



Karmaveer Bhaurao Patil University, Satara

Syllabus for
B. Sc. II Computer Science
Under
Faculty of Science and
Technology
(As per NEP 2020)

With effect from Academic Year 2025-2026

Syllabi for Bachelor of Science Computer Science Part II

PREAMBLE:

This syllabus is framed to give sound knowledge with an understanding of computer science to undergraduate students in the second year of B.Sc. degree course. It has been designed to meet the specific needs of B.Sc. Computer Science students in accordance with the NEP 2020 guidelines.

It is an integrated degree in the Faculty of Science, plays a crucial role in modern education. The rapid growth of technology makes it essential to revise the existing Computer Science syllabus. This revision is a sincere effort to move toward a knowledge-driven and technology-oriented era.

It aims to equip students with both theoretical understanding and practical skills. Students from the science faculty must become competent in adapting to technological changes. The updated syllabus focuses on developing confidence in handling computers and related tools. It enables students to write and understand programs in various programming languages. Practical exposure to computer systems and peripherals is also emphasized. The curriculum ensures a strong foundation in programming skills and problem-solving abilities. By the end of the year, students will gain confidence and competence in the field of Computer Science.

- 1. TITLE:** Computer Science
- 2. YEAR OF IMPLEMENTATION:** From 2025-2026
- 3. DURATION:** 01 year
- 4. PATTERN:** Semester
- 5. MEDIUM OF INSTRUCTION:** English
- 6. STRUCTURE OF COURSE:** (As per NEP 2020)
- 7. PRACTICAL BATCH:** 16 Students/ Batch

As per NEP 2020

Sem (Level)	Courses		OE	VSC/SEC	AEC/ VEC/ IKS	Total Credit
	DSC	DSE				
	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)	VSC I (2) (P) (Major Specific) SEC I (2) (P)	AEC I (2) (English) IKS II (2) (Major Specific)	22
Sem IV (5.0)	Major VII (2) Major VIII (2) Major P IV (2)	Major VII (2) Major VIII (2) Major P IV (2)	OE IV (2)	VSC II (2)(P) (Major Specific) SEC II (2)(P)	AEC II (2) (English) VEC II (2) (EVS)	22
Credits	12	12	04	08	08	44

8. TITLE OF THE COURSE

B. Sc. (Computer Science) Part-II

Semester III				
Sr. No.	Components	Course Code	Course	Credits
1	Major	BCST 231	Data Structure using C	02
		BCST 232	Data Communication and Computer Network	02
2	Major Practical III	BCSP 233	Lab Based on BCST 231 and BCST 232	02
3	Minor	BCST 234	Computer Organizations	02
		BCST 235	Basics of HTML	02
5	Minor Practical III	BCSP 236	Lab Based on BCST 234 and BCST 235	02
6	OE	BCSPOE III	Open Elective III	02
7	VSC	BCSPVSC I	Object Oriented Programming using C++	02
8	SEC	BCSPSEC I	System Analysis and Design	02
9	AEC I	BCSTAEC I	English I	02
10	IKS II	BCSTIKS II	History of Computers in India	02
Total				22

OE: Open Elective Course, **IKS:** Indian Knowledge System, **VSC:** Vocational Skill Course, **SEC:** Skill Enhancement Course, **AEC:** Ability Enhancement Course, **T:** Theory, **P:** Practical

Semester IV				
Sr. No.	Components	Course Code	Course	Credits
1	Major	BCST 241	Object Oriented Concept using JAVA	02
		BCST 242	Operating System	02
2	Major Practical III	BCSP 243	Lab Based on BCST 241 and BCST 242	02
3	Minor	BCST 244	Cyber Security	02
		BCST 245	Design Principles using CSS	02
5	Minor Practical III	BCSP 246	Lab Based on BCST 244 and BCST 245	02
6	OE	BCSTOE IV	Open Elective IV	02
7	VSC	BCSPVSC II	Adobe Photoshop	02
8	SEC	BCSPSEC II	XML Programming	02
9	AEC I	BCSTAEC II	English II	02
10	VEC II	BCSTVEC II	Environmental Studies	02
Total				22

OE: Open Elective Course, **IKS:** Indian Knowledge System, **VSC:** Vocational Skill Course, **SEC:** Skill Enhancement Course, **AEC:** Ability Enhancement Course, **T:** Theory, **P:** Practical

