MANGALORE UNIVERSITY

State Education Policy – 2024
[SEP-2024]

CURRICULUM STRUCTURE

FOR

BACHELOR OF COMPUTER APPLICATIONS
BCA-DATA ANALYTICS

Semester	Course 1	Course 2	Course 3	Elective / Optional	Course	Language	Compulsory	Total Credit	Total Working hour
I	5 (3T+2P)	5 (3T+2P)	5 T			3+3	2	23	4+4+4+4+5+4+4+2=31
II	5 (3T+2P)	5 (3T+2P)	5T			3+3	2	23	4+4+4+4+5+4+4+2=31
III	5 (3T+2P)	5 (3T+2P)	5T	2		3+3		23	4+4+4+4+5+4+4+2=31
IV	5 (3T+2P)	5 (3T+2P)	5T	2		3+3	2	25	4+4+4+4+5+2+4+4+2=33
V	8 [(2x3T)+2P]	8 [(2x3T)+2P]	8 [(2x3T)+2P]				2	26	4+4+4+4+4+4+4+4+4+2=38
VI	3T+2P	3T+2P	Research Methodology+ Project Work- 12					22	4+4+4+4+22=38

MANGALORE UNIVERSITY

Suggested programme structure for the Under Graduate Programmes

[BCA, BCA (A.I & M.L), BCA (D.A)]

Total Credits	142	

Note:

- **Course1 and Course2: I to IV Semester: Theory 3 credit=4 contact hours & Practical 2 credit=4 contact hours**
- **Course3: I to IV Semester: Theory 5 credit=5 contact hours**
- **Course1, Course2 and Course3: V and VI Semester: Theory 3 credit=3 contact hours & Practical 2 credit=4 contact hours**
- **Elective/Optional: 2 credit=2 contact hours**
- **Languages: 3 credit=4 contact hours**
- **Compulsory: 2 credit=2 contact hours**

Semester V								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BCABDAS 501**	**Software Engineering**	**Core**	**3**	**80**	**20**	**100**	**3**
2	**BCABDAS 502**	**Artificial Intelligence**	**Core**	**3**	**80**	**20**	**100**	**3**
3	**BCABDAS 503**	**Business Intelligence and Analytics**	**Core**	**3**	**80**	**20**	**100**	**3**
4	**BCABDAS 504**	**Web Application Development**	**Core**	**3**	**80**	**20**	**100**	**3**
5	**BCABDAS 505**	**Machine Learning**	**Core**	**3**	**80**	**20**	**100**	**3**
6	**BCABDAS 506**	**Design Analysis and Algorithm**	**Core**	**3**	**80**	**20**	**100**	**3**
7	**BCABDPS 507**	**Artificial Intelligence and Machine Learning-LAB**	**Practical**	**4**	**40**	**10**	**50**	**2**
8	**BCABDPS 508**	**Web Application Development Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
9	**BCABDPS**	**Algorithms Lab**		**4**	**40**	**10**	**50**	**2**

	509		Practical					
10	BCABDSS 501	Data Visualization with Power BI and Tableau	Compulsor y	2	40	10	50	2
Sub – Total				32	640	160	800	26

Semester VI								
Sl No	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1	BCABDAS 601	Fundamental of Datascience	Core	3	80	20	100	3
2	BCABDAS 602	Big Data Analytics	Core	3	80	20	100	3
3	BCABDPS 603	Fundamental of Datascience lab	practical	4	40	10	50	2
4	BCABDPS 604	Big Data Analytics lab	practical	4	40	10	50	2
5	BCABDPS 605	Research Methodology Project Work	Project Work	22	400	100	500	12
Sub – Total				36	640	160	800	22

SEMESTER V

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Software Engineering (THEORY)**		
Course Code:	**BCABDAS501**	No. of Credits	**03**
Contact hours	**39 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.
- An ability to work in one or more significant application domains.
- Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.
- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
- Demonstrate an ability to use the techniques and tools necessary for engineering practice.

Unit	Description	Hours

1	**Introduction:** The Problem Domain-Software is Expensive, Late and Unreliable, Maintenance and Rework, Software Engineering Challenges-Scale, Quality and Productivity, Consistency and Repeatability, Change, The Software Engineering Approach-Phased Development Process, Managing the process. **Software Processes:** Software Process-Component Software Processes, ETVX Approach for Process Specification, Desired Characteristics of a Software Process-Predictability, Support Testability and Maintainability, Support Change, Early Defect Removal, Process Improvement and Feedback, Software Development Process Models- Waterfall Model, Prototyping, Iterative Development, Comparison of Models.	**09**
2	**Software Requirement Analysis and Specification:** Software Requirements-Needs for SRS, Requirement Process, Problem Analysis - Data Flow Modelling-Data Flow Diagrams and Data Dictionary, Requirements Specification- Characteristics of an SRS, Components of an SRS, Structure of a Requirement Document, Validation. **Function Oriented Design:** Design Principles-Problem Partitioning and Hierarchy, Abstraction, Modularity, Top-down and Bottom-up strategies, Module- Level Concepts-Coupling, Cohesion, Design Notation and Specification-Structure Charts, Structured Design.	**10**
3	**Detailed Design:** Detailed Design and PDL- PDL Logic/Algorithm Design, Verification-Design Walkthroughs, Critical Design Review, Consistency Checkers. **Coding:** Programming Principles and Guidelines-Common Coding Errors, Structured Programming, Some Programming Practices, Coding Standards, Verification-Code Inspections	**10**
4	**Testing:** Testing Fundamentals-Error, Fault and Failure, Test Oracles, Test Cases and Test Criteria, Black Box Testing- Equivalence Class Partitioning, Boundary Value Analysis, Cause-Effect Graphing, White Box Testing-Control Flow Based Criteria, Data Flow Based Testing, Testing Process-Levels of Testing, Test Plan, Test Case Specification, Defect Logging and Tracking.	**10**

Text Books:

1. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd edition, Narosa Publishing House.

Reference Books:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill, 2009.

2. K K Aggarwal, Yogesh Singh, Software Engineering, 1st edition, New Age International Pvt Ltd Publishers

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Quizzes/ Mini Projects/Group Discussion/ Experiential Learning.

