St. Joseph's College of Commerce (Autonomous) #163, Brigade Road, Bangalore - 560 025

LESSON PLAN (MODULE WISE)

COURSE: B.COM., REGULAR SEMESTER: VI SUBJECT: OPERATIONS RESEARCH

Lecture Hours: 60

<u>OBJECTIVE</u>: To provide a good foundation in the mathematics of operation research and appreciation of its potential application for decision making in the business world.

Sl. No	UNIT & OBJECTIVES	No. of Lecture Hours	Methodology/ Instructional Techniques	Evaluation/ Learning Confirmation
MODULE 1	Introduction to Operations Research: <u>Objective</u> : To understand to meaning, definition, scope, nature, models and applications of Operations Research.	4		
1.	Meaning – Nature and Scope of Operations Research	1	Lecture and PPT	Question and Answer
2.	OR Models	1	Lecture and Illustrations	Question and Answer
3.	Nature and Limitations of OR	1	Lecture and Illustrations	Question and Answer
4.	Applications of OR	1	Lecture	Question and Answer
MODULE 2	INTRODUCTION TO LINEAR PROGRAMMING Objective: To construct LP Model and solve Maximization and Minimization Problem graphically.	12		
1.	Basic concepts – Construction of LP model	1	Lecture and Illustrations	Question and Answer
2.	Problems on Formulation of LP Model	1	Lecture, Problems and Solutions	Question and Answer
3.	Problems on Formulation of LP Model	1	Lecture, Problems and Solutions	Question and Answer
4.	Problems on Graphical LP Solution - Maximization	1	Lecture, Problems and Solutions	Question and Answer
5.	Problems on Graphical LP Solution - Maximization	1	Lecture, Problems and Solutions	Question and Answer
6.	Problems on Graphical LP Solution - Maximization	1	Lecture, Problems and Solutions	Question and Answer
7.	Problems on Graphical LP Solution - Maximization	1	Lecture, Problems and Solutions	Question and Answer
8.	Problems on Graphical LP Solution - Minimization	1	Lecture, Problems and Solutions	Question and Answer
9.	Problems on Graphical LP Solution - Minimization	1	Lecture, Problems	Question and

			and Solutions	Answer
10.	Problems on Graphical LP Solution - Minimization	1	Lecture, Problems	Question and
			and Solutions	Answer
11.	Problems on Graphical LP Solution - Minimization	1	Lecture, Problems	Question and
		1	and Solutions	Answer
12.	Revision		Revision	Test/
		1		, Assignment/
				MCQ
MODULE 3	SIMPLEX METHOD			
	<u>Objective</u> : To understand the meaning and use			
	of slack, surplus and artificial variables, to solve	14		
	Maximization and Minimization problems and			
	construct Duality to a given model.			
1.	Introduction- Standard LP form and basic solutions	1	Lecture and	Question and
			Illustrations	Answer
2.	Problems on instruction of Slack Variables		Lecture, Problems	Question and
<u>~</u> .		1	and Solutions	Answer
3.	Problems on instruction of Surplus Variables		Lecture, Problems	Question and
	I I I I I I I I I I I I I I I I I I I	1	and Solutions	Answer
4.	Problems on instruction of Artificial Variables		Lecture, Problems	Question and
		1	and Solutions	Answer
5.	Problems on Maximization		Lecture, Problems	Question and
5.		1	and Solutions	Answer
6.	Problems on Maximization		Lecture, Problems	Question and
		1	and Solutions	Answer
7.	Problems on Maximization		Lecture, Problems	Question and
		1	and Solutions	Answer
8.	Problems on Maximization		Lecture, Problems	Question and
0.		1	and Solutions	Answer
9.	Problems on Minimization – Big M Method		Lecture, Problems	Question and
9.	1 Toblems on Winningzation – Dig Wi Wethod	1	and Solutions	Answer
10.	Problems on Minimization – Big M Method		Lecture, Problems	Question and
10.	1 Toblems on Minimization – Dig M Method	1	and Solutions	Answer
11.	Drohloms on Minimization Pig M Mathad		Lecture, Problems	Question and
11.	Problems on Minimization – Big M Method	1	and Solutions	-
12.	Problems on Minimization - Big M Method	1		Answer Question and
12.			Lecture, Problems and Solutions	-
	Minimization of LPP – Duality	1		Answer
13.			Lecture, Problems	Question and
14	Minimized in a CLDD - Deality	1	and Solutions	Answer
14.	Minimization of LPP – Duality		Lecture, Problems	Question and
	TDANCDODTATION DDODI EM		and Solutions	Answer
MODULE 4	TRANSPORTATION PROBLEM			
	Objective: To understand the meaning of	11		
	Transportation Model, methods of finding the Initial	14		
	Solution by using different methods and Testing for			
1	Optimality.		Lasterer	Ourostian in 1
1.	Meaning – Introduction to transportation models	1	Lecture	Question and
2	- Loops in transportation table and its properties			Answer
2.	Problems on finding out Initial Solution under	1	Lecture, Problems	Question and
	North-west Corner Method		and Solutions	Answer
3.	Problems on finding out Initial Solution under	1	Lecture, Problems	Question and