9. EVALUATION STRUCTURE:

➤ Semester III

Course	Course Category	Course Code	Internal Evaluation			ESE	Total Marks	Credits
			CCE-I	CCE-II	CCE-III			
Major	T	BCST 231	10	10	10	30	50	02
	T	BCST 232	10	10	10	30	50	02
	P	BCSP 233	20			30	50	02
Minor	T	BCST 234	10	10	10	30	50	02
	T	BCST 235	10	10	10	30	50	02
	P	BCSP 236	20			30	50	02
OE	P	BCSPOE III	20			30	50	02
VSC	P	BCSPVSC I	20			30	50	02
SEC	P	BCSPSEC I	20			30	50	02
AEC I	T	BCSTAEC I	10	10	10	30	50	02
IKS II	T	BCSTIKS II	10	10	10	30	50	02
Total							550	22

OE: Open Elective Course, **IKS:** Indian Knowledge System, **VSC:** Vocational Skill Course, **SEC:** Skill Enhancement Course, **AEC:** Ability Enhancement Course, **VEC:** Value Education Course, **T:** Theory, **P:** Practical, **CCE:** Continuous Comprehensive Exam, **ESE:** End Semester Exam

➤ Semester IV

Course	Course Category	Course Code	Internal Evaluation			ESE	Total Marks	Credits
			CCE-I	CCE-II	CCE-III			
Major	T	BCST 241	10	10	10	30	50	02
	T	BCST 242	10	10	10	30	50	02
	P	BCSP 243	20			30	50	02
Minor	T	BCST 244	10	10	10	30	50	02
	T	BCST 245	10	10	10	30	50	02
	P	BCSP 246	20			30	50	02
OE	T	BCSTOE IV	20			30	50	02
VSC	P	BCSPVSC II	20			30	50	02
SEC	P	BCSPSEC II	20			30	50	02
AEC I	T	BCSTAEC II	10	10	10	30	50	02
VEC II	T	BCSTVEC II	10	10	10	30	50	02
Total							550	22

OE: Open Elective Course, **IKS:** Indian Knowledge System, **VSC:** Vocational Skill Course, **SEC:** Skill Enhancement Course, **AEC:** Ability Enhancement Course, **VEC:** Value Education Course, **T:** Theory, **P:** Practical, **CCE:** Continuous Comprehensive Exam, **ESE:** End Semester Exam

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.

CCE: Continuous Comprehensive Exam T: Theory, P: Practical, ESE: End Semester Exam
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10. OTHER FEATURES:

A) LIBRARY:

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

B) EQUIPMENT:

1.Computer =120

Software's: -

Dev C++, Turbo C7, Oracle, JDK, Ubuntu, StarUML, Adobe Photoshop, Visual Studio, Jupyter Notebook, Scala, Tableau, Hadoop

2.LCD projector=2

3.Smart board= 5



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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: DSC (Major V)

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course and Code : Data Structure using C (BCST 231)

Course Objectives: Students Should be able to...

- 1) know the basic concepts such as Linear and Non-Linear Data structures.
- 2) learn the notations used to analyze the Performance of algorithms.
- 3) understand the behavior of data structures such as stacks queues and their representations.
- 4) study an appropriate data structure for a specified application and analyse various algorithms.

Course Outcomes: Students will be able to...

- 1) explain C Programs to implement data structure such as array, linked list, stacks, queues, trees and graphs.
- 2) utilize fundamentals of C and ability to choose appropriate data structure to represent data items in real world problems.
- 3) discuss the time and space complexities of algorithms.
- 4) demonstrate practical understanding of data communication concepts such as error detection, flow control, and transmission techniques.

Module	Title and Contents	Hrs.
Module -1:	Basic of Data Structures and Algorithms C 1.1. Data Structures Basics: Structure and Problem-Solving. 1.2. Algorithm Specification-Introduction, Performance analysis- time and space Complexity. 1.3. Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples. 1.4. Introduction to Linear and Non-Linear data structures, Applications of linear data structure (Searching & Sorting).	08
Module -2:	Stack 2.1. Introduction of stack. 2.2. Representation –static & dynamic, Operations. 2.3. Application-Infix to postfix & prefix, postfix evaluation. 2.4. Concept of Multiple stacks.	07
Module -3:	Queue 3.1. Introduction of Queue. 3.2. Representation –static & dynamic, Operations. 3.3. Circular queue, De-Queue, priority queues. 3.4. Concept of Multiple Queues.	07
Module -4:	Linked List 4.1. Introduction, Representation of linked lists in Memory, Memory allocation and	08

	Garbage collection. 4.2. Types of linked list. 4.3. Operations on singly linked list, traversing a linked list, Searching linked list. 4.4. Insertion into linked list, Deletion from a linked list.	
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Reference Books: -

- 1) S. S. Srivastava, 'Data Structures Through C in Depth', BPB Publications, 2018.
- 2) G. S. Baluja, 'Data Structures Through C', Khanna Publishers, 2017.
- 3) S. K. Srivastava and Deepali Srivastava, 'Data Structures Through C in Depth', BPB Publications, 2016.
- 4) R. S. Salaria, 'Data Structures and Algorithms Using C', Khanna Book Publishing, 2015.
- 5) A. K. Sharma, 'Data Structures Using C', Pearson Education India, 2014.

