Short Questions.

UNIT-I

1) define OR ?

O.R is a scientific method with a Quantitative basis for decisions regarding the operations under their control.

(or)

It is the application of scientific methods, techniques & tools to the problems involving the operations to provide optimum solutions.

2) What are the phases/steps in OR ?

Phase 1 : Formulating the problem
Phase 2 : construct the mathematical model
Phase 3 : Analyse & deriving the solutions.
Phase 4 : Test the model.
Phase 5 : Control the solution
Phase 6 : decision making.

3) Applications of OR (various models of OR) ?

1) Allocation model (LPP, transportation, assignment etc)
2) network models
3) Sequencing models
4) Competitive models
5) waiting line models
6) Replacement models.

4) Limitations of OR ?

1) Impossibility & infeasibility
2) Intangeable situation
3) decission making is impossible.

5) What is unbound solution?

If a distant & finite soln. cant be located or the soln. exists at infinity then the soln is said to be unbounded soln.

In graphical soln unbound solution is obtained if feasable region is unbounded (0 to ∞).

6) What is Infeasible / inconsistent solution?

When the feasible region does not exist, then the soln is said to be infeasible solution. in some cases of graphical method, one constraint is ≤ and other is ≥ type.

7) What is unique solution?

If the optimum soln is one & only one then the soln is unique.

8) Multiple optimal solution?

When several optimum solutions exist the solutions are said to be multiple. opt. solution.

UNIT-II

9) difference between Primal & dual solutions?

Primal	dual
1) If objective function is maximized	1) then obj. function is minimized
2) If objective fn is minimized	2) then obj. fn is maximized
3) coeff of decision variable in object frame	3) Constraints in the constraint set
4) number of decisions variable	4) number of Constraints.
5) unbound solution	5) Infeasible solution
6) ≤ & ≥ type constraints	6) ≥ & ≤ type constraints.

10) Advantages of duality ?.

1) In physics electrical circuit applications, parallel circuits can be connected in series circuits for simplifications

2) When problem does not yield any solution in primal it can be verified by dual.

3) When primal form is complex in nature, dual form can be applied.

UNIT-3 :-

11) methods available for initial basic feasible soln ?

1) north-west corner method.
2) Least cost
3) vogel's approximation (or) Penality

12) methods for optimality ?.

1) modified distribution method
2) stepping stone method.

13) Types of transportation model ?.

1) Balanced transportation model.
2) unbalanced transportation
3) degeneracy transportation
4) Maximizing the profil transp.
5) Transshipment transp model.

14) degeneracy ?.

While testing for optimality, if the no. of cells are less than $(m+n-1)$, then that transportation problem is said to be degeneracy. Here m = no. of rows
n = no. of columns

15) Types of assignment problems :

1) Minimizing the m/c time
2) maximizing the profit.
3) unbalanced assignment
4) Travelling salesman

16) difference b/w Transportation and assignment ?

Transportation	Assignment.
1) Transp. model is used to Transport materials from one position to other	1) Assignment model is used to assign the job to the machine.
2) Supply & demand are needed.	2) no supply, no demand is required.
3) If supply = demand, then it is said to be balanced transport-ation otherwise unbalanced.	3) If no. of rows = no. of columns then it is balanced otherwise unbalanced.
4) Possibility of degeneracy	4) no degeneracy.
5) Vogels method	5) Hungarian method.

UNIT-4 :

17) necessity of replacement ?

a) when machine runs with less efficiency.
b) A new technology replaces old technology machine.
c) the average cost, repairs & maintanance & operation cost are higher than the revenue from the machine.
d) If the equipment is non-repairable
e) no availability of spare parts.

18) Explain 2 person zero sum game ?.

In a game there are two players with different strat-egies & the result of the game is zero sum. (ie when one wins the other looses).

19) Pay-off matrix ?.

If two person zero sum game, a matrix represents the outcome of the game when two players make their strategies.

UNIT-5.

20) What is sequencing ?.

It is a mathematical tool in OR which is used in productoin process to find an optimum sequence of performing jobs on different machines in such a way that the total proc-essing time is minimized.

different models of sequencing

a) n jobs x 1 m/c.
b) n jobs x 2 m/c.
c) n jobs x 3 m/c.
d) n jobs x m m/c.

21) Assumptoins made before sequencing ?.

a) Each m/c can process one operatoin at a time
b) Each operatoin once started must be performed till completoin
c) Each operatoin change-over time should be neglected
d) there is only one type of m/c's for all the jobs.
e) Time interval for processing is independent.

