



Karmaveer Bhaurao Patil University, Satara

**Syllabus for
B. Sc. II Computer Science (Entire)**

**Under
Faculty of Science and Technology
(As per NEP 2020)**

With effect from Academic Year 2025-2026

Syllabi for Bachelor of Science (B. Sc.) Part – II Computer Science (Entire)

1. **TITLE:** Computer Science (Entire)

2. **YEAR OF IMPLEMENTATION:** From 2025-2026

3. **DURATION:** 01 year

4. **PATTERN:** Semester

5. **MEDIUM OF INSTRUCTION:** English

6. **PRACTICAL BATCHES:** 16 students/Batch

7. **STRUCTURE OF COURSE:**

As per NEP (2.0)

Sem (Level)	Subject		OE	VSC/SEC	AEC /VEC/IKS	Total	Degree/Com cr. MEME
	Course I	Course II					
	Major	Minor					
Sem III (5.0)	Major V(2) Major VI(2) Major P III(2)	Minor V(2) Minor VI(2) Minor P III(2)	OE III (2) (T)	VSC 1 (2) (P) (Major Specific) SEC 1(2) (P)	AEC 1 (2) (English) IKS 2(2) (Major Specific)	22	UG Diploma
Sem IV (5.0)	Major VII(2) Major VIII(2) Major P IV (2)	Minor VII(2) Minor VIII(2) Minor P III(2)	OE IV (2) (T)	VSC 2 (2) (P) (Major Specific) SEC 2(2) (P)	AEC 2 (2) (English) VEC 2(2) (Environm ental Studies)	22	
Credit	12	12	4	8	8	44	Exit Option 4 cr. NSQ/ Internship/Skill Courses

8. COURSE TITLE

Titles of B.Sc. II Course:

SEM - III

Sr.no	Course Category		Name of Course	Credits
1	Course -I (Major)	BCSET 231	Data Structure using C	2
2		BCSET 232	Cloud Computing	2
3		BCSEP 233	Lab based on BCSET 231 & BCSET 232	2
4	Course-II (Minor)	BCSET 234	Web Multimedia -I	2
5		BCSET 235	Basic JavaScript	2
6		BCSEP 236	Lab based on BCSET 234 & BCSET 235	2
7	VSC	BCSEPVSC 1	Data Analytics-I	2
8	SEC	BCSEPSEC 1	Operating System	2
9	AEC	BCSETAEC 1	English	2
10	OE	BCSET OE 3	OE 3	2
11	IKS	BCSETIKS 2	History of Computers in India	2

SEM - IV

Sr.no	Course Category		Name of Course	Credits
1	Course -I (Major)	BCSET 241	Object Oriented Programming using C++	2
2		BCSET 242	Cyber Security Concepts	2
3		BCSEP 243	Lab based on BCSET 241 & BCSET 242	2
4	Course-II (Minor)	BCSET244	Web Multimedia II	2
5		BCSET 245	Computer Networks	2
6		BCSEP 246	Lab based on BCSET 244 & BCSET 245	2
7	VSC	BCSEPVSC 2	Data Analytics -II	2
8	SEC	BCSEPSEC 2	Linux Operating System	2
9	AEC	BCSETAEC 2	English	2
10	OE	BCSET OE 4	OE 4	2
11	VEC	BCSET VEC 2	Environmental Awareness for Computer Science	2

9. Evaluation Structure:

Vertical	Course Category	Course Code	Internal Evaluation (Best of Two CCE)			ESE	Total Marks	Credits
			CCE-I	CCE-II	CCE-III			
Course -I (Major)	T	BCSET 231	10	10	10	30	50	02
	T	BCSET 232	10	10	10	30	50	02
	P	BCSEP 233	20			30	50	02
Course-II (Minor)	T	BCSET 234	10	10	10	30	50	02
	T	BCSET 235	10	10	10	30	50	02
	P	BCSEP 236	20			30	50	02
VSC	P	BCSEPVSC 1	20			30	50	02
SEC	P	BCSEPSEC 1	20			30	50	02
AEC	T	BCSETAEC 1	10	10	10	30	50	02
OE	P	BCSEP OE 3	20			30	50	02
IKS	T	BCSETIKS 2	10	10	10	30	50	02
		Total					550	22

Vertical	Course Category	Course Code	Internal Evaluation (Best of Two CCE)			ESE	Total Marks	Credits
			CCE-I	CCE-II	CCE-III			
Course -I (Major)	T	BCSET 241	10	10	10	30	50	02
	T	BCSET 242	10	10	10	30	50	02
	P	BCSEP 243	20			30	50	02
Course-II (Minor)	T	BCSET 244	10	10	10	30	50	02
	T	BCSET 245	10	10	10	30	50	02
	P	BCSEP 246	20			30	50	02
VSC	P	BCSEPVSC 2	20			30	50	02
SEC	P	BCSEPSEC 2	20			30	50	02
AEC	T	BCSETAEC 2	10	10	10	30	50	02
OE	P	BCSEP OE 4	20			30	50	02
VEC	T	BCSETVEC 2	10	10	10	30	50	02
		Total					550	22

Abbreviations: DSC: Discipline Specific Course; DSE: Discipline Specific Elective; CCE: Continuous Comprehensive Examination; AEC: Ability Enhancement Course; VSC: Vocational Skill Course; IKS: Indian Knowledge System; SEC: Skill Enhancement Course; OE: Open Elective; VEC: Value Educational Course; T: Theory; P: Practical ESE: End Semester Examination

INTERNAL EVALUATION STRUCTURE

- Internal evaluation of theory papers shall carry a weightage of 40%.
- **Activity:** For the internal evaluation of theory papers following activities will be adopted for CCE I & CCE II: class test/ open book test/ online course/ Industrial review/ Industrial visit/ e learning video creation/ assignment/seminar/ case study/ fieldwork/ project.
- CCE III shall consist of multiple-choice questions.
- Each CCE will carry 10 marks for 2-credit theory papers and 20 marks for 4-credit theory papers, and the best two scores will be considered for final score.
- Internal evaluation of practical papers shall carry a weightage of 40%.
- For practical examinations, internal evaluation will be based on student performance, attendance, journal records, and viva voce.

10. OTHER FEATURES:

A) LIBRARY:

Reference books, Textbooks and journals are available in Institute and Departmental Library. (Separate reference lists are attached along with the respective course syllabus)

B) EQUIPMENT:

1. Computers: 80 Desktop Computers
2. Installed Software: Visual Studio, R Software, Dev C++, MATLAB
3. Smart Classroom Equipment: 4 Smart Digital Screen
4. Projector: 2
5. LED Screen: 2
6. Development Boards / Embedded Systems: Raspberry Pi, Arduino UNO, Arduino Nano
7. Operating Systems Available Windows, Linux (Ubuntu)

11. Syllabus:



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: Major (DSC) V

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Data Structure Using C (BCSET 231)

Course Objectives: Student should be able to ...

1. study the concept of Data Structure
2. understand the Searching and Sorting Methods
3. discuss the Concept of Stack and Queue.
4. acquire knowledge of Linked list and trees

Course Outcomes: Student will be able to ...

