B. A. (HONS)
SEMESTER – V (MINOR)
OPERATIONS RESEARCH - I
COURSE CODE – DSC-M—STA-354
CREDIT MARK DISTRIBUTION – 04

COURSE OBJECTIVES

The course aims at building capabilities in the students for analyzing different situations in the industrial/ business scenario involving limited resources and finding the feasible solution within constraints. The objective of this course is to enable the student to understand and analyze managerial problems to equip him/ her to use the resources such as capitals, materials, production controlling, directing, staffing, and machines more effectively.

PRE – REQUISITE

The world of Operations Research is dynamic and fast paced. It is also the blending of mathematics, optimization, statistics, and computer science, techniques to improve decision making, processes and systems. The learners should have knowledge of mathematics up to higher school level to learn basic contents of Operations Research.

CO – REQUISITE

Linear Programming (Up to two variables and construction of general problem up to three variables), Transportation Problems (Balanced and Unbalanced Transportation Problems), Assignment Problems (Balanced assignment problems, Maximization and Minimization Problems Using Hungarian's method) & Replacement Problems (Problem when units are deteriorating with time and the value of money remains unchanged).

COURSE OUTCOMES

- Understanding the basic concept and working of O.R. to solve the Industrial/ Organizational problem in optimum manner.
- Solve linear programming problems using appropriate technique and interpret the results obtained.
- Determine feasible strategy for Minimization of Cost of shipping of products from source to Destination using various methods, finding initial basic feasible solution of the Transportation problems.
- Optimize the allocation of resources to Demand points in the best possible way using various techniques and minimize the cost or time of completion of number of jobs by number of persons as well as maximize the profit or sale.

UNIT	CONTENT	WEIGHTAGE
1	**INTRODUCTION TO OPERATIONS RESEARCH** ➢ Origin of OR ➢ Definitions of Operations Research (OR) ➢ Nature and Scope of OR ➢ Characteristics of OR ➢ Phases of OR ➢ Merits and Limitations of OR ➢ Different types of Models in OR ➢ Applications of OR in the fields of Marketing, Finance Planning ➢ Techniques of OR	**25%**
2	**LINEAR PROGRAMMING PROBLEM (LPP)** ➢ Meaning of Linear Programming Problems (LPP) ➢ Advantages / Uses, Assumptions and Limitations of LPP ➢ Understanding of Terms used in LPP ➢ Mathematical form of LPP ➢ Conversion of practical problem into mathematical form up to 3 variables only ➢ Solution of LP problem for two variables only by graphical method	**25%**
3	**TRANSPORTATION PROBLEM (TP)** ➢ Meaning of balanced and unbalanced Transportation Problem (TP) ➢ General Transportation table and its mathematical form ➢ Initial basic feasible solution (IBFS) and its cost By using ✓ North-West Corner Method (NWCM), ✓ Least Cost (Matrix Minima) Method (LCM) ✓ Vogel's Approximation Method (VAM) ➢ Examples based on these methods	**25%**
4	**ASSIGNMENT PROBLEM (AP) AND REPLACEMENT PROBLEM (RP)** ➢ Meaning of balanced Assignment Problem (AP) ➢ Mathematical form of AP ➢ Hungarian's method for solving AP in the cases of Minimization and Maximization problem ➢ Meaning of Replacement Problem (RP) ➢ Simple examples of Replacement Problem when the units are deteriorating with time and the value of money remains unchanged	**25%**

MODE OF EVALUATION

Evaluation will be divided in two parts.

- **External:** Semester end Examination will be conducted by the Gujarat University of 50 Marks
- **Internal:** Internal Evaluation of 50 marks will be decided by the colleges / Institutes/ University departments as per the instruction given by the University.

FBLD (Flip Blended Learning Design Template)

- Any One Unit from the above syllabus can be discussed by the faculty through online mode.
- Online mode can be SWAYAM MOOC Course or any other suggested by the UGC or Gujarat University.

