Class- TYBMS Sem- VI (2019-20)

Sub-Operation Research

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Mutiple choice Questions:-

Chp 1- Introduction to Operations Research

1. Operations Research (OR), which is a very powerful tool for _____ .

   a) Research **b) Decision-making**

   c) Operations d) None of the above

2. Who coined the term Operations Research?

   a) J.F. McCloskey b) F.N.Trefethen

   c) P.F. Adams **d) Both A and B**

3. This innovative science of Operations Research was disclosed during ____ .

   a) Civil War b) World War I

   c) World War II d) Industrial Revolution

4. Operations Research was known as an ability to win a war without really going in to a _____ .

   a) Battle field b) Fighting

   c) War **d) Both A and B**

5. Who defined Operations Research as scientific method of providing executive departments with a quantative basis for decisions regarding the operations under their control ?

   a) Morse and Kimball (1946) b) P.M.S. Backett (1948)

   c) E.L. Arnoff and M.J. Netzorg d) None of the above

6. Who defined Operations Research as scientific approach to problem solving for executive management ?

   a) E.L. Arnoff b) P.M.S. Backett

   c) H.M. Wagner d) None of the above

7. Who defined Operations Research as an aid for the executive in marketing his decisions by providing him with the quantitative information based on the scientific method analysis ?

a) Kitte b) H.M. Wagner

c) E.L. Arnoff d) None of the above

8. Operations Research has the characteristics the it is done by a term of ___ .

a) Scientists b) Mathematicians

c) Academics d) All of the above

9. There is a great scope for _____ working as a term to solve problems of defence by using the Operations Research approach.

a) Economists b) Administrators

c) Statisticians and Technicians **d) All of the above**

10. Operations Research emphasizes on the overall approach to the system. This characteristics of Operations Research is often referred as _____ .

a) System Orientation b) Decision-making

c) Interdisciplinary Team Approach **d) None of the above**

11. Operations Research cannot give perfect _____ to problems.

a) Answers b) Solutions

c) Both A and B d) Decisions

12. Operations Research simply helps in improving the _____ of the solution but does not result in a perfect solution.

a) Quality b) Clarity

c) Look d) None of the above

13. Operations Research involves_____ attack of complex problems to arrive at the optimum solution.

a) Scientific b) Systematic

c) Both A and B d) Statistical

14. Operations Research is a _____ .

a) Science b) Art

c) Mathematics **d) Both A and B**

CHP 2- LINEAR PROGRAMMING PROBLEMS: INTRODUCTION & FORMULATION

15. 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.

16. Linear programming is a

a) Constrained optimization technique

b) Technique for economic allocation of limited resources

c) Mathematical technique

d) All of the above

17. A constraint in an LPP model restricts

a) Value of the objective function

b) Value of decision variable

c) Use of available resources

d) All of the above

18. 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

19. Constraints in an LP model represents

a) Limitations

b) Requirements

c) Balancing limitations & requirements

d) All of the above

20. 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

21. 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

22. 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

23. 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.

24. 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**

25. Which of the following is not a characteristics of the LP

    a) Resources must be limited

    b) Only one objective function

    c) Parameters value remains constant during the planning period

    d) The problems must be of minimization type

26. Which of the following is an limitation associated with an LP model

    a) The relationship among decision variables is linear

    b) No guarantee to get integer valued solution

    c) No consideration of effect of time & uncertainty in LP model

    d) All of the above

27. Who developed Linear Programming for the purpose of scheduling the complicated procurement activities of the United States Air Force?

    a) George B. Dantzig b) James B. Dantzig

    c) George B. Dante d) George V. Dantzig

28. _____ assumptions means the prior knowledge of all the coefficients in the objective function, the coefficients of the constraints and the resource value.

    a) Proportionality **b) Certainty**

    c) Finite choices d) Continuity

29. The word 'Linear' means that the relationships are represented by____.

    a) Diagonal lines b) Curved lines

    c) Straight lines d) Slanting lines

30. The word 'programming' means taking decisions _____.

    a) Systematically b) Rapidly

    c) Slowly d) Instantly

31. LP is a major innovation since _____ in the fields of business decision-making, particularly under condition of certainty.