1. demonstrate an understanding of fundamental data structures
2. analyze and compare various sorting and searching algorithms
3. design and implement different types of linked lists
4. develop and apply stack and queue data structures

Module	Title and Contents	Hrs
Module - 1	Basics of Data Structure 1.1 Data Structure: Need of data structure, Linear and non-linear 1.2 Classification of data structure 1.3 Operations on data structure: Traversing, Inserting, Deleting, Searching, Sorting, Merging 1.4 Different approaches to designing an algorithm: top-down, bottom-up 1.5 Performance analysis: time complexity and space complexity, Big 'O' Notation 1.6 Sorting techniques: Introduction, selection sort, insertion sort, bubble sort, merge sort, quick sort & Searching: Linear search, Binary search	07
Module - 2	Stack and Queue 2.1 Introduction to stack: stack as abstract data type 2.2 representation of stack through arrays 2.3 Applications of stack: reversing a list 2.4 conversion of infix to postfix, evaluation of postfix 2.5 converting an infix into prefix, evaluation of prefix expression, recursion 2.6 Introduction: Queue as ADT, representation of queue as an array 2.7 Types of queue: circular queue, double ended queue, priority queue, dequeue 2.8 Applications of queue	08
Module - 3	Linked List & Tree 3.1 Introduction: Terminologies -node, address, pointer, information, next, null pointer, empty list etc 3.2 Types of list: linear, circular, doubly list 3.3 Operations on linked list: searching, inserting, deleting 3.4 Trees terminologies 3.5 Types of trees	07
Module - 4	Graph 4.1 Graph- introduction, terminologies 4.2 Representation of a graph 4.3 Traversal of graph: Depth-first search (DFS), Breadth-first Search (BFS) 4.4 Applications of graph	08

4.5 Hashing: Hash function collision resolution technique

Reference Books:-

1. Y. P. Kanetkar, Data Structures Through CBPB Publications, 2nd ed., 2017.
2. E. Balagurusamy, Data Structures Using C, McGraw Hill Education, 2nd ed., 2017.
3. R. Thareja, Data Structures Using C, Oxford University Press, 2nd ed., 2014.
4. E. Horowitz, S. Sahni, and S. Anderson-Freed Fundamentals of Data Structures in C, Universities Press, 2nd ed., 2008.
5. Kruse R. L., Bruce P. L., and Clovis L. T.. Data Structures and Program Design in C. 2nd ed., 2007.

Evaluation Pattern: 40:60**Total Marks: 50****Continuous Comprehensive Evaluation (20 Marks):**

- CCE - I: 10 Marks: Activity
- CCE - II: 10 Marks: Activity
- CCE - III: 10 Marks: MCQ Test
(The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
- Question -2: Attempt any two questions.
(Three questions of 10 marks)
- Question -3: Attempt any four questions.
(Six questions of 5 marks)
- (50 Marks converted to 30 marks)



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: Major (DSC) VI

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Cloud Computing (BCSET 232)

Course Objectives: Student should be able to ...

1. understand the concepts of Cloud Computing.
2. study Taxonomy of Virtualization Techniques.
3. imbibe Cloud Computing Architecture.
4. acquire knowledge on Aneka Cloud Application Platform.

Course Outcomes: Student will be able to ...

1. implement the concept of virtualization and how this has enabled the development of Cloud Computing
2. apply the fundamentals of cloud, cloud Architectures and types of services in cloud
3. design different Applications in cloud
4. explore some important cloud computing driven commercial systems

Module	Title and Contents	Hrs
Module - 1	Cloud Computing Fundamentals 1.1 Definition, Types of Clouds, Motivation for Cloud Computing 1.2 The Need for Cloud Computing, Cloud Computing Is a Platform 1.3 Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models 1.4 Comparing cloud providers with traditional IT service providers	08
Module - 2	Cloud Computing Architecture and Management 2.1 Cloud architecture, Layer, Anatomy of the Cloud 2.2 Network Connectivity in Cloud Computing 2.3 Types of cloud, Applications on the Cloud 2.4 Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud application, Migrating Application to Cloud 2.5 Phases of Cloud Migration Approaches for Cloud Migration	07
Module - 3	Cloud Infrastructure and Computing 3.1 Infrastructure as a Service, Platform as a Service, Software as a Service 3.2 High-Performance Computing, Parallel Computing 3.3 Distributed Computing, Cluster Computing, Grid Computing, Bio computing 3.4 Mobile Computing, Quantum Computing 3.5 Optical Computing, Nano computing	07
Module - 4	Cloud Service Providers 4.1 Captiva Cloud Toolkit, Google, Google Cloud Connect, Google Cloud Print, Google App Engine 4.2 Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue Service 4.3 Microsoft Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint 4.4 IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform Virtualization Services Provided by SAP, Sales force, Sales Cloud 4.5 Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform	08

Reference Books:-

1. A. T. Velte, T.J. Velte, and R. Elsenpeter. Cloud Computing: A Practical Approach. McGraw-Hill Education, 2nd ed. 2019.

2. T. Erl, R. Puttini, and Z. Mahmood, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall (Pearson), 1st ed., 2013.
3. J. R. Ray, Cloud Computing: From Beginning to End, Create Space Independent Publishing Platform, ed., 2015.
4. S. Kumar, Cloud Computing: Insights into New-Era Infrastructure, Wiley India Pvt. Ltd., 1st ed. 2011
5. J. Hurwitz, R. Bloor, M. Kaufman, and F. Halper, Cloud Computing For Dummies, For Dummies (Wiley Publishing), 1st ed., 2009.

Evaluation Pattern: 40:60

Total Marks: 50

Continuous Comprehensive Evaluation (20 Marks):

- CCE - I: 10 Marks: Activity
 - CCE - II: 10 Marks: Activity
 - CCE - III: 10 Marks: MCQ Test
- (The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
- Question -2: Attempt any two questions.
(Three questions of 10 marks)
- Question -3: Attempt any four questions.
(Six questions of 5 marks)
- (50 Marks converted to 30 marks)



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: Major (DSC) P-III

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Practical VII (BCSEP 233)

Course Objectives: Student should be able to ...

1. study the concept of Data Structure
2. understand the Searching and Sorting Methods
3. acquire the Concept of Stack and Queue.
4. know the Cloud Applications.

Course Outcomes: Student will be able to ...

1. apply basic aspects of data structures including Stacks, Queue, Linked list and Tree.
2. analyze different sorting and searching algorithms, Implementations of linked list.
3. implementations of stack and queue
4. use vmware.

Sr. No.	List of Practical (Any 15)	Hrs.
1.	Write C programs to implement Search Algorithms, Linear Search, Binary Search.	60
2.	Write C programs to implement Sorting Algorithms Selection Sort, Insertion Sort, Bubble Sort.	
3.	Write C programs to implement Sorting Algorithms Merge Sort, Quick Sort.	
4.	Write C programs to perform Stack Operations using Array Implement Stack using Array, Access Element from Stack, Check if Stack is Empty	
5.	Write C programs to Implement Queue using Array	
6.	Write C programs to perform Singly Linked List - Basic Operations · Insert an Element	
7.	Write C program to Binary Search Tree (BST) - Operations a. Insert Element into BST b. Delete Element from BST c. Search Key Element in BST	
8.	Write C program to Graph Traversals - Part 1 Implement BFS (Breadth-First Search)	
9.	Write C program to Graph Traversals - Part 2 Implement DFS (Depth-First Search)	
10.	Practice combining multiple data structures (e.g., stack + recursion, linked list in BFS/DFS)	
11.	Discuss the process of choosing the right cloud deployment model for a startup	
12.	Perform the migration of a traditional web application to a cloud environment	
13.	Compare IaaS, PaaS, and SaaS models for developing and running a business application	
14.	Implement basic cloud services using AWS (Amazon Web Services)	
15.	Explore high-performance and grid computing for scientific research using cloud resources	

16.	Develop and host a cloud-based mobile application using Google Cloud services	
17.	Study the use of SAP HANA Cloud Platform for Enterprise Resource Planning (ERP)	
18.	Manage and monitor cloud infrastructure using Microsoft Azure	
19.	Use Salesforce as a SaaS tool for Customer Relationship Management (CRM)	
20.	Discuss future computing paradigms in the cloud such as edge computing, serverless, and quantum computing.	