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Artificial Intelligence (THEORY)**		
Course Code:	**BCABDAS502**	No. of Credits	**03**
Contact hours	**39Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Gain a historical perspective of AI and its foundations.
- Become familiar with basic principles and strategies of AI towards problem solving
- Understand and apply approaches of inference, perception, knowledge representation, and learning.
- Understand the various applications of AI

Unit	Description	Hours
1	**Introduction-** What is Artificial Intelligence, Foundations of AI, History, AI - Past, Present and Future. Intelligent Agents- Environments- Specifying the task environment, Properties of task environments, Agent based programs-Structure of Agents , Types of agents- Simple reflex agents, Model-based	**09**

	reflex agents, Goal-based agents; and Utility-based agents.	
2	**Problem Solving by Searching**-Problem-Solving Agents, Well-defined problems and solutions, examples Problems, Searching for Solutions, Uninformed Search Strategies-Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bidirectional search, Greedy best-first search, A* Search, AO* search Informed (Heuristic) Search Strategies, Heuristic Functions	**10**
3	**Knowledge Representation** - Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic,	**10**
4	**First-Order Logic** First-Order Logic-Syntax and Semantics of First-Order Logic, Using First-Order Logic, Unification and Lifting Forward Chaining, Backward Chaining.	**10**

Text Book:

1. Stuart Russel, Peter Norvig: Artificial Intelligence: A Modern Approach, 2nd Edition, Pearson Education, 2003

Reference Book:

1. Tom Mitchell, "Machine Learning", 1st Edition, McGraw-Hill,2017
2. Elaine Rich, Kevin Knight, Shivashankar B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition,

Pedagogy: Lecture / PPT/ Videos/ Animations/ Quizzes/ Mini Projects/Group Discussion/ Experiential Learning.

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Business Intelligence and Analytics (THEORY)**		
Course Code:	**BCABDAS503**	No. of Credits	**03**
Contact hours	**39 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Explain the Business Intelligence, Analytics and Decision Support system
- List the technologies for Decision making, Automated decision systems
- Explain sentiment analysis techniques
- Illustrate Multi-criteria Decision making systems, predictive modeling techniques

Unit	Description	Hours
1	**An Overview of Business Intelligence, Analytics, and Decision Support:** Information Systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, Business Analytics Overview. **Decision Making:** Introduction and Definitions, Phases of the	**09**

	Decision, Making Process, The Intelligence Phase, Design Phase, Choice Phase, Implementation Phase, Decision Support Systems Capabilities, Decision Support Systems Classification, Decision Support Systems Components.	
2	**Neural Networks and Sentiment Analysis**: Basic Concepts of Neural Networks, Developing Neural Network-Based Systems, Illuminating the Black Box of ANN with Sensitivity, Support Vector Machines, A Process Based Approach to the Use of SVM, Nearest Neighbor Method for Prediction, Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis, Speech Analytics.	**10**
3	**Model-Based Decision Making:** Decision Support Systems modeling, Structure of mathematical models for decision support, Certainty, Uncertainty, and Risk, Decision modeling with spreadsheets, Mathematical programming optimization, Decision Analysis with Decision Tables and Decision Trees, Multi-Criteria Decision Making with Pairwise Comparisons	**10**
4	**Automated Decision Systems and Expert Systems**: Automated Decision Systems, The Artificial Intelligence field, Basic concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems.	**10**

Text Book:

1. Ramesh Sharda, Dursun Delen, EfraimTurban, J.E.Aronson,Ting-Peng Liang, David King, "Business Intelligence and Analytics: System for Decision Support", 10th Edition, Pearson Global Edition, 2013

Reference Book:

1. Data Analytics: The Ultimate Beginner's Guide to Data Analytics Paperback – 12 November 2017by Edward Mize.

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Quizzes/ Mini Projects/Group Discussion/ Experiential Learning.

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Web Application Development (THEORY)**		
Course Code:	**BCABDAS504**	No. of Credits	**03**
Contact hours	**39 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the basics of PHP and MySQL, including their roles in web development.
- Write and execute PHP scripts to create dynamic web pages.
- Use PHP sessions and cookies to manage state and user information.

Unit	Description	Hours

1	Overview and features of CSS3. **Animation**: Introduction, Start and End States, Interpolation, Animations in HTML. All About CSS Animations, creating a Simple Animation, Detailed Look at the CSS Animation Property, Keyframes, Declaring Multiple Animations, Wrap-up. All About CSS Transitions, Adding a Transition	**09**
2	**Introduction to PHP:** Introduction to PHP, History and Features of PHP, Understanding PHP, Writing Comments in PHP, Sending Data to the Web Browser, Data types in PHP, Keywords in PHP, Using Variables, Constants in PHP, Expressions in PHP, Operators in PHP, Conditional statements: if, if-else, switch, The ? Operator, Looping statements: while Loop, do-while Loop, for Loop .	**10**
3	**Arrays in PHP**: Creating Arrays, Accessing Array elements, Indexed v/s Associative arrays, Multidimensional arrays, using Array Functions. Functions in PHP, Function definition, Creating and invoking user-defined functions, Formal parameters versus actual parameters, Function and variable scope. Strings in PHP: What is String? Creating and Declaring String, String Functions. **Class and Objects in PHP:** Creating and accessing a Class &Object, Object properties, object methods.	**10**
4	**Form Handling**: Creating HTML Form, Handling HTML Form data in PHP **Database Handling using PHP with MySQL**: Introduction to MySQL, Database terms, Data Types, Accessing MySQL using MySQL Client and Using phpMyAdmin, MySQL Commands, Using PHP with MySQL, PHP MySQL Functions, Connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Counting Returned Records, Inserting, deleting and Updating Records with PHP.	**10**

Textbooks:

1. Kevin Tatroe, Peter MacIntyre and Rasmus Lerdorf, Programming in PHP, 3rd Edition O'Reily Publications
2. Robin Nixon, Learning PHP, My SQL, JavaScript, CSS and HTML5, 3rd

Edition, O'Reily Publications
3. Larry Ullman, PHP and MySQL for Dynamic Websites Peachpit Press

Reference Books:

1. Deitel, Paul_Deitel, Harvey_Deitel, Abbey - Internet and World Wide Web How to Program-Pearson Education (US) (2011)
2. Steven Holzner, PHP the Complete Reference
3. Chris Bates - Web Programming_ Building Internet Applications-Wiley (2002)
4. Web Programming with HTML5, CSS, and JavaScript-John Dean

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Quizzes/ Mini Projects/Group Discussion/ Experiential Learning.