    a) Industrial Revolution b) World War I

    c) World War II d) French Revolution

32. Linear Programming has been successful applied in ____.

    a) Agricultural b) Industrial applications

    c) Both A & B d) Manufacturing

33. The method of formal calculations often termed as Linear Programming was developed later in which year ?

    a) 1947 b) 1988

    c) 1957 d) 1944

CHP 3- LINEAR PROGRAMMING PROBLEMS: GRAPHICAL METHOD

34. The graphical method of LP problem uses

    a) Objective function equation b) Constraint equations

    c) Linear equations **d) All of the above**

35. 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

36. 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

37. 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

38. While plotting constraints on a graph paper, terminal points on both the axes are connected by 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

39. 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) Note of the above

40. 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

41. 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

42. 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

43. 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

44. 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

45. 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

46. 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

47. Graphic method can be applied to solve a LPP when there are only _____ variable

    a) Four b) More than One

    c) Two d) Three

48. If the feasible region of a LPP is empty, the solution is _____ .

    a) Infeasible b) Unbounded

c) Alternative d) None of the above

UNIT - II CHP. 5 - ASSIGNMENT PROBLEM: HUNGARIAN METHOD

49. An assignment problem is considered as a particular case of a transportation problem because

a) The number of rows equals columns b) All xij = 0 or 1

c) All rim conditions are 1 **d) All of the above**

50. 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**

51. 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

52. 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

53. The purchase 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

54. 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

55. If there were n workers & n jobs there would be

a) n! Solutions b) (n-1)! Solutions

c) (n!) solutions d) n solutions

56. 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

57. 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

58. For maximization in assignment problem, the objective is to maximize the _____ .

a) Profit b) optimization

c) cost d) None of the above

59. If no, of rows are equal to number of columns and the Matrix elements are Time elements then the problem is :

a) Balanced and Minimization Transportation Problem

b) Unbalanced and Minimization Transportation Problem

c) Balanced and Minimization Assignment Problem

d) Unbalanced and Minimization Assignment Problem

60. If no. of rows are not equal to number of columns and the Matrix elements are Profit elements then the problem is :

a) Balanced and Maximization Transportation Problem

b) Unbalanced and Maximization Transportation Problem

c) Balanced and Maximization Assignment Problem

d) Unbalanced and Maximization Assignment Problem

CHP. 6 - TRANSPORTATION PROBLEMS

61. 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

62. 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

63. 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

64. An alternative optimal solution to a minimization transportation problems 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

65. 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 degenerate initial solution

d) All of the above

66. 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

67. 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

68. 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.

d) Either of the above

69. In a Transportation Problem, the smallest quantity is chosen at the corners of the closed path with negative sign to be assigned at unused cell because

a) It improves the total cost b) It does not disturb rim conditions

c) It ensure feasible solution d) All of the above

70. 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

71. 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

72. If Total Supply is equal to Total Demand and the Matrix elements are Time elements then the problem is

a) Balanced and Minimization Transportation Problem

b) Unbalanced and Minimization Transportation Problem

c) Balanced and Minimization Assignment Problem

d) Unbalanced and Minimization Assignment Problem

73. The solution of any transportation problem is obtained in how many stages?

a) Five b) Four c) Three **d) Two**

74. An optimal solution is the _____ stage of a solution obtained by improving the initial solution

a) Third b) First **c) Second** d) Final

75. MODI method is used to obtain _____

a) Optimal solutions b) Optimality test

c) Both A and B **d)** Optimization

76. Any feasible solution to a transportation problem containing m origins and n destinations is said to be _____ .

a) Independent b) Degenerate **c) Non-degenerate** d) Both A and B

77. A path formed by allowing horizontal and vertical lines and the entire corner cells of which are occupied is called a _____ .

a) Occupied path b) Open path

c) Closed path d) None of the above

78. Transportation algorithm can be used for minimizing the transportation cost of _____ from O origins and D destinations.

a) Goods b) Products

c) Items d) None of the above

79. If demand is lesser than supply then dummy demand node is added to make it a _____ .

a) Simple problem **b) Balanced problem**

c) Transportation problem d) None of the above

UNIT 3 CHP. 7- NETWORK ANALYSIS

80. What network model enables engineer managers to schedule, monitor, and control large and complex projects by using only one time factor per activity?

a) Forecasting **b) Critical path method**

c) Program evaluation review technique d) Simulation

81. What network model enables engineer managers to schedule, monitor, and control large and complex projects by employing three time estimate for each activity?