Reference Books:-

1. Y. P. Kanetkar, Data Structures Through CBPB Publications, 2nd ed., 2017.
2. E. Balagurusamy, Data Structures Using C, McGraw Hill Education, 2nd ed., 2017.
3. R. Thareja, Data Structures Using C, Oxford University Press, 2nd ed., 2014.
4. A. T. Velte, T.J. Velte, and R. Elsenpeter. Cloud Computing: A Practical Approach. McGraw-Hill Education, 2nd ed. 2019.
5. T. Erl, R. Puttini, and Z. Mahmood, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall (Pearson), 1st ed., 2013.

Practical Evaluation Pattern: 40:60

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal : 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE = 30 Marks



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Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: Minor (DSC) V

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Web Multimedia I (BCSET 234)

Course Objectives: Student should be able to ...

1. understand basics of Internet and World Wide Web.
2. study Various HTML tags.
3. know HTML linking with multimedia.
4. introduction of CSS & Style Sheets to Create Web pages.

Course Outcomes: Student will be able to ...

1. analyze a web page.
2. identify its elements and attributes.
3. create web pages using html and its various tags.
4. apply relationship of HTML and CSS.

Module	Title and Contents	Hrs
Module - 1	Basics of Internet and Web Designing	07
	1.1 Internet, HTTP and HTTPS 1.2 Website, Dynamic and Static Website 1.3 Five golden rules in web design, Web page Design 1.4 Basic Principle Involved in Developing a web 1.5 Planning process, site map, web layout	
Module - 2	HTML Concepts	08
	2.1 Basic structure of HTML 2.2 Fundamental Elements of HTML 2.3 Advantages and Disadvantages of HTML 2.4 Basic HTML Tags 2.5 Text Formatting Tags and List Tags 2.6 HTML Tables: - Table Heading, Cell padding and Cell spacing Attributes, Colspan and Rowspan 2.7 HTML List: - Unordered List, Ordered Lists, type Attribute	
Module - 3	HTML Linking and HTML Embedding Multimedia	08
	3.1 HTML Text Link: - Linking Documents, target Attribute, Use of Base Path, Linking to a Page Section, Setting Link Colors 3.2 Working with image, Display alternate text on image HTML 3.3 Email Link: - HTML Email Tag, aligning an image, using image link 3.4 What is multimedia, working with multimedia file using object tag to insert object	
Module - 4	Cascading Style Sheets	07
	4.1 Concept of CSS, Creating Style Sheet 4.2 CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts) 4.3 Working with Block Element and Objects, Working with list and Tables 4.4 CSS ID and Class Box Model (Introduction, Border Properties, Padding Properties, Margin Properties) CSS Color 4.5 Creating Page layout and Site Design	

Reference Books:-

1. R. Rajaram, Multimedia: Concepts and Applications, Khanna Book Publishing, 2nd ed., 2018.
2. T. Vaughan, Multimedia: Making It Work, McGraw-Hill Education, 9th ed., 2014.
3. R. Steinmetz and K. Nahrstedt, Multimedia Computing, Communications & Applications, Pearson Education, 1st ed., 2004.
4. R. C. Gonzalez and R. E. Woods, Digital Image Processing, Pearson Education, 4th ed., 2018.
5. K. Sayood, Introduction to Data Compression, Morgan Kaufmann, 5th ed., 2017.
6. J. D. Gautam, Multimedia and Web Technology, McGraw Hill Education, 1st ed., 2016.

Evaluation Pattern: 40:60

Total Marks: 50

Continuous Comprehensive Evaluation (20 Marks):

- CCE - I: 10 Marks: Activity
 - CCE - II: 10 Marks: Activity
 - CCE - III: 10 Marks: MCQ Test
- (The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
- Question -2: Attempt any two questions.
(Three questions of 10 marks)
- Question -3: Attempt any four questions.
(Six questions of 5 marks)
- (50 Marks converted to 30 marks)



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Faculty of Science and Technology

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Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: Minor (DSC) VI

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Basic JavaScript (BCSET 235)

Course Objectives: Student should be able to ...

1. explain the role of javascript in web development and understand basic concepts.
2. access and modify HTML elements dynamically using javascript.
3. define and call functions, handle user interactions using event listeners.
4. study techniques, use browser developer tools, and write error-free, efficient code through testing and iteration.

Course Outcomes: Student will be able to ...

1. use JavaScript syntax, variables, and control structures.
2. manipulate arrays and objects using built-in methods.
3. apply functions, scope rules, and closures effectively.
4. handle DOM manipulation and events for interactivity.

Module	Title and Contents	Hrs
Module - 1	JavaScript Fundamentals 1.1 Definition, Basic syntax 1.2 Variables and Data Types: Declaring variables using var, let, and const, Data types – string, number, boolean, array, object, null, undefined 1.3 Control Flow: Conditional statements (if, else, switch) 1.4 Loops (for, while, do...while), Logical operators (&&, , !)	08
Module - 2	Arrays and Objects 2.1 To create, manipulate, and iterate arrays and objects 2.2 Arrays: Creating arrays, Adding/removing elements, Accessing and iterating over array elements, common array methods like push(), pop(), splice(), map(), filter() 2.3 Objects: Creating and using JavaScript objects, Understanding object properties and methods 2.4 Object-Oriented Programming Concepts: Introduction to OOP in JavaScript, Use of this keyword 2.5 Method definition inside objects	07
Module - 3	Functions and Scope 3.1 Functions: Declaring and calling functions, Passing parameters, Returning value 3.2 Scope: Global scope, Local scope, Block scope using let and const 3.3 Closures: Definition and real-life examples of closures 3.4 Use cases in function factories and data privacy	07
Module - 4	DOM Manipulation and Event Handling 4.1 Introduction to DOM: the structure of a webpage (DOM tree), Accessing DOM elements using getElementById, querySelector, etc 4.2 Modifying DOM Elements: Changing content (innerHTML), styles (style property), and attributes (setAttribute) 4.3 Event Handling: Adding event listeners, Handling common events like click, mouseover, input, Using the event object 4.4 Basic form validation using JavaScript	08

Reference Books: -

1. D. Flanagan, JavaScript: The Definitive Guide, O'Reilly Media, 7th ed., 2020.
2. M. Haverbeke, Eloquent JavaScript: A Modern Introduction to Programming, No Starch Press, 4th ed., 2024.
3. J. Pollock, JavaScript: A Beginner's Guide, McGraw-Hill Education, 6th ed., 2017.
4. E. Brown, Learning JavaScript, O'Reilly Media, 3rd ed., 2016.
5. L. Lemay, Teach Yourself JavaScript in 21 Days, Sams Publishing, 3rd ed., 2002.

Evaluation Pattern: 40:60

Total Marks: 50

Continuous Comprehensive Evaluation (20 Marks):

- CCE - I: 10 Marks: Activity
 - CCE - II: 10 Marks: Activity
 - CCE - III: 10 Marks: MCQ Test
- (The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
- Question -2: Attempt any two questions.
(Three questions of 10 marks)
- Question -3: Attempt any four questions.
(Six questions of 5 marks)
- (50 Marks converted to 30 marks)



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: Minor (DSC) P III

Marks: 50

Credits: 4

From: A. Y. 2025-26

Name of the Course and Code: Practical VIII (BCSEP 236)

Course Objectives: Student should be able to ...

1. understand basics of Internet and World Wide Web.
2. study Various HTML tags.
3. state CSS & Style Sheets to Create Web pages.
4. deliver JavaScript Fundamentals, Interactivity in Web Pages.

Course Outcomes: Student will be able to ...

