Course Code	PCA20S02J	Course Name	DATA ANALYSIS USING R	Course Category	S	Skill Enhancement Course	L	T	P	C
							0	3	2	4

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

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning			Program Learning Outcomes (PLO)														
CLR-1 :	Learn in-depth concepts, methods and applications of data mining	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Learn how to start looking at data from the perspective of the data scientist																		
CLR-3 :	Experimenting with different data mining techniques for knowledge discovery																		
CLR-4 :	Use R software for data import and export, data exploration and visualization, and for data analysis tasks																		
CLR-5 :	Demonstration on how to perform classification and clustering data mining tasks on real time datasets																		
CLR-6 :	Build an effective model and perform model evaluation based on performance metrics																		

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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 :	Understand Data Mining and its various tasks	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Perform Linear Regression and Logistic Regression on a dataset	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Extract interesting rules from dataset using Association Rule Mining	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Apply various Classification Algorithms in data mining	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Perform unsupervised learning using various Clustering Techniques	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Effectively use R programming constructs and packages to perform mining on different datasets	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

Duration (hour)		15	15	15	14	15
S-1	SLO-1	Introduction to Data Science	Working with R Programming	Classification in R	Clustering In R	Data Visualization in R
	SLO-2	What is Data Science	Data Types and Syntax	Classification - Introduction	Clustering - introduction	Overview of Data Visualization
S-2	SLO-1	Scenarios on Data Science,	Processing on Variables	Types of Classification	Types of Clustering	Packages
	SLO-2	Data Science and Organization			Application of Clustering,	
S-3	SLO-1	Different types of data	Data Items on Structure	Application of Classification	Overview of K-means,	Interactive Graphics
	SLO-2					

S 4 S 5	SLO-1	Lab 1: Implementation of how to install R program and import packages	Lab 4: Implementation of data types in R	Lab 7: Implementation of Decision Tree and KNN in R	Lab 10: Implementation of Kmeans	Lab 13: Implementation of data visualization in R
	SLO-2					
S-6	SLO-1	Structured data	Classes and Manipulate Objects	Overview of DT, Naïve Bayes, KNN, Random forest	Hierarchical, Medoids, DBSCAN	Plotting
	SLO-2	Unstructured data	Control statements IF, ELSE, SWITCH	Introduction – DT, DT Algorithm, Example of DT with R	Packages,	Scatter plot
S-7	SLO-1	Machine generated data	Loop statements FOR	Introduction – Naïve bayes	Introduction – K-means	Box plot, Bar plot,
	SLO-2			Naïve Bayes Algorithm		Pie chart
S-8	SLO-1	Understanding on Data Science Process	WHILE, REPEAT	, Example of Naïve Bayes with R	K-means Algorithm	Histogram
	SLO-2					
S-9- S 10	**SLO-1**	Lab 2: **Implementation of R program - basic**	Lab 5: **Implementation of Control Statements in R**	Lab 8: **Implementation of Naïve Bayes**	Lab 11: **Implementation of mediods**	Lab 14: **Implementation of various charts**
	SLO-2					
S-11	SLO-1	Explain on Research Goal	Working with String and Date	Introduction - KNN	Example of K-means with R	XKD-Style Plots
	SLO-2	Data Processing on Data Science, Getting Start With R	Understanding on Vector	KNN Algorithm, Example of KNN with R	Introduction – Hierarchical	Heat Maps
S-12	SLO-1	Overview of R, Why R for Data Science, Eclipse, Live-R, Project Workspace Setup	List, Data Frames, Working with Arrays	Introduction – Random Forest	Hierarchical Algorithm	Introduction to predictive models
	SLO-2		Read and Write data from CSV,	Random Forest Algorithm,		
S-13	SLO-1	Understanding on R Packages	Tabular Data and Database	Example of Random Forest with R	Example of Hierarchical with R	What is Model?
	SLO-2	Load Libraries and Installed Packages				
S 14- S15	**SLO-1**	Lab 3: **Implementation of R program - basic**	Lab 6: **Implementation of Looping Statements**	Lab 9: **Implementation of Random forest in R**	Lab 12: **Implementation of Hierarchical with R**	Lab 15: **Implementation of predictive model in R**
	SLO-2					

Learning Resources	1. *R for Data Science by Hadley Wickham* 2. *Introduction to Data Science, R. Irizarry*	3. *R Programming for Data Science, Roger D Peng* 4. *Data Visualization: A practical introduction, by Kieran Healy*

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	-	40%	-	40%	-	40%	-	40%	-	40%
	Understand										
Level 2	Apply	-	40%	-	40%	-	40%	-	40%	-	40%
	Analyze										
Level 3	Evaluate	-	20%	-	20%	-	20%	-	20%	-	20%
	Create										
	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 Industry	Experts from Higher Technical Institutions	Internal Experts
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