Vipul's™

OPERATIONS RESEARCH

(BMS Third Year : Sixth Semester)

(Core Courses – Compulsory)

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Multiple Choice Questions (MCQs)

Chapter 1 Introduction to Operations Research

(1) Operations Research Models in which values of all variables and all possible outcomes are known with certainty are called __________ models.

(a) Physical

(b) Symbolic

(c) Deterministic

(d) Probabilistic

(2) Operations Research Models in which some or all variables are random in nature are called __________ models.

(a) Physical

(b) Symbolic

(c) Deterministic

(d) Probabilistic

(3) Mean, median and mode are measures of __________.

(a) Central tendency

(b) Dispersion

(c) Probability

(4) __________ and __________ are techniques applied in project management.

(a) CPM and PERT

(b) Assignment and Transportation

(c) Decision theory and Inventory models

(5) Operations Research techniques are __________ in nature.

(a) Qualitative

(b) Judgemental

(c) Approximate

(d) Quantitative

[Ans.: (1 – Deterministic); (2 – Probabilistic); (3 – Central tendency); (4 – CPM, PERT); (5 – Quantitative)]

Chapter 2 Linear Programming - I

(1) __________ are the entities whose values are to be determined from the solution of the LPP.

(a) Objective function

(b) Decision Variables

(c) Constraints

(d) Opportunity costs

(2) __________ specifies the objective or goal of solving the LPP.

(a) Objective function

(b) Decision Variables

(c) Constraints

(d) Opportunity costs

(3) Objective function is expressed in terms of the __________.

(a) Numbers

(b) Symbols

(c) Decision Variables

(4) __________ are the restrictions or limitations imposed on the LPP.

(a) Variables

(b) Costs

(c) Profits

(d) Constraints

(5) The type of constraint which specifies maximum capacity of a resource is '__________ or equal to' constraint.

(a) Less than

(b) Greater than

(c) Less than or greater than

(6) In linear programming ________ represents mathematical equation of the limitations imposed by the problem. ***(April 19)***

(a) Objective function

(b) Decision variable

(c) Redundancy

(d) Constraints

[Ans.: (1 – Decision variables); (2 – Objective function); (3 – decision variables); (4 – Constraints); (5 – less than); (6 – Constraints)]

Chapter 3 Linear Programming - II

(1) The region of feasible solution in LPP graphical method is called ____.

(a) Infeasible region
(b) Unbounded region
(c) Infinite region
(d) Feasible region

(2) When it is not possible to find solution in LPP, it is called as case of __________.

(a) Unknown solution
(b) Unbounded solution
(c) Infeasible solution
(d) Improper solution

(3) When the feasible region is such that the value of objective function can extend to infinity, it is called a case of __________.

(a) Infeasible solution
(b) Alternate optimal
(c) Unbounded solution
(d) Unique solution

(4) When the constraints are a mix of 'less than' and 'greater than' it is a problem having __________.

(a) Multiple constraints
(b) Infinite constraints
(c) Infeasible constraints
(d) Mixed constraints

(5) In case of an '________' constraint, the feasible region is a straight line.

(a) less than or equal to
(b) greater than or equal to
(c) mixed
(d) equal to

(6) In linear programming, unbounded solution means ______. ***(April 19)***

(a) Infeasible solution
(b) Degenerate solution
(c) Infinite solutions
(d) Unique solution

[Ans.: (1 – Feasible region); (2 – Infeasible solution); (3 – Unbounded solution); (4 – Mixed constraints); (5 – equal to); (6 – Infinite solutions)]

Chapter 4 Linear Programming - III

(1) The incoming variable column in the simplex algorithm is called __________.

(a) key column
(b) incoming column
(c) variable column
(d) important column

(2) The outgoing variable row in the simplex algorithm is called __________.

(a) outgoing row
(b) key row
(c) interchanging row
(d) basic row

(3) The intersection value of key column and key row is called _________.

(a) vital element
(b) important element
(c) key element
(d) basic element

(4) The variable added to the LHS of a less than or equal to constraint to convert it into equality is called __________.

(a) surplus variable
(b) artificial variable
(c) slack variable
(d) additional variable

(5) A resource which is completely utilized is called __________ in simplex.

(a) null resource
(b) scarce resource
(c) zero resource
(d) abundant resource

(6) A resource which is partially utilized is called __________ in simplex.

(a) surplus resource
(b) extra resource
(c) available resource
(d) abundant resource

(7) The value of one extra unit of resource is called __________ in simplex.