1. analyze a web page.
2. identify its elements and attributes.
3. create web pages using HTML and its various Tags.
4. apply JavaScript syntax, variables, and control structures.

Sr. No.	List of Practical (Any 15)	Hrs.
1.	Create the basic structure of a webpage using HTML.	60
2.	Design and implement forms in HTML.	
3.	Apply inline and basic CSS styling to HTML elements.	
4.	Perform text styling and use different fonts using CSS.	
5.	Design a simple navigation menu using HTML and CSS.	
6.	Apply backgrounds and manage page layout using CSS.	
7.	Use CSS hover effects and transitions for interactive elements.	
8.	Design a responsive webpage layout using media queries.	
9.	Embed multimedia content like audio, video, and images in a webpage.	
10.	Create tables in HTML and position elements using CSS.	
11.	Create a basic HTML page and write a simple JavaScript program using alert() and console.log() to display messages.	
12.	Declare variables using var, let, and const, and demonstrate different data types such as string, number, boolean, null, undefined, array, and object using typeof operator.	
13.	Create a JavaScript program that uses if, else if, else, and switch statements to check age groups or grade ranges.	
14.	Demonstrate the use of for, while, and do...while loops and use of logical operators (&&, , !) in conditions.	
15.	Create an array of numbers, add/remove elements, and use methods like push(), pop(), splice(), map(), and filter() for array operations.	
16.	Create a JavaScript object with properties and methods and access them using dot notation and bracket notation.	

17.	Define an object with methods using the this keyword and show basic object-oriented behavior in JavaScript..	
18.	Declare functions with parameters and return values, and demonstrate scope using var, let, and const.	
19.	Create a closure and explain how inner functions maintain access to the outer function's variables even after the outer function has executed.	
20.	Access and modify HTML elements using JavaScript, add event listeners for user interaction (like click and input), and perform basic form validation.	

Reference Books:-

1. R. Rajaram, Multimedia: Concepts and Applications, Khanna Book Publishing, 2nd ed., 2018.
2. T. Vaughan, Multimedia: Making It Work, McGraw-Hill Education, 9th ed., 2014.
3. R. Steinmetz and K. Nahrstedt, Multimedia Computing, Communications & Applications, Pearson Education, 1st ed., 2004.
4. E. Brown, Learning JavaScript, O'Reilly Media, 3rd ed., 2016.
5. L. Lemay, Teach Yourself JavaScript in 21 Days, Sams Publishing, 3rd ed., 2002.

Practical Evaluation Pattern: 40:60

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal : 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE = 30 Marks



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: VSC I

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Data Analytics-I (BCSEPVSC 1)

Course Objectives: Student should be able to...

1. understands the basics of MATLAB.
2. perform mathematical operations efficiently using MATLAB's array-based approach.
3. learn the fundamental concepts of programming with R.
4. discuss data structures in R and their manipulation.

Course Outcomes: Student will be able to...

1. apply different data types and structures in MATLAB.
2. utilize conditional data selection techniques to extract relevant information.
3. demonstrate proficiency in programming in the R language.
4. manipulate and analyze data effectively using R.

Sr. No.	List of Practical (Any 15)	Hrs.
1.	Program to create vectors and matrices by using matlab.	60
2.	Program to create Array Indexing and modification by using matlab.	
3.	Mathematical Expressions with symbolic variables by using matlab.	
4.	Program to Define and solve symbolic equation by using matlab.	
5.	Algebraic manipulation and simplification by using matlab.	
6.	Symbolic function in matlab.	
7.	Visualize symbolic function and equation by using matlab.	
8.	Numeric data type in matlab.	
9.	Calculus with symbolic maths by using matlab.	
10.	To solve a system of linear equations using MATLAB by applying matrix operations.	
11.	Program to create Vector using R.	
12.	Program to implement Arithmetic operator using R.	
13.	Program to implement logical operator using R.	
14.	Program to create Barplot, Histogram using R.	
15.	Program to create ogive curve using R.	
16.	Program to create frequency polygon, pie chart using R.	
17.	Program to create Matrix.	
18.	Program to create Array.	
19.	Program to create list.	
20.	Program to create data frame.	

Reference Books:-

1. A. Jamal and J. Raut, Statistics with R Programming, Digilearning Tech Pvt. Ltd., 2024.
2. V. R. Pawgi, Statistical Computing Using R Software, Nirali Prakashan, 2022.
3. R. Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press, 2020.
4. R. K. Bansal, MATLAB and Its Applications in Engineering, Laxmi Publications, 2018.
5. S. Jain, Modeling and Simulation Using MATLAB - Simulink, PHI Learning, 2016.

Practical Evaluation Pattern: 40:60

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal : 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE = 30 Marks



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: SEC I

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Operating System (BCSEPSEC 1)

Course Objectives: Student should be able to...

1. study of different types of Operating System and their services.
2. learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
3. understand Memory management Concepts
4. discuss Deadlock and Concurrency concepts

Course Outcomes: Student will be able to...

1. apply the different services provided by Operating System at different level.
2. execute real life applications of Operating System in every field.
3. use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
4. build different memory management techniques like paging, segmentation and demand paging

Sr. No.	List of Practical (Any 15)	Hrs.
1.	Case study on Multitasking Operating System.	60
2.	Case study on Multiprogramming Operating System.	
3.	Case study on Time-sharing operating System	
4.	Case study on Evolution of Windows Operating System	
5.	The role of Operating System in Cloud Computing: A Case study on Amazon web services and Microsoft Azure	
6.	Case study on iOS security features	
7.	A Comparative analysis of open source and Licensed Operating System	
8.	Case study on Operating System Vulnerabilities.	
9.	Case study on Energy Efficient OS and Power Management techniques	
10.	Case study on future of OS like quantum computing and AI integration	
11.	Install and configure different type of Operating System	
12.	Use Performance monitor tool Windows performance Monitor to analyze system resource usage, memory and disk I/O	
13.	Perform file system operations such as file creation, deletion, reading and writing using system call or command-line utilities	
14.	Case study on different Scheduling Algorithm	
15.	DOS Internal Commands	
16.	DOS External Commands	
17.	Complete Information about Windows Operating System	
18.	Experiment with restoring files from backup to ensure data integrity.	
19.	Practical on setting IP	

20.	Managing services using commands like systemctl to start stop enable and disable services	
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Reference Books: -

1. A. S. Godbole and Kailash Pathak, Operating Systems, Tata McGraw-Hill Publishing Company, 3rd ed., 2014.
2. D. M. Dhamdhere, Operating Systems: A Concept-Based Approach, McGraw-Hill Education, 3rd ed., 2017.
3. Rajiv Chopra, Operating System: Fundamental Concepts and Programming, S. Chand Publishing, 2015.
4. Ramesh R. Bhosale, Operating System, Nirali Prakashan, 2022.
5. S. V. Shinde, Operating Systems (OS), TechKnowledge Publications, 2022.

Practical Evaluation Pattern: 40:60

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal : 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE = 30 Marks



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – III

Type: IKS II

Marks: 50

Credits: 2

From: A. Y. 2025-26

**Name of the Course and Code: History of Computers in India
(BCSETIKS 2)**

Course Objectives: Student should be able to ...

1. design for a steam-powered, mechanical computer
2. study digital computing replaced Analog methods in the 1940s and 1950s
3. learn the Evolution of Indian programming languages
4. understand story behind the Modern Computing

Course Outcomes: Student will be able to ...

