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

PAPER ID : 9974 **Roll No.** | | | | | | | | | | |

B. Tech.

(SEM. VI) THEORY EXAMINATION 2010-11

PRINCIPLES OF OPERATION RESERACH

Time : 3 Hours *Total Marks : 100*

Note : Attempt **all** questions. All questions carry equal marks.

1. Attempt any **two** of the following : **(10×2=20)**

(a) State some important application of L.P.P. and solve the following L.P.P. by graphical method.

Minimize $Z = 20x_1 + 10x_2$;

Subject to $x_1 + 2x_2 \le 40$; $4x_1 + 3x_2 \ge 60$; $3x_1 + x_2 \ge 30$; $x_1, x_2 \ge 0$.

(b) Using two-phase simplex method solve following LPP :

Minimize $Z = x_1 + x_2$

Subject to $2x_1 + x_2 \ge 4$; $x_1 + 7x_2 \le 7$; where $x_1, x_2 \ge 0$

(c) Solve by dual Simplex Method :

Minimize $Z = 2x_1 + x_2$

Subject to $3x_1 + x_2 \ge 3$; $4x_1 + 3x_2 \ge 6$

$x_1 + 2x_2 \ge 3$; $x_1 \ge 0$, $x_2 \ge 0$

$8x_1 + 3x_2 + 6x_3 = 800$

2. Attempt any **four** of the following : **(5×4=20)**

(a) Explain some practical application of 0-1 integer linear programming problem.

(b) Determine an initial basic feasible solution using Vogel's approximation method :

	D_1	D_2	D_3	D_4	Availability
O1	5	8	3	6	30
O2	4	5	7	4	50
O3	6	2	4	6	20
Req.	30	40	20	10	100

(c) Suggest optium solution to the following assignment problem and also maximum sales :

Salesmen	Market (Sales in lakh Rs.)			
	I	II	III	IV
A	44	80	52	60
B	60	56	40	72
C	36	60	48	48
D	52	76	36	40

(d) Write algorithm of branch and bound technique for solving Integer programming problem.

(e) What is an assignment problem ? It is true to say that it is a special case of the transportation problem. Explain it.

(f) Define following terms :

(a) Degeneracy in TP

(b) Unbalanced TP.

3. Attempt any two of the following : (10×2=20)

(a) A salesman has to visit five cities A, B, C, D and E. The distance between the five cities are as follows :

	A	B	C	D	E
A	-	2	5	7	1
B	6	-	3	8	2
C	8	7	-	4	7
D	12	4	6	-	5
E	1	3	2	8	-

Find optimum schedule for salesmen.

$8x_1 + 3x_2 + 6x_3 = 800$

(b) Construct PERT network for following activity table and find critical path and also find the probability of project complete in 29 days :

Activity	Optimistic	pessimistic	Most likely
1-2	1	5	1.5
2-3	1	3	2
2-4	1	5	3
3-5	3	5	4
4-5	2	4	3
4-6	3	7	5
5-7	4	6	5
6-7	6	8	7
7-8	2	6	4
7-9	5	8	6
8-10	1	3	2
9-10	3	7	5

(c) What is the difference between PERT and CPM techniques ? Write advantage of CPM and PERT.

4.

(b

(c)

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4. Attempt any **two** of the following : **(10×2=20)**

(a) State some important application of inventory models. A particular item has a demand of 9,000 unit/year. The cost of one procurement is Rs. 100 and the holding cost per unit is Rs. 2.40 per year. The demand rate is uniform and no shortage allowed. Determine (a) Economic lot size, (b) Number of order per year, (c) Optimum scheduling period, (d) The total cost per year if the cost of one unit is Re. 1

(b) Find the optimum order quantity for which the price break are :

Quantity	Unit cost (Rs.)
$0 < x < 500$	Rs. 10
$500 \le x < 750$	Rs. 9.25
$750 \le x$	Rs.8.75

The monthly demand for the product is 200 units, shortage cost is 2% of the unit cost and cost of ordering is Rs. 100.

(c) Let the value of money be assumed to be 10% per year and suppose that the Machine A is replaced after every 3 years whereas Machine B is replaced after every six years.

The yearly costs of both the Machines are given as :

Year	1	2	3	4	5	6
Machine A	1000	200	400	1000	200	400
Machine B	1700	100	200	300	400	500

Determine which machine should be purchased.

5. Attempt any **two** of the following : **(10×2=20)**

(a) State Bellman's principal of optimally in Dynamic Programming and using dynamic programming to show that $\sum_{i=1}^{n} P_i \log P_i$ subject to the constraints $\sum_{i=1}^{n} P_i = 1, P_i \geq 0$ for all i is minimum when $P_1 = P_2 = \text{------} = \frac{1}{n}$

(b) Use dynamic programming to solve the LPP :

Minimize $Z = 6x_1 + 7x_2$

Subject to $2x_1 + 3x_2 \leq 12$; $2x_1 + x_2 \leq 8$; where $x_1, x_2 \geq 0$

(c) A baking company sells one of its types of cake by weight. It makes a profit of 95 paise a pound on every pound of cake sold on the day it is baked. It disposes of all cakes not sold on the day they are baked at a loss of 15 paise a

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pound. If demand is known to have probability density function $f(R) = 0.03 - 0.0003\,R$ find the optimum amount of the company should bake density.