

LNCT UNIVERSITY, BHOPAL

Programme:- BCA (AI & DA)

Semester – IV

wef: July 2022

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Web Technologies	BAI-401	L	T	J	EST	CAT	Total
		3	1	0	70	30	100

Course Objective	Students will gain the theoretical skills and practical experience required for web design and development and they will also learn to develop, host and maintain a responsive website.
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Units	Contents (Theory)	Hours /week
I	Introduction: Internet and World Wide Web, Evolution and History of World Wide Web, Basic features, Web Browsers; Web Servers, Hypertext Transfer Protocol, Overview of TCP/IP and its services, URLs, Searching and Web-Casting Techniques, Search Engines and Search Tools.	8
II	Web Publishing: Hosting your Site; Internet Service Provider; Web terminologies, Phases of Planning and designing your Web Site; Steps for developing your Site; Choosing the contents; Home Page; Domain Names, Front page views, Adding pictures, Links, Backgrounds, Relating Front Page to DHTML. Creating a Website and the Markup Languages.	8
III	Web Development: Introduction to HTML; Hypertext and HTML; HTML Document Features; HTML command Tags; Creating Links; Headers; Text styles; Text Structuring; Text colors and Background; Formatting text; Page layouts.	8
IV	Images: Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes; DHTML: Dynamic HTML, Features of DHTML, CSSP(cascading style sheet positioning).	8
V	Introduction to E-Commerce: Definition of Electronic Commerce, E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective, Types of E-commerce, Internet and Extranet, Digital signature, Mobile Commerce.	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Raj Kamal	Internet and Web Technologies	II	Tata McGraw-Hill.

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Ramesh Bangia	Multimedia and Web Technology	II	Firewall Media.
Thomas A. Powell,	Web Design: The Complete Reference	IV	Tata McGrawHill
Wendy Willard,	HTML Beginners Guide	I	Tata McGraw-Hill.
Deitel and Goldberg,	Internet and World Wide Web, How to Program	II	PHI.

COURSE OUTCOMES: Students will be able to

CO 1	Implement an appropriate planning strategy for developing websites
CO 2	Create a webpage and use scripting languages to transfer data and add interactive components to other web pages.
CO 3	Structure and implement HTML/CSS.
CO 4	Understand how to insert and use forms, Images and Buttons.
CO 5	Analyze the impact of E-commerce on business models and strategy

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Name of Paper	Paper Code	Theory					
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Foundation of Machine Learning And Pattern Recognition	BAI-402	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 machine learning, supervised learning, unsupervised learning, and reinforcement learning.						
Units	Contents (Theory)						Hours /week
I	<p>Introduction: Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation</p> <p>Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning, Important concepts of machine learning: Parametric vs non-parametric models, the trade-off between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias- variance trade off, overfitting, model selection, no free lunch theorem</p>						8
II	<p>Linear Regression: Linear regression, estimating the coefficients, accessing the accuracy of coefficient, estimates, accessing the accuracy of the model, multiple linear regression, qualitative predictors. Classification: Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, bayes' theorem of classification, LDA for $p=1$, LDA for $p>1$, quadratic discriminant analysis</p> <p>Classification: Classification with non-linear decision boundaries, support vector machine, one-versus-one classification, one-versus- many classification</p>						8
III	<p>Resampling Methods, Model Selection and Regularization: Cross-validation, leave-one-out cross- validation, k-fold cross-validation, the bootstrap, subset selection, shrinkage methods, ridge and lasso regression, dimension reduction methods, principal components regression, partial least square.</p>						8
IV	<p>Tree Based Methods: Advantages and disadvantages of trees, regression Trees, classification trees, bagging, random forest, boosting</p>						8

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V	Support Vector Machine: Maximum margin classifier, classification using a separating hyperplane, the maximal margin classifier, support vector classifier, support vector machines,	8	
Text Books/ References Book:-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Tom M. Mitchell	Machine Learning	First edition	McGraw Hill Education
Christopher M. Bishop -	Pattern Recognition and Machine Learning (Information Science and Statistics)	1 st	Springer
Trevor Hastie, Robert Tibshirani and Jerome Friedman	The Elements of Statistical Learning: Data Mining, Inference, and Prediction	2 nd Edition	Springer
COURSE OUTCOMES: Students will be able to			
CO1	Learn Basic Algorithms of Machine Learning.		
CO2	Learn Supervised and Unsupervised Learning.		
CO3	Understand Linear Regression, Classification, Tree, PCA, SVD, SVM.		
CO4	Understand Resampling Methods.		
CO5	Understand Optimization Techniques.		

