MS-51

MANAGEMENT PROGRAMME

Term-End Examination

June, 2013

MS-51 : OPERATIONS RESEARCH

Time : 3 hours   *Maximum Marks : 100*

(Weightage 70%)

Note :   *Attempt* **any four** *questions. All questions carry* **equal** *marks.*

1.   (a)   Explain the differences between PRIMAL and DUAL problem. Discuss the significance of shadow price in dual problem.

(b)   One unit of product A contributes Rs. 7 and requires 3 units of raw materials and 02 hours of labour. One unit of product B contributes Rs. 5 and requires one unit of raw material and one hour of labour. Availability of raw material at present is 48 units and there are 40 hours of labour.

(i)   Formulate and solve it as a linear programming problem to optimize the contribution.

(ii)   Write its dual.

2. (a) Discuss the arrival and service process in any queuing model. Also explain the concept of 'Optimal Service Rate'.

   (b) A repair shop attended by a single machine has an average of six customers an hour who bring small appliances for repair. The mechanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him four minutes, on an average. Arrivals are poisson and service time has the exponential distribution. You are required to find :

   (i) the proportion of time during which the shop is empty,

   (ii) the probability of at least one customer in the shop,

   (iii) the average number of customers in the system,

   (iv) the average time spent, including service.

3. (a) Explain the two-person zero-sum game and Dominance principle in game theory.

   (b) Given the pay off matrix for player A, obtain the optimum strategies for both the players and determine the value of the game.

$$\text{Player A} \begin{array}{c} \text{Player B} \\ \begin{bmatrix} 6 & -3 & 7 \\ -3 & 0 & 4 \end{bmatrix} \end{array}$$

4. (a) State and explain Bellman's principle of optimality.

   (b) What are the advantages and disadvantages of Monte Carlo simulation as a problem solving technique ?

5. (a) Discuss the impact of quantity discount on economic order quantity and hence on inventory control procedure.

   (b) Purchase Manager has decided to place order to a minimum quantity of 500 numbers of a particular item in order to get a discount of 10%. From the past records, it was found out that in the last year, 8 orders each of size 200 units were placed. The ordering cost is Rs. 500 per order, inventory carrying cost is 40% of the inventory value and the price of the item is Rs. 400 per unit. Is the Purchase Manager justified in his decision ? What is the effect of his decision on savings to the company ?

6. Write short notes on *any three* of the following :
   (a) Goal Programming
   (b) Periodic Review System in Inventory Control
   (c) Dynamic Programming
   (d) Degeneracy in LP problem
   (e) Assignment Problem

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