1. design for a steam-powered, mechanical computer
2. use digital computing replaced Analog methods in the 1940s and 1950s
3. apply the Evolution of Indian programming languages
4. describe the story behind the Modern Computing

Module	Title and Contents	Hrs.
Module - 1	Pre-Independence Era of Computers	07
	1.1 Introduction: Computing in the Pre-industrial World	
	1.2 Establishment of the Tata Institute of Fundamental Research	
	1.3 Analog Computing in the 19th and early 20 th	
	1.4 Introduction of electronic computers in India	
	1.5 Information Technology before 1945	
Module - 2	Early Computing Initiatives	08
	2.1 Development of the first indigenous electronic computer: HEC-2M	
	2.2 Role of F.C. Kohli in setting up the first computer	
	2.3 Manufacturing company in India	
	2.4 Computers and Culture in the 1960s	
	2.5 Early Computer Languages and Software	
Module - 3	Era of Mainframes and Minicomputers	07
	3.1 Introduction of mainframe and minicomputer technologies in India	
	3.2 Role of the Department of Electronics (DoE) in promoting computerization	
	3.3 Evolution of Indian programming languages (FORTRAN, COBOL).	
Module - 4	Modern Computing	08
	4.1 Emergence of Indian IT companies and software exports	
	4.2 Role of NRIs in the growth of the Indian IT industry	
	4.3 Internet and Digital Revolution	
	4.4 Mobile computing and smartphone revolution in India	
	4.5 Artificial Intelligence (AI) and Machine Learning (ML) in Indian industries.	

Reference Books: -

1. R. S. Sharma, India's Ancient Past, Oxford University Press, Rev. ed., 2007.
2. M. Campbell-Kelly and W. Aspray, Computer: A History of the Information Machine, Pearson Education India, 2nd ed., 2004.
3. F. Turner, From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism, University of Chicago Press, 1st ed., 2006.

4. M. Campbell-Kelly, From Airline Reservations to Sonic the Hedgehog: A History of the Software Industry, MIT Press, 1st ed., 2003.
5. J. Abbate, Inventing the Internet, MIT Press, 1st ed., 1999.

Evaluation Pattern: 40:60

Total Marks: 50

Continuous Comprehensive Evaluation (20 Marks):

- CCE - I: 10 Marks: Activity
- CCE - II: 10 Marks: Activity
- CCE - III: 10 Marks: MCQ Test
(The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
- Question -2: Attempt any two questions.
(Three questions of 10 marks)
- Question -3: Attempt any four questions.
(Six questions of 5 marks)
- (50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: Major (DSC) VII

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Object Oriented Programming Using C++ (BCSET 241)

Course Objectives: Student should be able to ...

1. study the concept of Object-Oriented Programming
2. understand the operators and control structure in C++
3. discuss the constructors and destructors
4. learn the concept of Inheritance, Polymorphism and it's types

Course Outcomes: Student will be able to ...

1. apply basic concepts of object oriented programming.
2. use various control structures to improve programming logic.
3. design classes and objects.
4. develop constructor and destructor.

Module	Title and Contents	Hrs
Module - 1	Object Oriented Terminology	
	1.1 Introduction, need and requirement of object oriented programming 1.2 Beginning with C++, C++ concepts 1.3 Keywords, variables, constants, basic data types memory management operators 1.4 Application of OOP, Basics concept of object-oriented programming 1.5 Structure of C++ program, Class and Object: introduction, specifying a class, access specifies, defining member function, creating objects, memory allocation for object 1.6 Array of object, Static data member, static member function, friend function	07
Module - 2	Constructors and Destructor in C++	
	2.1 Concepts of Constructors 2.2 Types of constructors: Default, parameterized, copy, Overloaded constructors 2.3 Multiple constructors in a class 2.4 Constructors with default arguments 2.5 Concepts of Destructor	08
Module - 3	Inheritance	
	3.1 Introduction of Inheritance 3.2 Types of Inheritance : Single Inheritance, Multilevel Inheritance, Multiple Inheritance Hierarchical Inheritance, Hybrid Inheritance 3.3 Virtual base class 3.4 Abstract Class 3.5 Constructor in derived class	07
Module - 4	Polymorphism	
	4.1 Introduction of Polymorphism 4.2 Types of polymorphism 4.3 Compile time polymorphism ,Run time polymorphism 4.4 function overloading 4.5 operator overloading overloading unary and binary operators	08

	4.6 rules for operator overloading Run time polymorphism :virtual function, rules for virtual function, pure virtual function	
Reference Books:-		
1. E. Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education, 8th ed., 2020. 2. D. Ravichandran, Programming with C++, McGraw Hill Education, 4th ed., 2018. 3. K. R. Venugopal, Rajkumar Buyya, and T. Ravishankar, Mastering C++, McGraw Hill Education, 2nd ed., 2017. 4. A.N. Kamthane, Programming in C++, Pearson India, 2nd ed., 2013. 5. N. Barkakati, Object Oriented Programming in C++, PHI Learning Pvt. Ltd., 1st ed., 2008.		
Evaluation Pattern: 40:60		
Total Marks: 50		
Continuous Comprehensive Evaluation (20 Marks):		End Semester Examination (50 Marks):
• CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test (The Best of two will be considered for the final mark entry)		• Question -1: Solve the following questions. (Five questions of 2 Marks) • Question -2: Attempt any two questions. (Three questions of 10 marks) • Question -3: Attempt any four questions. (Six questions of 5 marks) • (50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: Major (DSC) VIII

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Cyber Security Concepts (BCSET 242)

Course Objectives: Student should be able to ...

1. understand various types of cyber-attacks and cyber-crimes.
2. learn threats and risks within context of the cyber security
3. overview of the cyber laws & concepts of cyber forensics.
4. study the defensive techniques against these attacks.

Course Outcomes: Student will be able to ...

1. analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet common from such attacks.
2. interpret and forensically investigate security incidents.
3. apply policies and procedures to manage Privacy issues.
4. design and develop secure software modules.

Module	Title and Contents	Hrs
Module - 1	Basic concepts of Cyber Security	08
	1.1 Introduction 1.2 Layers of security 1.3 Vulnerability, Cyber threat, Harmful acts 1.4 CIA Triad, Assets and Threat, motive of attackers 1.5 Active attacks, passive attacks, Software attacks, hardware attacks 1.6 Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc. 1.7 Comprehensive Cyber Security Policy	
Module - 2	Cyberspace and the Law & Cyber Forensics	07
	2.1 Introduction, Cyber Security Regulations 2.2 Roles of International Law 2.3 The INDIAN Cyberspace, National Cyber Security Policy 2.4 Introduction to computer forensics, Historical background of Cyber forensics 2.5 Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence 2.6 Forensics Analysis of Email 2.7 Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics	
Module - 3	Cybercrime: Mobile and Wireless Devices	07
	3.1 Introduction to Mobile & Wireless Devices 3.2 Common Cyber Threats to Mobile Devices 3.3 Wireless Network Vulnerabilities 3.4 Real-World Cases and Statistics	
Module - 4	Cyber Security: Organizational Implications	08
	4.1 Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks 4.2 Privacy policies and their specifications 4.3 Privacy policy languages 4.4 Privacy in different domains- medical, financial, cost of cybercrimes and IPR issues 4.5 Web threats for organizations, security and privacy implications 4.6 Social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations	

Reference Books:-

1. R. Kumar, Cyber Security Essentials, BPB Publications, 1st ed., 2023.
2. V. A. Mishra, N. N. Sakhare, A. J. Patankar, and N. D. Kale, Cyber Security, Nirali Prakashan, 2022.
3. B. J. Taunk and A. B. Nimbalkar, Cyber Security, Nirali Prakashan, 2022.
4. A. Shinde, Cyber Security, Technical Publications, 1st ed., 2022.
5. N. Godbole and S. Belapure, Cyber Security, Wiley India Pvt. Ltd., 2nd ed., 2017.

