LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SIXTH SEMESTER – **NOVEMBER 2016**

ST 6607/ST 6604/ST 6601 – OPERATIONS RESEARCH

Date: 15-11-2016 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART - A

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

1. **What is linear programming problem?**
2. **What is a surplus variable?**
3. **What is the need for artificial variables?**
4. **What do you mean by decision variables in a LPP?**
5. **What is a transportation problem?**
6. **What is an assignment problem?**
7. **Define the term dummy activity in network analysis.**
8. **What is Free float?**
9. **Define saddle point.**
10. **What is maximin criterion?**

Section – B

Answer Any FIVE questions **(5 * 8 = 40)**

11. **Give the importance of Operations Research.**
12. **The ABC manufacturing company can make two products P1 and P2. Each of the product requires time on a cutting machine and a finishing machine. The data is given below:**

	Product		Time available
	P1	P2	
Cutting hours (per unit)	2	1	8 hrs.
Finishing hours (per unit)	3	3	12 hrs.
Profit (per unit)	Rs. 6	Rs. 4	
Maximum sales (unit per week)	-	200	

Formulate linear programming problem.

13. **Explain the Two Phase method.**

14. **Solve the following unbalanced assignment problem of minimizing total time for doing all jobs.**

Jobs

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

15. **A Project consists of 8 jobs A to H with the following precedence and estimates of time. Draw a project network.**

Job	A	B	C	D	E	F	G	H
Predecessor	-	-	A, B	A, B	B	D, E	C, F	D, E
Time (days)	15	10	10	10	5	5	20	10

16. **Explain the time estimates in a PERT network.**
17. **Using the principle of dominance solve the following game:**

8	10	9	14
10	11	8	12
13	12	14	13

18. **Solve the game theory problem as a LPP.**

Section – C

Answer Any TWO questions **(2 *20 = 40)**

19. **(a) Explain the different models of Operations Research. (8 marks)**
    (b) Solve the following LPP graphically. (12 marks)

    Max Z = $2X_1 + 3X_2$

    Subject to $x_1 + x_2 >= 30$; $x_2 >= 3$; $x_2 <= 12$;

    $x_1 - x_2 >= 0$; $x_1 <= 20$

    $x_1, x_2 >= 0$.

20. **(a) Solve the following LPP using Big M method. (12 marks)**

    Maximize $Z = X_1 + 2X_2$

    Subject to $X_1 - X_2 >= 3$; $2X_1 + X_2 <= 10$

    $X_1, X_2 >= 0$.

    (b). Write down the importance of studying primal and dual of LPP. (8 marks)

21. **Solve the following transportation problem using Vogels method in order to minimize total transportation cost. (20 marks)**

		Destinations				
Origin	D1	D2	D3	D4	D5	Availabilities
O1	3	5	8	9	11	20
O2	5	4	10	7	10	40
O3	2	5	8	7	5	30
Requirements	10	15	25	30	40	120

22. (a)The following table shows the jobs of a network along with their time estimates. (12 marks)

	Duration in days		
Job	**a**	**m**	**b**
1 – 2	**1**	**7**	**13**
1 – 6	**2**	**5**	**14**
2 – 3	**2**	**14**	**26**
2 – 4	**2**	**5**	**8**
3 – 5	**7**	**10**	**19**
4 – 5	**5**	**5**	**17**
6 – 7	**5**	**8**	**29**
5 – 8	**3**	**3**	**9**
7 - 8	**8**	**17**	**32**

Draw the project network and find the probability that the project is completed in 40 days.

(b). Solve the following game whose pay-off matrix is (8 marks)

		Player B		
		1	**2**	**3**
	1	**4**	**-1**	**5**
Player A	**2**	**0**	**5**	**3**
	3	**5**	**3**	**7**
