LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

SIXTH SEMESTER – **APRIL 2016**

ST 6607/ST 6604/ST 6601 – OPERATIONS RESEARCH

Date: 18-04-2016 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART - A

Answer **ALL** the questions: (10x2=20 marks)

1. State the applications of operations research.
2. What is meant by degeneracy in a transportation problem?
3. Write the steps involved in formulating the LPP.
4. Find the basic feasible solution of $x_1+x_2+2x_3=4$
   $X_1-x_2+x_3=1$
5. Explain the term artificial variable and explain its uses in LPP.
6. Give an example of LPP having the feasible region as a square
7. Formulate the dual of the following LPP

   Min. $z = 3x_1 + x_2$

   S.t

   $x_1 + 4x_2 \geq 5,\ 2x_1 + x_2 \geq 3,\ x_1, x_2 \geq 0.$
8. State the main difference between PERT and CPM
9. Define two person zero sum game.
10. For a payoff matrix $\begin{pmatrix} 2 & 6 \\ -2 & 2 \end{pmatrix}$. What is the value of the game?

PART-B

Answer any **FIVE** questions: (5x8=40 marks)

11. State the advantages of a model.
12. Three articles A, B and C have weight, volume and cost as given below:

	Weight	Volume	Cost(Rs.)
A	4	9	5
B	8	7	6
C	2	4	3

The total weight cannot exceed 2,000 units and total volume cannot exceed 2,500 units. Find the number of articles to be selected from each type such that the total cost is minimum. Formulate this as a linear programming problem.

13. Solve the following LPP graphically.

Maximize $Z = 3x_1+5x_2$

Subject to

$X_1+x_2 \geq 6$

$-x_1+x_2 \leq 4$

$X_1\ X2 \geq 0$

14. Apply the principle of duality to solve the following LPP.

Minimize Z =16X+16Y

Subject to

$2x+4y \geq 3$

$3x+2y \geq 4$

$X, Y \geq 0$

15. Find the IBFS by using VAM method.

Stores.

Warehouse.	S1	S2	S3	S4	Availability.
A	5	1	3	3	34
B	3	3	5	4	15
C	6	4	4	3	12
D	4	1	4	2	19
Requirement.	21	25	17	17	80

16. Write down the major steps involved in decision making process.

17. Construct the network diagram for the following Activities:

B<E, F; C<G, L; E, G<H; L, H<I; L<M; H<N; H<J; I, J<P; P<Q.

18. Using principle of dominance solve the following game:

$$\begin{bmatrix} 8 & 10 & 9 & 14 \\ 10 & 11 & 8 & 12 \\ 13 & 12 & 14 & 13 \end{bmatrix}$$

PART - C

Answer any **TWO** questions: (2x20=40 marks)

19. Solve the following LPP by using two phase method.

Min $z= 4x_1+x_2$

Subject to

$3x_1+x_2=3$

$4x_1+3x_2 \geq 6$

$X_1+2x_2 \geq 4$

$X_1, X_2 \geq 0$

20. Find the optimal solution and hence solve the following LPP by using Big "M" method.

Minimize Z= 4x+y

Subject to

$3x+4y \geq 20$

$X+5y \geq 15$

$X, Y \geq 0$

21. (a). Solve the following assignment problem for minimum cost.

Job

Operator.	1	2	3	4	5
1	6	2	5	2	6
2	2	5	8	7	7
3	7	8	6	9	8
4	6	2	3	4	5
5	9	3	8	9	7
6	4	7	4	6	8

b) For the following problem: 1. Construct a PERT net work. 2. Critical path and project duration.

Activity	1-2	2-3	2-4	3-5	4-5	4-6	5-7	6-7	7-8	7-9	8-10	9-10
A	1	1	1	3	2	3	4	6	2	4	1	3
B	5	3	5	5	4	6	6	8	6	8	3	7
M	1.5	2	3	43	3	5	5	7	4	6	2	5

(10+10)

22. (a). A company produces the three products A, B and C and the pay – offs under different states of nature for demand, good, fair and poor are given as follows:

States of nature.

Product	Good	Fair	Poor	Maximum Pay –offs.	Minimum Pay – offs.
A	70,000	40,000	-20,000	70,000	-20,000
B	60,000	65,000	-10,000	65,000	-10,000
C	55,000	45,000	15,000	55,000	15,000

Calculate Maximax, Maximin, Minimax Regret, Hurwitz, and Laplace criterion.

(b) Solve the following game:

$$\begin{array}{c} \\ \text{Playaer A} \end{array} \begin{array}{c} \text{Player B} \\ \begin{bmatrix} 3 & -1 & 1 & 2 \\ -2 & 3 & 2 & 3 \\ 2 & -2 & -1 & 1 \end{bmatrix} \end{array}.$$

(10+10)

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