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Machine Learning (THEORY)**		
Course Code:	**BCABDAS505**	No. of Credits	**03**
Contact hours	**39 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Recall the problems for machine learning. And select the either supervised, unsupervised or reinforcement learning.
- Understand theory of probability and statistics related to machine learning
- Illustrate concept learning, ANN, Bayes classifier, Q

Unit	Description	Hours
	Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.	

1	**Concept Learning**: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm. **Decision Tree Learning**: Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning.	**09**
2	**Artificial Neural Networks:** Introduction, Neural Network representation, Appropriate problems, Perceptrons, Backpropagation algorithm. **Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, Bayes Optimal Classifier, GIBBS Algorithm, Naive Bayes classifier, Bayesian belief networks(except inference), EM algorithm.	**10**
3	**Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem(only definitions and formula(if any)), General approach for deriving confidence intervals, Difference in error of two hypothesis(except hypothesis testing).	**10**
4	**Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function **Reinforcement Learning:** Introduction, Learning Task, Q Learning.	**10**

Text Books:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.

Reference Books:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Quizzes/ Mini Projects/Group Discussion/ Experiential Learning.

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Design Analysis and Algorithm (THEORY)**		
Course Code:	**BCABDAS506**	No. of Credits	**03**
Contact hours	**39 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the fundamental concepts of algorithms and their complexity, including time and space complexity, worst-case and average-case analysis, and Big-O notation.
- Design algorithms for solving various types of problems, such as Sorting, Searching, and Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques.
- Analyze and compare the time and space complexity of algorithms with other algorithmic techniques.
- Evaluate the performance of Sorting, Searching, Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques using empirical testing and benchmarking, and identify their limitations and potential improvements.

- Apply various algorithm designs to real-world problems and evaluate their effectiveness and efficiency in solving them.

Unit	Description	Hours
1	**Introduction:** What is an Algorithm? Fundamentals of Algorithmic problem solving, Important Problem Type Fundamentals of the Analysis of Algorithm Efficiency, Analysis Framework, Measuring the input size, Units for measuring Running time, Orders of Growth, Worst-case, Best-case and Average-case efficiencies. **Asymptotic Notations and Basic:** Efficiency classes, Informal Introduction, O-notation, Ω-notation, θ-notation, mathematical analysis of non-recursive algorithms, and mathematical analysis of recursive algorithms.	**09**
2	**Brute Force & Exhaustive Search:** Introduction to Brute Force approach, Selection Sort and Bubble Sort, Sequential search- -Closest-Pair and Convex-Hull Problems by Brute Force, Exhaustive Search -Travelling Salesman Problem, Job Assignment and Knapsack Problem.	**10**
3	**Decrease-and-Conquer:** Introduction, Insertion Sort, Depth First Search, Breadth First Search Topological Sorting. **Divide-and-Conquer:** Introduction, Merge Sort, Quick Sort, Binary Search, Multiplication of large Integers and Strassen's Matrix Multiplication.	**10**
4	**Greedy Technique:** Introduction, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees, Decision Trees. Sum of subset Problem, Job Scheduling.	**10**

Text Book:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 2nd Edition, 2009, Pearson.

Reference Books:

1. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Quizzes/ Mini Projects/Group Discussion/ Experiential Learning.

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Artificial Intelligence and Machine Learning Lab**		
Course Code:	**BCABDPS507**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART -A

1. Develop a program to create histograms for all numerical features and analyze the distribution of each feature. Generate box plots for all numerical features and identify any outliers. Use California Housing dataset.
2. Develop a program to Compute the correlation matrix to understand the relationships between pairs of features. Visualize the correlation matrix using a heat map to know which variables have strong positive/negative correlations. Create a pair plot to visualize pairwise relationships between features. Use California Housing dataset.
3. Develop a program to implement Principal Component Analysis (PCA) for reducing the dimensionality of the Iris dataset from 4 features to 2.

4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Find-S algorithm to output a description of the set of all hypotheses consistent with the training examples.
5. Develop a program to implement k-Nearest Neighbour algorithm to classify the randomly generated 100 values of x in the range of [0,1]. Perform the following based on dataset generated. c. Label the first 50 points {x1,……,x50} as follows: if (xi ≤ 0.5), then xi Class1, else xi Class1 d. Classify the remaining points, x51,……,x100 using KNN. Perform this for k=1,2,3,4,5,20,30
6. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs
7. Develop a program to demonstrate the working of Linear Regression and Polynomial Regression. Use Boston Housing Dataset for Linear Regression and Auto MPG Dataset (for vehicle fuel efficiency prediction) for Polynomial Regression

PART -B

1. Write a Program to implement Breadth First Search (BFS) using Python.
2. Write a Program to implement Depth First Search (DFS) using Python.
3. Write a Program to implement Tic-Tac-Toe game using Python.
4. Write a Program to Implement 8-Puzzle problem using Python
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Tower of Hanoi using Python.
7. Write a Program to Implement 8-Queens Problem using Python

Evaluation Scheme for Lab Examination:

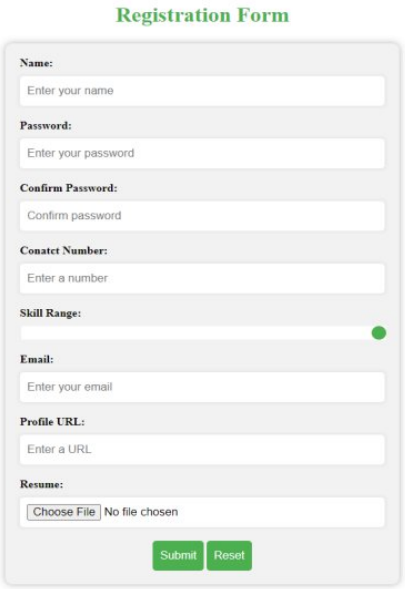
Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8 Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10 Marks**	**20 Marks**

Practical Record	**05 Marks**
Total	**40 Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Web Application Development Lab**		
Course Code:	**BCABDPS508**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

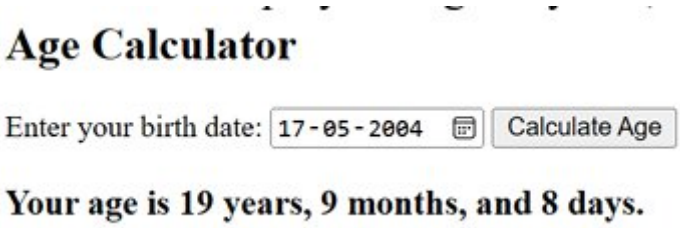
Part –A

1. Design a HTML5 web page containing a form with text, password, number, range, email, url, file, submit and reset elements which must be styled using CSS3 according to the following screenshot.