Evaluation Pattern: 40:60

Total Marks: 50

Continuous Comprehensive Evaluation (20 Marks):

- CCE - I: 10 Marks: Activity
 - CCE - II: 10 Marks: Activity
 - CCE - III: 10 Marks: MCQ Test
- (The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
 - Question -2: Attempt any two questions.
(Three questions of 10 marks)
 - Question -3: Attempt any four questions.
(Six questions of 5 marks)
- (50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

**Board of Studies in Computational Sciences
(Computer Science (Entire))**

Programme: B.Sc.

Semester – IV

Type: Major (DSC) P IV

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Practical IX (BCSEP 243)

Course Objectives: Student should be able to ...

1. study the concept Object Oriented Programming.
2. understand the operators and control structure in C++.
3. learn the constructors and destructors, Inheritance, Polymorphism and its types.
4. discuss how to protect computers and networks

Course Outcomes: Student will be able to ...

1. use various control structures to improve programming logic, Design classes and objects.
2. apply constructor and destructor, operator overloading, inheritance, and polymorphism
3. design basic cyber security tools
4. demonstrate common types of cyber attacks

Sr. No.	List of Practical (Any 15)	Hrs.
1.	Write programs using conditional and looping statements in C++	60
2.	Use of classes and object	
3.	Use static data members and static member functions in a class	
4.	Implement constructors and destructors in a C++	
5.	Demonstrate single and multilevel inheritance in C++	
6.	Perform multiple and hybrid inheritance using C++	
7.	Demonstrate function overloading and function overriding in C++	
8.	Overload operators in C++	
9.	Use friend class and friend function in C++	
10.	Implement virtual functions and runtime polymorphism	
11.	Understand basic cyber security concepts and their importance	
12.	Study different layers of security and perform threat modeling	
13.	Identify system vulnerabilities and understand various cyber threats	
14.	Analyze a case study on internet governance and cybercrime incidents	
15.	Explore digital forensics and methods of collecting digital evidence	
16.	Perform email forensics for identifying spoofed or malicious emails	
17.	Discuss cyber threats targeting mobile and wireless devices	
18.	Create a basic cyber security policy for an organization or institution	
19.	Discuss privacy challenges and rights in the digital era	
20.	Evaluate social media risks and promote security awareness practices.	

Reference Books: -

1. A. Shinde, Cyber Security, Technical Publications, 1st ed., 2022.
2. N. Godbole and S. Belapure, Cyber Security, Wiley India Pvt. Ltd., 2nd ed., 2021.
3. D. Ravichandran, Programming with C++, McGraw Hill Education (India), 4th ed., 2018.
4. K. R. Venugopal, Rajkumar Buyya, and T. Ravishankar, Mastering C++, McGraw Hill Education, 2nd ed., 2017.

Practical Evaluation Pattern: 40:60**Total Marks: 50****Internal Evaluation (20 Marks):**

- Journal: 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE=30 Marks



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: Minor (DSC) VII

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Web Multimedia II (BCSET 244)

Course Objectives: Student should be able to ...

1. understanding Multimedia Fundamentals.
2. study multimedia integration.
3. learn Multimedia Creation and Optimization.
4. discuss Attractive web using Multimedia.

Course Outcomes: After Completion student will be able to ...

1. apply Multimedia Fundamentals
2. use proficiency in Multimedia Tools and Technologies.
3. implement Multimedia Content Creation
4. analyze Multimedia Integration and Interactivity.

Module	Title and Contents	Hrs
Module -1	Introduction to Multimedia on the Web	07
	1.1 Definition and significance of multimedia in web development 1.2 Components of multimedia: text, images, audio, video, animations 1.3 Image formats: JPEG, PNG, GIF, SVG 1.4 Image optimization techniques	
Module -2	Audio and Video Basics	08
	2.1 Introduction to audio and video formats commonly used on the web 2.2 Embedding audio and video elements in HTML 2.3 Basic techniques for audio and video optimization 2.4 Using CSS to style multimedia elements 2.5 Applying styles to images, audio, and video components 2.6 Introduction to basic CSS animations	
Module -3	Advanced Multimedia Techniques	07
	3.1 CSS image effects: filters, transitions 3.2 Image galleries and sliders using HTML, CSS, and JavaScript 3.3 Responsive image techniques 3.4 Custom audio and video controls using JavaScript 3.5 Introduction to HTML5 audio and video APIs, CSS animations and transitions	
Module -4	Animation Techniques	08
	4.1 Introduction to JavaScript animation libraries like Green Sock Animation Platform (GSAP) 4.2 SVG animations using CSS and JavaScript 4.3 Creating interactive multimedia elements using HTML, CSS, and JavaScript, 4.4 Implementing interactive features like image zoom, draggable elements, Using multimedia APIs (e.g., YouTube Data API, Sound Cloud API) 4.5 Case studies of multimedia integration in web applications.	

Reference Books: -

1. M. A. Shotton, Computer Vision for Multimedia Applications: Methods and Solutions, Academic Press, 1st ed., 2014.
2. A. Watson and P. Rayner, Multimedia Programming Using Max/MSP and TouchDesigner, Focal Press, 1st ed., 2012.
3. R. Steinmetz and K. Nahrstedt, Multimedia Systems, 1st ed., 2004.
4. S. Horton, Web Development and Design Foundations with HTML5, Pearson, 8th ed., 2018.

5. R. Chopra, Computer Graphics, Multimedia and Animation, S. Chand & Company Ltd., 2nd ed., 2018.

Evaluation Pattern: 40:60

Total Marks: 50

Continuous Comprehensive Evaluation (20 Marks):

- CCE - I: 10 Marks: Activity
- CCE - II: 10 Marks: Activity
- CCE - III: 10 Marks: MCQ Test
(The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
- Question -2: Attempt any two questions.
(Three questions of 10 marks)
- Question -3: Attempt any four questions.
(Six questions of 5 marks)
- (50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: Minor (DSC) VIII

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Computer Networks (BCSET 245)

Course Objectives: Student should be able to ...

1. study the fundamental types of computer networks.
2. learn TCP/IP model merits & demerits.
3. discuss OSI model merits & demerits.
4. understand the role of various protocols in Networking

Course Outcomes: Student will be able to ...

1. use and explore the basics of Computer Networks and Various Protocols.
2. apply the World Wide Web concepts.
3. create a network and flow of information further
4. design easily the concepts of network security, Mobile Security etc.

Module	Title and Contents	Hrs
Module -1	Basic Concepts of Computer Networks 1.1 Definition, Uses of Networks, Types of Networks, 1.2 Reference Models: TCP/IP Model, The OSI Model 1.3 Comparison of the OSI and TCP/IP reference model. Architecture of Internet. 1.4 Physical Layer: Guided transmission media, Wireless transmission media, 1.5 Switching	07
Module -2	Protocols and Switching Devices 2.1 Data Link Layer - Design issues, Error Detection & Correction 2.2 Elementary Data Link Layer Protocols 2.3 Sliding window protocols 2.4 Multiple Access Protocols, 2.5 Collision free protocols 2.6 Ethernet- Physical Layer 2.7 Ethernet Mac Sub layer 2.8 Data link layer switching: Use of bridges, learning bridges, repeaters, hubs, bridges, switches, routers and gateways.	08
Module -3	Network Layer Design Concepts 3.1 Network Layer: Network Layer Design issues, store and forward packet switching 3.2 connection less and connection-oriented networks 3.3 routing algorithms-optimality principle, shortest path, flooding, Distance Vector. 3.4 Count to Infinity Problem, 3.5 Link State Routing, Path Vector, Routing, Hierarchical Routing 3.6 Congestion control algorithms 3.7 IP addresses, CIDR, Subnetting, SuperNetting 3.8 IPv4, Packet Fragmentation, IPv6 Protocol 3.9 Transition from IPv4 to IPv6, ARP, RARP.	07
Module -4	Transport Layer Protocols Overview 4.1 Transport Layer: Services provided to upper layers elements of transport protocol 4.2 addressing connection establishment, Connection release 4.3 Error Control & Flow Control, Crash Recovery. 4.4 The Internet Transport Protocols: UDP 4.5 Introduction to TCP, The TCP Service Model 4.6 Segment Header, The Connection Establishment, The TCP Connection Release,	08

