Bachelor of Computer Applications

(Data Science)

Semester–II

Course Code	Course Title	L	T	P	Credits
BCA-102A	**Operating System** (Pre-requisite: None)	3	0	0	3
		CIE	**SEE**		**Total**
		40	60		100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-102A.1	Understand the fundamental concepts of operating systems.
BCA-102A.2	Apply process scheduling algorithms to solve process management problems
BCA-102A.3	Interpret memory management techniques and virtual memory.
BCA-102A.4	Implement file systems and disk scheduling algorithms.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA-102A.1	3	-	-	-	-	-	-	2
BCA-102A.2	3	2	3	-	-	-	-	2
BCA-102A.3	3	3	3	2	-	-	-	2
BCA-102A.4	3	2	3	-	-	-	-	2

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   **Contact Hours: 11**

Fundamentals of Operating System and Processes

Introduction of Operating System: Definition, Functions & Characteristics; Operating System Services; Operating System Architecture; Types of Operating system: Batch, Multiprogramming, Multi Processing, Time-sharing, Real-time, Distributed; System Programs and System calls.

Processes: Definition, Process states, Process Control Block, Operations on Processes, inter process Communication, Threading and Multithreading.

UNIT-II   **Contact Hours: 12**

Process Scheduling, Synchronization and Deadlocks

Process Scheduling: Definition, Types of Schedulers, Scheduling Criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only), Scheduling algorithms: Preemptive and Non - Preemptive, FCFS, SJF, Priority, RR, and Multi-level Queue (with and without Feedback) Scheduling.

Synchronization: Critical Section Problem, Semaphores, Classical Problem of Synchronization.

Deadlocks: Definition, Necessary conditions for Deadlock, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.

UNIT-III   Contact Hours: 12

Memory Management

Memory Concepts: Logical and Physical Address Space, Swapping, Internal and External Fragmentation.

Memory Allocation Techniques: Contiguous Memory Allocation- Single and Multi-Partitioned, Non-Contiguous Memory Allocation – Paging and Segmentation.

Virtual Memory Management: Demand Paging, Page-Replacement Algorithms: FIFO,   LRU, Optimal, Thrashing.

UNIT-IV   Contact Hours: 10

File and Directory management, Disk Scheduling algorithms

File Concept: File System and its Functions, Different types of Files and their access methods.

Directory: Directory Structures, Directory Operations, Directory Allocation Methods.

Disk Scheduling: Disk Structure, Disk Scheduling Algorithms: First come First Serve (FCFS), Shortest Seek Time First (SSTF), SCAN, C-SCAN, LOOK, C- LOOK.

Text Books:

1. Silberschatz A., Galvin P.B., and Gagne G., *Operating System Concepts*, John Wiley & Sons.
2. Godbole, A.S., *Operating Systems*, Tata McGrawHill Publishing Company, New Delhi.

Reference Books:

1. William Stallings, *Operating Systems: Internals and Design Principles*, Prentice Hall
2. William S. Davis and T. M. Rajkumar, *Operating Systems: A Systematic View*, Pearson.

Course Code	Course Title	L	T	P	Credits
BCA-122A	**Programming with Python** (Pre-requisite: None)	3	0	0	3
		CIE	SEE		Total
		40	60		100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-122A.1	Understand the fundamentals of Python programming, including data types, input/output
BCA-122A.2	Analyze and implement operators and control structure in Python.
BCA-122A.3	Utilize ordered data objects including string, list and tuple.
BCA-122A.4	Utilize unordered data objects including set and dictionary and design functions.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA-122A.1	3	-	-	2	-	-	-	2
BCA-122A.2	3	3	2	2	-	-	-	3
BCA-122A.3	3	3	3	3	-	-	-	3
BCA-122A.4	3	3	3	3	-	-	2	3

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   **Contact Hours: 9**

Basics of Python

Overview and applications areas of Python, Python installation, Comments, Keywords, Identifiers, Variables declaration, Standard Data types, id(), type(), quotations for string literals, data type conversion methods, Input/Output statements, escape characters, round( ), importing 'math' package

UNIT-II   **Contact Hours: 11**

Operators and Control statements in Python

Operators: Arithmetic, Assignment, Comparison, Logical, Bitwise, Reference or identity (is/ is not), Membership (in /not in)
Control Statements: conditional statements (if, else, elif), loop statements (for, while), break, continue, pass statement.

