Course Code	PCS21G03J	Course Name	RESEARCH METHODOLOGY	Course Category	G	Generic Elective Course	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	*To become familiar with objective of research*
CLR-2 :	*To get exposed to resources for research*
CLR-3 :	*To learn art of writing and presentation*
CLR-4 :	*To study about the data collection*
CLR-5 :	*To learn about analysis and inference*

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*Have a thorough understanding of steps involved in research preparation and planning*	3	80	70
CLO-2 :	*Perform literature review and case study*	3	85	75
CLO-3 :	*Learn the basics of academic writing and presentation*	3	75	70
CLO-4 :	*Learn the basics of data collection*	3	85	80
CLO-5 :	*Knowledge about analysis and inference*	3	85	75

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO 1	PSO 2	PSO 3
L	H	-	H	L	-	-	-					-	-	-
M	H	L	M	L	-	-	-					-	-	-
M	H	M	H	L	-	-	-					-	-	-
M	H	M	H	L	-	-	-					-	-	-
H	H	M	H	L	-	-	-					-	-	-

Duration (Hour)		15	15	15	15	15
S-1	SLO-1	*Objectives of research*	*Literature search*	*Proposal submission for funding agencies*	*Basic statistical distributions*	*Large sample tests*
	SLO-2	*Understanding research and its goals*	*Online data bases*	*Elements of Style*	*Basic statistical distributions and their applications:*	*small sample tests*
S-2	SLO-1	*Objectives of research*	*search tools*	*Basic knowledge of funding agencies*	*Binomial*	*Student t-test*
	SLO-2	*Critical thinking*	*Online data bases*	*More about funding agencies*	*Features of Binomial*	*F test*
S-3	SLO-1	*Techniques for generating research topics*	*trustworthiness*	*Proposal submission for funding agencies*	*Poisson*	*χ 2 test and their applications in research studies*
	SLO-2	*Topic slection*	*Methods of Dispersion*	*Elements of Style*	*Non parametric test*	*Descriptive statistics for one variable*
S4-5	SLO-1	*Lab 1: Construction of Frequency Table*	*Lab 4:Calculation of Methods of Dispersion*	*Lab 7:Test of Significance for single and two samples*	*Lab 10: Non Parametric Test*	*Lab 13: Descriptive statistics for one variable*
	SLO-2					
S-6	SLO-1	*Topic justification*	*Citation in dices*	*Research report writing, Communication skills*	*Normal*	*Correlation and Regression analysis*
	SLO-2	*Techniques involved in designing a questionnaire*	*Principles underlying impact factor*	*Tailoring the presentation to the target audience*	*ANOVA*	*Time series analysis :*
S-7	SLO-1	*Methods of scientific enquiry*	*Literature review*	*Oral presentations*	*Exponential*	*Forecasting methods Factor anlaysis*
	SLO-2	*Discuss about hypothese*	*Case studies*	*Poster preparations*	*Weibull*	*Cluster analysis*

Duration (Hour)		15	15	15	15	15
S-8	SLO-1	*Formuation of hypotheses*	*Feature of case studies*	*Communication skills*	*anGeometric distributions*	*discriminant analysis (Basic ideas only)*
	SLO-2	*Graphical representation of data*	*Skewness*	*Discuss about the Deviation*	*Two way ANOVA*	*Inferential statistics*
S9-10	SLO-1	*Lab 2: Graphical representation of data*	*Lab 5: Skewness*	*Lab 8: Deviation from Stability Deviation from Normality*	*Lab 11: Two way ANOVA*	*Lab 14: Explore command Inferential statistics for one variable*
	SLO-2					
S-11	SLO-1	*hypotheses testing of the same*	*review articles*	*Submission of research articles for Publication in Reputed journal*	*Sample size determination*	*Principles of Experimentation*
	SLO-2	*Preparation of the research proposal*	*Meta-analysis*	*Thesis writing*	*sampling techniques*	*Basic Experimental designs*
S-12	SLO-1	*Development of a research proposal*	*Role of the librarian*	*Research report writing*	*Random sampling*	*Completely Randomized Design*
	SLO-2	*Sources of information*	*Ethical Research*	*Elements of excellent presentation*	*stratified sampling*	*Randomized Block Design*
S-13	SLO-1	*Steps of research process*	*moral issues in Research*	*preparation, visual and delivery*	*systematic sampling*	*Latin Square Design*
	SLO-2	*Different types of Graphs*	*Plagiarism- Tools to avoid plagiarism*	*Oral communication skills and oral defence.*	*cluster sampling*	*Factorial Designs : 2^2, 2^3 and 2^4*
S 14-15	SLO-1	*Lab 3: Different types of Graphs*	*Lab 6: Calculation of correlation coefficient*	*Lab 9: Small Sample Test*	*Lab 12:Test of Homogenity of means for more than two samples*	*Lab 15:Simpile Linear Regression*
	SLO-2					

Learning Resources	
	1. Anderson B.H., Dursaton and Poole, M : Thesis and assignment writing, Wiley Eastern 1997 2. Bordens, K. S. and Abbott, B.B : Research design and Methods, Mc Graw Hill, 2008 3. Leedy, P. . : Practical Research – Planning and design, Ninth Edition, Pearson, 2010
	4. Walpole, R.A., Myers, R.H., Myers, S.L. and Ye, King : Probability and Statistics for Engineers and Scientists, Pearson Prentice Hall, Pearson Education Inc., 2012 5. Kothari, C.K. [2004], 2.e, Research Methodology – Methods and Technique3s [New Age International, New Delhi] 6. Ganesan R, Research Methodology for Engineers, MJP Publishers, Chennai. 2016

Learning Assessment											
Bloom's Level of Thinking		**Continous 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	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	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 Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
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