4.7 The TCP Sliding Window, The TCP Congestion Control Algorithm.

Reference Books: -

1. B. Singh, Data Communications and Computer Networks, PHI Learning Pvt. Ltd., 2022.
2. R. Agrawal and B. B. Tiwari, Data Communication and Computer Networks, Vikas Publishing House, 2020.
3. B. A. Forouzan, Data Communications and Networking, McGraw-Hill Education, 2017.
4. A. Pal, Computer Networking: Principles, Protocols and Practice, PHI Learning, 2015.
5. P. C. Gupta, Data Communications and Computer Networks, PHI Learning Pvt. Ltd., 2013.

Evaluation Pattern: 40:60**Total Marks: 50****Continuous Comprehensive Evaluation (20 Marks):**

- CCE - I: 10 Marks: Activity
- CCE - II: 10 Marks: Activity
- CCE - III: 10 Marks: MCQ Test
(The Best of two will be considered for the final mark entry)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions.
(Five questions of 2 Marks)
- Question -2: Attempt any two questions.
(Three questions of 10 marks)
- Question -3: Attempt any four questions.
(Six questions of 5 marks)
(50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: Minor (DSC) P IV

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Practical X (BCSEP-246)

Course Objectives: Student should be able to ...

- 1) understanding Multimedia Fundamentals.
- 2) study multimedia integration.
- 3) discuss routing, addressing, and switching techniques effectively.
- 4) learn core data communication methods.

Course Outcomes: Student will be able to ...

- 1) use Multimedia Fundamentals
- 2) apply proficiency in Multimedia Tools and Technologies.
- 3) implement multimedia Content Creation
- 4) design Multimedia Integration and Interactivity.

Sr. No.	List of Practical (Any 15)	Hrs.
1.	Create a webpage with text, images, and a background video	60
2.	Design an image gallery with a slideshow feature	
3.	Embed and customize audio files on a webpage	
4.	Embed and enhance video playback on a webpage	
5.	Apply animation effects to text and images using CSS or JavaScript	
6.	Build an audio playlist with equalizer or visual effects	
7.	Perform basic video editing and optimization for the web	
8.	Apply CSS filters and hover effects to enhance images	
9.	Design responsive multimedia elements for different screen sizes	
10.	Add overlay captions and improve navigation using multimedia features	
11.	Study the OSI and TCP/IP Models	
12.	Demonstrate Different Types of Networks (LAN, MAN, WAN)	
13.	Study Wired and Wireless Transmission Media	
14.	Demonstrate Error Detection Techniques (Parity Bit and CRC)	
15.	Simulate the Working of ALOHA and CSMA/CD Protocols	
16.	Identify and Understand Basic Network Devices	
17.	Study Sliding Window Protocol with Animation or Coding	
18.	Study and Perform IPv4 Addressing and Subnetting	
19.	Understand the Working of TCP and UDP Protocols Using Socket Programming	
20.	Demonstrate TCP Connection Establishment and Release (3-Way Handshake)	

Reference Books: -

1. M. A. Shotton, Computer Vision for Multimedia Applications: Methods and Solutions, Academic Press, 1st ed., 2014.

2. R. Steinmetz and K. Nahrstedt, Multimedia Systems, Springer, 1st ed., 2004.
3. B. A. Forouzan, Data Communications and Networking, McGraw-Hill Education, 2017.
4. B. Singh, Data Communications and Computer Networks, PHI Learning Pvt. Ltd., 2022.
5. R. Agrawal and B. B. Tiwari, Data Communication and Computer Networks, Vikas Publishing House, 2020.

Practical Evaluation Pattern: 40:60

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal: 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE = 30 Marks



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: VSC II

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Data Analytics –II (BCSEPVSC 2)

Course Objectives: Student should be able to ...

1. study algebraic manipulation and simplification techniques to solve mathematical problems.
2. learn mathematical operations efficiently using MATLAB.
3. discuss proficiency in data import and export using R.
4. deliver basic data visualization techniques in R.

Course Outcomes: Student will be able to ...

1. use the principles behind curve fitting and how it is used to model data in MATLAB.
2. create solutions for system of linear equations by using MATLAB.
3. apply data visualizations for exploratory analysis and presentation.
4. implement statistical methods using R for data analysis.

Sr. No.	List of Practical (any 15)	Hrs.
1.	Program to create vectors and matrices by using matlab.	60
2.	Program to create Array Indexing and modification by using matlab.	
3.	Mathematical Expressions with symbolic variables by using matlab.	
4.	Program to Define and solve symbolic equation by using matlab.	
5.	Algebraic manipulation and simplification by using matlab.	
6.	Symbolic function in matlab.	
7.	Visualize symbolic function and equation by using matlab.	
8.	Numeric data type in matlab.	
9.	Calculus with symbolic maths by using matlab.	
10.	Solve a system of linear equations using MATLAB by applying matrix operations.	
11.	Program to read csv file using R.	
12.	Program to import data from excel.	
13.	Program to create function.	
14.	Program to implement If condition using R.	
15.	Program to implement if-else condition using R.	
16.	Program to implement multiple if-else.	
17.	Program to implement for loop.	
18.	Program to implement while loop.	
19.	Statistical analysis for univariate data using R.	
20.	Statistical analysis for bivariate data using R.	

Reference Books:-

1. H. Wickham, Advanced R, Chapman & Hall/CRC, 2nd ed., 2019.
2. J. Silge and D. Robinson, Text Mining with R: A Tidy Approach, O'Reilly Media, 1st ed., 2018.

3. R. Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press, 1st ed., 2020.
4. P. Patankar and S. Kulkarni, MATLAB and Simulink, BPB Publications, 1st ed., 2022.

Practical Evaluation Pattern: 40:60

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal: 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE = 30 Marks



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: SEC II

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Linux Operating System(BCSEPSEC 2)

Course Objectives: Student should be able to ...

1. study the concepts of Operating System
2. understand Linux commands.
3. learn VI editor Concepts
4. discuss Shell Programming

Course Outcomes: Student will be able to ...

1. get knowledge of Operating System.
2. use Linux Commands
3. operate VI Editor
4. implement Shell Programming.

Lab Course	List of Practical (Any 15)	Hrs.
1.	Monitoring GPU performance using Task manager	60
2.	Demonstration of GUI Linux	
3.	Study of directory management commands	
4.	Study of File management Commands	
5.	Study of basic commands of VI editor	
6.	Write a shell script to display table of given number	
7.	Write a practical on navigation commands(pwd,ls,cd)	
8.	Write a practical on file and directory manipulation commands(mkdir,rm,mv)	
9.	Write a shell script to count 1 to 10	
10.	Write a shell Script to add 2 numbers	
11.	Perform practical on Basic filters	
12.	Practical to perform chmod command	
13.	Practical on searching pattern.	
14.	Write a shell script on looping statements	
15.	Shell script on continue statement	
16.	Shell script on break statement	
17.	Write a shell script to accept file name as argument and display information about file	
18.	Perform Search and replace operation in VI editor	
19.	Case study on writing and executing shell script	
20.	Write a shell script on Conditional Statements.	

