OPTIMIZATION TECHNIQUES

IV Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEB12	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I. COURSE OVERVIEW:

The optimization Techniques is also called Operations research for short and it is a scientific approach to decision making which seeks to determine how best to design and operate a system under conditions requiring allocation of scarce resources. Optimization Technique as a research tool, primarily has a set or collection of algorithms which act as tools for problems solving in chosen application areas. This course has extensive applications in engineering, business and public systems and is also used by manufacturing and service industries to solve their day to day problems. This course facilitates to learn various models to optimize the solution of a problem.

II. OBJECTIVES:

The course should enable the students to:

I	Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization ofobjective function).
II	The problem formulation by using linear, dynamic programming, game theory andqueuing models.
III	The stochastic models for discrete and continuous variables to control inventory and simulation of manufacturing models for the production decision making.
IV	Formulation of mathematical models for quantitative analysis of managerialproblems in industry.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Understand** the concepts operations research modeling techniques to solve complex problems involved in various industries.	Understand
CO 2	**Find** the appropriate algorithm for transportation and assignment of resources to optimize the process of assignment.	Remember
CO 3	**Understand** the Concepts of sequencing to solve complex problems for effective scheduling of jobs on machines.	Understand
CO 4	**Identify** appropriate equipment replacement technique to be adopted to minimize maintenance cost by eliminating equipment break-down.	Apply
CO 5	**Apply** the knowledge of game theory concepts to articulate real-world competitive situations to identify strategic decisions to counter the consequences.	Apply
CO 6	**Identify** appropriate method for application of simulation to solve inventory and queuing problems for real world applications.	Apply

IV. SYLLABUS:

MODULE-I	DEVELOPMENT OF O.R AND ALLOCATION	Classes: 09

Development, Definition– Characteristics and Phases**,** Types of models, Operations Research models, applications. Allocation**:** Linear Programming Problem Formulation, Graphical solution, Simplex method, Artificial variables techniques: Two–phase method, Big-M method.

MODULE-II	TRANSPORTATION AND ASSIGNMENT	Classes: 09

Transportation Problem, Formulation, Optimal solution, unbalanced transportation problem, Degeneracy. Assignment problem, Formulation, Optimal solution, Variants of Assignment Problem, Traveling Salesman problem.

MODULE-III	SEQUENCING AND REPLACEMENT	Classes: 09
Sequencing Introduction**:** Flow**,** Shop sequencing**,** n jobs through two machines**,** n jobs through three machines, Job shop sequencing, two jobs through 'm' machines. Replacement**:** Introduction**:** Replacement of items that deteriorate with time**,** when money value is not counted and counted, Replacement of items that fail completely, Group Replacement.		
MODULE-IV	**THEORY OF GAMES AND INVENTORY**	**Classes: 09**
Theory Of Games: Introduction – Terminology, Solution of games with saddle points and without saddle points, 2×2 games, dominance principle, m X 2 & 2 X n games, Graphical method. Inventory: Introduction**,** Single item**,** Deterministic models**,** Purchase inventory models with one price break and multiple price breaks, Stochastic models, demand may be discrete variable or continuous variable, Single period model and no setup cost.		
MODULE-V	**WAITING LINES, DYNAMIC PROGRAMMING AND SIMULATION**	**Classes: 09**
Waiting Lines: Introduction, Terminology, Single Channel, Poisson arrivals and exponential service times with infinite population and finite population models, Multichannel, Poisson arrivals and exponential service times with infinite population. Dynamic Programming: Introduction, Terminology, Bellman's Principle of optimality, Applications of dynamic programming, shortest path problem, linear programming problem. Simulation: Introduction, Definition, types of simulation models, steps involved in the simulation process - Advantages and Disadvantages, Application of Simulation to queuing and inventory.		
Text Books:		
1. J. K. Sharma, "Operations Research", Macmillan, 5th Edition, 2012. 2. R. Pannerselvan, "Operations Research", PHI Publications, 2nd Edition, 2006.		
Reference Books:		
1. M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2013. 2. Maurice Saseini, Arhur Yaspan, Lawrence Friedman, "Operations Research: Methods & Problems", 1st Edition, 1959. 3. Hamdy A. Taha, "Introduction to O.R", PHI, 8th Edition, 2013. 4. Harvey M.Wagner, "Operations Research", PHI Publications, 2nd Edition,1980.		
Web References:		
1. https://www.aicte-india.org/flipbook/p&ap/Vol.%20II%20UG/UG_2.html#p=8 2. https://www.britannica.com/topic/operations-research		
E-Text Books:		
1. http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdf 2. https://www.pdfdrive.com/operations-research-books.html		