ij}$ where $i=j$ is a
81. In Markov analysis, state probabilities must
   a. Sum to one
   b. Be less than one
   c. Be greater than one
   d. None of the above

82. State transition probabilities in the Markov chain should
   a. Sum to 1
   b. Be less than 1
   c. Be greater than 1
   d. None of the above

83. If a matrix of transition probability is of the order n*n, then the number of equilibrium equations would be
   a. n
   b. n-1
   c. n+1
   d. None of the above

84. In the long run, the state probabilities become 0 & 1
   a. In no case
   b. In same cases
   c. In all cases
   d. Cannot say

85. While calculating equilibrium probabilities for a Markov process, it is assumed that
   a. There is a single absorbing state
   b. Transition probabilities do not change
   c. There is a single non-absorbing state
   d. None of the above

86. The first-order Markov chain is generally used when
   a. Transition probabilities are fairly stable
   b. Change in transition probabilities is random
   c. No sufficient data are available
   d. All of the above

87. A problem is classified as Markov chain provided
   a. There are finite number of possible states
   b. States are collectively exhaustive & mutually exclusive
   c. Long-run probabilities of being in a particular state will be constant over time
   d. All of the above

88. The transition matrix elements remain positive from one point to the next. This property is known as:
a. Steady-state property
b. Equilibrium property
c. Regular property
d. All of the above

89. Markov analysis is useful for:
   a. Predicting the state of the system at some future time
   b. Calculating transition probabilities at some future time
   c. All of the above
   d. None of the above

90. Which of the following is not one of the assumptions of Markov analysis:
   a. There are a limited number of possible states
   b. A future state can be predicted from the preceding one
   c. There are limited number of future periods
   d. All of the above

91. An advantage of simulation as opposed to optimization is that
   a. Several options of measure of performance can be examined
   b. Complex real-life problems can be studied
   c. It is applicable in cases where there is an element of randomness in a system
   d. All of the above

92. The purpose of using simulation technique is to
   a. Imitate a real-world situation
   b. Understand properties & operating characteristics of complex real-life problems
   c. Reduce the cost of experiment on a model of real situation
   d. All of the above

93. Which of the following is not the special purpose simulation language
   a. BASIC
   b. GPSS
   c. GASP
   d. SIMSCRIPT

94. As simulation is not an analytical model, therefore the result of simulation must be viewed as
   a. Unrealistic
   b. Exact
   c. Approximation
   d. Simplified

95. While assigning random numbers in Monte Carlo simulation, it is
   a. Not necessary to assign the exact range of random number interval as the probability
   b. Necessary to develop a cumulative probability distribution
   c. Necessary to assign the particular appropriate random numbers
   d. All of the above

96. Analytical results are taken into consideration before a simulation study so as to
   a. Identify suitable values of the system parameters
   b. Determine the optimal decision
c. Identify suitable values of decision variables for the specific choices of system parameters
d. All of the above

97. Biased random sampling is made from among alternatives which have
   a. Equal probability
   b. Unequal probability
   c. Probability which do not sum to 1
d. None of the above

98. Large complicated simulation models are appreciated because
   a. Their average costs are not well-defined
   b. It is difficult to create the appropriate events
   c. They may be expensive to write and use as an experimental device
d. All of the above

99. Simulation should not be applied in all cases because it
   a. Requires considerable talent for model building & extensive computer programming efforts
   b. Consumes much computer time
   c. Provides at best approximate solution to problem
d. All of the above

100. Simulation is defined as
   a. A technique that uses computers
   b. An approach for reproducing the processes by which events by chance & changes are created in a computer
   c. A procedure for testing & experimenting on models to answer what if ____, then so & so ___ types of questions
d. All of the above

101. The general purpose system simulation language
   a. Requires programme writing
   b. Does not require programme writing
   c. Requires predefined coding forms
d. Needs a set of equations to describe a system

102. Special simulation languages are useful because they
   a. Reduce programme preparation time & cost
   b. Have the capability to generate random variables
   c. Require no prior programming knowledge
d. All of the above

103. Few causes of simulation analysis failure are
   a. Inadequate level of user participation
   b. Inappropriate levels of detail
   c. Incomplete mix of essential skills
d. All of the above

104. To make simulation more popular, we need to avoid
   a. Large cost over runs
   b. Prolonged delays
c. User dissatisfaction with simulation results
d. All of the above

105. The important step required for simulation approach in solving a problem is to
a. Test & validate the model
b. Design the experiment
c. Conduct the experiment
d. All of the above

DECISION SCIENCE - ANSWER KEY

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