OPTIMIZATION TECHNIQUES

SYLLABUS

IV Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEB12	Foundation	3	-	-	3	30	70	100
Contact Classes: 60	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 60		

COURSE OBJECTIVES:

The students will try to learn:

I. Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function).

II. The problem formulation by using linear, dynamic programming, game theory and queuing 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 managerial problems in industry.

COURSE OUTCOMES (COs):

CO 1 Recall the theoretical foundations of various issues related to linear programming modeling to formulate real-world problems as a L P model

CO 2 Explain the theoretical workings of the graphical, simplex and analytical methods for making effective decision on variables so as to optimize the objective function.

CO 3 Identify appropriate optimization method to solve complex problems involved in various industries.

CO 4 Demonstrate the optimized material distribution schedule using transportation model to minimize total distribution cost.

CO 5 Find the appropriate algorithm for allocation of resources to optimize the process of assignment.

CO 6 Explain the theoretical workings of sequencing techniques for effective scheduling of jobs on machines.

CO 7 Identify appropriate equipment replacement technique to be adopted to minimize maintenance cost by eliminating equipment break-down.

CO 8 Apply the knowledge of game theory concepts to articulate real-world competitive situations to identify strategic decisions to counter the consequences.

CO 9 Demonstrate the various selective inventory control models to analyse and optimize inventory systems.

CO10 Explain the theoretical workings of dynamic programming method to find shortest path for given network.

CO11	Develop a suitable queuing system to control important performance measures dynamically.
CO12	Identify appropriate method for application of simulation to solve inventory and queuing problems for real world applications.

SYLLABUS

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

Development, definition, characteristics and phases, types of operation 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 PROBLEM**	**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, and 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 PROGRAMMIMG 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", 2nd Edition, PHI Publications, 2006.

Reference Books:

1. A. 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.

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