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Name of Paper	Paper Code	Theory					
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Computer Networks	BAI-403	L	T	J	EST	CAT	Total
		3	1	0	70	30	100
Course Objective	The course objective includes learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks.						
Units	Contents (<i>Theory</i>)						Hours /week
I	Definition of a Computer Network, Networking, Advantages and disadvantages of Networks, Components of a computer network, Use of Computer networks, Networks for companies, Networks for people, Social Issues, Classification of networks, Based on transmission technology, Type of Networks: LAN, MAN, WAN, Wireless networks.						8
II	Networks Software, Protocol hierarchy, Design issues for the layers, Merits and Demerits of Layered Architecture, The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Models, Transmission Medium, Guided & Unguided Transmission medium, Twisted pair, Coaxial cable, Optical fiber, Wireless transmission, Electromagnetic spectrum, Radio transmission, Microwave transmission.						8
III	Data Communications, Data transmission modes, Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous, Network topologies, Linear Bus Topology, Ring Topology, Star Topology, Hierarchical or Tree Topology, Topology Comparison transmission, Standards – Ethernet, Token bus, Token ring, interfacing devices – bridge, hub, switch, router, gateway.						8
IV	Considerations when choosing a Topology, Switching, Circuit switching, Message switching, Packet switching, Implementation of packet switching, Multiplexing, FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing, TDM – Time division multiplexing:						8
V	Modulations & demodulations, Comparison of channel access protocols, IEEE standards, Ethernets, Fast Ethernet, Gigabit Ethernet, IEEE 802.3 frame format, File transfer protocol (FTP), IP protocol (IPV4), UDP protocol.						8

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Text Books/ References Book:-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Brijendra Singh	Data Communication and Computer Networks	2/e,	PHI
Behrouz A Forouzan	Data Communication and Computer networks	4th ed,	McGraw Hill
Achyut S Godbole	Data communications and networks,	Second ed	McGrawHill,
COURSE OUTCOMES: Students will be able to			
CO1	Characterize and understand computer networks from the view point of components and from the view point of services.		
CO2	Display good understanding of the flow of protocols in general and a network protocol in particular.		
CO3	Model a problem or situation in terms of layering concept and map it to the TCI/IP stack.		
CO4	To understand how to send a huge number of signals at the same time		
CO 5	Analysis and design of various modulation and demodulation techniques.		

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Name of Paper	Paper Code	Theory					
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Analysis and Design of Algorithms	BAI-404	L	T	J	EST	CAT	Total
		3	1	0	70	30	100

Course Objective	<ol style="list-style-type: none"> 1. To provide a mathematical foundation for analyzing and proving the efficiency of an algorithm. 2. To focus on the design of algorithms in various domains of computer engineering. 3. To provide familiarity with main thrusts of work in algorithms sufficient to give some context for formulating and seeking known solutions to an algorithmic problem.
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Units	Contents (<i>Theory</i>)	Hours /week
I	Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.	8
II	Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.	8
III	Brute Force – Selection Sort and Bubble Sort – Sequential Search and Brute-force string matching – Divide and conquer – Merge sort – Quick Sort – Binary Search – Binary tree- Traversal and Related Properties – Decrease and Conquer – Insertion Sort.	8
IV	Transform and conquer – Presorting – Balanced Search trees – AVL Trees – Heaps and Heap sort –Dynamic Programming – Warshall’s and Floyd’s Algorithm.	8
V	Backtracking – n-Queen’s Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
AnanyLevitin	“Introduction to the Design	2003	Pearson Education Asia

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	and Analysis of Algorithm”, Pearson Education Asia		
Sara Baase and Allen Van Gelder	“Computer Algorithms - Introduction to Design and Analysis”	2003	Pearson Education Asia
Aho A.V.,Hopcroft J.E. and Ullman J.D.	“The Design and Analysis Of Computer Algorithms”	2003	Pearson Education Asia
COURSE OUTCOMES: Students will be able to			
CO1	Able to Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic analysis.		
CO2	Explain and apply the major algorithm design paradigms and major Computational Geometry algorithms and their analysis.		
CO3	Able to explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it and analyze String matching algorithms.		
CO4	Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.		
CO5	Solve problems on decrease and conquer Backtracking, Branch and Bound strategy.		

