

OPERATIONS RESEARCH

Q1. What is Operations Research? Explain how Operations Research helps in decision making. Or Explain how Operations Research helps in managerial decision making process.

Q2. What are different costs associated with inventory? Or Discuss the different types of cost considered in inventory management. Derive an expression for the Economic order Quantity Or Derive an expression for the Economic order Quantity when a complete order of stock arrives at a constant rate per day Or Derive the EOQ formula with instant supply model under standard assumptions.

Q3. What do you mean by the theory of Games? Explain briefly the concept of a two person zero-sum game Or State the characteristics of a two person zero sum game. Explain the concept of strategy.

Q4. What do you mean by decision making under risk and decision making under uncertainty? What do you mean by a decision tree?

Q5. Explain in non-technical language the scope and purpose of OR. And its usefulness to the firm. Give two examples of the application of OR in industry and business.

Q6. What are the objectives of carrying inventory?

Q7. Distinguish between single server and multi server queuing system

Q8. Explain the role of dummy variable in network diagram.

Q9. State and explain (a) alternative arrival plan; (b) service pattern; (c) queue discipline in a queue model;

Q10. Write Short Notes:

- a) PERT and CPM;
- b) Transportation Problem;
- c) Single server queuing system;
- d) Monte Carlo simulation;
- e) Two person zero sum games;
- f) The Assignment problem;
- g) Decision making under risk;
- h) Problem of degeneracy in Linear programming;

- i) Duality in Linear Programming;
- j) Minimax rule in decision making under uncertainty;
- k) Group replacement policy and its advantages;
- l) Equal probability criteria under uncertainty;
- m) Basic assumptions of Linear programming;
- n) Optimality test by MODI method;
- o) Crashing problems in CPM;
- p) Primal and its dual in a linear programme and their;
- q) Operating characteristics of a queue system;
- r) Minimum regret criterion in decision under uncertainty;

ANS:

Q1 and Q5:

Define OR:

- a) OR is the application of scientific methods, techniques and tools to problems involving the operations of a system so as to provide those in control of the system with optimum solutions to the problem. Or
- b) OR is applied decision theory. It uses any scientific, mathematical or logical means to attempt to cope with the problems that confront the executive when he or she tries to achieve a thorough-going rationality in dealing with the decision problems. Or
- c) OR is a management activity pursued in two complementary ways –one half by the free and bold exercise of commonsense untrammelled by any routine, and the other half by the application of a repertoire of well established pre-created methods and techniques.

Helps in Decision Making (Scope):

- a) OR is useful to the Directing Authority in decision optimum allocation of various limited resources such as men, machines, material, time, money etc. for achieving the optimum goal.

- b) OR is useful to Production Specialist in:
 - i) designing, selecting and locating sites;
 - ii) determining the number and size;
 - iii) scheduling and sequencing the production runs by proper allocation of machines;
 - iv) calculating the optimum product mix;

- c) OR is useful to the Marketing Manager in determining :
 - i) how to buy, how often to buy, when to buy and what to buy at the minimum possible cost;
 - ii) distribution points to sell the products and the choice of the customers;
 - iii) minimum per unit sale price;
 - iv) the customers' preference relating to the size, colour, packaging etc for various products and the size of the stock to meet the future demand;
 - v) the choice of different media of advertising;

- d) OR is useful to the Personnel Administrator in finding out:
 - i) skilled persons at a minimum costs;
 - ii) the number of persons to be maintained on full time basis in a variable workload, like freight handling etc;
 - iii) the optimum manner of sequencing personnel to variety of jobs;

- e) OR is useful to the Financial Controller to:
 - i) find out a profit plan for the company;
 - ii) determine the optimum replacement policies;
 - iii) find out the long term capital requirements as well as the ways and means to generate these requirements;

Characteristics (Significant features) of OR:

VORA: Nature & Characteristic Features of OR, Chapter1. read from:

“The significant features of operations research are given below:.....till end of point 5”

ANS:

Q2 and Q6:

VORA, Chapter 9, Inventory Management:

Read-

- i) Inventory Costs, page no: 388-389
- ii) Inventory management Systems, under Fixed Order quantity System MODEL 1 : The classical EOQ Model (Full), page no 389-395. Don't read Robustness of EOQ model. Read again “Review of the assumptions of EOQ model” page 396.
- iii) Objectives of carrying inventory: Read “Types of Inventory” page no 386-387

ANS:

Q3:

VORA: Chapter 15- Read page no.701-708 i.e. from Beginning to end of Dominance rule;

Read also Limitations of the Game theory;

ANS:

Q4.

- i) Decisions under Uncertainty- VORA, page no 615-617, under Decision Rules;
- ii) Decisions under Risk- VORA, page no 617-618, under Decision Rules;
- iii) Decision Trees-VORA, page no.627

Also go through Pay off Table and Regret Table from VORA – These two may come this year

ANS:

Q7 & Q9:

- i) Alternative arrival plan- Read Arrival Process from VORA page no 459-460;
- ii) Service pattern- Read Service system from VORA page no. 460-461;
- iii) Queue discipline- Read Queue Structure from VORA page no. 461-462;
- iv) The main difference is that in multi server system it is to consider whether there is a separate, independent queue for each server or the customers form a single queue from which they are picked up for service. Indeed if there are as many queues as the service stations, equal to say K, the system can be thought of and analysed as one composed of K different single server queuing systems. So for the two systems there are differences in operating characteristics which are summarized below:

(Now you give all the operating characteristics for MODEL A , MODEL B and MODEL C as given in VORA under “key points to remember” in page 493, just before the topic “ Test Your Understanding”)

ANS:

Q8:

Read VORA, “ Rules of Network Construction” page no. 538-541, item no (j)

For other questions on PERT and CPM read VORA, chapter 12 –

- i) page no 536-541, just before Redundancy in Precedence Relationship;
- ii) page no 545-552, Scheduling the Activities: Earliest and latest Times;
- iii) For Q10 (o)-Read VORA, page no 556 “Time cost trade off” –First three para.

BALANCE SHORT NOTES, I THINK can be manageable from VORA. IF not call me.