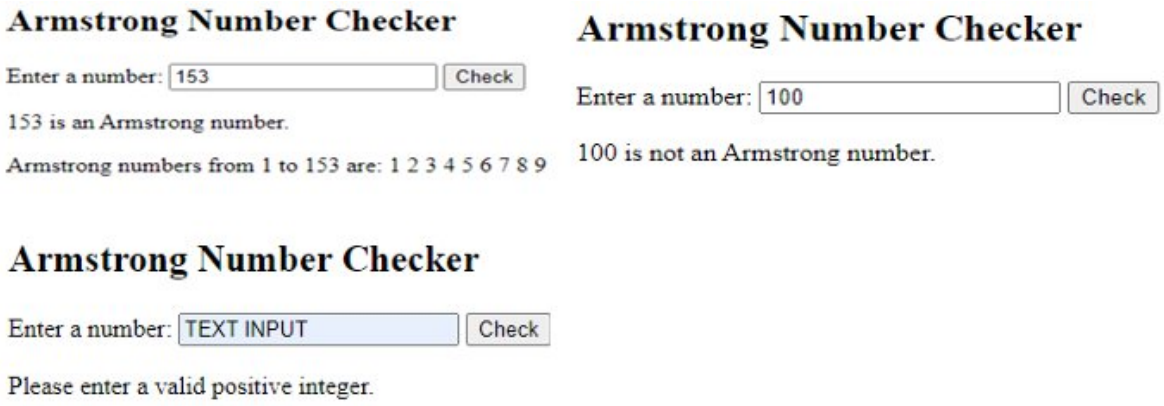


2. Design and implement a web page using HTML and CSS to create a box that performs multiple animations simultaneously.
3. Write a PHP program demonstrating the usage of sessions to store and retrieve user credentials like username and password. Combine the login, welcome, and logout functionalities into two files –'index.php' and 'welcome.php'.

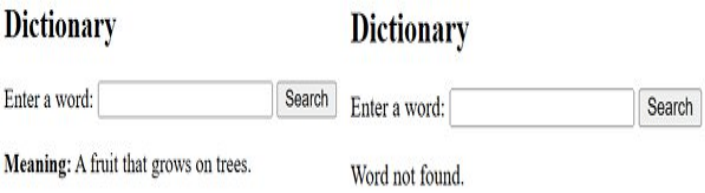
4. Write a PHP program with a user interface for calculating age based on the user's birth date. Display the age in years, months, and days



5. Write a PHP program that collects input from the user through a textbox and checks whether the given number is an Armstrong number or not. 1. If the number is indeed an Armstrong number, display all numbers in range from1 to that specified number (Note : 0 is Not an Armstrong Number). 2. Perform text validation, including checks for positive integers and general text input.



6. Write a PHP program to create an associative array representing a dictionary with words as keys and their meanings as values. Allow users to input a word and display its meaning if found, otherwise, display a "Word not found" message. (Please keep 10 pairs of keys and their meanings)



7. Write a PHP program that includes a user form with a text field and submit buttons for various string manipulations. It will display the result accordingly. (for replace, replace ‘a’ with ‘x’).

PART B

1. Design a webpage with a card or image that changes its size, position, and opacity on hover using CSS transitions and transformations. Use different timing functions.
2. PHP program to implement student registration form using Labels, Text Boxes, Text Area, Checkbox, Radio Buttons, Select and Submit button. (First Name, Last Name, Address, E-Mail, Mobile, City, State, Gender, Hobbies, Blood Group). Display user inserted value in a new PHP page in a neat format.
3. Write a PHP program that implements a class to add and find the difference of two distance values given in feet and inches. The user inputs are collected through an HTML form.

Distance Calculator

Distance 1:
Feet: 5
Inches: 8

Distance 2:
Feet: 3
Inches: 9

Calculate

Results:

Sum: 9' 5"

Difference: 5' 8"

4. Develop a PHP program that facilitates the addition, multiplication of two matrices. Utilize HTML for the user interface and PHP for the backend logic. Dynamically generate the required number of textboxes based on the specified number of rows and columns. Implement three distinct buttons to perform each matrix operation For instance, consider the addition of two matrices as an example.

Matrix Addition

Enter the number of rows: 2

Enter the number of columns: 3

Matrix A

3	4	6
4	2	-2

Matrix B

5	6	2
3	5	4

Add Matrices

Result Matrix

8	10	8
7	7	2

5. Program to implement a login form where users enter their username and password. Validate the credentials against data stored in a MySQL database and grant access if they are correct.
6. Program to create a feedback form with fields for name, email, subject, and message. Store the submitted feedback data in a MySQL database for later review.
7. Develop a web application for proficiently managing hotel reservations, employing PHP for backend logic and MySQL for data storage. The application should feature a well-structured database table

encompassing essential fields such as Room Number (primary key), Room Type (e.g., singlesemi,single deluxe, double semi, double deluxe, dormitory), Capacity, and Status (booked or available).

Within the application's user interface, provide a textbox for entering the room number and two distinct buttons for check-in and check-out functionalities. Ensure that both check in and check-out operations are executed based on the entered room number, facilitating a seamless and intuitive user experience.

a) Insert 5 records into the table through the interface, reflecting both available and booked rooms.
b) Lists all available rooms and booked rooms on the webpage.
c) Change the booking status to "booked" when a user checks in.
d) Change the room status to "available" when a user checks out.
e) Displays appropriate messages for successful booking, check-out, or if the room number is not present or not in the expected status.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8 Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Algorithms Lab**		
Course Code:	**BCABDPS509**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

1. Write a program to sort a list of N elements using Selection Sort Technique.

2. Write a program to read ‘n’ numbers, find minimum and maximum value in an array using divide and conquer.

3. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n> 5000, and record the time taken to sort.

4. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort.

5. Write program to implement the BFS algorithm for a graph.

6. Write program to implement the DFS algorithm for a graph.

7. Write a program to implement Strassen's Matrix Multiplication of 2*2 Matrixes.

PART-B

1. Write program to implement backtracking algorithm for solving problems like N queens.

2. Design and implement in to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S={1, 2, 5, 6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

3. Write a program find shortest paths to other vertices using Dijkstra's algorithm.

4. Write a program to perform Knapsack Problem using Greedy Solution.

5. Write program to implement greedy algorithm for job sequencing with deadlines.

6. Write a program to perform Travelling Salesman Problem

7. Write a program that implements Prim’s algorithm to generate minimum cost spanning Tree.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8 Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Data Visualization with Power BI and Tableau(SKILL BASED) Compulsory**		
Course Code:	**BCABDSS501**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After completing this course, a student will be able to:

- Demonstrate proficiency in connecting and preparing data in Power BI and Tableau.
- Create and customize a variety of charts and visualizations, including bar charts, area charts, maps, scatter plots, pie charts, and tree maps.
- Utilize basic and advanced functions such as SUM, AVR, and aggregate features.
- Develop interactive dashboards and storylines, adding interactivity and actions to enhance user experience.
- Perform data manipulations, including sorting, filtering, pivoting, and blending.

- Work with time series data, create data extracts, and manage data hierarchies.
- Gain practical skills for publishing visualizations and dashboards, making data insights accessible and actionable.

Works to be carried out by the students

1.	Install Power BI Desktop, explore the interface and load data from Excel file.
2.	Use Power Query Editor to clean and transform a dataset.
3.	Use Power Query Editor to combine data from multiple tables.
4.	Visualize data using basic chart types-Bar chart, Column chart and Pie chart by loading a dataset.
5.	Use cards, maps and matrices for advanced visuals by loading a dataset
6.	Enhance dashboard interactivity using slicers and filters
7.	Use drill-through pages and bookmarks for navigation and detail views.

Scheme of Evaluation

Internal Assessment	**10 Marks (C1)** Basis for Internal Assessment Continuous Evaluation: 10 Marks
Evaluation of Report	**40 Marks (C2)** i) Preparation and presentation: 25 Marks ii) Viva-Voce: 10 Marks iii) Record Book: 05 Marks

SEMESTER VI

Program Name	**BCA-DATA ANALYTICS**	Semester	**VI**
Course Title	**Fundamentals of Data Science (Theory)**		
Course Code:	**BCABDAS601**	No.of Credits	**03**
Contact hours	**39 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the concepts of data and pre-processing of data.
- Know simple pattern recognition methods
- Understand the basic concepts of Clustering and Classification
- Know the recent trends in Data Science

Unit	Description	Hours

1	**Data Mining**: Introduction, Data Mining as a subject, Definitions, Knowledge Discovery in Databases (KDD) Vs Data Mining, DBMS Vs Data Mining, DM techniques, Problems, Issues and Challenges in DM, DM applications.	**09**
2	**Data Warehouse**: Introduction- What is Data Warehouse, Difference between Operational Database System and Data Warehouses, Multidimensional Data Model- From Tables and Spreadsheets to Data Cubes, Stars, Snowflakes, and Fact Constellations, OLAP Operations in the Multidimensional Data Model. Data Warehouse Architecture- A Three-Tier Architecture, Metadata Repository. **Data Processing**: Why Preprocess the Data, Data Cleaning- Missing Value, Noisy Data. Data Integration and transformation- Data Integration (Definition), Data Transformation.	**10**
3	**Mining Frequent Patterns**: Basic Concept –Market Basket Analysis, Frequent Item Set Mining Methods, frequent Pattern Mining. Apriori algorithm, Generating Association Rule, Improving the efficiency of Apriori. Mining Association Rules- Mining Multilevel Association Rules, Mining Multidimensional Association Rules, and Constraint based Association Mining.	**10**
4	**Classification:** Basic Concepts, Issues, Decision Tree Induction, Attribute Selection Measures (Definition and formula - Information gain, Gain ratio, Gini index). Bayesian Classification: Bayes' Theorem, Rule-Based Classification, k Nearest Neighbor. **Prediction**: Linear Regression, Nonlinear Regression. **Clustering**: Cluster Analysis, A Categorization of Major Clustering Methods Partitioning Methods: k-means.	**10**

Text Books:

1. Arun K Pujari – "Data Mining Techniques" 3rd Edition, Universities Press
2. Jiawei Han and Micheline Kambar – "Data Mining Concepts and Techniques" Second Edition

Reference Books:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson Education, 2012.
2. 4 K.P.Soman, Shyam Diwakar, V.Ajay: Insight into Data Mining – Theory and Practice, PHI 5
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar - "Introduction to Data Mining", Pearson Education

Program Name	**BCA-DATA ANALYTICS**	Semester	**VI**
Course Title	**Big Data Analytics (THEORY)**		
Course Code:	**BCABDAS602**	No. of Credits	**03**
Contact hours	**39 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Relate Big data with Cloud Computing, Hadoop and IoT.
- Interpret Hadoop Architecture and utilize Hadoop Ecosystem components.
- Understand several mechanisms for Big Data generation, acquisition and storage.
- Understand and Compare various Big Data Analytic Methods.
- Outline Big Data Analysis in various Fields.

