# **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

#### [Ans.: (c) Deterministic]

- (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

[Ans.: (d) Probabilistic]

- (3) Mean, median and mode are measures of \_\_\_\_\_
  - (a) Central tendency
  - (b) Dispersion
  - (c) Probability

(4)

[Ans.: (a) Central tendency]

\_\_\_\_\_ and \_\_\_\_\_ are techniques applied in project management.

- (a) CPM and PERT
- (b) Assignment and Transportation
- (c) Decision theory and Inventory models

### [Ans.: (a) CPM, PERT]

- (5) Operations Research techniques are \_\_\_\_\_\_ in nature.
  - (a) Qualitative
  - (b) Judgemental
  - (c) Approximate
  - (d) Quantitative

#### [Ans.: (d) Quantitative]

# Linear Programming - I (Basic Concepts and Problem Formulation)

- (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

[Ans.: (b) Decision variables]

- \_\_\_\_\_\_ specifies the objective or goal of solving the LPP.
  - (a) Objective function
  - (b) Decision Variables
  - (c) Constraints
  - (d) Opportunity costs

[Ans.: (a) Objective function]

- (3) Objective function is expressed in terms of the
  - (a) Numbers
  - (b) Symbols
  - (c) Decision Variables

### [Ans.: (c) decision variables]

\_\_\_\_\_\_ are the restrictions or limitations imposed on the LPP.

- (a) Variables
- (b) Costs
- (c) Profits
- (d) Constraints

### [Ans.: (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

[Ans.: (a) less than]

(2)

(4)

MCQs

- (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.: (d) Constraints]

# Linear Programming - II (Graphical Method)

- (1) The region of feasible solution in LPP graphical method is called \_\_\_\_\_.
  - (a) Infeasible region
  - (b) Unbounded region
  - (c) Infinite region
  - Feasible region (d)

[Ans.: (d) Feasible region]

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

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

## [Ans.: (c) Infeasible solution]

- When the feasible region is such that the value of objective function can (3) extend to infinity, it is called a case of \_ -
  - (a) Infeasible solution
  - (b) Alternate optimal
  - Unbounded solution (c)
  - (d) Unique solution

## [Ans.: (c) Unbounded solution]

- When the constraints are a mix of 'less than' and 'greater than' it is a (4) problem having \_\_\_\_\_.
  - (a) Multiple constraints
  - (b) Infinite constraints
  - Infeasible constraints (c)
  - Mixed constraints (d)

## [Ans.: (d) Mixed constraints]

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

- (a) less than or equal to
- (b) greater than or equal to

- (c) mixed
- (d) equal to
- [Ans.: (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.: (c) Infinite solutions]

# Linear Programming - III (Simplex Method)

- (1) The incoming variable column in the simplex algorithm is called
  - (a) key column
  - (b) incoming column
  - (c) variable column
  - (d) important column

[Ans.: (a) key column]

- (2) The outgoing variable row in the simplex algorithm is called \_\_\_\_\_\_.
  - (a) outgoing row
  - (b) key row
  - (c) interchanging row
  - (d) basic row
  - [Ans.: (b) key 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

### [Ans.: (c) key 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

### [Ans.: (c) slack variable]

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

- (a) null resource
- (b) scarce resource
- (c) zero resource

- (d) abundant resource
- [Ans.: (b) scarce resource]

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

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

### [Ans.: (d) abundant resource]

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

- unit price (a)
- (b) extra price
- (c) retail price
- (d) shadow price

### [Ans.: (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

el Sino [Ans.: (a) Either zero or negative]

# **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

[Ans.: (b) least cost]

- (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

### [Ans.: (c) Vogel's approximation]

- (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

### [Ans.: (c) feasible]

- (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

### [Ans.: (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
- [Ans.: (c) epsilon]
- (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

## [Ans.: (a) There is no degeneracy]

- (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.: (c) Vogel's approximation method]

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# Assignment Problems

- (1) If the number of rows and columns in an assignment problem are not equal than it is called \_\_\_\_\_ problem.
  - prohibited (a)
  - (b) infeasible
  - (c) unbounded
  - (d) unbalanced

### [Ans.: (d) unbalanced]

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

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- (a) NWCR
- (b) VAM
- (c) LCM
- (d) Hungarian

### [Ans.: (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

### [Ans.: (c) Regret matrix]

- The extra row or column which is added to balance an assignment problem (4) is called \_\_\_\_\_.
  - (a) regret
  - (b) epsilon
  - (c) dummy
  - (d) extra

### [Ans.: (c) Dummy]

- (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

[Ans.: (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.: (b) Problem is unbalanced]

# Network Analysis - I (Critical Path Method (CPM))

	The longest path in the network diagram is called path.		
	(a)	best	
	(b)	worst	
	(c)	sub-critical	
	(d)	critical	
	[Ans	.: (d) Critical]	
(2)	The second longest path in the network diagram is called		
	(a)	alternate	
	(b)	feasible	
	(c)	sub-critical	
	(d)	critical	
	[Ans	.: (c) Sub-critical]	
(3)	Forw	vard pass calculations are done to find occurrence times of	
	even	ts.	
	(a)	exact 🔰	
	(b)	earliest	
	(c)	latest	
	(d)	approximate	
	[Ans	: (b) earliest]	
(4)	Back	ward pass calculations are done to find occurrence times of	
	even	ts.	
	(a)	tentative	
	(b)	definite	
	(c)	latest	
	(d)	earliest	
	[Ans	.: (c) latest]	

- (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

[Ans.: (c) critical]

(6) Floats for critical activities will be always \_\_\_\_\_. (April 19)

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

[Ans.: (b) Zero]



# Network Analysis - II (Project Crashing)

- 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

[Ans.: (a) direct, indirect]

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

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- (a) significant
- (b) insignificant
- (c) direct
- (d) indirect
- [Ans.: (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

### [Ans.: (c) direct]

- (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

### [Ans.: (a) increases, 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.: (b) decreases, increases]



# Network Analysis - III (Programme Evaluation and Review Technique (PERT))

- - (a) pessimistic
  - (b) optimistic
  - (c) most likely
  - (d) expected
  - [Ans.: (b) optimistic]

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

- (a) expected
- (b) most likely
- (c) pessimistic
- (d) optimistic
- [Ans.: (c) pessimistic]

(3) In PERT, the time estimate calculated by using formula  $\left| \frac{a+4m+b}{6} \right|$ 

called \_\_\_\_\_ time.

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

### [Ans.: (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

[Ans.: (c) mean]

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

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

[Ans.: (d) <, <]

- The maximum time in which an activity will be completed assuming all (6) possible delays and postponements is termed as \_\_\_\_\_\_.
  - (a) optimistic time
  - most likely time (b)
  - pessimistic time (c)
  - (d) expected time

tic tim. [Ans.: (c) pessimistic time]

# Job Sequencing Problems

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

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

[Ans.: (c) processing]

- (2) The order in which machines are required for completing the jobs is called
  - (a) machines order
  - (b) working order
  - processing order (c)
  - (d) job order

[Ans.: (c) processing order]

- (3) The time between the starting of the first job and completion of the last job in sequencing problems is called \_ 5.
  - (a) total time
  - (b) assignment time
  - elapsed time (c)
  - (d) idle time

## [Ans.: (c) elapsed time]

- The time during which a machine remains waiting or vacant in sequencing (4) problem is called \_\_\_\_\_\_ time.
  - (a) processing
  - (b) waiting
  - idle (c)
  - (d) free

[Ans.: (c) idle]

In sequencing problem, the order of completion of jobs is called (5)

(b) job sequence

<sup>(</sup>a) completion sequence

- (c) processing order
- (d) job order

[Ans.: (d) job sequence]

- (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.: (c) elapsed time]

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# **Theory of Games**

(a) clients (b) members (c) customers (d) players [Ans.: (d) players] A game having more than two players is called \_\_\_\_\_ game. (2) (a) multi-person (b) many person (c) n-person (d) unknown person [Ans.: (c) n-person]

The participants in a game are called \_\_\_\_\_.

(3) The outcome of the interaction of selected strategies of opponents in a game is called \_\_\_\_\_\_.

- (a) income
- (b) profit
- (c) payoff
- (d) gains

[Ans.: (c) payoff]

(4) In a game, the alternatives or courses of action available to each player are called \_\_\_\_\_.

- (a) options
- (b) choices
- (c) actions
- (d) strategies

#### [Ans.: (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

(1)

(d) equal point

[Ans.: (c) saddle 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.: (b) strategies]