UNIT-III   **Contact Hours: 13**

Ordered Data Objects

Ordered Data Objects: String: declaration, indexing, len(), concatenation, repetition, 'in'/'not in' operator,

slice, Traversal, Built-in functions; List: declaration, indexing, len(), creating list using range(), list with initial values, converting string to list, concatenation, repetition, 'in'/'not in' operator, slice, traversal, built-in functions; Tuple: declaration, indexing, len( ), creating tuple using range(), tuple with initial values, converting string to tuple, converting list to tuple, concatenation, repetition, 'in'/'not in' operator, slice, traversal, built-in functions.

UNIT-IV   Contact Hours: 12

Unordered Data Objects and Functions

Unordered Data Objects: Set: Roster and Rule form, len(), converting list to set and set to list, Built-in functions, Set operations;   Dictionary: declaration, len(), inserting and accessing a value, keys(), values(), items(), Built-in functions

Functions: defining a function, calling a function, keyword arguments, default arguments, variable length arguments, scope of variables, Recursive function, map(), Lambda function

Text Books:

1. E. Balagurusamy, *Introduction to Computing and Problem Solving Using Python*, McGrawHill Education
2. Yashavant Kanetkar, Aditya Kanetkar, *Let us Python*, BPB Publications
3. Bob Dowling, *An introduction to Python for absolute beginners*, Cambridge University Press.
4. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson Education
5. Sheetal Taneja, Naveen Kumar, *Python Programming A Modular Approach*, Pearson
6. Rao R. Nageswara , *Core Python Programming*, Dream Tech, New Delhi

Reference Books:

1. Mark Lutz, *Learning Python*, 5th edition, O'Reilly.
2. Martin C. Brown, *Python: The Complete Reference*, McGraw-Hill

Course Code	Course Title	L	T	P	Credits
BCA-192A	**Programming with Python Lab** (Pre-requisite: Python)	0	0	4	2
		CIE	**SEE**		**Total**
		50	50		100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-192A.1	Develop Python programs using data types, input/output
BCA-192A.2	Apply operators and control structures in Python
BCA-192A.3	Utilize ordered data objects in designing Python programs
BCA-192A.4	Design programs using unordered data objects and functions.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA-192A.1	3	2	3	2	-	-	-	2
BCA-192A.2	3	3	3	2	-	-	-	3
BCA-192A.3	3	3	3	2	-	-	-	3
BCA-192A.4	3	3	3	2	-	-	2	3

List of Experiments

No.	Experiment Detail
1.	Assume you travel 80 km to and fro in a day. Fuel Cost is INR 80 per liter and your vehicle's Fuel Average is 18 km/litre. Write a Python program to calculate the Driving Cost per day.
2.	Write a program to calculate the area and circumference of a circle for the given radius as input.
3.	Write a program to make use of various Data conversion methods in Python.
4.	Write a Python program which iterates the integers from 1 to 30 (included). if number is divisible by 3 print "PIET", if number is divisible by 5 print "DCA". if number is divisible by both 3 and 5 print "PIET & DCA" and otherwise print the number itself.

5.	Write a Python program to display the following pattern for the given input of no. of lines.
	    1
	   121
	  12321
	 1234321

6.	Write a program to check whether the given integer number is Palindrome or not.
7.	Assuming your weight in kilogram and height in meters, calculate your Body Mass Index (BMI) value using the formula BMI=weight/(height*height) Height is given in (feet.inches) form and weight is given in kgs and to convert total height in meters consider 1 Feet = 0.3048 meter and 1 Inch = 0.0254 meter

8.	Create a list of city names from the given list where city name contains substring 'pur' cities=['Jaipur','Ambala','Nagpur','Kanpur','Karnal','Sholapur']
9.	Wrtie a program to remove leading and trailing blank spaces from string items in the list animals = [' monkey ', ' pitbull dog ', ' rabbit ']
10.	Book order is given as list of sublists with the following items Order Number Book Title Author Quantity Unit Price 34587 Learning Python Mark Lutz 4 40.95 98762 Programming Python Mark Lutz 5 56.80 77226 Head First Python Paul Barry 3 32.95 Write a Python program to generate the Order summary in this List of tuple form [('34587', 163.8), ('98762', 284.0), ('77226', 108.85)] Where first item in the tuple is Order Number, second item is Net Price i.e. Quantity*Unit Price if Net Price < 100.00 it should be increased by Rs. 10.
11.	employees=['Gurpreet','Manjot','Shabadpreet','Gurleen','Vishal','Noor','Navjeet'] gym_members=['Shabadpreet','Vishal','Navjeet'] developers=['Shabadpreet','Gurpreet','Gurleen','Manjot','Navjeet'] From the above given lists write Python program to answer the following queries: i) List all employees who have gym membership and also developers ii) List all the employees who are not either gym members or developers
12.	A string is given to you e.g. "aabaacdaadd". Create a dictionary of each character in the given string and its frequency, i.e. output={'a': 6, 'b': 1, 'c': 1, 'd': 3}