(a) unit price
(b) extra price
(c) retail price

(d) shadow price

(8) In simplex, a maximization problem is optimal when all Delta J, i.e. $C_j - Z_j$ values are __________.

(a) Either zero or positive

(b) Either zero or negative

(c) Only positive

(d) Only negative

[Ans.: (1 – key column); (2 – key row); (3 – key element); (4 – slack variable); (5 – scarce resource); (6 – abundant resource); (7 – Shadow price); (8 – Either zero or negative)]

Chapter 5 Transportation Problems

(1) To find initial feasible solution of a transportation problem the method which starts allocation from the lowest cost is called ________ method.

(a) north west corner

(b) least cost

(c) south east corner

(d) Vogel's approximation

(2) In a transportation problem, the method of penalties is called __________ method.

(a) least cost

(b) south east corner

(c) Vogel's approximation

(d) north west corner

(3) When the total of allocations of a transportation problem match with supply and demand values, the solution is called __________ solution.

(a) non-degenerate

(b) degenerate

(c) feasible

(d) infeasible

(4) When the allocations of a transportation problem satisfy the rim condition (m + n – 1) the solution is called __________ solution.

(a) degenerate

(b) infeasible

(c) unbounded

(d) non-degenerate

(5) When there is a degeneracy in the transportation problem, we add an imaginary allocation called __________ in the solution.

(a) dummy

(b) penalty

(c) epsilon

(d) regret

(6) If M + N – 1 = Number of allocations in transportation, it means _________. (Where 'M' is number of rows and 'N' is number of columns)

(a) There is no degeneracy

(b) Problem is unbalanced

(c) Problem is degenerate

(d) Solution is optimal

(7) Which of the following considers difference between two least costs for each row and column while finding initial basic feasible solution in transportation?

(a) North west corner rule

(b) Least cost method

(c) Vogel's approximation method

(d) Row minima method

[Ans.: (1 – least cost); (2 – Vogel's approximation); (3 – feasible); (4 – non-degenerate); (5 – epsilon); (6 – There is no degeneracy); (7 – Vogel's approximation method)]

Chapter 6 Assignment Problems

(1) If the number of rows and columns in an assignment problem are not equal than it is called __________ problem.

(a) prohibited

(b) infeasible

(c) unbounded

(d) unbalanced

(2) The method of solution of assignment problems is called __________ method.

(a) NWCR

(b) VAM

(c) LCM

(d) Hungarian

(3) When a maximization assignment problem is converted in minimization problem, the resulting matrix is called __________.

(a) Cost matrix

(b) Profit matrix

(c) Regret matrix

(d) Dummy matrix

(4) The extra row or column which is added to balance an assignment problem is called __________.

(a) regret

(b) epsilon

(c) dummy

(d) extra

(5) When a particular assignment in the given problem is not possible or restricted as a condition, it is called a __________ problem.

(a) infeasible

(b) degenerate

(c) unbalanced

(d) prohibited

(6) If in an assignment problem, number of rows is not equal to number of columns then __________.

(a) Problem is degenerate

(b) Problem is unbalanced

(c) It is a maximization problem

(d) Optimal solution is not possible

[Ans.: (1 – unbalanced); (2 – Hungarian); (3 – Regret matrix); (4 – Dummy); (5 – Prohibited); (6 – Problem is unbalanced)]

Chapter 7 Network Analysis - I

(1) The longest path in the network diagram is called __________ path.

(a) best

(b) worst

(c) sub-critical

(d) critical

(2) The second longest path in the network diagram is called __________ path.

(a) alternate

(b) feasible

(c) sub-critical

(d) critical

(3) Forward pass calculations are done to find __________ occurrence times of events.

(a) exact

(b) earliest

(c) latest

(d) approximate

(4) Backward pass calculations are done to find __________ occurrence times of events.

- **(a)** tentative
- **(b)** definite
- **(c)** latest
- **(d)** earliest

(5) An activity whose start or end cannot be delayed without affecting total project completion time is called __________ activity.

- **(a)** dummy
- **(b)** non-critical
- **(c)** critical
- **(d)** important

(6) Floats for critical activities will be always _________. ***(April 19)***

- **(a)** one
- **(b)** zero
- **(c)** highest
- **(d)** same as duration of the activity

[Ans.: (1 – Critical); (2 – Sub-critical); (3 – earliest); (4 – latest); (5 – critical); (6 – Zero)]

Chapter 8 Network Analysis - II

(1) The two types of costs involved in project crashing are __________ and __________ costs.

