SATAVAHANA UNIVERSITY, KARIMNAGAR.

Department of Statistics

CBCS Pattern with Semester System (w.e.f.2016-2017)

B.Sc (Statistics) - Semester –VI

Paper –VIII-A

(OPERATIONS RESARCH)

(Question Bank for Practical Examinations)

UNIT – I

1.Define O.R according to Morse & Kimball and explain useful in any two various fields.

2. Define convex set and explain 3 properties of convex set.

3. Define General Linear Programming Problem.

4. A firm manufactacturer two types of products A and B and sells them at a profit of Rs:2/- on type –A and Rs: 3/- on type B,each product is processed on two machines G and H. Type A requires 1 mint. of processing time on the G and 2 mint. on H. Type B requires 1 mint. on G and 1 mint. on H.The machine G is available not more than 6 hours 40 mints. While machine H is available for 10 hours during any working day. Formulate as LPP.

5 Solve the following LPP by graphically.

Max: $Z = 3X_1 + X_2$

S.C : $-2X_1 + X_2 \leq 1$

$X_1 \leq 2$

$X_1 + X_2 \leq 3$

and $X_1 \geq 0; X_2 \geq 0$

6. Define the terms (i) Feasible solution (ii) Optimum solution

(iii) Slack Variables (iv) Surplus Variables

7. Define Standard form GLPP and write its characteristics..

8. Define Basic Feasible Solution and obtain all basic feasible solutions of the following system of linear equations:

$$X_1 + 2X_2 + X_3 = 4$$

$$2X_1 + X_2 + 5X_3 = 5$$

9.Use the Simplex Method to solve the following LPP:

$$\text{Max : } Z = 4X_1 + 10X_2$$

$$\text{S.C : } 2X_1 + X_2 \leq 50$$

$$2X_1 + 5X_2 \leq 100$$

$$2X_1 + 3X_2 \leq 90$$

$$\text{and } X_1 \geq 0;\ X_2 \geq 0$$

10. Show that the LPP:

$$\text{Max : } Z = 4X_1 + X_2 + 4X_3 + 5X_4$$

$$\text{SC : } 4X_1 - 6X_2 - 5X_3 + 4X_4 \geq -20$$

$$3X_1 - 2X_2 + 4X_3 + X_4 \leq 10$$

$$3X_1 - 3X_2 + 5X_3 + 2X_4 \leq 20$$

$$\text{and } X_j \geq 0 \text{ for } j = 1, 2, 3 \text{ \& } 4.$$ has an unbound solution.

UNIT-II

11. Define Artificial Variable.

12. Explain in detail Big-M method algorithm.

13. Use Two-Phase method to solve the following LPP.

$$\text{Max : } Z = 3X_1 + 2X_2$$

$$\text{S.C : } 2X_1 + X_2 \leq 2$$

$$3X_1 + 4X_2 \geq 12 \text{ \& } X_1 \geq 0;\ X_2 \geq 0$$

14. What is degeneracy in LPP. How to resolve it.

15. Define the terms: (i) Primal problem (ii) Dual Problem.

16. Write the dual of the following LPP :

$$\textbf{Min} : Z = 3X_1 - 2X_2 + 4X_3$$

$$\textbf{SC} : 3X_1 + 5X_2 + 4X_3 \geq 7$$

$$6X_1 + X_2 + 3X_3 \geq 4$$

$$7X_1 - 2X_2 - X_3 \leq 10$$

$$X_1 - 2X_2 + 5X_3 \geq 3$$

$$4X_1 + 7X_2 - 2X_3 \geq 2$$

$$\text{and } X_j \geq 0 \text{ for } j = 1, 2, \& 3$$

17. Write the Dual of the following LPP :

$$\textbf{Min} : Z = 30X_1 + 23X_2 + 29X_3$$

$$\textbf{SC} : 6X_1 + 5X_2 + 3X_3 \leq 26$$

$$4X_1 + 2X_2 + 5X_3 \leq 7$$

$$\text{and } X_j \geq 0 \text{ for } j = 1, 2, \& 3$$

Show that the dual of the dual is Primal.

18. Write the Dual Simplex Algorithm.

19. Solve the following LPP by Dual Simplex method.

$$\textbf{Max} : Z = 2X_1 + 3X_3$$

$$\textbf{SC} : 2X_1 - X_2 - 3X_3 \geq 3$$

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

$$\text{and } X_j \geq 0 \text{ for } j = 1, 2, \& 3$$

20. State and prove dual is the dual is primal.

UNIT-III

21. State and prove the existence of feasible solution of Transportation Problem.

22. Write any 4 basic assumptions of the Transportation Problem model.

23. Write the VAM (Penalty Method) algorithm to find IBFS in TP.

24. Determine an IBFS by LCEM

	A	**B**	**C**	**D**	**Availability**
I	**20**	**22**	**17**	**4**	**120**
II	**24**	**37**	**9**	**7**	**70**
III	**32**	**37**	**20**	**15**	**50**
Req:	**60**	**40**	**30**	**110**	

25. Explain in detail Unbalanced Transportation Problem.

26. Determine an Optimum solution to the following TP by MODI method.

	D_1	**D_2**	**D_3**	**D_4**	**Supply**
O_1	**21**	**16**	**15**	**3**	**11**
O_2	**17**	**18**	**14**	**23**	**13**
O_3	**32**	**27**	**18**	**41**	**19**
Demand	**6**	**10**	**12**	**15**	

27. What is degeneracy in TP and how to resolve it.

28. Explain Transhipment Problem.

29. Maximization case in TP –Explain.

30. Determine an Optimum solution to the following TP by stepping stone method.

	D_1	D_2	D_3	Available
O_1	4	4	9	25
O_2	3	5	8	20
Req	18	16	11	

UNIT-IV

31. Explain Assignment Problem is a special case of LPP.

32.Slove the following Assignment Problem which minimises the total man hours.

		MEN			
		A	B	C	D
JOBS	1	10	25	15	20
	2	15	30	5	15
	3	35	20	12	24
	4	17	25	24	20

33. Explain Unbalanced Assignment Problem

34. Define Travelling Salesmen Problem and explain mathematical formulation of Travelling Salesmen Problem.

35. Solve the following Assignment Problem using Hungarian method.

TASKS	MEN E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

36. Define Sequencing Problem.

37. Define the terms: (i) No. of Machines (ii) Processing Order

(iii) Idle Time on Machine (iv) Total Elapsed Time

38. Solve the following Sequencing Problem and also find the Idle times on machines M_1 & M_2

JOBS	1	2	3	4	5	6
M_1	1	3	8	5	6	3
M_2	5	6	3	2	2	10

39. Solve the following 3 machine Sequencing Problem and also calculate the Idle times on machines M_1 ,M_2 & M_3

Machines	A	B	C	D	E	F	H
M_1	3	8	7	4	9	8	7
M_2	4	3	2	5	1	4	3
M_3	6	7	4	11	5	6	12

40. Solve the following 3 machine Sequencing Problem and also calculate the Idle times on machines M_1 ,M_2 & M_3

Machines	**A**	**B**	**C**	**D**	**E**
M_1	**7**	**12**	**11**	**9**	**8**
M_2	**8**	**9**	**5**	**6**	**7**
M_3	**11**	**13**	**9**	**10**	**14**

*****