Evaluation Pattern: 40:60

Total Marks: 50

Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks • CCE - II: 10 Marks • CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (50 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 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 : DSC (Major VI)

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course and Code: Data Communication and Computer Network (BCST 232)

Course Objectives: Students Should be able to...

- 1) describe the fundamental concepts of data communication, including transmission media
- 2) know the architecture, components, and operations of computer networks.
- 3) learn the layered approach to network design (OSI and TCP/IP models).
- 4) understand network security, congestion control, and wireless networking principles.

Course Outcomes: Students will be able to...

- 1) illustrate the basic concepts of data communication and networking, including types of networks
- 2) design the functions and services of each layer in the OSI and TCP/IP reference models.
- 3) discuss and evaluate various data encoding, error detection, and correction techniques.
- 4) explain knowledge of switching techniques, routing algorithms.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Data Communication and Networks 1.1 Basics of Data Communication. 1.2 Components and Types of Networks (LAN, MAN, WAN), Network Topologies. 1.3 OSI and TCP/IP Reference Models, Networking Devices (Hub, Switch, Router). 1.4 Transmission Modes (Simplex, Half Duplex, Full Duplex).	08
Module -2:	Physical and Data Link Layers 2.1 Transmission Media: Wired & Wireless, Analog vs Digital Transmission. 2.2 Multiplexing: FDM, TDM, WDM, Error Detection and Correction (Parity, CRC, Checksum). 2.3 Flow Control and Error Control Techniques, Data Link Layer Protocols, HDLC, PPP. 2.4 MAC Protocols: CSMA/CD, CSMA/CA.	07
Module -3:	Network and Transport Layers 3.1 Logical Addressing: IPv4 & IPv6, Subnetting and Super netting. 3.2 Routing Concepts and Algorithms (Distance Vector, Link State). 3.3 Protocols: IP, ICMP, ARP, RARP, TCP vs UDP. 3.4 Connection Management and Congestion Control.	07
Module -4:	Application Layer and Network Security 4.1. Application Layer Protocols: DNS, FTP, HTTP, SMTP, POP3. 4.2. Client-Server and Peer-to-Peer Models, Basics of Network Security. 4.3. Encryption, Firewalls, VPNs. 4.4. Introduction to Cloud and Wireless networks.	08

Reference Books: -

- 1) B. A. Forouzan and S. C. Fegan, 'Data Communications and Networking', McGraw Hill Education, 2023.

- 2) P. C. Gupta, 'Data Communication and Computer Networks', PHI Learning, 2022.
- 3) N. S. Gill, 'Data Communication and Computer Networks', Khanna Book Publishing, 2021.
- 4) Achyut S. Godbole and Atul Kahate, 'Data Communications and Networks', McGraw Hill Education, 2020.
- 5) A. S. Tanenbaum and David J. Wetherall, 'Computer Networks', Pearson Education, 2019.

Evaluation Pattern: 40:60

Total Marks: 50

Internal Continuous Evaluation (20 Marks):

- CCE - I: 10 Marks
 - CCE - II: 10 Marks
 - CCE - III: 10 Marks
- (Best of 2 from CCE I, II & III Selected for final Score)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions (5 questions of 2 Marks)
- Question - 2: Attempt any two (3 questions of 10 marks)
- Question – 3: Attempt any four (6 questions of 05 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: DSC P III (Major)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Practicals based on theory paper BCST231 & BCST 232 (BCSP 233)

Course Objectives: Students Should be able to...

- 1) study the basic concepts of data structures and computer networks.
- 2) describe C programs to implement different data structures.
- 3) know basic networking configuration and communication tasks.
- 4) learn problem-solving skills using data structures and networking concepts.

Course Outcomes: Students will be able to...

- 1) utilize basic data structures using C programming.
- 2) apply searching and sorting techniques to solve problems.
- 3) demonstrate and test basic computer network connections.
- 4) illustrate networking tools to analyze and troubleshoot networks.

