Version No:
Approval Date:

Operations Research

Programme(s) in which it is offered: BBA

Course Category: Core	**Schedule of Offering**: Even
Course Credit Structure: 6	**Course Code: MAN3212**
Total Number of Hours: 6	**Contact Hours Per Week:6**
Lecture: 5 Credits, 75Hours	**Tutorial:** 1Credits, 15 Hours
Practical: 0 Credits,0 Hours	**Medium of Instruction: English**
Date of Revision:	**Skill Focus:** Employability
Short Name of the Course: ITBA	**Course Stream** ***(Only for Minor Courses)*****:**
Grading Method: Pass/Fail	**Repeatable:** Credit
Course Level: Beginner	

Course Description

This course is a core course for BBA students. The total credit of the course is 6.

Course Introduction

To acquaint students with the construction of mathematical models for managerial decision situations and to use computer software packages to obtain a solution wherever applicable. The emphasis is on understanding the concepts, formulation and interpretation.

Course Objective

This course aims to

1. Aims to introduce students to use quantitative methods and techniques for effective decision making.
2. Give students a working knowledge of model formulation and applications that are used in solving business decision.

Course Outcome

After successful completion of this course, the students will be able to

CO1. Define and explain the core concepts of Linear Programming such as Simplex Method and Graphical representations.
CO2. Formulate and solve Transportation and Assignment Problem.
CO3. Create network diagrams for project scheduling.
CO4. Solve problems related to Decision theory.
CO5. Understand the application of Game theory and simulation in business.

PO-CO Mapping

PO-CO Mapping Matrix

CO/PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	✓								
CO2	✓	✓				✓			
CO3		✓							
CO4						✓			
CO5		✓							

Prerequisites and other constraints

There are no formal pre-requisites. Programming experience or knowledge is not required.

Pedagogy

This course will run in lecture mode. The lectures will focus on both theory and the application of the theory. There will be assignments supporting the learning.

Suggested Reading:

1. N. D. Vohra: Quantitative Management, Tata McGraw Hill.
2. P. K. Gupta, Man Mohan, Kanti Swarup: Operations Research, Sultan Chand.
3. V. K. Kapoor: Operations Research, Sultan Chand & Sons.
4. J. K. Sharma: Operations Research Theory & Applications, Macmillan India Limited.

Evaluation Pattern

Evaluation Matrix

	Component Type	Weightage Percentage	Total Marks	Tentative Dates	Course Outcome

Continuous Internal Assessment (CIA) Components*					Mapping
	Assignment / Presentation/ Quiz	10	10		
	Mid Term Examination	20	20		
	CIA Marks	30	**30**		
ESE		70	**70**		
Total		**100**	**100**		

* The assignments involved in CIA will be subject to plagiarism checks. A submission with unexplained similarities exceeding 30% for Undergraduate courses, 20% for Postgraduate courses and 10% for PhD courses will be reverted for resubmission. The final submission is subject to score penalization as defined by the course instructor at the start of the course, with a clear communication of the same to all the registered candidates.

Note:

1. Course Outcome mapping of this matrix should match with the PO-CO Matrix.
2. The component type is based on the course and the instructor.
3. The Weightage Percentage for the internal components should be calculated based on the total CIA marks.

Module Sessions

Module I: Linear Programming: Formulation of L.P. Problems, Graphical Solutions (Special cases: Multiple optimal solution, infeasibility, unbounded solution); Simplex Methods (Special cases: Multiple optimal solution, infeasibility, degeneracy, unbounded solution) Big-M method and Two-phase method; Duality and Sensitivity (emphasis on formulation & economic interpretation.

Activities:

1. Assignment
2. Quiz

Module II: Elementary Transportation: Formulation of Transport Problem, Solution by N.W. Corner Rule, Least Cost method, Vogel's Approximation Method (VAM), Modified Distribution Method. (Special cases: Multiple Solutions, Maximization case, Unbalanced

case, prohibited routes).

Elementary Assignment: Hungarian Method, (Special cases: Multiple Solutions, Maximization case, Unbalanced case, Restrictions on assignment.)

Assignment

1. Assignment
2. Quiz

Module III: **Network Analysis:** Construction of the Network diagram, Critical Path- float and slack analysis (Total float, free float, independent float), PERT, Project Time Crashing.

Activities:

1. Assignment
2. Quiz

Module IV: Decision Theory: Pay off Table, Opportunity Loss Table, Expected Monetary Value, Expected Opportunity Loss, Expected Value of Perfect Information and Sample Information

Markov Chains: Predicting Future Market Shares, Equilibrium Conditions (Questions based on Markov analysis) Limiting probabilities, Chapman Kolmogrov equation.

Activities:

1. Assignment
2. Quiz

Module V: Introduction to Game Theory: Pay off Matrix- Two-person Zero-Sum game, Pure strategy, Saddle point; Dominance Rule, Mixed strategy, Reduction of m x n game and solution of 2x2, 2 x s, and r x 2 cases by Graphical and Algebraic methods; Introduction to Simulation: Monte Carlo Simulation.

Activities:

1. Assignment
2. Quiz