a) Forecasting **b) Program evaluation review technique**

c) Critical path method d) Simulation

82. For a project manager to have an effective means of identifying and communicating the planned activitiesand their interrelationships, he must use a network technique. One of the network techniques is commonly known as PERT. What does Pert stands for?

a) Project evaluation review technique b) Program evaluation review technique

c) Path evaluation review technique d) Program execution review technique

83. What is the benefit of using PERT/CPM network as integral component of project management?

a) They furnish a consistent framework for planning, scheduling, monitoring and controlling project.

b) They illustrate the interdependencies of all tasks

c) They can be used to estimate the expected project completion dares as well as the probability that the project will be completed by a specific date

d) All of the above

84. The CPM was developed by Rand and Walker in which year?

a) 1957 b) 1958

c) 1959 d) 1960

85. In what year was PERT developed?

a) 1957 b) 1959

c) 1960 **d) 1958**

86. In a PERT/CPM network, computing the critical path requires

a) determining the total project duration

b) assigning the earliest finish time for an activity as the earliest start time for the next

c) that the latest finishing time for an activity not delay the overall project beyond initial expectation

d) a sophisticated and complex computer program

87. At the completion of the forward and backward passes, the slack for an activity is given by the

a) difference between early start and early finish

b) difference between early start and latest finish

c) difference between latest start and early finish

d) amount of idle labor on the critical path

88. The basic difference between PERT and CPM is that

a) PERT deals with events and CPM with activities

b) Critical Path is determined in PERT only

c) Costs are considered on CPM only and not in PERT

d) Guessed times are used in PERT and evaluated times in CPM

89. In a PERT network, the earliest (activity) start time is the

a) Earliest time that an activity can be finished without delaying the entire project.

b) Latest time that an activity can be started without delaying the entire project.

c) Earliest time that an activity can start without violation of precedence requirements.

d) Latest time that an activity can be finished without delaying the entire project

90. The time by which activity completion time can be delayed without affecting the start of succeeding activities, is known as :

a) Interfering float b) Total float

c) Duration **d) Free float**

91. Pick up the incorrect statement from the following :

a) The activity which consumes maximum time, is called a node

b) The activity is the time consuming part of a project

c) The beginning and end of a job, are called events

d) Logically and sequentially connected activities and events form a network

92. The artificial activity which indicates that an activity following it, cannot be started unless the preceding activity is complete, is known as :

a) Free float b) Event

c) Dummy d) Constant

93. An important assumption in PERT calculations is :

a) Activity times are normally distributed

b) Activity times are independent.

c) A and B

d) None of the above.

94. In PERT, slack time equals

a) EST + t **b) LST – EST**

c) Zero d) EFT – EST

95. A dummy activity is required when

a) Two or more activities have the same starting events.

b) Two or more activities have different ending events.

c) Two or more activities have the same ending events.

d) The network contains two or more activities that have identical starting and ending events.

96. PERT analysis computes the variance of the total project completion time as

a) The sum of the variances of all activities in the project.

b) The sum of the variances of all activities not on the critical path.

c) The variance of the final activity of the project.

d) The sum of the variances of all activities on the critical path.

97. If an activity has zero activity slack it

a) means that the project is expected to be delayed.

b) must be a dummy activity.

c) is on the critical path.

d) all of the above

98. Pick the wrong relationship:

a) Interfering float = Total float – Free float

b) Total float = Free float + Independent float

c) Total float ≥ Free float ≥ Independent float

d) Free float = Total float – Head event slack

99. Choose the correct condition of the following:

a) Crash Direct Cost > Normal Direct Cost, Crash time > Normal time

b) Crash Direct Cost < Normal Direct Cost, Crash time > Normal time

c) Crash Direct Cost < Normal Direct Cost, Crash time < Normal time

d) Crash Direct Cost > Normal Direct Cost, Crash time < Normal time

100. Indirect cost _____ when the project is crashed

a) Increases **b) Decreases**

c) Becomes zero d) None of the above

101. Which of these statements regarding time – cost trade - offs in CPM networks is true?

a) Crashing is not possible unless there are multiple critical paths.

b) Crashing a project often reduces the duration of non-critical, activities.

c) Activities not on the critical path can never by on the critical path, even after crashing.

d) Crashing shortens the project duration by assigning more resources to one or more of the critical tasks.

102. Activity to be crashed is selected based on :

a) critical activity with minimum crash cost

b) non-critical activity with minimum crash cost

c) critical activity with maximum crash cost

d) non-critical activity with maximum crash cost

103. Which of the following is not a concept associated with CPM

a) Normal Time **b) Probability**

c) Normal Cost c) Crash Cost

UNIT 4 CHP. 8 - JOB SEQUENCING PROBLEMS

104. An approach that minimizes the total time for sequencing a group of jobs through two work centers while minimizing total idle time in the work centers.

a) Gross Materials Requirement Plan b) Load Report

c) Lot – for – Lot **d) Johnson's Rule**

105. When a set of jobs must pass through two workstations whose sequence is fixed, _____ is the rule most commonly applied

a) Johnson's Rule b) Earliest Due Date Rule

c) First Come, First Serve Rule d) Slack Time Remaining

106. _____ is the process of determining which job to start first and in what order other jobs should be processed on the machine or in work centre

a) job sequencing b) Priority rules

c) Batch production d) None of these

107. In sequencing if smallest time for a job belongs to machine- 1 then that job has to placed _____ of the sequence.

a) in the middle **b) in the starting**

c) at end d) none of them

108. In sequencing the time involved in moving jobs from one machine to another is _____ .

a) negligible b) positive number

c) significant d) none of them

109. _____ operation is carried out on a machine at a time.

a) Two b) at least one

c) only one d) non of them

110. Processing time Mij's are _____ of order of processing the jobs.

a) dependent b) negligible

c) independent d) none of them

111. If there are n jobs to be performed, one at a time, on each of m machines, the possible sequences would be

a) (n!)m **b)** (n)m c) (m!)n d) (m)n

112. The minimum processing time on machine M1 and M2 are related as

a) Min t1j = Max t2j **b) Min t1j ≥ Max t2j**

c) Min t1j ≤ Max t2j d) Min t2j ≥ Max t1j

UNIT - IV CHP. 9 - THEORY OF GAMES

113. Who developed the Game Theory.

a) J. R. Hicks b) William J. Baumol

c) Neumann Morgenstern d) Samuelson P. T.

114. What is a saddle point?

a) Equilibrium point b) Balanced Growth Point

c) Imbalanced Growth Point d) Unstable Equilibrium Point

115. In a constant sum game, what is true?

a) Both player get equal gains b) Both players adopt the same strategy

c) Mixed strategies are adopted by players **d) What one player gains, the other loses**

116. When minimax and the maximin in a pay off matrix are equal

a) It is a indeterminate solution

b) It is a strictly determined game

c) It can not be solved by a Two person constant sum game.

d) It can not be solved by zero sum game.

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

a) the dominant strategy. b) the game-winning choice.

c) super optimal. d) a gonzo selection.

118. Which of the following circumstances in an industry will result in a Nash equilibrium?

a) All firm have a dominant strategy and each firm chooses its dominant strategy.

b) All firms have a dominant strategy, but only some choose to follow it.

c) All firms have a dominant strategy, and none choose it.

d) None of the above is correct

119. Which of the following describes a Nash equilibrium?

a) A firm chooses its dominant strategy, if one exists

b) Every competing firm in an industry chooses a strategy that is optimal given the choices of every other firm.

c) Market price results in neither a surplus nor a shortage

d) All firms in an industry are earning zero economic profits

120. Game theory is concerned with

a) predicting the results of bets placed on games like roulette

b) the choice of an optimal strategy in conflict situations

c) utility maximization by firms in perfectly competitive markets

d) the migration patterns of caribou in Alaska

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

a) payoff b) penalty

c) reward d) end-game strategy

122. A strategy that is best regardless of what rival players do is called

a) first-mover advantage. b) a Nash equilibrium strategy

c) tit-for-tat. **d) a dominant strategy.**

123. A common assumption about the players in a game is that

a) neither player knows the payoff matrix.

b) the players have different information about the payoff matrix.

c) only one of the players pursues a rational strategy.

d) the specific identity of the players is irrelevant to the play of the game.

124. In a zero-sum game,

a) what one player wins, the other loses.

b) the sum of each player's winnings if the game is played many times must be zero.

c) the game is fair – each person has an equal chance of winning.

d) long-run profits must be zero.