Sr. No.	Content (Any 15 of the following)	Hrs.
1	Write a linear searching algorithm with example.	60
2	Write a binary searching algorithm with example.	
3	Write a Bubble sort, Insertion sort, selection sort algorithm with example.	
4	Problems with Big O notations omega notations, Theta notations	
5	STACK Implementation using Array with PUSH, POP, and display Operations.	
6	STACK Implementation using Link list with PUSH, POP, and display Operations	
7	Perform Queues operations using simple Array implementation. Use Templates.	
8	Perform Queues operations using link list implementation. Use Templates	
9	Create and perform different operations on Double-ended Queues using array implementation.	
10	Create and perform different operations on Double-ended Queues using Linked List implementation.	
11	Study of Networking Devices – Identify and understand routers, switches, hubs, bridges, and modems	
12	IP Address Configuration – Assign static and dynamic IPs to computers.	
13	Networking Commands – Use commands like ping, ipconfig, tracert, lookup, netstat, etc.	
14	Network Topology Setup (Simulation) – Create star, bus, and ring topologies using tools like Cisco Packet Tracer or GNS3.	
15	Calculate and create subnets from given IPs.	
16	Static & Dynamic Routing – Setup static routing in Cisco Packet Tracer; observe dynamic routing with RIP or OSPF	
17	Stop-and-Wait Protocol Simulation – Simple implementation to show flow control.	

18	File Transfer using FTP – Setup an FTP server and connect clients to transfer files.	
19	Network Security Tools – Introduction to tools like Nmap, Wireshark, or Cain & Abel for ethical learning.	
20	Web Server Configuration – Setup Apache or Nginx server to host a website.	
Reference Books: - 1) R. S. Salaria, 'Data Structures and Algorithms Using C', Khanna Book Publishing, 2015. 2) A. K. Sharma, 'Data Structures Using C', Pearson Education India, 2014. 3) S. K. Bose, 'Computer Networks', PHI Learning, 2007. 4) K. S. Easwarakumar and S. R. K. Rao, 'Computer Networks', Pearson Education, 2006. 5) A. S. Tanenbaum, 'Computer Networks', Pearson Education, 2003.		
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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Board of Studies in Computer Science

Programme: B.Sc.

Semester - III

Type: DSE (Minor V)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Computer Organizations (BCST234)

Course Objectives: Students Should be able to...

- 1) understand basic concepts and terminology of computers.
- 2) study operate desktop computers to carry out computational tasks.
- 3) describe working of Hardware and Software and the importance of operating systems.
- 4) know programming languages, number systems, peripheral devices, networking, multimedia and internet concepts.

Course Outcomes: Students will be able to...

- 1) design the basic concepts of computer organization, architecture, and functional units of a computer system.
- 2) discuss the organization and operation of CPU, memory hierarchy, and input/output systems.
- 3) explain knowledge of instruction sets, addressing modes, and processor organization.
- 4) utilize arithmetic operations, control unit design, and techniques for improving computer performance.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Computer Architecture 1.1.Basic Computer Components: CPU, Memory, I/O devices, Basic functions of each component. 1.2.Simple Block Diagram: How data flows within a computer system, Relationship between CPU, Memory, and I/O devices. 1.3.Computer Generations: A brief overview of the history. 1.4.Evolution of computers.	08
Module -2:	Memory Organization 2.1.Basics: Types of memory: RAM, ROM, Cache Memory hierarchy: From Registers to Hard Disk. 2.2.Cache Memory: What is cache memory and why is it used? Simple explanation of cache hit/miss. 2.3.Simple Memory Structure: How memory is organized in a computer system. 2.4.Addressing in memory (Direct and Indirect addressing).	07
Module -3:	CPU Organization 3.1. CPU Components: Basic parts of the CPU: ALU (Arithmetic and Logic Unit), Control Unit, Registers, The role of the ALU in processing data. 3.2. Instruction Cycle: The Fetch-Decode-Execute cycle, A simple overview of how instructions are processed step by step. 3.3. Registers: What are registers? 3.4. Purpose of general-purpose and special-purpose registers.	07

Module -4:	Input/output Organization 4.1. Basic I/O Devices: Common input devices (keyboard, mouse) and output devices (monitor, printer). 4.2. I/O Operations: Basic I/O operations: Input, Output, and the role of the CPU. 4.3. I/O Interface. 4.4. How the CPU interacts with I/O devices via ports and buses.	08
Reference Books: - 1) I. Singh, 'Computer Organization and Architecture', Khanna Publishing House, 2024. 2) V. Keshari, 'Computer Organization', S. K. Kataria & Sons, 2024. 3) V. Rajaraman, T. Radhakrishnan, 'Computer Organization and Architecture', PHI Learning, 2024. 4) S. Yadav, M. Mehta, 'Computer System Organization', AICTE, 2024. 5) A. P. Godse, D. A. Godse, 'Computer Organization and Architecture', Technical Publications, 2021.		
Evaluation Pattern: 40:60		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks • CCE - II: 10 Marks • CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (50 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 marks) (50 Marks converted to 30 marks)	



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Board of Studies in Computer Science

Programme: B.Sc.

