

LNCT UNIVERSITY, BHOPAL

Programme:- BCA(AI & DA)

Semester – V

wef: July 2022

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Data Mining and Warehousing	BAI -501	L	T	J	EST	CAT	Total
		3	1	0	70	30	100

Course Objective

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

Units	Contents (Theory)	Hours /week
I	Data Warehousing: History of Data Warehouses; Concepts; Benefits; Comparison of OLTP and Data Warehousing, Data Marts.	8
II	Principles of Dimensional Modeling: Objectives; Requirements to Data Design; STAR Schema: concept of Keys, Advantages. Dimensional Modeling: Updates to the Dimension tables; miscellaneous dimensions; SNOWFLAKE schema; Aggregate fact tables; Families of STARS..	8
III	Data Warehousing Architecture: Data: Operational, Store, Detailed, Lightly and Highly summarized, Metadata; Archive/Backup; Manager: Load, Warehouse, Query; Architecture models: 2,Tier, 3,Tier and 4,Tier .	8
IV	OLAP: Definitions, Rules, Characteristics, Features and functions, Dimensional analysis; Hypercube; Drill, Down and Rollup; Slice, and, Dice or Rotation; OLAP Models.	8
V	Data Mining: Definition; Knowledge discovery process (KDP); OLAP vs. Data mining; Data mining vs. Data warehouse; Major data mining techniques; Cluster detection; Decision trees; Memory based reasoning; Neural networks; Genetic algorithms; Applications; Benefits..	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Pieter Adriaans, Dolf & Zantinge	Data mining	1996	Addison Wesley
Sam Anahory & Dennis Murray	Data Warehousing in real world	1997	Addison Wesley
Paulraj Ponniah	Data Warehousing: Fundamentals for IT Professionals	2012, Second	Wiley India Pvt Ltd.

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		Edition	
Mark Hall, Ian Witten and Eibe Frank	Data Mining: Practical Machine Learning Tools and Techniques	2011, Third edition	Morgan Kaufmann Publisher
COURSE OUTCOMES: Students will be able to			
CO1	Understand the functionality of the various data mining and data warehousing components .		
CO2	Have a deeper understanding of database systems and their underlying theory to be able to improve the decision-making process		
CO3	Compare different approaches of data ware housing and data mining with various technologies.		
CO4	To evaluate the different models of OLAP and data preprocessing.		
CO5	To develop ability to design various algorithms based on data mining Tools and describe the designing of Data Warehousing so that it can be able to solve the root problems.		

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Foundation of Neural Network and Deep Learning	BAI-502	L	T	J	EST	CAT	Total
		3	1	0	70	30	100

Course Objective	The objective of this course is to teach students the basic concepts of neural networks, neurons, and deep learning.
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Units	Contents (Theory)	Hours /week
I	The neural network: The neuron, linear perceptron, feed-forward neural network, limitations of linear neurons, sigmoid, tanh, relu neurons, softmax output layer, information theory, cross entropy, Kullback-Leibler divergence.	8
II	Training feed-forward neural network: Gradient Descent, delta rules and learning rates, gradient descent with sigmoidal neurons, the backpropagation algorithms, stochastic and minibatch gradient descent, test sets, validation sets and overfitting, preventing overfitting	8
III	TensorFlow: Computation graphs, graphs, sessions and fetches, constructing and managing graph, flowing tensors, sessions, data types, tensor arrays and shapes, names, variables, placeholders and simple optimization, linear regression and logistic regression using tensorflow.	8
IV	Implement Neural Network: Introduction to Keras, Build neural network using Keras, Evaluating models, data preprocessing.	8
V	Deep Learning: Feature engineering, feature learning, overfitting, underfitting, weight regularization, dropout, universal workflow of deep learning.	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Francois Chollet	Deep Learning with Python	1 st edition	Manning Publications;
Ian Goodfellow, Yoshua Bengio, Aaron Courville, Francis Bach	Deep Learning	3 rd January 2017	MIT Press

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Reza Zadeh, Bharath Ramsundar	Tensor Flow for Deep Learning	1 st edition, 2018	Shroff/O'Reilly
COURSE OUTCOMES: Students will be able to			
CO1	Learn Neural Network concepts		
CO2	Learn Feed Forward and Backpropagation		
CO3	Learn Tensorflow		
CO4	Implement neural networks through Keras.		
CO5	Learn workflow of Deep Learning .		

