11351

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4093   Roll No. ☐☐☐☐☐☐☐☐☐☐☐

B.Tech.

(SEM VI) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

OPERATIONS RESEARCH

Time : 3 Hours   *Total Marks : 100*

Note : (i) *Attempt all questions.*

(ii) *Assume suitably missing data if any.*

1. Attempt **any two** of the following :

(a) Baba Furniture Company employs four carpenters for 10 days to assemble tables   **10**
and chairs. It takes 2 hours to assemble a table and 30 minutes to assemble a
chair. Customers usually buy between four and six chairs with each table. The
profits are Rs. 135 per table and Rs. 50 per chair. The company operates on
8-hours shift a day. Determine the 10 days optimal production mix graphically.

(b) (i) Write the dual of the following primal problem :   **4**

Maximize $z = 5x_1 + 6x_2$

Subject to $x_1 + 2x_2 = 5$

$-x_1 + 5x_2 \geq 3$

$4x_1 + 7x_2 \leq 8$

x_1 unrestricted

$x_2 \geq 0$

(ii) Discuss post optimal or sensitivity analysis.   **6**

(c) Solve the following LPP by using artificial variables or Dual Simplex Method.   **10**

Minimize $z = 3x_1 + 2x_2$

Subject to $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + x_2 \leq 3$

$x_1, x_2 \geq 0$

Attempt **any one** of the following :

(a) (i) In the transportation problem in Table, the total demand exceeds the total supply. Suppose that the penalty costs per unit of unsatisfied demand are $5, $3 and $2 for destination 1, 2 and 3 respectively. Determine the optimum solution. **14**

$$
\begin{array}{|ccc|c}
5 & 1 & 7 & 10 \\
6 & 4 & 6 & 30 \\
3 & 2 & 5 & 15 \\
\hline
70 & 20 & 50 &
\end{array}
$$

(ii) Determine the optimal assignment for the following problem. The data indicate that worker 1 cannot work on job 3 and worker 3 cannot work on job 4 **6**

$$
\begin{array}{c}
& & \text{job} \\
& & 1 & 2 & 3 & 4 \\
& 1 & 50 & 50 & - & 20 \\
& 2 & 70 & 40 & 20 & 30 \\
\text{Worker} & 3 & 90 & 30 & 50 & - \\
& 4 & 70 & 20 & 60 & 70
\end{array}
$$

(b) A four period inventory models operates with following data. Find the optimal policy and total cost using dynamic programming. The initial inventory $x_1 = 15$ units. The unit production cost is Rs. 20, and holding cost per period is Rs. 10 for all periods. **20**

Period ix	Demand Di (Units)	Set up cost Ki Rs.
1	76	980
2	26	1140
3	90	1850
4	67	700

3. Attempt **any one** of the following :

(a) (i) Discuss four different criteria of decision making under uncertainty. **12**

(ii) Formulate the following game as a LPP. **8**

$$
\begin{array}{c|ccc}
& B_1 & B_2 & B_3 \\
\hline
A_1 & 3 & -1 & -3 \\
A_2 & -2 & 4 & -1 \\
A_3 & -5 & -6 & 2
\end{array}
$$

(b) (i) Solve the following game. The payoff is for player A   **12**

$$
\begin{array}{c|cccc}
 & B_1 & B_2 & B_3 & B_4 \\
\hline
A_1 & 2 & 2 & 3 & -1 \\
A_2 & 4 & 3 & 2 & 6 \\
A_3 & 3 & 2 & 2 & 5 \\
\end{array}
$$

(ii) Discuss decision making with utilities.   **8**

4. Attempt **any one** of the following :

(a) (i) A shop is about to order some heaters for a forecast spell of cold weather. **12** The shop pays Rs. 1000 for each heater, and during the cold spell they sell for Rs. 2000 each. Demand for the heater declines after the cold spell, and any unsold unit sold at Rs. 500. Previous experience suggests the likely demand for heaters is as follows :

Demand	10	20	30	40	50
Probability	0.20	0.30	0.30	0.10	0.10

How many heaters should the shop buy ?

(ii) Compare Reorder Point (ROP) and Periodic review systems.   **8**

(b) (i) Explain how simulation can be applied in the case of inventory control **10** where the demand is probabilistic and lead time is random.

(ii) How different type of inventory classification helps in deciding service **10** level ? Explain taking an example.

5. Attempt **any one** of the following :

(a) (i) Discuss process oriented simulation language.   **10**

(ii) A television repairman finds that the time spent on his jobs has an **10** exponential distribution with a mean of 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution approximately with an average rate of 10 per - 8 hour day, what is the repairman's expected idle time each day ? How many jobs are ahead of the average set just brought in ?

(b) (i) What are some of the operating characteristics of a queuing system ? How **8** can they be used in the evaluation, or design system ?

(ii) Discuss the Monte Carlo method of solving a problem illustrating it by **12** outlining a procedure to solve a specified problem of your choice by the same ?

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