Course title: Quantitative Methods For Managerial Decisions. (Open Elective)			
Course code:	**19IP8OE**	Credits:	03
Teaching hours/week:	03	Total teaching hours:	42
CIE: 50 marks	SEE: 50 marks	SEE: 03 hours	
Prerequisite- -			

Course Objectives:

Quantitative Methods For Managerial Decisions students will be well grounded in the mathematical, engineering, and modelling skills and they will be prepared to apply those skills to the efficient design, analysis, operation and control of complex systems.

Modules	Teaching hours
Module I **Introduction to OR : Definitions, Phases of OR study and applications** **Linear Programming problems**: Mathematical Formulation, Standard Form, Basic Solutions, Feasible Solutions, Optimal Solution, Degenerate solutions, Graphical and Simplex methods. Two Phase and Big-M methods, Unbounded, In feasible and alternative solutions. Resolving Degeneracy in LPP.	**09**
Module II **Assignment problem:** Formulation, Hungarian Method, Unbalanced problem, Assignment for maximization, Travelling Salesman problem **Transportation Problem:** Formulation of Transportation Model, Basic Feasible solution by NWC Rule, Row Minimum, Lowest cost entry and Vogel approximation methods. Optimality methods, Unbalanced problem, degeneracy in transportation.	**9**
Module III **Project Management:** Network Construction, CPM: determination of critical path and Total elapsed time, Concept of slack and Float, PERT-Estimation of Project duration and Variance, analysis about the completion of projects. **Crashing of Networks:** Basic concept, Optimal cost of the project	**8**

Module IV	
Queuing Theory: Queuing system : Types and Characteristics, Steady state analysis of M/M/1 and concept of M/M/K model **Replacement problem**: Basic Concept of Replacement of items that deteriorate with time: costs involved Replacement procedure with and without consideration of Time value of money. Replacement of items that fail suddenly: Group Replacement	**8**

Module V	
Games Theory : Formulation of Games, Characteristics of games, Two-Person Zero Sum game, Maximin/Minimax principle, Saddle point, Games without saddle point, solution for (2 X 2) game, Dominance property, Graphical solution for (2 x n) and (n x 2) games	**8**

Question paper pattern:
CIE: Question paper will be for 40 marks consisting of four questions carrying 10 mark s each. Students have to answer both the questions.
SEE: There will be two questions from each module and students have to answer 5 questions selecting at least one question from each module. Each question will carry 20 marks and consist of a maximum of 3 sub-questions.

Reference Books:
01. Taha S A –"Operations Research and Introduction", McMillian
02. Philips, Ravindran and Soeberg- "Principles of Operations research", PHI
03. Hiller and Liberman-" Introduction to Operations Research", McGraw Hill V Edn
04. S.D.Sharma –"Operations Research", Kedarnath, Ramnath and Co.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
19IP8OE	CO1	Develop proficiency with tools for optimization and their application in industry Involving scarce resources
	CO2	Apply the concept of assignment and transportation problem to formulate and solve decision making problem
	CO3	utilize the network techniques to manage the scarce resources and optimize for a given project
	CO4	Apply the concept of queuing theory and Perform economic analysis for replacement problem

	CO5	Apply Games theory for decision making for competitive circumstances