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Theory of Computation	BAI -503	L	T	J	EST	CAT	Total
		3	1	0	70	30	100
Course Objective	The objectives of this course are to learn types of grammars and models of automata and establishing connections among grammars, automata and formal languages.						
Units	Contents (<i>Theory</i>)						Hours /week
I	Introduction to Finite Automata: The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata. Applications of finite automata, Finite automata with Epsilon transitions.						8
II	Finite Automata and Regular Expressions: Applications of Regular Expressions; Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata.						8
III	Context-free grammars: Parse trees; Applications; Ambiguity in grammars and Languages. Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's.						8
IV	Deterministic Pushdown Automata: Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs.						8
V	The Turing machine: Programming techniques for Turing Machines, Extensions to the basics Turing machines, Turing machines and computers.						8
Text Books/ References Book:-							
Name of Authors	Titles of the Book		Edition		Name of the Publisher		
John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman	Introduction to Automata Theory, Languages and Computation		3rd Edition		Pearson Education, 2011		
John C Martin	Introduction to Languages and Automata Theory		3rd Edition		Tata McGrawHill, 2007		

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Daniel I.A. Cohen	Introduction to Computer Theory	2nd Edition	John Wiley & Sons, 2009
Thomas A. Sudkamp	An Introduction to the Theory of Computer Science, Languages and Machines	3rd Edition	Pearson Education, 2006

COURSE OUTCOMES: Students will be able to

CO1	Interpret the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability Construct the abstract machines including finite automata, pushdown automata, and Turing machines from their associated languages and grammar.
CO2	Make use of pumping lemma to show that a language is not regular / not context-free
CO3	Construct the grammar for any given finite automata, pushdown automata or Turing machines
CO4	Outline the characteristics of P, NP and NP Complete problems
CO 5	Solve computational problems regarding their computability and complexity and prove the basic results of the theory of computation

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Data Visualization Tools & Techniques	BAI-504	L	T	J	EST	CAT	Total
				3	1	0	70
Course Objective	The basic objective is to understand the data analysis & visualize your data & method, understanding models not just a tool-oriented Analyst.						
Units	Contents (<i>Theory</i>)						Hours /week
I	Introduction To Data Handling: Overview of Data analysis, Introduction to Data visualization, Working with statistical formulas - Logical and financial functions, Data Validation & data models, Power Map for visualize data, Power BI-Business Intelligence, Data Analysis using statistical methods, Dashboard designing.						8
II	Introduction To Data Manipulation Using Function: Heat Map, Tree Map, Smart Chart, Azure Machine learning , Column Chart, Line Chart , Pie,Bar, Area, Scatter Chart, Data Series, Axes , Chart Sheet , Trendline , Error Bars, Sparklines, Combination Chart, Gauge, Thermometer Chart , Gantt Chart , Pareto Chart etc , Frequency Distribution, Pivot Chart, Slicers , Tables: Structured References, Table Styles , What-If Analysis: Data Tables Correlation model Regression model						8
III	Data Strategy & Consumer behaviour Analytics: Understanding Product & Category, Competitive Analysis, Market Share understanding- Market potential Index, Seasonality-Sales Trending, Consumer behaviour Analytics-MIND AND MARKET FACTORS, Budget planning & Execution- MIMI, Regression & Correlation Analysis for Sales trending, Forecasting method with predictive investment modelling, Cohort Analysis, Google Analytics(GA), Case Studies-Assignments.						8
IV	TABLEAU Software: GETTING STARTED WITH TABLEAU SOFTWARE: What is Tableau? What does the Tableau product suite comprise of? How Does Tableau Work? Tableau Architecture, What is My Tableau Repository?						8
V	Data Connectivity: Connecting to Data and Introduction to data source concepts, Understanding the Tableau workspace, Dimensions and Measures, Data Types & Default Properties, Building basic views, Saving and Sharing your work-overview						8