Semester - III

Type: DSE (Minor VI)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Basics of HTML (BCST 235)

Course Objectives: Students Should be able to...

- 1) learn HTML structure and syntax.
- 2) understand responsive and accessible web designs.
- 3) study text, images, links, lists, and tables.
- 4) describe simple forms and apply attributes.

Course Outcomes: Students will be able to...

- 1) design basic web pages using HTML elements and tags.
- 2) utilize web pages with text, images, tables, and hyperlinks.
- 3) apply HTML forms using various input controls.
- 4) demonstrate simple, well-structured, and user-friendly web pages following HTML standards.

Module	Title and Contents	Hrs.
Module -1:	Introduction to HTML 1.1 Definition and purpose of HTML, Evolution of HTML versions Setting up a development environment (text editor, browser). 1.2 HTML Documents, Basic structure of an HTML document. 1.3 Common HTML Tags, HTML Tags, formatting tags, Creating an HTML Document. 1.4 Applications of HTML, Features and Limitations of HTML.	08
Module -2:	Exploring HTML Elements and Functions 2.1. Golden rules of web designing, Introduction to elements HTML, Working with Text. 2.2. HTML comments. Working with Lists, Tables & Frames. 2.3. Formatting tables using colspan , row span. 2.4. Linking to external resources (images, CSS files, other web pages).	07
Module -3:	HTML Functions 3.1 Working with Hyperlinks, Images and Multimedia. 3.2 Text formatting and structuring. 3.2 Forms and controls. 3.4 HTML styles.	07
Module -4:	HTML Integration 4.1 Inline CSS Internal vs external CSS. 4.2 Use of alt, label and aria attributes. 4.3 Using UTF-8-character encoding. 4.4 Design a multi-page responsive HTML website.	08

Reference Books: -

- 1) P. Gupta, 'Computer Applications: Textbook for Class X', BPB Publications, 2021.
- 2) S. Jain, M. G. Iyer, 'Web Designing and Publishing', BPB Publications, 2020.
- 3) A. Sinha, R. Battewad, A. Ranjan, 'JavaScript for Modern Web Development', BPB Publications, 2020.
- 4) I. Bayross, 'Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP', BPB Publications, 2018.
- 5) R. Chopra, 'Web Engineering', PHI Learning, 2016.

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

- CCE - I: 10 Marks
- CCE - II: 10 Marks
- CCE - III: 10 Marks

(Best of 2 from CCE I, II & III Selected for final Score)

End Semester Examination (50 Marks):

- Question -1: Solve the following questions (5 questions of 2 Marks)
- Question - 2: Attempt any two (3 questions of 10 marks)
- Question – 3: Attempt any four (6 questions of 05 marks)
(50 Marks converted to 30 marks)



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Programme: B.Sc.

Semester - III

Type: DSE P III (Minor)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Practicals based on theory paper BCST234 & BCST 235 (BCSP 236)

Course Objectives: Students Should be able to...

- 1) know the structure and syntax of HTML to build basic web pages.
- 2) learn HTML tags to format text, add images, links, lists, tables, and forms.
- 3) understand simple static web pages using proper coding practices.
- 4) study the basic structure and functional units of a computer system.

Course Outcomes: Students will be able to...

- 1) illustrate the basic structure and syntax of HTML.
- 2) design standard HTML tags to design simple web pages.
- 3) discuss binary arithmetic and understand number systems.
- 4) explain memory hierarchy and input/output operations.

Sr. No.	Content (Any 15 of the following)	Hrs.
1	Demonstrate data flow between CPU, Memory, and I/O.	60
2	Create a visual/electronic chart of the 1st to 5th generations of computers.	
3	Illustrate and explain Register → Cache → RAM → Disk.	
4	Simulate how cache works using a simple C or Python program.	
5	Write small assembly-style code snippets to demonstrate addressing.	
6	Animate the Fetch-Decode-Execute process.	
7	Create a simple 4-bit ALU (addition and subtraction only).	
8	Simulate data transfer between registers.	
9	Prepare a chart showing input and output devices with specs.	
10	Demonstrate simple CPU to I/O data transfer using simulated ports.	
11	Create a basic HTML document with appropriate structure(DOCTYPE, html, head, body).	
12	Use HTML tags to create headings (h1-h6) and paragraphs.	
13	Add line breaks and horizontal rules to separate content on webpage.	
14	Insert images into your HTML document using the img tag.	
15	Create hyperlinks (both absolute and relative paths) to link to other web pages.	
16	Design a table that displays student information: Name, Roll Number, and Grade for at least 5 students.	
17	Create ordered and unordered lists with list items.	
18	Design a table with rows and columns, and apply colspan and row span attributes.	
19	Create an HTML page that embeds a video (e.g., an MP4 file) and an audio clip (e.g., MP3 file) with control options.	