22) Jackson's rule ?

this rule is used in sequencing & scheduling of 'n' jobs & 3 m/c's. It helps to convert 3 m/c into 2 m/c problem with the following conditions.

1) min M1 ≥ max M2
2) min M3 ≥ max M2
3) min M2 ≥ max M1
4) Min M1 ≥ max M3 etc.

23) Elapsed time ?

It is the time between starting of the first job to completing the last job.

24) characteristics of game theory ?

a) no. of persons.
b) no. of activities.
c) chance of strategies
d) Pay-off.

25) mixed strategy ?

When a player is guessing to two alternative strategies with probability knowledge, it is called mixed strategy.
($P_1 + P_2 = 1$)

26) Pure strategy ?

If a player knows exactly what other player is going to do (1x1) matrix, it gives exact strategy for the course of actions.

27) customer behavior (Jockeying, balking, Revenging etc)
28) Queuing model (Kendall's model) (a/b/c:d/e)
29) Queue discipline (FIFO, FCFO, SIRO etc)

} In main notes.

30) Parameters of queue sys ?

1) mean arrival Rate (λ)
2) mean service Rate (μ)

Q) What are the areas of applications of OR.

Ans:

Application Area	Functions
① Finance-budgetting	• Cash flow planning. • Long range capital requirements. • Claim and complaint procedures.
② Marketing	• Product selection • Advertising media with respect to cost and time • Number of salesman required
③ Manufacturing	• Production scheduling • Production smoothing • Employment training, layoffs and optimum product units
④ Facilities planning	• Estimation of number of facilities • Determining the transport schedule • Factory size, location of factories, warehouses, hospitals etc.

Q) Define the terms optimum solution, feasible solution, unbounded solution

Ans:- Optimum solution :- A feasible solution is said to be optimum, if it also optimizes (maximizes or minimizes) the given objective function.

feasible solution :- Any set $X = \{x_1, x_2, \ldots x_{n+m}\}$ of variables is called a feasible solution or programme of LP problem, if it satisfies the set of given constraints and given non-negativity restrictions also

Unbounded solution :- If the value of the objective function Z can be increased or decreased indefinitely, such solutions are called unbounded solutions.

Q) What is Duality? What is the significance of dual variables in a linear problem model.

Ans:- Duality in linear progsamming states that every linear programming problem has another linear progsamming problem related to it and thus can be derived from it. The original linear progsamming problem is called "Primal", while the derived linear problem is called "Dual".

Q) State the conditions to be satisfied in order to apply the dual Simplex method.

Ans:- [redacted]

→ If we convert all the STC to less than & equal (≤) and get negative value, Then in such case, dual simplex method is used.

→ The main objective is to bring the primal back to feasibility by retaining optimality.

→ This method is advantageous over simplex method as it retains both feasibility of primal and optimality which is not possible using simplex method.

Q) State the assumptions made in L.P.P.

Ans:-

(1) Conditions of Certainty :- Numbers in object and constraint are known with certainity.

(2) linearity or proportionality :- 1 unit → 6 hrs Therefore 10 units → 60 hours.

(3) Additively :- It means that total of all activities equals the sum of each individual activity.

(4) Divisibility :- The numbers should be whole numbers.

(5) Non-negative variable :- Answers or variables are non-negative.

(6) Finiteness :- Solution cannot compute if there are infinite number of activities

(7) Optimality :- Maximum profit or Minimum cost always occur at a corner point of the set of the feasible solution.

Q) What is the use of sensitivity analysis

Ans:- Sensitivity analysis deals with finding out the amount by which we can change the input data for the output of our linear progsamming model to remain comparatively unchanged. This helps us in determining the sensitivity of the data we supply for the problem.

Q) Degeneracy in simplex method.

Ans:- In Simplex Method, degeneracy occurs, where there is a tie for the minimum positive replacement ratio for selecting outgoing variable.

Q) Define Operational Research and state the models which are covered under it.

Ans:- → Operational research is a scientific method through which decision making problems related to risk and uncertainty can be effectively solved by using mathematical, economic and statistical models for decision and control problems

→ Such problems are usually encountered in our [redacted] routine lives such as inventory control, production scheduling, man power planning, distribution and maintenance

Models:-

1. Game Theory models
2. Allocation (distribution) models
3. Waiting line (queuing) model
4. Job sequencing model