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Text Books/ References Book:-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Stephen Few	"Information Dashboard Design: Displaying Data for At-a-glance Monitoring"		
Julie Steele, Noah Iliinsky	"Beautiful Visualization, Looking at Data Through the Eyes of Experts"		
COURSE OUTCOMES: Students will be able to			
CO 1	Understand concepts of Data Handling.		
CO 2	Understand concepts of Data Manipulation.		
CO3	Understand consumer behavior and strategies.		
CO4	Understand Tableau Architecture.		
CO5	Understand Data Connectivity.		

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Introduction to Mobile Computing	BAI-505 E-I (1)	L	T	J	EST	CAT	Total
		3	1	0	70	30	100
Course Objective	<ul style="list-style-type: none">The objective of this course is to explain the principles and theories of mobile computing technologies. Also to describe infrastructures and technologies of mobile computing technologies.						
Units	Contents (<i>Theory</i>)						Hours /week
I	Introduction, issues in mobile computing, Characteristics of Mobile Computing, Structure of Mobile Computing, overview of wireless telephony: cellular concept.						8
II	GSM, air-interface, channel structure, CDMA, GPRS. Wireless Networking, Wireless LAN Overview: MAC issues, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP.						8
III	Data management issues, Hoarding techniques, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system.						8
IV	Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment. The Future of Mobile Computing.						8
V	Mobile Adhoc networks (MANETs), Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV)						8

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Text Books/ References Book:-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
J. Schiller	Mobile Communications	2 nd ed.(2003)	Addison Wesley
Charles Perkins,	Mobile IP. Design Principles and Practices	1998	Addison Wesley.
Charles Perkins	Ad hoc Networking	2008	Addison Wesley
Shambhu Upadhyaya, Abhijit Chaudhury	Mobile Computing	2008	Springer
COURSE OUTCOMES: Students will be able to			
CO 1	Apply the fundamental design paradigms and technologies to mobile computing applications.		
CO2	Describe the possible future of mobile computing technologies and applications.		
CO3	Identify and solve database issues using hoarding techniques		
CO4	Illustrate technical format, addressing and transmission strategies of packets		
CO5	Determine the functionality of MAC, Network layer and Identifying a routing protocol for given Adhoc Networks.		

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Soft Computing and Applications	BAI-505 E-I (2)	L	T	J	EST	CAT	Total
				3	1	0	70
Course Objective	The objective of this course is to familiarize with soft computing concepts, introduce and use the idea of Neural networks, fuzzy logic, genetic algorithm and use of heuristics based on human experience.						
Units	Contents (<i>Theory</i>)						Hours /week
I	Artificial Neural Networks: Basic-concepts-single layer perception-Multi layer perception-Supervised and unsupervised learning back propagation networks, Application.						8
II	Supervised Learning: Introduction and how brain works, Neuron as a simple computing element, The perceptron, Backpropagation networks: architecture, multilayer perceptron, backpropagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories (BAM),RBF Neural Network.						8
III	Fuzzy sets and Fuzzy reasoning: Fuzzy matrices-Fuzzy functions-decomposition-Fuzzy automata and languages- Fuzzy control methods-Fuzzy decision making, Applications.						8
IV	Neuro-Fuzzy Modeling: Adaptive networks based Fuzzy interfaces-Classification and Representation trees-Data dustemp algorithm –Rule base structure identification-Neuro-Fuzzy controls						8
V	Genetic Algorithm: Survival of the fittest-pictures computations-cross over						8