	North-west Corner Method		and Solutions	Answer
4.	Problems on finding out Initial Solution under	1	Lecture, Problems	Question and
	Least Cost Cell Method	1	and Solutions	Answer
5.	Problems on finding out Initial Solution under	1	Lecture, Problems	Question and
	North-west Corner and Least Cost Cell Method		and Solutions	Answer
6.	Problems on finding out Initial Solution under	1	Lecture, Problems	Question and
	VAM Method		and Solutions	Answer
7.	Problems on finding out Initial Solution under	1	Lecture, Problems	Question and
	VAM Method	1	and Solutions	Answer
8.		_	Illustration	Question and
	Economic interpretation of Ui's and Vj's	1		Answer
9.			Lecture, Problems	Question and
	Testing for Optimality-MODI method	1	and Solutions	Answer
10.			Lecture, Problems	Question and
101	Testing for Optimality-MODI method	1	and Solutions	Answer
11.			Lecture, Problems	Question and
11.	Testing for Optimality-MODI method	1	and Solutions	Answer
12.			Lecture, Problems	Question and
12.	Testing for Optimality-MODI method	1	and Solutions	Answer
13.			Lecture, Problems	Question and
15.	Testing for Optimality-MODI method	1	and Solutions	Answer
14.	Trans- shipment Problems	1	Lecture, Problems	Question and
	A CELONMENT DOODLEM		and Solutions	Answer
AODULE 5	ASSIGNMENT PROBLEM			
	<u>Objective:</u> To understand the meaning of	8		
	Assignment Problems and to solve it using			
	Hungarian Method.		T	
1.	Introduction-Mathematical statement of the	1	Lecture	Question and
	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem	1		Answer
1. 2.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation		Lecture and	Answer Question and
2.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory)	1	Lecture and Illustrations	Answer Question and Answer
	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation	1	Lecture and Illustrations Lecture and	Answer Question and Answer Question and
2. 3.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory)		Lecture and Illustrations Lecture and Illustrations	Answer Question and Answer Question and Answer
2.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian	1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems	Answer Question and Answer Question and
2. 3. 4.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method	1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions	Answer Question and Answer Question and Answer
2. 3.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian	1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems	Answer Question and Answer Question and Answer Question and
2. 3. 4.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method	1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer
2. 3. 4.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian	1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems	Answer Question and Answer Question and Answer Question and Question and
2. 3. 4. 5.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems	Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7. 8.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method Hungarian Method	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7. 8.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7. 8.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7. 8.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method Digetive: To develop a Project Network, determine Time Estimates, calculating various	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7. 8.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7. 8. MODULE 6	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method Difference To develop a Project Network, determine Time Estimates, calculating various floats and identifying the Critical path and Project Completion Time.	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer
2. 3. 4. 5. 6. 7. 8.	Introduction-Mathematical statement of the Problem- Methods of solving Assignment problem Enumeration- Simplex and Transportation (Theory) Enumeration- Simplex and Transportation (Theory) Problem on Transportation using Hungarian Method Problem on Transportation using Hungarian Method	1 1 1 1 1 1 1	Lecture and Illustrations Lecture and Illustrations Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions Lecture, Problems and Solutions	Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer Question and Answer

	network		study problems	Answer
3.	Deterministic time Estimates-developing a Project	1	Lecture and case	Question and
	network	1	study problems	Answer
4.	Project duration and critical Path-forward pass-	1	Lecture, Problems	Question and
	backward pass-float	1	and Solutions	Answer
5.	Project duration and critical Path-forward pass-	1	Lecture, Problems	Question and
	backward pass-float	1	and Solutions	Answer
6.	Project duration and critical Path-forward pass-	1	Lecture, Problems	Question and
	backward pass-float	1	and Solutions	Answer
7.	Probabilistic Time Estimates	1	Lecture and	Question and
			Problems	Answer
8.	Difference Between PERT and CPM	1	Lecture	Question and
	Difference between r EKT and CFM	1		Answer

Books for Reference:

- 1. Operation Research by S. Kalavathy .S. Vikas Pub Co.
- 2. Operation Research by Sharma J.K. Mc Millan, New Delhi.
- 3. Quantitative Techniques, System Analysis and Data Processing by V.K. Kapoor Sultan Chand.

DATES & NATURE OF CIA:

1. First Unit Test 10 marks - between December 5th -10th, 2015 - Written Test.

2. Mid Term Exams 30 marks - Jan end, 2016.

3. Second CIA for 10 marks - between Feb 15-20th, 2015 - Assignment/Project.

Prepared By: CA. Jayakumar Nair.

Approved By: