LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B. Sc. DEGREE EXAMINATION - **STATISTICS**

SIXTH SEMESTER – JUNE 2015

ST 6607 /ST 6604 / ST 6601 – OPERATIONS RESEARCH

Date: 03/07/2015 Dept. No. Max. Marks: 100

Time : 10.00 – 1.00

PART A

Answer ALL the questions. **(10 x 2 = 20)**

1. Mention any two applications of Operations Research.
2. Define Linear Programming Problem.
3. What is the need for artificial variables?
4. Give the dual for the following primal:

$Minimize\ Z = 3X_1 + X_2$

$Subject\ to\ the\ constraints$

$X_1 + X_2 \geq 1$

$2X_1 + 3X_2 \geq 2$

$X_1 \geq 0,\ X_2 \geq 0$

5. Define transportation problem.
6. Give any one example of an unbalanced assignment problem.
7. What are the three time estimates used in PERT?
8. Give any two errors in networking.
9. Define Two person zero sum game.
10. Mention any two methods for making decision under uncertainty.

PART B

Answer any FIVE questions. **(5 x 8 = 40)**

11. Solve the following LPP graphically

$Maximize\ Z = 4x_1 + 3x_2$

$Subject\ to\ the\ constraints$

$2x_1 + x_2 \leq 1000$

$x_1 + x_2 \leq 800$

$x_1 \leq 400$

$x_2 \leq 700$

$x_1, x_2 \geq 0$

12. Explain the Big M method of solving a LPP.
13. Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows.

Operators	Machines				
	A	B	C	D	E
I	10	3	10	7	7
II	5	9	7	11	9
III	13	18	2	9	10
IV	15	3	2	7	4
V	16	6	2	12	12

Find the optimal assignment.

14. Find the basic feasible solution for the given transportation problem using North West Corner rule for the data given below.

		Destination				
		P	Q	R	T	Supply
Source	A	4	6	8	13	50
	B	13	11	10	8	70
	C	14	4	10	13	30
	D	9	11	13	8	50
	Demand	40	35	105	20	

15. The following table gives the activities and duration in a construction project:

Activities	1 – 2	1 – 3	2 – 3	2 – 4	3 – 4	4 – 5
Duration	20	25	10	12	6	10

i) Draw the network diagram and indicate the critical path and project duration.

ii) Also compute the earliest and latest event time.

16. For the data given below, find the Critical Path.

Activity	A	B	C	D	E	F	G	H	I
Predecessor	-	-	A	B	C,D	B	E	E	F,G
Duration (days)	4	7	2	9	6	5	2	10	4

17. Explain the method of linear programming to solve a m x n game without a saddle point.

18. Solve the following game.

$$\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$$

PART C

Answer any TWO questions. **(2 x 20 = 40)**

19. Solve the given LPP using Dual Simplex method

$$Minimize\ Z = 36X_1 + 60X_2 + 45X_3$$

Subject to the constraints

$$X_1 + 2X_2 + 2X_3 \geq 40$$

$$X_1 + X_2 + 5X_3 \geq 25$$

$$X_1 + 4X_2 + X_3 \geq 50$$

$$X_1 \geq 0,\ X_2 \geq 0,\ X_3 \geq 0$$

20. Solve the following transportation problem.

Source	Destination				Availability
	D_1	D_2	D_3	D_4	
O_1	21	16	25	13	11
O_2	17	18	14	23	13
O_3	32	27	18	41	19
Requirement	6	10	12	15	

21. a)Solve the following game:

Player B

1 2 3

Player A $\begin{matrix} 1 \\ 2 \end{matrix}\begin{pmatrix} 6 & 7 & 15 \\ 20 & 12 & 10 \end{pmatrix}$

b) Explain Savage and Hurwicz criterion in detail.

22.A project consists of eight activities with the following relevant information:

Activity	Immediate Predecessor	Most optimistic time	Most likely time	Most pessimistic time
A	-	3	6	15
B	A	2	5	14
C	-	6	12	30
D	A	2	5	8
E	B	5	11	17
F	A	3	6	15
G	C	3	9	27
H	F	1	4	7
I	D, E	2	5	8

a) Draw the network diagram and find the expected project completion time.

b) Find the critical path.

c) What is the probability that the project will be completed in 27 weeks?

ꕥAll the Bestꕥ