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	mutation-reproduction-rank method-rank space method, Application.			
Text Books/ References Book:-				
Name of Authors		Titles of the Book	Edition	Name of the Publisher
S. N. Sivanandan and S. N. Deepa		Principles of Soft Computing	2nd Ed, 2011	Wiley India
B K Tripathy, J. Anuradha		Soft computing Advances and Applications		Cengage Learning
B Yegnanarayana, Prentice		Artificial Neural Network,	2012	Hall of India Pvt.Ltd ,
R. Rajasekaran and G. A and Vijayalakshmi Pa		, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications		Prentice Hall of India
COURSE OUTCOMES: Students will be able to				
CO1	Identify and describe soft computing techniques and their roles in building intelligent machines			
CO2	Recognize the feasibility of applying a soft computing methodology for a particular problem			
CO3	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems, genetic algorithms to combinatorial optimization problems and neural networks to pattern classification and regression problems			
CO4	Effectively use modern software tools to solve real problems using a soft computing approach and evaluate various soft computing approaches for a given problem.			
CO5	Use the concepts of Genetic algorithm and its applications to soft computing using some applications.			

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Digital Marketing	BAI-505 E-I (3)	L	T	J	EST	CAT	Total
				3	1	0	70
Course Objective	The objective of the course is to teach digital marketing methods, from a variety of perspectives-as analysts, consumers and entrepreneurs.						
Units	Contents (<i>Theory</i>)						Hours /week
I	Introduction to Digital Marketing: Definition, Principles, Key concept of Digital Marketing, Characteristics, DMI Framework, DMI Quality Scale.						8
II	Search Marketing: SEO Concepts, SEO Process, SEO Google Search Console, Off Page Optimization, On Page Optimization, PPC Concepts, Keyword Selection, Campaign Management, Conversion Tracking, Conversion Metrics, Keyword Research, Targetting, CPA, CTR.						8
III	Email Marketing: Concepts, User Behavior, Scheduling, Email Copy, Email Structure, Email Delivery, Online Data Capture, Off Line data Capture, Segmentation, Email Design, Filtering. Digital Display Advertising: Concepts, Benefits, Challenges, Ad Formats, Ad Features, Ad Display Frequency.						8
IV	Social Media Marketing: Concepts, Goal Priorities, Features, News Feed, Insights, Business Page, Engagement, Setup and Profile, Channels, Tumblr, Blogging.						8
V	Mobile Marketing: Opportunities and Risks, SMS Content, SMS Strategy, Mobile Advertising, Mobile Optimized Website, Mobile Apps, DMI 6 step process of Mobile App, QR Code, Mobile Coupons and Ticketing.						8
Text Books/ References Book:-							
Name of Authors		Titles of the Book			Edition	Name of the Publisher	
Ian Dobson		The Art of Digital Marketing:			1 st ed.	Wiley	

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	The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns		
Puneet Singh Bhatia	Fundamentals of Digital Marketing	1 st ed.	Pearson
Vandana Ahuja	Digital Marketing	1 st ed.	Oxford Universty Press

COURSE OUTCOMES: Students will be able to

CO1	Understand the impact of technology on the traditional marketing.
CO2	Understand how they can use digital marketing to increase sales and grow their business
CO3	Understand the elements of the digital marketing plan.
CO4	Understand how to reach your online target market and develop basic digital marketing objectives.
CO5	Understand market associated risk or law and establish customer engagement.

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Name of Paper	Paper Code	Practical				
		Credit		Marks		
Programming Lab in Data Visualization	BAI -506	P	J	ESP	CAP	Total
		2	-	30	20	50

Note : List will be provided by samatrix.

Name of Paper	Paper Code	Practical				
		Credit		Marks		
Minor Project-II / Internship Evaluation-II	BAI-507	P	J	ESP	CAP	Total
			4	30	20	50

Contents (Practical)

Process: - Project Guide of the project will be by department. Any related technology can be chosen for development of Project. And evaluation of Internship will be done.