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Machine Learning Practical with Python, Scikit-learn, Matplotlib, TensorFlow	BAI-405	L	T	J	EST	CAT	Total
		3	1	0	70	30	100
Course Objective	Objective of this subject to make them enable and learn about various machine learning models and methods. Various estimators will be known to students.						
Units	Contents (<i>Theory</i>)						Hours /week
I	Introduction to Machine Learning Models: What are Machine Learning Models, Detect anomalies using Machine Learning Models, Traditional Rule Based approaches Vs Machine Learning Models, Introduction to Python Packages pandas, matplotlib, seaborn, sklearn, Exploratory Data Analysis, Model Development, Train Test Split, Data Modelling, How to select best model, Confusion Matrix						8
II	Data Scaling in Machine Learning and Regression Statistics: Understanding Standardization & Normalization Concepts, KNeighbors Classifiers, Functional Vs Statistical Approach in Linear Regression, Graphical Representation, Least Square Estimators using Trial & Error Methods, Residuals, Properties of Fitted Regression Line, ANOVA, Residual Standard Error, R-Square Coefficient of Determination, Multiple R-Square Coefficient of Correlation, Adjusted R-Square						8
III	Relationships, Model Accuracy and Validations: Understanding Relationships – Predictor & Response, Regression Using Stats Model, Multiple Linear Regression, Correlation Matrix, Logistic Regression with Scikit Learn, Stats Model & Dummy Variable, Confounding effect, LDA, Ridge Regression, Cross Validation- RidgeCV, Optimal Ridge Regression, Lasso Regression, LassoCV, Optimal Lasso, Principle Component Analysis (PCA), Implementing PCA						8
IV	Unsupervised Learning: Principle component analysis, what are principal components, clustering methods, k-means clustering, hierarchical clustering,						8

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	Independent component analysis, latent semantic indexing,	
V	Markov Models, Hidden Markov Models The Elements of Statistical Learning: Data Mining, Inference, and Prediction by Trevor Hastie, Robert.	8

Text Books/ References Book:-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Tom M. Mitchell	Machine Learning	First edition	McGraw Hill Education
Christopher M. Bishop -	Pattern Recognition and Machine Learning (Information Science and Statistics)	1 st	Springer
Trevor Hastie, Robert Tibshirani and Jerome Friedman	The Elements of Statistical Learning: Data Mining, Inference, and Prediction	2 nd Edition	Springer
Tom M. Mitchell	Machine Learning	First edition	McGraw Hill Education
COURSE OUTCOMES: Students will be able to			
CO1	Understand Machine Learning Models, Pandas Library, Scikit Learn		
CO2	Understand Data Scaling, Regression Statistics, ANOVA, R-Square		
CO3	Understand Relationship, Model Accuracy and Validations		
CO4	Understand Unsupervised Learning		
CO5	Learn markov models		

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Name of Paper	Paper Code	Practical				
		Credit		Marks		
Programming Lab in Machine Learning	BAI-406	P	J	ESP	CAP	Total
		2	-	30	20	50

Contents (Practical):

List will be provided by Samatrix

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		Credit		Marks		
Programming Lab in Web Technologies	BAI-407	P	J	ESP	CAP	Total
		2	-	30	20	50

Contents (Practical):

1. Creating "Hello world" Application.
2. Creating an Application that displays message based on the screen orientation.
3. Create an application that displays custom designed Opening Screen.
4. Play an audio, based on the user event.
5. Create an UI with all views.
6. Create menu in Application.
7. Read/ write the Local data.
8. Create / Read / Write data with database (SQLite).
9. Create an application to send SMS.
10. Create an application to send an e-mail.
11. Display Map based on the Current/given location.
12. Learn to deploy android Applications.

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Name of Paper	Paper Code	Practical				
		Credit		Marks		
Minor Project-I	BAI-408	P	J	ESP	CAP	Total
		0	1	30	20	50

Note:- Develop project using front end and back-end of any IT platforms to fulfill the requirements of any organization/firm.

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Name of Paper	Paper Code	Practical				
		Credit		Marks		
CRT Training-II	BAI-409	P	J	ESP	CAP	Total
		-	-	-	-	-

Note:- The topics included in this training are:-

Quantitative Ability:-

1. Time & Distance
2. Time and Work
3. Permutation and Combination
4. Probability
5. Set Theory
6. Allegation & Mixture

Logical Reasoning:-

1. Alphabet Test
2. Clocks
3. Puzzle Test
4. Statements and Arguments
5. Non-Verbal Reasoning
6. Cubes and Dice

Verbal Ability:-

1. Sentence Improvement
2. Reading Comprehension
3. Sentence Re- Arrangements
4. Conjunction
5. Theme Detection
6. Spellings
7. Idioms