LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.A. DEGREE EXAMINATION – **ECONOMICS**

THIRD SEMESTER – NOVEMBER 2007

ST 3103/3100 - RESOURCE MANAGEMENT TECHNIQUES

BB 26

Date : 02/11/2007 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

SECTION-A

Answer ALL questions. Each carries 2 marks. (10 x 2 = 20)

1. Define a General Linear programming problem.
2. Illustrate graphically the meaning of an infeasible solution.
3. What is the need for introducing artificial variables in LPP?
4. Convert the following UBTP into BTP:

	D1	D2	D3	Availability
F1	8	7	6	20
F2	4	5	6	40
F3	5	7	3	60
Demand	30	50	10	

5. Distinguish between Degenerate and Non-Degenerate TP.
6. Define a Balanced Assignment problem.
7. Distinguish between CPM and PERT.
8. What are the rules to be followed for drawing a network model?
9. Explain briefly the ABC Inventory model.
10. Distinguish between shortage cost and holding cost in an Inventory model.

SECTION-B

Answer any FIVE questions. Each carries 8 marks. (5 x 8 = 40)

11. A toy manufacturer produces two types of dolls: a basic version doll A and a deluxe version doll B. Each doll of type B takes twice as long to produce as one doll of type A. The company has time to make a maximum of 2000 dolls per day and each type requires equal amount of it. Type B requires a fancy dress of which there are only 600 per day available. If the company makes a profit of Rs.30 and Rs.50 per doll, respectively, on doll A and B; how many of each should be produced per day in order to maximize the profit? Formulate the problem as an LPP and do not solve it?

12. Solve the following problem graphically:

$$\text{Max } Z = 5x + 2y$$

Sub to

$$x + y \le 10$$
$$x = 5$$
$$x, y \ge 0.$$

13. Define a Transportation Problem. Show that the Transportation problem (TP) is a special case of LPP.
14. Obtain the initial basic feasible solution using VAM for the following TP:

$$\begin{array}{c c} \begin{pmatrix} 5 & 1 & 8 \\ 2 & 4 & 0 \\ 3 & 6 & 7 \end{pmatrix} & \begin{array}{c} 12 \\ 14 \\ 4 \end{array} \\ \begin{array}{ccc} 9 & 10 & 11 \end{array} & \end{array}$$

15. Consider the following problem of assigning four operators to four machines. The assignment costs in dollars are given. Operator 1 cannot be assigned to machine III. Also, operator 3 cannot be assigned to machine IV. Find the assignment schedule and minimum assignment cost.

	Machine			
Operator	I	II	III	IV
1	5	5	-	2
2	7	4	2	3
3	9	3	5	-
4	7	2	6	7

16. Construct the Network diagram for the following constraints:
A, B and C are the first activities of the project, can start simultaneously.
A < D, E, F ; B < I, G ; D < I, G ; C < H ; G < H ; I < K, L ;
E , H < J ; E, H < M, N ; F < M , N ; M, I < O ; J, L, O < P.
Activities K, N and P are the terminal jobs of the project.

17. A company currently replenishes its stock of a certain item by ordering enough supply to cover a 1-month demand. The annual demand of the item is 1500 units. It is estimated that it costs \$20 every time an order is placed. The holding cost per unit inventory per month is \$2 and no shortage is allowed. Determine the optimal order quantity and the time between orders.

18. Write short notes on the following:
i) North-West Corner rule ii) Total float and Free float
iii) Lead time and iv) Dynamic Inventory model. (4x2)

SECTION-C

Answer any TWO questions. Each carries 20 marks. (2 x 20 = 40)

19. Use simplex method to solve the following L.P.P. :

Maximize $z = 4x_1 + 10x_2$

Sub to :

$$2x_1 + x_2 \leq 50$$
$$2x_1 + 5x_2 \leq 100$$
$$2x_1 + 3x_2 \leq 90$$
$$x_1, \; x_2 \geq 0.$$

20. Solve the following transportation problem:

	D_1	D_2	D_3	D_4	Availability
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Requirement	20	40	30	10	

21. Construct the network model for the following PERT problem:

Activity	(a, b, m) in days
1,2	(5, 8, 6)
1,4	(1, 4, 3)
1,5	(2, 5, 4)
2,3	(4, 6, 5)
2,5	(7, 10, 8)
2,6	(8, 13, 9)
3,4	(5, 10, 9)
3,6	(3, 5, 4)
4,6	(4, 10, 8)
4,7	(5, 8, 6)
5,6	(9, 15, 10)
5,7	(4, 8, 6)
6,7	(3, 5, 4)

a) Identify the critical path and the duration covered by the project.
b) Find the probabilities that the different events will occur without delay. (10+10)

22. a) Explain in detail the Single item static model with one price break. (12)

b) An item is consumed at the rate of 30 items per day. The holding cost per unit per unit time is \$0.05 and the setup cost is \$100. Suppose that no shortage is allowed and the purchasing cost per unit is \$10 for any quantity less than or equal to q = 300 and \$ 8 otherwise. Find the economic lost size. What is the answer if q = 500 instead?. (8)

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