- **(a)** direct and indirect
- **(b)** total and partial
- **(c)** visible and invisible
- **(d)** measurable and non-measurable

(2) In project crashing, rent and overheads are treated as __________ costs.

- **(a)** significant
- **(b)** insignificant
- **(c)** direct
- **(d)** indirect

(3) In project crashing, the costs associated with actual activities (e.g. manpower, materials, machinery etc.) are called __________ costs.

- **(a)** visible
- **(b)** measurable
- **(c)** direct
- **(d)** indirect

(4) In project crashing, as we systematically crash the project, direct cost of project __________ and indirect cost of project __________.

(a) increases - decreases

(b) decreases - increases

(c) increases - remains same

(d) remain same - decreases

(5) In project crashing, as we systematically crash the project, total project cost initially __________ and after the optimal point, it __________.

(a) increases - decreases

(b) decreases - increases

(c) remains same - decreases

(d) decreases - remains same

[Ans.: (1 – direct, indirect); (2 – indirect); (3 – direct); (4 – increases, decreases); (5 – decreases, increases)]

Chapter 9 Network Analysis - III

(1) The shortest possible completion time of an activity in PERT is called __________ time.

(a) pessimistic

(b) optimistic

(c) most likely

(d) expected

(2) The longest possible completion time of an activity in PERT is called __________ time.

(a) expected

(b) most likely

(c) pessimistic

(d) optimistic

(3) In PERT, the time estimate calculated by using formula $\left[\frac{a + 4m + b}{6}\right]$ is called __________ time.

(a) optimistic

(b) pessimistic

(c) most likely

(d) expected

(4) In PERT, the expected project completion time is also called as __________ project completion time.

(a) average

(b) normal

- **(c)** mean
- **(d)** critical

(5) Fill in the blanks with ‘<’ or ‘>’ sign as applicable a ☐ m ☐ b

- **(a)** <, >
- **(b)** >, <
- **(c)** >, >
- **(d)** <, <

(6) The maximum time in which an activity will be completed assuming all possible delays and postponements is termed as ___________.

- **(a)** optimistic time
- **(b)** most likely time
- **(c)** pessimistic time
- **(d)** expected time

[Ans.: (1 – optimistic); (2 – pessimistic); (3 – expected); (4 – mean); (5 – <, <); (6 – pessimistic time)]

Chapter 10 Job Sequencing Problems

(1) The time required by each job on each machine is called __________ time.

- **(a)** elapsed
- **(b)** idle
- **(c)** processing
- **(d)** average

(2) The order in which machines are required for completing the jobs is called __________.

- **(a)** machines order
- **(b)** working order
- **(c)** processing order
- **(d)** job order

(3) The time between the starting of the first job and completion of the last job in sequencing problems is called __________.

- **(a)** total time
- **(b)** assignment time
- **(c)** elapsed time
- **(d)** idle time

(4) The time during which a machine remains waiting or vacant in sequencing problem is called __________ time.

- **(a)** processing
- **(b)** waiting

(c) idle
(d) free

(5) In sequencing problem, the order of completion of jobs is called __________.
- **(a)** completion sequence
- **(b)** job sequence
- **(c)** processing order
- **(d)** job order

(6) The total time required to complete all the jobs in a job sequencing problem is known as ___________.
- **(a)** idle time
- **(b)** processing time
- **(c)** elapsed time
- **(d)** processing order

[Ans.: (1 – processing); (2 – processing order); (3 – elapsed time); (4 – idle); (5 – job sequence); (6 – elapsed time)]

Chapter 11 Theory of Games

(1) The participants in a game are called __________.
- **(a)** clients
- **(b)** members
- **(c)** customers
- **(d)** players

(2) A game having more than two players is called __________ game.
- **(a)** multi-person
- **(b)** many person
- **(c)** n-person
- **(d)** unknown person

(3) The outcome of the interaction of selected strategies of opponents in a game is called __________.
- **(a)** income
- **(b)** profit
- **(c)** payoff
- **(d)** gains

(4) In a game, the alternatives or courses of action available to each player are called __________.
- **(a)** options
- **(b)** choices

(c) actions

(d) strategies

(5) A situation in a game where, in the payoff matrix, maximin of row is equal to minimax of column is called __________.

(a) centre point

(b) main point

(c) saddle point

(d) equal point

(6) The various alternatives or courses of actions available to each player in a game are called as __________.

(a) saddle points

(b) strategies

(c) pay-off

(d) 'n' player game

[Ans.: (1 – players); (2 – n-person); (3 – payoff); (4 – strategies); (5 – saddle point); (6 – strategies)]