20	Create a static website.	
Reference Books: - 1) A. P. Godse, D. A. Godse, 'Computer Organization and Architecture', Technical Publications, 2021. 2) S. R. Sarangi, 'Computer Organisation and Architecture', McGraw Hill Education, 2013. 3) P. N. Basu, 'Computer Organization and Architecture', Vikas Publishing House, 2012. 4) K. L. James, 'The Internet: A User Guide', PHI Learning, 2010. 5) S. K. Bajpai, 'Internet and Web Technology', S. K. Kataria & Sons, 2008.		
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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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: Object Oriented Programming using C++
(BCSPVSC I)

Course Objectives: Students Should be able to...

- 1) describe the basic concepts of object-oriented programming using C++.
- 2) know C++ programs using classes, objects, and inheritance.
- 3) learn object-oriented concepts to solve programming problems.
- 4) understand coding, debugging, and program testing skills.

Course Outcomes: Students will be able to...

- 1) utilize C++ programs using object-oriented programming concepts.
- 2) apply classes, objects, inheritance, and polymorphism in applications.
- 3) demonstrate file handling and exception handling in C++ program.
- 4) explain debug, test, and improve the performance of C++ programs.

Sr. No.	Content	Hrs.
1	Write a C++ program to demonstrate the use of various data types and identifiers.	60
2	Create a C++ program to perform basic arithmetic operations.	
3	Implement a C++ program to find the factorial of a given number.	
4	Implement a C++ program to display the Fibonacci series up to a given limit using do-while loop.	
5	Develop a program to check whether a given number is a prime number or not using for loop.	
6	Implement a program to display the pattern.	
7	Implement a C++ program to demonstrate class and objects.	
8	Write a C++ program for swapping two numbers.	
9	Implement operator overloading in C++.	
10	Write a C++ program to demonstrate the use of constructors (default, parameterized, copy) and destructors in a class	
11	Write a program to demonstrate the concept of inheritance with a base class "Shape" and derived classes (Rectangle, Circle) to calculate area and perimeter.	
12	Develop a class "Employee" with static data members (employee count, total salary) and static member functions to display employee details and average salary.	
13	Write a C++ program to implement abstraction.	
14	Write a C++ program to implement Polymorphism.	
15	Implement a C++ program to read and write data to a file using file handling techniques.	

Reference Books: -

- 1) N. P. Gopalan, B. Sivaselvan, C. Mala, 'Object-Oriented Programming Using C++', PHI Learning, 2011.

- 2) M. T. Somashekara, D. S. Guru, H. S. Nagendraswamy, K. S. Manjunatha, 'Object-Oriented Programming with C++', PHI Learning, 2010.
- 3) D. Jana, 'C++ and Object-Oriented Programming Paradigm', PHI Learning, 2010.
- 4) P. Sarang, 'Object-Oriented Programming with C++', PHI Learning, 2009.
- 5) D. Samanta, 'Object-Oriented Programming with C++ and Java', PHI Learning, 2008.

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: System Analysis and Design (BCSPSEC I)

Course Objectives: Students Should be able to...

- 1) know the ability to analyze user requirements for system development.
- 2) learn system models using tools like DFD and UML diagrams.
- 3) understand structured and object-oriented approaches in system design.
- 4) study and practice system documentation and reporting.

Course Outcomes: Students will be able to...

- 1) illustrate real-world problem-solving skills by modeling user and system interactions.
- 2) design business requirements into technical specifications through system design tools
- 3) create and interpret Data Flow Diagrams (DFD) and UML diagrams for system analysis.
- 4) apply clear, precise system documentation to support maintenance and future development.

Sr. No.	Content	Hrs.
1	Preparing Software Requirements Specifications.	60
2	Identifying Domain Classes from the Problem Statements.	
3	Modeling UML Class Diagrams and Sequence diagrams.	
4	Modeling UML Use Case Diagrams and Capturing Use Case Scenarios.	
5	E-R Modeling and State chart and Activity Modeling.	
6	Modeling Data Flow Diagrams.	
7	Estimating size, effort, cost, time, and resources for a project.	
8	Estimation of Test Coverage Metrics and Structural Complexity.	
9	Conduct unit tests for the implemented system modules.	
10	Create a detailed SRS document including functional and non- functional requirements.	
11	Create an interface to connect and enable communication between two different systems.	
12	Draw a context-level (Level 0) DFD and add more detail and draw a level1 DFD for your system.	
13	Draw an Entity Relationship Diagram using basic symbols.	
14	Design a sample login or data entry form and also design a simple report format (Input and Output design)	
15	Create a small user manual with steps to use the system.	