Unit	Description	Hours
1	**Introduction: Big Data Analytics :**Introduction. Need of Big Data, BigData Classification of Data-Structured, Semi-structured and Unstructured , BigData Definitions , BigData Characteristics , BigData Types , BigData Classification , BigData Handling Techniques **RELATED TECHNOLOGIES:** Cloud Computing - Cloud Computing Preliminaries, Relationship Between Cloud Computing and Big Data, IoT - IoT Preliminaries, Relationship Between IoT and Big Data, Data Center, Hadoop - Hadoop Preliminaries, Relationship between Hadoop and Big Data.	**10**
2	**Introduction to Hadoop :**Introduction, Hadoop and its Ecosystem, Hadoop Distributed File System, Mapreduce Framework and Programming Model, Hadoop Yarn, Hadoop Ecosystem Tools	**09**
3	**BIG DATA STORAGE:** Storage System for Massive Data, Distributed Storage System, StorageMechanism for Big Data-Database Technology, Design Factors, Database Programming Model. **BIG DATA GENERATION AND ACQUISITION:** Big Data Generation-Enterprise Data, IoT Data, Internet Data, Bio medical Data, Data Generation from Other Fields, Big Data Acquisition Data Collection, Data Transportation, Data Pre-processing.	**10**
4	**BIG DATA ANALYSIS:** Traditional Data Analysis, Big Data Analytic Methods, Architecture for Big Data Analysis - Real-Time vs. Offline Analysis, Analysis at Different Levels, Analysis with Different Complexity, Tools for Big Data Mining and Analysis. **BIG DATA APPLICATIONS**: Application Evolution, Big Data Analysis Fields - Structured Data Analysis, Text Data Analysis, Web Data Analysis, Multimedia Data Analysis, Network Data Analysis, Mobile Traffic Analysis, Key Applications - Application of Big Data in Enterprises, Application of IoT Based Big Data, Application of Online	**10**

	Social Network Oriented Big Data, Applications of Healthcare and Medical Big Data, Collective Intelligence, Smart Grid.	

Text Books:

1. Min Chen, Shiwen Mao, Yin Zhang,Victor C.M. Leung, Big Data: Related Technologies,Challenges and Future Prospects, Springer; 2014.
2. Raj Kamal, Preeti Saxena Introduction to Hadoop, Spark, and Machine-Learning, McGraw Hill Education(India) Private Limited CHENNAI

Reference Books:

1. Eric Sammer, Hadoop Operations, 2 nd Edition., O'Reilley, 2012.
2. Vignesh Prajapati, Big Data Analytics with R and Hadoop,PACKT Publishing,2013.

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Fundamentals of Data Science-Lab**		
Course Code:	**BCABDPS603**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Sl. No.	**PART-A Programs**
1	Write a Python program to perform data preprocessing techniques such as handling missing values, removing noisy data, and transforming datasets.
2	Write a Python program to create and display a simple multidimensional data cube for sales data using rows, columns, and measures.

3	Write a Python program to perform OLAP operations such as roll-up, drill-down, slice, and dice on a sample dataset.
4	Write a Python program to calculate Information Gain, Gain Ratio, and Gini Index for attribute selection in Decision Tree classification.
5	Consider a dataset with varied numerical scales (e.g., Age ranging from 20–60, and Income ranging from ₹20,000– ₹150,000). Write Python program to Implement Min-Max Normalization to scale the features strictly between 0 and 1. Also to Implement Z-Score Standardization to centre the data around a mean of 0 with a standard deviation of 1.
6	Write a Python program to perform cluster analysis using the K-Means algorithm and visualize the formed clusters using graphs.
PART-B Programs	
1	Write a Python program to implement the Apriori algorithm for discovering frequent itemsets from a transactional dataset and display the frequent itemsets based on minimum support threshold.
2	Write a Python program to generate Association Rules from frequent itemsets using support, confidence, and lift measures.
3	Write a Python program to implement Decision Tree classification using a suitable dataset and evaluate the classifier performance using accuracy metrics.
4	Write a Python program to implement the Naïve Bayes classifier for predicting class labels from a suitable dataset.
5	Write a Python program to implement K-Nearest Neighbors (KNN) classification using the Iris dataset and classify flower species based on feature values.
6	Write a Python program to implement Linear Regression analysis for predicting student marks based on study hours or similar numerical data.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing-5, Logic- 5, Execution -5 Marks**	**15 Marks**
Program-2	**PART-B** **Writing-5, Logic- 10, Execution -5 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**V**
Course Title	**Big Data Analytics -Lab**		
Course Code:	**BCABDPS604**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Note: The programs can also be executed using Hadoop, MapReduce and HiveSQL.

Sl. No.	**PART-A Programs**
1	Write a Python program to count words in a large text file, using PySpark
2	Create a PySpark program to determine the maximum and minimum values from a dataset.
3	Write a program for Implementation of MapReduce Using PySpark. Demonstrate map(), reduce(), reduceByKey(), and flatMap() operations
4	Using PySpark demonstrate the uses of dropna, fillna, drop Duplicates, Imputer
5	Write a Python program to Analyze Volume, Variety, Velocity, and Veracity of large datasets
6	Using PySpark Perform sentiment analysis on Twitter datasets.

Sl. No.	**PART-B Programs**
1	Develop a PySpark application to count the frequency of hashtags from a social media dataset.
2	Develop a PySpark program to count the frequency of each character in a large text file.
3	Develop a PySpark application to analyze IoT sensor data streams for temperature, humidity, or traffic monitoring and generate alerts for abnormal readings.
4	Write a PySpark program for Sales Data Analysis Using Spark SQL with Real-World Dataset such as the Superstore Sales Dataset (https://www.kaggle.com/code/shreyhenry/super-store-exploratory-analysis?select=superstore_sales.csv). Analyse a large sales dataset and generate business insights such as: Total sales, Best-selling products, Region-wise sales, Monthly revenue, Top customers.
5	Process social media text data by tokenizing sentences, removing stop words, and classifying sentiment. Key Concepts to be demonstrated: Tokenizer, StopWordsRemover, HashingTF, IDF.
6	Create a PySpark application to analyze healthcare datasets (disease trends, patient records) or social network datasets (user interactions, hashtag trends) for pattern discovery and prediction.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing-5, Logic- 5, Execution -5 Marks**	**15 Marks**
Program-2	**PART-B** **Writing-5, Logic- 10, Execution -5 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**VI**
Course Title	**Research Methodology+ Project Work**		
Course Code:	**BCABDPS605**	No.of Credits	**12**
Contact hours	**22 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**100**	Summative Assessment Marks	**500**

PROJECT GUIDELINES

Preamble: Project work has been made a part of BCA course to give students exposure to Software development exercises. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices. As such, during the development of the project students shall involve themselves in all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation, with an overall emphasis on the development of reliable software systems. Since, the project work spans over the entire final semester, the students shall be advised to take up projects for solving problems of software industry or any research organization or the real-life problems suggested by the faculty in- charge of BCA project work in the Institutions. Topic chosen of work must be nontrivial, analytical and application–oriented. It must involve substantial original work and/or development effort based on the theme. Solved, off-the-shelf and pirated work is not entertained. Any attempt of plagiarism or use of unfair means will result in rejection of the work. All activities of the Project Development must be time-bound and the equal participation of the team members expected throughout the Development process.

GENERAL GUIDELINES TO THE INSTITUTIONS

- Calendar of Project Work shall be announced before the commencement of the Sixth semester. Calendar should contain tentative schedules for the submission of Project Proposal, Project Acceptance, Project Synopsis, Problem Analysis Document, System Design Document, Database Design, Detailed Design, Coding and Testing, Final Report, Internal Assessment exams (at least two), Viva/Voce etc.
- Students shall undertake projects with real life problems (that has direct relevance in day-to-day activities or to knowledge extension) either in their

Colleges or in industry/research and development laboratories/software companies as recommended by the faculty in-charge of BCA project work in the Institutions. If a student intends to do industry project, the faculty in-charge shall ensure that the projects are genuine and original in nature.

- There shall be not more than three members in a Project team.
- At least two internal assessment exams shall be conducted to evaluate the progress made by the students at different stages of project work. Such exams may include written tests, document verification and presentations, work demonstration, group discussion, viva-voce etc. so as to objectively assess the understanding gained by the students in course of their project work.

PROJECT VALUATION

External and Internal Examiners together conduct project valuation objectively. To begin with, the finer details about various points contained in the scheme of valuation may be conclusively agreed upon through mutual consultation. During project evaluation, a student shall present his/her work through live demonstration of the software application developed as a part of project. However, if live demonstration is not possible due to the reason that some companies do not divulge source code on account of ownership rights or copyrights, students may be allowed to make PPT presentation of their authentic works. In such cases, candidates shall produce necessary declarations issued by the companies to this effect. However, students shall be enabled to present their work in entirety. The primary objective of project evaluation shall be to assess the extent of effort that was put in to meet the objectives of the project and also to gauge the understanding gained by the students in course of their project works. While evaluating Project Reports, examiners shall scrutinize whether Software Development Life Cycle (SDLC) principles have been consistently followed in the project work and the same are documented well in the Reports. However, the relative and overall emphasis of these principles to a particular problem domain chosen may be taken into account so that project evaluations remain fair and objective.

SCHEME OF VALUATION and Marks Distribution

	Particulars	**Marks**
Internal Assessment:100		
	Progress assessment for TWO times @ 50 marks at each time	100
Project Report Valuation :300 marks		
1	Introduction	20
2	Related studies about the project	20
3	Project plan & implementation-target achieved/output	250

	delivered(effectiveness)	
4	Other mandatory documents & information (certificates, contents, tables, figures, bibliography etc.)	10
Viva-Voce: 100 marks		
1	Live Demonstration (Software execution) or Dry runs (Presentation of authentic screenshots or captured videos may be used to walk through complete scenarios)-consistency and completeness	80
2	Question and Answer (Oral only or Oral and written)	20
Grand Total Marks		500

FORMAT OF PROJECT SYNOPSIS

Synopsis is a brief outline or general view, as of a subject or written work; an abstract or a summary of the Project Work. It must be as brief (NOT MORE THAN 20 A4 sized paper pages) as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up.

The write up must adhere to the guidelines and should include the following;

1. Title of the Project.
2. Introduction, objectives and scope of the Project.
3. Project category (Database/Web Application/Client-server/Networking/ Multimedia/gaming/Simulation etc.).
4. Tools / Platform, Hardware and Software Requirement specifications.
5. Analysis (DFDs at least up to second level, ER Diagrams/ Class Diagrams, Database Design etc, as per the project requirements).
6. A complete structure which includes: Number of modules and their description to provide an estimation of the student's effort on the project, Data Structures as per the project requirements for all the modules, Process logic of each module, testing process to be used, reports generation (Mention tentative content of report).
7. Whether Industry Defined/Client Defined/User Defined Project Mention the type. Mention the name and Address of the Industry/Client.
8. Limitation of the project.
9. Future scope and further enhancement of the project.

GUIDELINES FOR PREPARATION OF DISSERTATION

1. ORGANISATION OF THE DISSERTATION

The dissertation shall be presented in a number of chapters; starting with Introduction and ending with Conclusion. Each of the chapters will have precise title reflecting the contents of the chapter. A chapter can be subdivided in to sections, sub-sections and sub-sub-section so as to present the content discretely and with due emphasis.

Sequence of items in Dissertation Report

The following sequence may be followed in the preparation of the final dissertation report:

- Cover Page (On the hardboundcover)
- Title Page (Inner Cover Page)
- Certificate from the Institute
- Certificate from the Company
- Declaration
- Acknowledgement
- (Detailed) Table of Contents (with page numbers).
- List of Figures (with figure number, figure titles and page numbers)
- List of Tables with table number, table title and page number.
- Chapters

1. **Introduction**
    - **a.** Introduction of the System
        - i. Project Title
        - ii. Category
        - iii. Overview
    - **b.** Background
        - **i.** Introduction of the Company
        - **ii.** Brief note on Existing System
    - **c.** Objectives of the System
    - **d.** Scope of the System
    - **e.** Structure of the System
    - **f.** System Architecture
    - **g.** End Users
    - **h.** Software/Hardware used for the development
    - **i.** Software/Hardware required for the implementation

2. **SRS**
    - **a.** Introduction (Brief write-up about SRS)
    - **b.** Overall Description

i. Product perspective
ii. Product Functions
iii. User characteristics.
iv. General constraints
v. Assumptions

c. Special Requirements (Software / Hardware-if any)
d. Functional requirement.
    i. Module 1
    ii. Module 2
e. Design Constraints
f. System Attributes
g. Other Requirements (if any)

3. **System Design (Functional Design)**
    a. Introduction (brief write-up about System Design)
    b. Assumptions and Constraints
    c. Functional decomposition
    d. Description of Programs
        i. Context Flow Diagram (CFD)
        ii. Data Flow Diagrams (DFDs–Level 0, Level 1, Level 2)
    e. Description of components
        i. Functional component 1
        ii. Functional component 2
4. **Database Design (or Data structure)**
    a. Introduction (brief write-up about Database design)
    b. Purpose and scope
    c. Table Definition
    d. ER diagram

5. **Detailed Design (Logic design of modules)**
    a. Introduction (brief write-up about Database design)
    b. Structure of the software package (structure chart)
    c. Modular decomposition of the System
        i. Module1
            1. Inputs
            2. Procedural details
            3. File I/O interfaces
            4. Outputs
            5. Implementation aspects (if any)
        ii. Module 2 ……

6. **Program code listing**
    a. Database connection

b. Authorization / Authentication
c. Data store / retrieval /update
d. Data validation
e. Search
f. Named procedures / functions
g. Interfacing with external devices (if any)
h. Passing of parameters
i. Backup/recovery
j. Internal documentation

7. User Interface (Screens and Reports)

a. Login
b. Main Screen / Home page
c. Menu
d. Data store / retrieval / update
e. Validation
f. View
g. On screen reports
h. Data Reports
i. Alerts
j. Error messages

8. Testing

a. Introduction (brief write-up about Software Testing)
    i. Unit Testing
    ii. Integrate Testing
    iii. System Testing
b. Test Reports

- Conclusion
- Limitations
- Scope for enhancement (future scope)
- Abbreviations and Acronyms (list)
- Bibliography / References (list in specified format)

2. DISSERTATION FORMAT

2.1 Paper

2.1.1 Quality

The dissertation shall be printed on white bond paper, whiteness 95% or above, weight 70 gram or more per square meter.

2.1.2 Size

The size of the paper shall be standard A4; height 297 mm, width 210 mm.

2.1.3 Type-Setting, Text Processing and Printing

The text shall be printed employing Laserjet or Inkjet printer, the text having been processed using a standard text processor. The standard font shall be Times New Roman of 12 pts with 1.5 line spacing.

2.1.4 Page Format

The printed sheets shall have the following writing area and margins:
Top margin .5”
Bottom margin.5”
Left margin1”
Right margin.75”

2.1.5Pagination

Page numbering in the text of the dissertation shall be numerals starting from**‘1’ at the center of the footer**. The text of the written dissertation shall not beless than 60 pages excluding references, tables, questionnaires and other annexure.

Pagination for pages before the Introduction chapter shall be in lower case Roman numerals, e.g., ‘iv’.

2.1.6 Paragraph format

Vertical space between paragraphs shall be about 2.5 line spacing.

The first line of each paragraph should normally be indented by five characters or 12 mm. A candidate may, however, choose not to indent if (s) he has provided sufficient paragraph separation.

A paragraph should normally comprise more than one line. A single line of a paragraph shall not be left at the top or bottom of a page (that is, no windows or orphans should be left). The word at the right end of the first line of a page or paragraph should, as far as possible, not be hyphenated.

2.2 Chapter and Section format

2.2.1 Chapter

Each chapter shall begin number (in Hindu on a fresh page with an additional top margin of about 75 mm. Chapter Arabic) and title shall be printed at the center of the line in 6 mm font size (18 pt) in bold face using both upper and lower case (all capitals or small capitals shall not be used). A vertical gap of about 25 mm shall be left between the chapter number and chapter title lines and between chapter title line and the first paragraph.

2.2.2 Sections and Sub sections

A chapter can be divided into Sections, Sub sections and Sub different concepts separately. Sections and sub-sub sections so as to present sections can be numbered using decimal points, e.g., 2.2 for the second Section in Chapter 2 and 2.3.4 for the fourth Sub Sections and Sub-- section in third Section of Chapter 2. Chapters, Sections shall be included in the Contents with page numbers flushed to the right. Further subsections need not be numbered or included in the contents. The Sections and Sub sections titles along with their numbers in 5 and 4mm (16 and 14 pt) fonts, respectively, in bold face shall be flushed to the left (not centered) with 15 mm space above and below these lines. In further subdivisions character size of 3 and 3.5 with bold face, small caps, all caps and italics may be sued for the titles flushed left or centered. These shall not feature in the contents.

2.2.3 Table / Figure Format

As far as possible tables and figures should be presented in portrait style. Small size table and figures (less than half of writing area of a page) should be incorporated within the text, while larger ones may be presented in separate pages. Table and figures shall be numbered chapter wise. For example, the fourth figure in Chapter 5 will bear the number Table Figure 5.4 or Fig.5.4

Table number and title will be placed above the table while the figure number and caption will be located below the figure. Reference for Table and Figures reproduced from elsewhere shall be cited in the last and separate line in the table and figure caption, e. g. (after McGregor [12]).

3 AUXILIARY FORMATS

1.1 Binding

The dissertation shall be hard cover bound in leather or rexin.

1.2 Front Covers

The front cover shall contain the following details:

- Full title of dissertation in 6 mm 22 point size font properly centered and positioned at the top.

- Full name of the candidate in 4.5 mm 15 point size font properly centered at the middle of the page.
- A 40 mm dia replica of the college emblem followed by the name of the Department and the year of submission, each in a separate line and properly centered and located at the bottom of the page.

1.2.1 Lettering

All lettering shall be embossed in gold.

1.2.2 Bound back

The degree, the name of the candidate and the year of submission shall also be embossed on the bound (side) in gold.

1.3 Blank sheets

In addition to the white sheets (binding requirement) two white shall be put at the beginning and end of the dissertation.

1.4 Title sheet

This shall be the first printed page of the dissertation and shall contain the submission statement: the Dissertation submitted in partial fulfillment of the requirements of the BCA, the name and Roll No. Of the candidate, name (s) of the supervisor and co- supervisor (s) (if any), Department and year of submission.

Questions Paper Pattern for Core Subjects

Duration:3 Hours **Max. Marks: 80**

*Note: **Answer any ten Questions from Part-A and one full Question from each unit in Part-B***

PART-A

1. Answer any 10 10 x 2=20

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.

PART-B

There are 4 Units - UNIT-I, II, III, IV

Each unit contains 2 main questions and it carry 15 Marks. 4 x 15=60

Each main question contains 2 or more sub questions.

UNIT-I

2 a)

b)

c)

3. a)

b)

c)

Same pattern for UNIT – II , UNIT - III and UNIT - IV