Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. S. Karthik, IT Analyst, Tata Consultancy Services	Dr. Neelanarayanan,, Professor, School of Computer Science and Engineering, VIT Chennai	1.Mrs.E.Aarthi
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Course Code	UMS20402T	Course Name	Resource Management Techniques	Course Category	C	Professional Core Course	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil

Course Offering Department	Mathematics and Statistics		Data Book / Codes/Standards	Graph sheet needed

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	To provide foundations in Operations Research																		
CLR-2 :	To apply basic concepts of Linear programming problems																		
CLR-3 :	To learn and understand Operations research approach to various applications																		
CLR-4 :	To provide a set of algorithms for solving sequencing problems	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Scientific Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLR-5 :	To employ appropriate methods of Game theory																		
CLR-6 :	To have a proper understanding of decision making problems																		

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	To recognize the scope and models of Operations research methods for decision making process.	3	85	80	L	L	L	M	L	-	-	-	L	M	H	M	-	-	-

					PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO-2:	To apply Operations research techniques for solving real life problems	3	80	75	M	M	M	M	M	-	-	-	M	M	H	M	-	-	-
CLO-3:	To know optimization through various transportation and assignment problems	3	85	80	H	H	M	H	M	-	-	-	M	M	H	H	-	-	-
CLO-4:	To schedule jobs through machines using the prescribed algorithm	3	85	80	M	H	M	H	M	-	-	-	M	M	H	H	-	-	-
CLO-5:	To calculate saddle point, strategy and value of the game by various methods	3	85	80	H	H	M	H	H	-	-	-	M	M	H	M	-	-	-
CLO-6:	To deal with optimization problems in real life situation	3	75	80	H	H	M	H	M	-	-	-	M	M	H	M	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Operations Research(O.R)	Introduction to Linear Programming Problem (LPP)	Transportation Problems(TP) - Examples, Definitions – decision variables, supply and demand constraints	Sequencing Problems: Introduction	Game theory: Definitions, Examples
	SLO-2	Scope of O.R	Mathematical formulation of LPP	Mathematical formulation of TP	Assumptions made while solving Sequencing problem	Characteristics of Game theory
S-2	SLO-1	Some O.R. Models	Basic assumptions to formulate LPP	Balanced and Unbalanced TP	Total elapsed time, Idle time, No passing Rule	Pure Strategies: Maximin - Minimax Principle
	SLO-2	Iconic Models, Analogue Models	Procédure for forming a LPP model	Methods for finding Initial basic feasible solution	Procedure for sequencing n jobs on 2 machines	Saddle point and value of the game
S-3	SLO-1	Mathematical Models	Formulation of LPP Model	North West Corner Rule	Sequencing n jobs on 2 machines	Mixed Strategies: Games without saddle points
	SLO-2	Static Models ,Dynamic Models	Formulation of LPP Model	North West Corner Rule	Sequencing n jobs on 2 machines	Solving 2x2 games
S 4	SLO-1	Deterministic Models, Stochastic Models	Graphic method of solving LPP	Row Minima Method	Sequencing n jobs on 2 machines	Solving 2x2 games
	SLO-2	Classification of Models	Graphic method Special Cases: Infeasibility	Column Minima Method	Procedure for sequencing n jobs on 3 machines	Matrix oddment method for 3x3 games
S-5	SLO-1	Characteristics of O.R.	Graphic method Special Cases:	Least Cost Method	Sequencing n jobs on 3	Matrix oddment method for nxn

S	SLO					
		Unboundedness			machines	games
	SLO-2	Principles of Modelling	Graphic method Special Cases: Redundancy	Least Cost Method	Sequencing n jobs on 3 machines	Matrix oddment method for nxn games
S-6	SLO-1	General methods for solving O.R. Models	Graphic method Special Cases	Vogel's Approximation Method(VAM)	Procedure for sequencing n jobs on m machines	Dominance property
	SLO-2	Main phases of O.R: Formulation of the problems:	Graphic method Special Cases	VAM Computational details	Sequencing n jobs on m machines	Dominance property: Computational details
S-7	SLO-1	Main phases of O.R: Formulation of the problems:	Graphic method Special Cases	VAM Computational details	Sequencing n jobs on m machines	Dominance property: Computational details
	SLO-2	Construction of a mathematical model	Advantages of LPP	VAM Computational details	Sequencing n jobs on m machines	Dominance property: Computational details
S-8	SLO-1	Construction of a mathematical model	Advantages of LPP	VAM Computational details	Sequencing n jobs on m machines	Dominance property: Computational details
	SLO-2	Solving the model constructed	Limitations of LPP	Unbalanced Transportation Problem	Sequencing n jobs on m machines: computational details	Dominance property: Computational details
S 9	SLO-1	Controlling and updating	General Linear Programming Problem	Unbalanced Transportation Problem	Sequencing n jobs on m machines: computational details	Graphical method for 2x3 games
	SLO-2	Testing the model and its solution, Implementation	Types of Solutions	Maximization case in Transportation Problem	Processing of 2 jobs on n machines	Graphical method for 2xn games
S 10	SLO-1	Role of O.R in industry	Canonical form of LPP	Assignment Problem(AP): Examples, Definitions – decision variables, supply and demand constraints	Processing of 2 jobs on n machines: Computational details	Graphical method for 2xn games
	SLO-2	Role of O.R. in Various fields	Standard form of LPP	Mathematical formulation of AP, Balanced and Unbalanced AP	Processing of 2 jobs on n machines: Computational details	Graphical method for 3x2 games
S-11	SLO-1	O.R and decision making	Simplex Algorithm Introduction	Assignment Algorithm: Hungarian Method	Processing of 2 jobs on n machines: Computational details	Graphical method for mx2 games
	SLO-2	Role of computers in O.R.	Simplex method: non-degenerate basic solution, degenerate basic solution	Hungarian Method: Computation details	Processing of 2 jobs on n machines: Computational details	Graphical method for mx2 games

S-12	SLO-1	Role of computers in O.R.	Simplex method: basic feasible solution	Solving Unbalanced AP	Processing of 2 jobs on n machines: Computational details	Graphical method for 2xn and mx2 games
	SLO-2	Limitations of O.R.	Simplex Algorithm: Computational details	Maximization case in AP	Graphical method	Limitations of game theory

Learning Resources	Theory: 1. Resource Management Techniques by Prof.V.Sundaresan, K.S.Ganapathy Subramanian, K. Ganesan. 2. Operations Research: An Introduction.H.A. Taha 3. Linear Programming. K.G. Murthy 4. Operations Research. KantiSwarup, Gupta, P.K. and Manmohan

Learning Assessment										
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	-	30%	-	30%	-	30%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	40%	-	40%	-
Level 3	Evaluate Create	30%	-	30%	-	30%	-	30%	-	30%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers	
Experts from Academic	Internal Experts
Dr.M.A.Baskar, Professor & Head, Dept. Of Mathematics, Loyola college, Chennai	J.Madhumitha, SRMIST
Dr.P.Dhanavanthan, Professor & Head, Dept. Of statistics, Pondicherry University	