Reference Books: -

- 1) V. K. Jain, 'System Analysis and Design', Dreamtech Press, 2008.
- 2) S. Mohapatra, 'Management Information Systems', PHI Learning, 2007.
- 3) S. K. Gupta, 'System Analysis and Design', Laxmi Publications, 2006.

- 4) D. Roy Choudhury, 'Systems Analysis and Design', New Age International, 2005.
- 5) M. K. Roy, 'System Analysis and Design', Tata McGraw-Hill, 2004.

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

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 BCSTIKS II

Course Objectives: Students Should be able to...

- 1) describe design for a steam-powered, mechanical computer.
- 2) know digital computing replaced analog methods.
- 3) learn the evolution of Indian programming languages.
- 4) understand the story behind the modern computing.

Course Outcomes: Students will be able to...

- 1) design for a steam-powered mechanical computer.
- 2) evaluate digital computing replaced analog methods.
- 3) discuss the knowledge about evolution of Indian programming languages.
- 4) demonstrate the story behind modern computing.

Module	Title and Contents	Hrs.
Module -1:	Pre-Independence Era of Computers 1.1.Introduction: Computing in the pre-Independence world. 1.2.Establishment of the TATA Institute of Fundamental Research. 1.3.Analog Computing in the 19 th and early 20 th . 1.4.Introduction of electronic computers in India, Information Technology before 1945.	08
Module -2:	Early Computing Initiative 2.1. Development of the first indigenous electronics computer: HEC-2M. 2.2.Role of F.C.kohli in setting up the first computer manufacturing company in India. 2.3. Computers and culture in the 1960s. 2.4.Early Computer languages and software.	07
Module -3:	Era of Mainframes and Minicomputers 3.1.Introduction of mainframe and minicomputer technologies in India. 3.2.Role of Department of Electronics (DoE) in prompting computerization. 3.3.Evaluation of Indian programming languages 3.4.(FORTRAN, COBOL). 3.5.Growth of Computer Centers and Data Processing in India.	07
Module -4:	Modern Computing 4.1.Emergence of Indian IT companies and software exports. 4.2.Role of NRIs in the growth of Indian IT industry, Internet and Digital Revolution. 4.3.Mobile Computing and smartphone Revolution in India. 4.4.Artificial Intelligence (AI) and Machine Learning (ML) in Indian industries.	08

Reference Books: -

- 1) D. C. Sharma, 'The Outsourcer: The Story of India's IT Revolution', MIT Press, 2015.
- 2) V. Rajaraman, 'History of Computing in India: 1955–2010', Supercomputer Education and Research Centre, Indian Institute of Science, 2012.
- 3) R. K. Shyamasundar, M. A. Pai, 'Homi Bhabha and the Computer Revolution', Oxford University Press, 2011.
- 4) R. Subramanian, 'India and Information Technology: A Historical and Critical Perspective', Idea Group Publishing, 2006.
- 5) V. Rajaraman, 'Information Technology in India: A Retrospective (1965–1999)', Tata McGraw-Hill, 2000.

Evaluation Pattern: 40:60**Total Marks: 50**

Internal Continuous Evaluation (20 Marks):	End Semester Examination (50 Marks):
• CCE - I: 10 Marks • CCE - II: 10 Marks • CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	• Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 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

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: DSC (Major VII)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Object Oriented Concept Using Java (BCST 241)

Course Objectives: Students will be able to...

- 1) study Object Oriented Programming language.
- 2) describe the analytical skills of object-oriented programming.
- 3) know abnormal termination of a program using exception handling.
- 4) learn the principles of the applets and its GUI programming.

Course Outcomes: Students Should be able to...

- 1) demonstrate professionally acceptable coding and performance standard.
- 2) explain the basic principles of the object-oriented programming.
- 3) utilize an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.
- 4) design and implement GUI-based and event-driven applications using Java libraries.

