OPERARTIONS RESEARCH AND QUANTITATIVE TECHNIQUES IN LOGISTICS

Date : 14.06.2015   Max Marks : 100

Time : 2.00 p.m. to 5.00 p.m.   Duration : 3 hours

<u>Instructions :</u>

1) Answer all questions in PART A   each question carries 1 mark Total 32 marks

2) Attempt any three questions in PART B each question carries 16 marks 48 marks

3) Part C compulsory and carry 20marks

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PART A   **32x1 = 32 marks**
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Q 1. Which of the following is correct?

1.   Model uses mathematical equations and statements to represent the relationships within the model.

   a) Physical Model   b) Mathematical Model   c) Ionic Model   d) Analogue Model

2. Which of the following is a Physical Model?

   a) Ionic Model   b) Verbal Model   c) Normative Model d) Deterministic model

3.   Which of the following characteristics apply to queuing system

   a) Customer population   b) arrival process   c) both a & b   d) Neither a & b

4.   Which of the following is not the special purpose simulation language?

   a) BASIC   b) GPSS   c) GASP   d) SIMSCRIPT

5. Linear programming is a

   a) constrained optimization technique   b) technique for economic allocation of limited resources

   c) mathematical technique   d) all of the above '

6. The extra inventory being carried to safeguard against delivery is

   a) EOQ   b)Safety stock   c)Reorder level   d) None of the above

7. Queuing theory helps to determine the balance between
   a) Cost of offering the services
   b) cost incurred due to delay in offering the services
   c) both a & b
   d) Only b

8. The sudden failure among items is seen as
   a) progressive   b) retrogressive   c) random   d) all of the above

Q 2. Fill in the blanks

1. Operation research approach to decision making is based on judgment, research and ---------------
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2. -------------- is an approximation or abstraction of reality which consider only the essential variables and parameters in the system along with their relationships.
3. ------------------ Models provide a physical appearance of the real objects under study, either reduced in size or scaled up.
4. -------------- is an approach for reproducing the process by which events of chance and change are created in a computer.
5. A linear programming is a technique which attempts to determine how best to allocate ---------------
   ------ in order to achieve some objective.
6. The purpose of inventory management is to minimize -----------------------
7. The (s, Q) policy is also known as the ------------------- quantity policy.
8. The ------------------- refers to the number of queues and their respective lengths.

Q 3. Match the following

A	B
1.Physical Model	a) Broadly applied to problems involving decision-making under risk and certainty
2.Linear Programming	b) Useful only in design problems
3.Decision Analysis Models	c) used for solving transportation problem
4.Utilization factor	d) Mathematical modeling technique used for decision making in planning and resource allocation
5.North-West Corner Method	e) Average demand x Average lead time
6.Lead Time	f) Order quantity that minimizes the total average inventory cost
7.EOQ	g) Average fraction of time that the servers are being utilized while serving customers
8.Buffer Stock	h) Delivery lag

Q 4. Find True or False of the following

1. Lack of implementation of results or findings is the one of the major reasons of failure of OR approach.
2. Utilization factor is the key operating characteristics for a queuing system
3. Operation research is the art of winning wars without actually fighting them.
4. The effect of time and uncertainty are taken into consideration by linear programming model
5. Gradual failure is progressive in nature.
6. Linear programming is a technique for finding the best uses of an organizations manpower , money and machinery
7. When total demand equals total supply, the transportation problem is said to be balanced
8. The basic reorder point policy is (Q, s) policy.

PART B   48 marks

(Attempt any three. Each question carry 16 marks)

Q 5: a) Define operations research. Describe the role of operation research in decision making.

   b) Discuss the various types of OR models.

Q 6: a) Write short note on Simulation.

   b) Describe the steps of simulation process.

Q 7: The products of three plants X, Y and Z are to be transported to four warehouses I, II, III and IV. The cost of transportation of each unit from plants to the warehouse along with the normal capacities of plants and warehouses are given below:

	Warehouse				
	I	II	III	IV	Available
X	25	17	25	14	300
Plant Y	15	10	18	24	500
Z	16	20	8	13	600
Required	300	300	500	500	

a) Solve the problem for minimum cost of transportation.

b) Are there any alternative solutions? If any, explain the methodology.

Q 8:   a) What are the advantages, limitations and applications of linear programming?

b) Explain the structure of a queuing system.

Q 9: A manufacturer has to supply customers with 600 units of product per year. Shortages are not

allowed and shortage amounts to 60 paise per unit per year. The set-up cost per run is Rs 80.

Find the following:

a) Economic order quantity

b) Minimum average inventory cost

c) Optimum numbers of orders per year

d) Optimum period of supply per optimum order

PART C   20 marks

Compulsory

Q. 10. A company machines and drills two castings X and Y. The time required to machine and drill one

casting including machine set-up time is as follows:

Casting	Machine Hours	Drilling Hours
X	4	2
Y	2	5

There are two lathes and three drilling machines. The working week is of 40 hours; there is no
lost time and overtime. Variables costs for both castings are Rs 120 per unit while total fixed cost amount
to Rs 1000 per week. The selling price of casting X is Rs 300 per unit and that of Y is Rs 360 per unit.
There are no limitations on the number of X and Y casting that can be sold. The company wishes to
maximize its profit.

Formulate a linear programming model for the problem and solve this problem using graphical
method

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