Course Code	PCA20C06T	Course Name	OPTIMIZATION 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 Need*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To impart the overall view of the subject of operations Research			
CLR-2 :	To apply mathematical models for solving real life problems			
CLR-3 :	To develop the students ability and help to solve quantitative issues in information technology			
CLR-4 :	This mathematical modelling, provides the knowledge in planning, controlling and scheduling to the network analysis			
CLR-5 :	To develop the decision making knowledge.			
Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*			
CLO-1:	To understand the mathematical models and its limitations.	3	85	80
CLO-2 :	To have skill in analysis of data by graphical and other methods.	3	80	70
CLO-3 :	To enable the student to apply the technique in solving problem	3	70	65
CLO-4 :	To provide the students with opportunity of using various software package for solving linear programming and integer programming models	3	70	70
CLO-5 :	To introduce the students to the use of basic methodology for the solution of linear programs and integer programs	3	80	70

Program Learning Outcomes (PLO)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1:	*M*	*L*	*L*	-	*L*	-	*L*	-	*M*	*L*	*L*	*L*	*M*	*M*	*L*
CLO-2 :	-	*L*	*H*	-	*H*	-	*L*	-	*H*	*M*	*H*	*M*	*L*	*M*	*L*
CLO-3 :	*M*	*M*	*H*	-	*H*	-	*M*	-	*M*	*M*	*H*	*M*	*L*	*M-*	*M*
CLO-4 :	*H*	*H*	*M*	-	*M*	-	*M*	-	*H*	*L*	*M*	*L*	*M*	*H*	*H*
CLO-5 :	-	*M*	*M*	-	*M*	-	*M*	-	*H*	*M*	*H*	*M*	*M*	*H*	*M*

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Introduction to operations research*	*Introduction of Transportation*	*Introduction of game theoryBasic definitions and Examples.*	*Introduction of Network Analysis*	*Introduction of Queuing theory , Basic Definitions*
	SLO-2	*Basic Definitions*	*Basic Definitions*	*Characteristics of Game theory and Uses of Game theory,*	*Objectives of Network Analysis and Main function of Network*	*Uses of Queuing theory, Meaning of Queuing System*
S-2	SLO-1	*Meaning of Operations Research*	*Mathematical formulation of LPP*	*Pure Strategies: Maximin - Minimax Principle*	*Advantages of Network Analysis*	*Elements of Queuing System*

	SLO-2	*Advantages of Operations Research*	*Finding initial Solution by Row-minima Method & Column-minima Method*	*Problems based on saddle point*	*limitations of Network Analysis*	*Kendal's Notation for representing Queuing models*
S-3	SLO-1	*Uses of Operations Research*	*Finding initial Solution by matrix-minima Method*	*Mixed strategy based problems*	*Rules for constructing a project network*	*The average number of units in the system*
	SLO-2	*Nature of Operations Research*	*Finding initial Solution by North-West Corner Method*	*Finding value of the games with saddle points*	*Constructing project network*	*Finding probability of waiting time in the Queue*
S-4	*SLO-1*	*Role of Operations Research in computer science*	*Finding initial Solution by VAM Method*	*Finding value of the games without saddle points*	*Network computations by Critical path method*	*. Problems on (M/M/1)*
	SLO-2	*Role of Operations Research in Information technology*	*Find the initial solution for unbalanced transportation problem*	*Solving 2X2 games*	*Earliest start time of a project network*	*Introduction to Inventory ,Types of Inventory*
S-5 to S-8	SLO-1	*Formulating the problem*	*Finding the optimum solution to maximize the profit*	*Solving 2X2 games*	*Earliest completion time of a project network*	*Application of Inventory*
	SLO-2	*Some Basic Assumptions*	*Calculating Optimum Solutions by MODI method*	*Matrix oddment method for nxn games*	*Latest start time of a project network*	*Some basic formulas*
S-9	SLO-1	*Standard form of LPP and Canonical form of LPP*	*Optimum Solution without Loop, ii) Optimum Solution with Loop*	*Matrix oddment method for nxn games*	*Latest completion time of a project network*	*Cost involved in inventory problem*
	SLO-2	*Graphical solution of a LPP*	*Introduction of Assignment problem*	*Introduction of Dominance property, Rules of Dominance*	*Network computations by PERT*	*Deterministic inventory models*
S-10	SLO-1	*Working Procedure for Graphical method*	*Hungarian procedure for solving Assignment Problem*	*Solving Games by Dominance property*	*Basic difference between PERT and CPM*	*Economic order quantity(E.O.Q)*
	SLO-2	*Solving LPP by Graphically*	*Mathematical Form & Difference between Transportation and Assignment Problems*	*Solving Games by Dominance property*	*Time estimates-Expected duration of each activity*	*Purchasing model with no shortages*
S-11	SLO-1	*Graphical Method, (i)Feasible Solution*	*Unbalanced Assignment Problem*	*solving game- Graphical method,*	*Time estimates-Expected variance of each activity and variance of project lengh*	*Problems on Purchasing model with no shortages*
	SLO-2	*, ii)Infeasible Solution, ii)Unbounded Solution*	*Finding the optimum solution to Restriction assignment method*	*Graphical Solutions of 2xM*	*Total float*	*Manufacturing model with no shortages*
S-12	SLO-1	*Simplex Method*	*Finding the optimum assignment to maximize the profit*	*Graphical Solutions of N x2*	*Free float and Independent float*	*Manufacturing model with no shortages*
	SLO-2	*Simplex Method*	*Solving the Travelling Salesmen Problem*	*.Limitations of Game Theory*	*Problems on Total float Free float and Independent float*	*Problems on Manufacturing model with no shortages*

Learning Resources	1. C.R.Kothari, (2013)"Quantitative Techniques" Third Revised Edition S.Chand Ltd, New Delhi. 2. V.Sundaresan, K.S.Ganapathy Subramanian, K. Ganesan (2017) "Resource Management Techniques" Eleventh Edition, A.R Publication. 3. Kallavathy.S, (2014) "Operations Research" Fourth Edition, Vikas publishing house.

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, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers	
Experts from Higher Technical Institutions	**Internal Experts**
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