Reference Books: -

1. R. Blum and C. Bresnahan, Linux Command Line and Shell Scripting Bible, Wiley, 2020.
2. M. L. Nagaraju and R. A. Rashmi, Operating System, IPublishCentral, 2019.

3. V. Rai, Expert Linux Administration Guide, BPB Publications, 2022.
4. A. Gonzalez, Linux Server Cookbook, BPB Publications, 2022.
5. V. Rai, Linux Administration: A Beginner's Guide, BPB Publications, 2022.

Practical Evaluation Pattern: 40:60

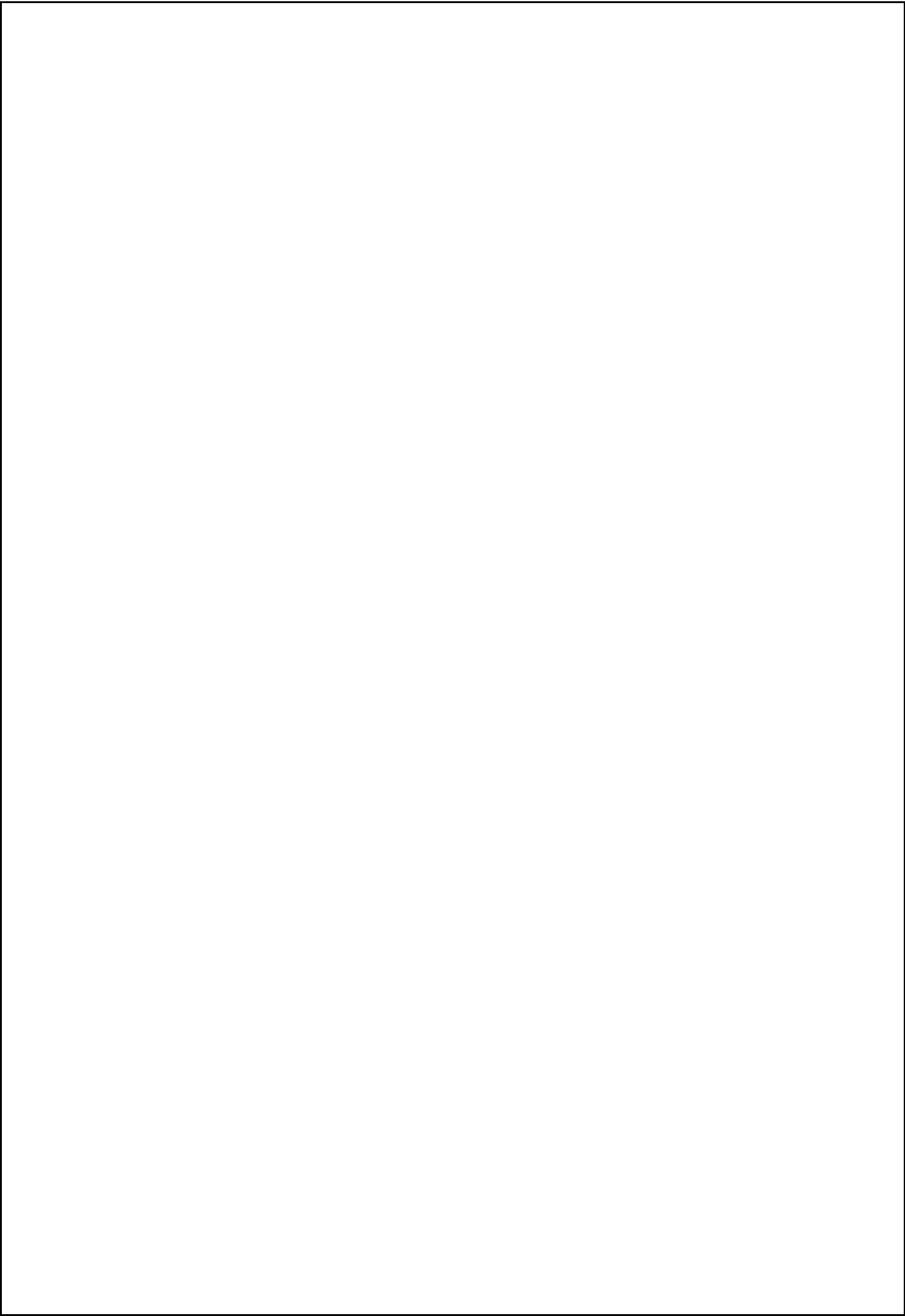
Total Marks: 50

Internal Evaluation (20 Marks):

- Journal : 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

ESE = 30 Marks





Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type : VEC II

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course and Code: Environmental Awareness for Computer Science (BCSETVEC 2)

Course Objectives: Student should be able to ...

1. study the Environmental Issues
2. understand the Role of Computer in creation of Environmental Issues.
3. learn the Sustainable development goals.
4. discuss the Computational Sustainability.

Course Outcomes: Student will be able to ...

1. apply key environmental issues such as pollution, resource depletion, and climate change, and the impact of technology on these problems.
2. use major environmental laws and ethical principles guiding sustainable development and responsible citizenship.
3. analyze the role of computer science in achieving sustainability through green IT, computational sustainability, and eco-friendly technologies.
4. describe the Sustainable Development Goals (SDGs), their structure, implementation, and challenges related to computer science.

Module	Title and Contents	Hrs
Module -1	Environmental issues	7
	1.1 Pollution and its types 1.2 Fresh-water overuse 1.3 Natural disasters 1.4 Fuel and Energy shortage due to overuse 1.5 Increase in wasteland 1.6 Biodiversity loss, Global warming and climate change (Causes and intensity of the problem) 1.7 role of Computer in creation of environmental issues	
Module -2	Environmental laws and ethics	8
	2.1 Environmental Protection Act 2.2 Wildlife Protection Act 2.3 Forest Conservation Act 2.4 Prevention and Control of Pollution Act (Air, Water, Land) 2.5 from unsustainable to sustainable development 2.6 Responsibilities of an Environmentally aware citizen	
Module -3	Sustainable Development Goals	7
	3.1 Implementation of Sustainable Development Goals 3.2 History 3.3 Structure of goals, targets and indicators 3.4 Goals with their targets and indicators 3.5 Challenges in sustainable development of goals in Environmental Awareness of Computer Science	

Module -4	Role of Computer Science (Entire) in meeting the sustainable development goals 4.1 Computational sustainability 4.2 Computational Research in Sustainability 4.3 Balancing environmental and socioeconomic needs 4.4 Biodiversity and conservation 4.5 Computational Synergies 4.6 Green IT	8
Reference Books:- 1. A. Kaushik and C. P. Kaushik, Perspectives in Environmental Studies, New Age International Publishers, 5th ed., 2016. 2. E. Bharucha, Textbook of Environmental Studies for Undergraduate Courses, Universities Press, 2nd ed., 2013. 3. R. Rajagopalan, Environmental Studies: From Crisis to Cure, Oxford University Press, 3rd ed., 2016. 4. P. D. Sharma, Ecology and Environment, Rastogi Publications, 15th ed., 2018. 5. S. P. Misra and S. N. Pandey, Essential Environmental Studies, Ane Books Pvt. Ltd., 4th ed., 2016.		
Evaluation Pattern: 40:60		
Total Marks: 50		
Continuous Comprehensive Evaluation (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test (The Best of two will be considered for the final mark entry)	End Semester Examination (50 Marks): • Question -1: Solve the following questions. (Five questions of 2 Marks) • Question -2: Attempt any two questions. (Three questions of 10 marks) • Question -3: Attempt any four questions. (Six questions of 5 marks) (50 Marks converted to 30 marks)	