REFERENCE BOOKS:

1. Operation Research - Kanti Swaroop
2. Operation Research : P. K. Gupta and Man Mohan
3. Operation Research : Dr R. V. S. Prasad
4. Operation Research : Dr. D. Giri
5. Operation Reach – S. D. Sharma and J. K. Sharma
6. Operations research - Models and methods by Chandrasekar Salimath, Bhupendar Parashar.
7. Operations Research – Taha
8. Operations Research – N. D. Vora

B. A. (HONS) NEP
SEMESTER – V (MINOR)
DISCRETE PROBABILITY DISTRIBUTIONS AND SAMPLING TECHNIQUES
COURSE CODE – DSC-M-STA-355
CREDIT MARK DISTRIBUTION – 04

COURSE OBJECTIVES

Discrete Probability Distribution and Sampling Techniques is a foundational course in probability theory and sampling that introduces students to the concepts and applications of probability and sampling in various fields. The course aims to develop students' understanding of Discrete Probability distributions and sampling, enabling them to solve problems involving uncertainty and randomness and to apply appropriate sampling methods in various real life problems.

PRE – REQUISITE

A strong foundation of basic concepts of probability is essential for understanding the concepts of Discrete Probability Distributions. Students should be familiar with arithmetic, algebra, and basic mathematical operations. The learner should have basic knowledge of combinatorial principles, such as permutation and combination, is often required. Combinatory is used to count the number of possible outcomes in various scenarios. Familiarity with basic probability terminology, such as events, outcomes, sample space and probabilities, can be beneficial. Basic familiarity with mathematical notation, symbols, and concepts used in probability, such as summation, factorial notation, and set notation.

COURSE OUTCOMES

Upon successful completion of a course on Discrete Probability Distribution and Sampling Techniques, Students will have a solid understanding of the concepts of probability distributions and sampling techniques. Students will be able to define and analyse discrete random variables. They will understand the concept of probability mass function (PMF) and calculate probabilities associated with specific outcomes and sets of outcomes. Students will be skilled in calculating the expected value (mean) and variance of discrete random variables. Overall, completing a course on Discrete Probability Distribution and Sampling Techniques should enable students to think probabilistically, understand the probabilistic aspects of data, learn different sampling techniques and apply these concepts to various practical scenarios in their academic and professional pursuits.

UNIT	CONTENT	WEIGHTAGE
1	**MATHEMATICAL EXPECTATION** **(For Discrete Random Variable)** ➢ Meaning of Discrete Random Variable ➢ Meaning of Probability Distribution ➢ Meaning of Mathematical Expectation ➢ Properties of Mathematical Expectation (Without Proof) ➢ Variance of a Discrete Random Variable ➢ Properties of Variance (without proof) ➢ Mean and Variance of Linear Combination of Two Independent Variables ➢ Examples based on the above Concepts	**25%**
2	**DISCRETE DISTRIBUTIONS -I** ➢ Concept of Probability Mass Function ➢ Introduction to Binomial Distribution ➢ Properties and Use of Binomial Distribution ➢ Introduction to Poisson Distribution ➢ Properties and Uses of Poisson Distribution ➢ Examples Related to these Distributions	**25%**
3	**DISCRETE DISTRIBUTIONS -II** ➢ Introduction to Negative Binomial Distribution ➢ Properties and Uses of Negative Binomial Distribution ➢ Geometric Distribution ➢ Properties and Uses of Geometric Distribution ➢ Examples Related to these Distributions	**25%**
4	**Sampling Techniques** ➢ Meaning of Population and Sample ➢ Characteristics of a Good Sample ➢ Meaning of Probability Sampling ➢ Simple Random Sampling ➢ Construction of simple random samples and examples based on $E(\bar{y})= \bar{Y}$ ➢ Stratified Sampling – (Theoretical Explanation Only) ➢ Meaning of Non-Probability Sampling – ➢ (Theoretical Explanation Only) • Observational Sampling • Purposive Sampling • Convenient Sampling	**25%**

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FBLD (Flip Blended Learning Design Template)

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- Online mode can be SWAYAM MOOC Course or any other suggested by the UGC or Gujarat University.

REFERENCE BOOKS

1. "Introduction to Probability and Mathematical Statistics" by Prasanna Sahoo (published by CRC Press)
2. "Probability and Statistics" by T.K. V. Iyengar (published by S. Chand Publishing)
3. "Fundamentals of Probability, with Stochastic Processes" by Saeed Ghahramani (published by PHI Learning Private Limited)
4. "Probability and Random Processes" by S.V. Prabhu and P.G. Sankaran (published by John Wiley & Sons India Pvt. Ltd.)
5. "A First Course in Probability and Statistics" by B.L.S. Prakasa Rao (published by Universities Press)