13.	In a shop store, data operator enters Item Name, Quantity sold and its Unit Price one by one till 'CLOSE' is entered. Create Python dictionary of Item Name and its Net Price.
	
	    Sample Input:
	    BANANA FRIES 2 20.60
	    POTATO CHIPS 3 15.50
	    APPLE JUICE 10 100.75
	    CANDY 5 2.50
	    APPLE JUICE 6 100.75
	    CANDY 5 2.50
	    CANDY 5 2.50
	    BANANA FRIES 3 20.60
	    CANDY 5 2.50
	    POTATO CHIPS 5 15.50
	    CLOSE
	Sample Output: {'BANANA FRIES': 103.0, 'POTATO CHIPS': 124.0, 'APPLE JUICE': 1612.0, 'CAND Y': 50.0}

14.	Write a function to make use of variable length arguments.
15.	Write a Recursive function to generate ith term of a Fibonacci Series 0,1,1,2,3,5,8,13,... Generate n

| | terms of Fibonacci Series using this recursive function. |

Text Books:

1. E. Balagurusamy, *Introduction to Computing and Problem Solving Using Python*, McGrawHill Education
2. Yashavant Kanetkar, Aditya Kanetkar, *Let us Python*, BPB Publications
3. Bob Dowling, *An introduction to Python for absolute beginners*, Cambridge University Press.
4. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson Education
5. Sheetal Taneja, Naveen Kumar, *Python Programming A Modular Approach*, Pearson
6. Rao R. Nageswara , *Core Python Programming*, Dream Tech, New Delhi

Reference Books:

1. Mark Lutz, *Learning Python*, 5th edition, O'Reilly.
2. Martin C. Brown, *Python: The Complete Reference*, McGraw-Hill

Course Code	Course Title	L	T	P	Credits
BCA-124A	**Office and Spreadsheet Tools** (Pre-requisite: None)	2	0	0	2
		CIE	SEE		Total
		40	60		100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-124A.1	Understand the basics of computer and operating system.
BCA-124A.2	Apply word processing features of MS-Word.
BCA-124A.3	Apply work sheet features for data entry and basic analysis using MS-Excel.
BCA-124A.4	Design effective presentations using MS-PowerPoint.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA-124A.1	3	-	-	-	-	-	-	3
BCA-124A.2	3	-	2	3	-	-	-	3
BCA-124A.3	3	-	2	3	-	-	-	3
BCA-124A.4	3	2	3	3	-	-	-	3

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   **Contact Hours: 8**

Fundamentals of Operating System

Definition, types of operating system, the user interface, exploring computer, icons, taskbar, desktop, using menu and menu selection, managing files and folders; types of software - system software, application software. Control panel - display properties, add/remove software and hardware, common utilities.

UNIT-II   **Contact Hours: 8**

Working with MS-Word

Creating, saving and editing a document - Selecting, deleting, replacing text, copying text to another file. Insert, formatting text and paragraph, using the font, dialog box, paragraph formatting using bullets and numbering in paragraph, use of smart art, checking spelling, line spacing, margins, mail merge, inserting headers and footers.

UNIT-III   **Contact Hours: 8**

Working with Spreadsheet

Entering Information - Numbers, formula, editing data in a cell, cell height and widths; Excel functions (sum,

min, max, average, count) using a range, moving and copying data, different operations on rows and columns in the worksheet, format cells, dialog box. Drawing different types of charts (column, bar, pie, line, area etc.), Sort and filter data.

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UNIT-IV　　　　　　　　　　　　　　　　　**Contact Hours: 6**

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Working with MS-Power Point

Introduction to Power Point presentation, creating a presentation, inserting smart arts, adding objects, applying transitions, and animation effects, adding tables, charts and media files, slide show.

Text Books:

1. David W. Beskeen, *Microsoft Office 365 & Office 2019: Introductory*, Cengage Learning, 2019
2. Sinha, P.K. and Sinha, Priti, *Computer Fundamentals*, BPB, 2004.
3. Sagman S, *MS Office for Windows XP*, Pearson Education, 2007
4. R. K.Taxali, *PC Software for Windows*, Made Simple, 2017.

Reference Books:

1. Norton, Peter, *Introduction to Computer*, McGrawHill, 2002.
2. Peter Waverka, *Microsoft Office 365 All-in-one for Dummies*, 2023.
3. Mansfield Ron,*Working in Microsoft Office*, Tata McGrawHill.
4. Balagurusamy E, *Fundamentals of Computers*, Tata McGrawHill.
5. Mavis Beacon, *All-in-one MS Office CD based views for self-learning*, BPB Publication.

Course Code	Course Title			L	T	P	Credits
BCA-194A	**Office and Spreadsheet Tools Lab** (Pre-requisite: MS Office)			0	0	4	2
				CIE	**SEE**		**Total**
				50	50		100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-194A.1	Understand basic navigation and file management functions of windows operating system
BCA-194A.2	Develop advanced word processing and collaboration skills using MS-Word
BCA-194A.3	Apply advanced features of MS-Excel for data analysis and visualization
BCA-194A.4	Develop professional presentation skills using MS-Power Point

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA-194A.1	3	-	-	-	-	-	-	3
BCA-194A.2	3	2	3	3	-	-	-	3
BCA-194A.3	3	2	2	3	-	-	-	3
BCA-194A.4	3	2	3	3	-	-	-	3

List of Experiments	
No.	**Experiment Detail**
1.	Identify and describe the function of icons, taskbar, and desktop.
2.	Navigate the Start menu and create, delete and move the files & folders.
3.	Install a new application via the Control Panel and also navigate through the control panel.
4.	Create a multi-page report in MS-Word with a table of contents, headers and footers, section breaks, and advanced formatting styles (e.g., columns, drop caps).
5.	Use mail merge in MS-Word to create personalized letters or emails using a data source (e.g., Excel spreadsheet) with fields for recipient names and addresses.
6.	Collaborate on a document with a partner using MS-Word's track changes, comments, and version history features to suggest edits and revisions.
7.	Use advanced Excel functions such as SUMIF, COUNTIF, and PivotTables to analyze and summarize data effectively.
8.	Analyze a dataset in Excel by calculating totals and averages.
9.	Create and customize different types of charts (e.g., bar chart, pie chart, line graph) in Excel based on a dataset, and interpret the data visually.

10.	Develop a professional PowerPoint presentation with slides containing multimedia elements (e.g., images, audio/video), animations, and transitions between slides.

Text Books:

1. David W. Beskeen, *Microsoft Office 365 & Office 2019: Introductory*, Cengage Learning, 2019
2. Sinha, P.K. and Sinha, Priti, *Computer Fundamentals*, BPB, 2004.
3. Sagman S, *MS Office for Windows XP*, Pearson Education, 2007
4. R. K.Taxali, *PC Software for Windows*, Made Simple, 2017.

Reference Books:

1. Norton, Peter, *Introduction to Computer*, McGrawHill, 2002.
2. Peter Waverka, *Microsoft Office 365 All-in-one for Dummies*, 2023.
3. Mansfield Ron, *Working in Microsoft Office*, Tata McGrawHill.
4. Balagurusamy E., *Fundamentals of Computers*, Tata McGrawHill.
5. Mavis Beacon, *All-in-one MS Office CD based views for self-learning*, BPB Publication.

Course Code	Course Title	L	T	P	Credits
BCA-106A	**Introduction to Web Technology** (Pre-requisite: None)	3	0	0	3
		CIE	**SEE**		**Total**
		40	60		100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-106A.1	Understand the evolution and components of the Internet.
BCA-106A.2	Explore the basic and advance elements of HTML in designing web pages.
BCA-106A.3	Apply CSS for Web Page Styling and Layout.
BCA-106A.4	Analyze Dynamic Web Functionality Using JavaScript.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA-106A.1	3	-	-	-	-	-	-	-
BCA-106A.2	3	-	-	-	-	-	-	3
BCA-106A.3	3	2	2	3	-	-	-	3
BCA-106A.4	3	3	2	3	-	2	-	3

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

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UNIT-I   **Contact Hours: 12**
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Introduction to Internet and Web Publishing

Introduction to Internet and its Components: Evolution and History of World Wide Web, Web Pages and Contents, Web Clients, Web Servers, Web Browsers, Hypertext Transfer Protocol, HTTP Request Message, Response Message, URLs, Searching, Dynamic and Static Website, Search Engines and Search Tools.

Web Publishing: Hosting website, Internet service provider, Planning and designing website, Steps for developing website.

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UNIT-II   **Contact Hours: 11**
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Basics of Hyper Text Mark-up Language (HTML)

Introduction, History of HTML, Introduction to DHTML, Structure of HTML Page, HTML tags versus HTML elements, HTML Basic Formatting Tags and attributes of tag, Paragraph Tag, Comments in HTML, Heading

Tag, Div Tag, Span Tag , Different types of List Tag- Unordered Lists, Ordered Lists, Definition list, Image Tag, Hyperlink-Internal and External, Table tag and its attributes , iFrame, Forms in HTML, Post and Get method

UNIT-III   Contact Hours: 12

Introduction to Cascading Style Sheet (CSS)

Basic Concepts, CSS Syntax, Features of CSS3, Style Rule: Cascading and Inheritance, Creating Style Sheets, CSS Selectors, CSS Comments, CSS Text Properties, CSS Colour Methods, Background Properties, Cursor Properties, CSS Table and List Properties, CSS Box Model, CSS Positioning, CSS Display Properties, CSS Float Properties.

UNIT-IV   Contact Hours: 10

Java Script and Document Object Model (DOM)

Introduction to JavaScript: History of JavaScript, Features of JavaScript, JavaScript basic programming: Variables, Operators, String manipulation, Control statements, Functions, Callback, JavaScript OOPs, Object, and Inheritance.
Working with HTML DOM: Finding HTML Elements, Changing HTML Elements, Adding and Deleting Elements, Adding Events Handlers.

Text Books:

1. Jon Duckett, *HTML and CSS: Design and Build Webs*, Wiley
2. Julie Meloni, *HTML, CSS and JavaScript All in One*, Sams Teach Yourself: Covering HTML5, CSS3, and jQuery, Sams Publishing.

Reference Books:

1. Raj Kamal, *Internet and Web Technologies*, Tata McGrawHill.
2. Ramesh Bangia, *Multimedia and Web Technology*, Firewall Media.

Course Code	Course Title	L	T	P	Credits
BCA-174A	**Web Technology Lab** (Pre-requisite: HTML, CSS, JavaScript)	0	0	4	2
		CIE		SEE	Total
		50		50	100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-174A.1	Apply basic and advanced HTML elements to design web pages
BCA-174A.2	Implement CSS properties to enhance the functionality of HTML page
BCA-174A.3	Utilize JavaScript basic concepts to create dynamic web pages
BCA-174A.4	Implement event handling features of JavaScript in designing dynamic web pages

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA-174A.1	3	-	-	-	-	-	-	-
BCA-174A.2	3	-	2	-	-	-	-	3
BCA-174A.3	3	2	2	3	-	-	-	3
BCA-174A.4	3	3	2	3	-	2	-	3

List of Experiments	
No.	**Experiment Detail**
1.	Design a web page to demonstrate various text formatting HTML tags.
2.	Create ordered and unordered lists to display items, such as a list of favorite movies or a to-do list.
3.	Design a simple resume page with sections for personal information, education, experience, and skills.
4.	Create a simple image gallery with captions using the <img> tag
5.	Create a webpage with different section and demonstrate internal link.
6.	Create a table where some cells span multiple columns (using colspan) and rows (using rowspan).
7.	Develop a web page to demonstrate the use of the <iframe> tag to embed an external webpage within another HTML page
8.	Create registration form include different input types, radio buttons, checkboxes, and dropdown menus.
9.	Create a webpage and styling HTML Elements with CSS.
10.	Implement a CSS file and attach it to any 3 HTML webpages.

11.	Design a static website with HTML and CSS for a organization include pages like Home, About, Services, and Contact.
12.	Design a webpage with a form. Upon submission, a new page opens displaying "Message has been sent" in an alert box, ensuring user feedback and interaction.
13.	Create a Basic Calculator having add, subtract, multiply and division operators.
14.	Implement a JavaScript function to verify if a string reads the same forwards and backwards, ensuring efficient string manipulation.
15.	Create a 'to do' list (add and remove HTML Elements) with JavaScript by click event.
16.	Design an interactive image slider using JavaScript. Users can click buttons to navigate through images. JavaScript handles image changes dynamically, enhancing user engagement and showcasing practical DOM manipulation skills in web development.

Text Books:

1. Jon Duckett, *HTML and CSS: Design and Build Webs*, Wiley
2. Julie Meloni, *HTML, CSS and JavaScript All in One*, Sams Teach Yourself: Covering HTML5, CSS3, and jQuery, Sams Publishing.

Reference Books:

1. Raj Kamal, *Internet and Web Technologies*, Tata McGrawHill.
2. Ramesh Bangia, *Multimedia and Web Technology*, Firewall Media.

Course Code	Course Title			L	T	P	Credits
BCA-377A	**Industrial Internship** (Pre-requisite: None)			0	0	0	4
				CIE	**SEE**		**Total**
				50	50		100
Course Outcomes (COs): At the end of this course, students will be able to							
BCA-377A.1	Examine and evaluate problems given by industry.						
BCA-377A.2	Learn professional skills such as teamwork, communication, and project management in an industry setting.						
BCA-377A.3	Employ industry-standard tools and technologies to successfully complete assigned tasks and projects.						
BCA-377A.4	Develop comprehensive documentation summarizing project outcomes, and detailing the skills acquired during the internship.						
Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)							
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
BCA-377A.1	2	2	-	–	–	1	–	–
BCA-377A.2	2	–	–	3	2	3	–	3
BCA-377A.3	3	3	3	3	2	2	-	2
BCA-277A.4	2	–	3	3	2	–	2	3

Guidelines for Industrial Training/ Internship: This course requires students to participate in professional employment-related activity or work experience or co-operative education activity with an entity external to the educational institution, normally under the supervision of an employee of an organization or an individual professional. A key aspect of the internship is induction into actual, formal, and organized work situation. Internship involves working with government or private industry, training or high-end educational organizations (such as IITs, etc.), business establishments, etc. to provide opportunities for students to actively engage in on-site experiential learning.

a) The candidate shall be required to undergo industrial trainings /internships of the specified duration, provided in the Scheme of Studies and Examinations, in an industry/ business enterprise/ organization approved by the Head of the Department.

b) If the concerned Department perceives any limitations from the industry to accommodate all the enrolled students, a student may be permitted to complete a skill-oriented e-content course (of sufficient duration) relevant to the industry or undertake a project-based / research project under the supervision of a faculty of a premier Institute (such as I.I.T., I.I.Sc.) with prior approval from the competent authority.

c) The Training will be completed under the supervision of the officer (herein called Co. Training Supervisor) of the Company/ Organization under whose guidance and supervision the training was allotted to the candidate.

d) A student can do industrial training/internship of 45-60 days duration during summer vacation after the 2nd or 4th semester before taking an exit or completing the degree programme in the respective discipline. It will be of 4 credits.

e) If a student pursues 3 years UG Programme in respective discipline without taking Exit option, this internship (either done after 2nd or 4th semester) will be taken into account in 5th semester.

f) If a student takes Exit after 2 years in UG Programme, this internship (either done after 2nd or 4th semester) will be taken into account in 4th semester.

g) If a student takes Exit after 1 year in UG Programme, the mandatory internship done after 2nd semester will be taken into account in 2nd semester.

h) However, for those students who have taken lateral entry into the 3rd semester and have completed internship of 45-60 days duration during first year, the internship is not required after the 4th semester.

i) The candidates are required to submit a comprehensive report Training Supervisor within two weeks of completion of the training along with Co. Training Supervisor's Certificate in the beginning of the report stating that the report is an outcome of the work done by the candidate during his/her training.

j) The viva-voce shall be held by Internal Examiner within two weeks after submission of the report.

k) The Industrial Training/ Internship has only CIE component of 100 marks that shall be conducted as given in Table-1.

Table-1: Relative Weightages of Industrial Training/ Internship

Component	Description of the Component		Relative Weightage (Out of 100)
CIE	i)	Internship Synopsis Evaluation within 10 days of start of Internship	20
	ii)	Mid-Term Internship Evaluation	30
	iii)	Final Presentation and Internship Evaluation	50
		CIE Total	**100**
SEE	NIL		NIL
		Grand Total	**100**