Module	Title and Contents	Hrs.
Module -1:	Introduction To Java, Objects and Classes 1.1 Introduction to object-oriented programming. 1.2 Basic concepts of OOP (Object, class, inheritance, polymorphism etc.) Advantages of OOP over Procedure oriented programming. 1.3 History and features of Java Programming, Java Environment, Java tokens, constants, variables, data types, type casting, Operators and Expressions. 1.4 Implementing Java Program, Branching and looping statements, Class, objects, methods, Constructors and destructor.	09
Module -2:	Inheritance, Polymorphism and Packages 2.1 Defining sub class, subclass constructor, Inheritance- Multiple and hierarchical. 2.2 Defining packages, system packages, Creating & accessing Packages, Adding a class to package. 2.3 Polymorphism- function overloading and over ridding. 2.4 Difference between method overloading and overriding	07
Module -3:	Multithreading and Exception Handling 3.1 Concept of thread, Life cycle of thread, creating threads, extending a thread 3.2 Class- declaring the class, run () method, Stopping and blocking threads, Using thread method, Thread priority. 3.3 Introduction to exception, Syntax of exception handling 3.4 Examples of exception handling	08

Module -4:	AWT and Event Handling 4.1 Introduction to Abstract Window Toolkit (AWT) 4.2 Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames. 4.3 Layout Managers: Flow Layout. 4.4 Border Layout, Grid Layout	06
Reference Books: - 1) P. Gupta, 'Object Oriented Programming with Java', Iterative International Publishers, 2022. 2) E. Balagurusamy, 'Programming with Java', McGraw Hill Education, 2021. 3) M. T. Savaliya, 'Object-Oriented Programming with Java', BPB Publications, 2020. 4) E. Balagurusamy, 'Programming with Java', McGraw Hill Education, 2019. 5) R. Nageswara Rao, 'Core Java: An Integrated Approach', Dreamtech Press, 2018.		
Evaluation Pattern: 40:60		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks • CCE - II: 10 Marks • CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (50 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 marks) (50 Marks converted to 30 marks)	



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Faculty of Science and Technology

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester – IV

Type: DSC (Major VIII)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Operating System (BCST 242)

Course Objectives: Students Should be able to...

- 1) understand brief about OS organization.
- 2) study memory management technique.
- 3) describe Shell operating system.
- 4) know the basic organization of operating system.

Course Outcomes: Students will be able to...

- 1) discuss the fundamentals of operating system and its types.
- 2) design the basic Operating System Organization.
- 3) apply the process & memory management in Operating System.
- 4) demonstrate programs using a Shell Scripting.

Module	Title and Contents	Hrs.
Module -1:	Fundamental Concepts 1.1 System Software Resource Abstraction, OS strategies. 1.2 Types of operating systems –Windows, Linux/Ubuntu. 1.3 Multiprogramming, Batch, Time Sharing, Single user and Multiuser. 1.4 Process Control & Real Time Systems.	08
Module -2:	Operating System Organization 2.1 Factors in operating system design 2.2 Basic OS functions, implementation consideration. 2.3 Process modes, methods of requesting system services – system calls. 2.4 System programs.	07
Module -3:	Process Management and Memory Management 3.1. System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy, Thread model. 3.2. Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies. 3.3. Mapping address space to memory space, paging virtual memory. 3.4. Memory allocation strategies, fixed partition, variable partition.	08
Module -4:	Shell introduction and Shell Scripting 4.1 What is shell and various type of shell, Various editors present in Linux. 4.2 Different modes of operation in vi editor, what is shell script, Writing and	07

	executing the shell script, Shell variable (user defined and system variables) 4.3 System calls, Using system calls, Pipes and Filters. 4.4 Decision making in Shell Scripts (If else, switch), Loops in shell, Functions, Utility programs (cut, paste, join, tr, unique utilities), Pattern matching utility (grep).	
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Reference Books: -

- 1) R. Barona, S. Umamaheswari, A. Shobana, 'Operating Systems', Sri Krishna Hitech Publishing Company Pvt. Ltd., 2024.
- 2) I. A. Dhotre, 'Operating Systems', Technical Publications, 2018.
- 3) R. Ruhin Kouser, 'Operating Systems', Suchitra Publications, 2018.
- 4) R. Rajiv Chopra, 'Operating Systems: A Practical Approach', S. Chand Publishing, 2016.
- 5) N. Jayaprakash, 'Operating Systems', Anuradha Publications, 2019.

Evaluation Pattern: 40:60

Total Marks: 50

Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks • CCE - II: 10 Marks • CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (50 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 marks) (50 Marks converted to 30 marks)
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Karmaveer Bhaurao Patil University, Satara

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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 - IV

Type: DSCP IV (Major)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Practicals based on theory paper BCST241 & BCST 242 (BCSP 243)

Course Objectives: Students Should be able to...

- 1) learn Object Oriented Programming language.
- 2) understand the analytical skills of object-oriented programming.
- 3) study abnormal termination of a program using exception handling.
- 4) describe Shell operating system and memory management techniques.

Course Outcomes: Students will be able to...

- 1) demonstrate graphical user interfaces, multithreaded programming, and event-driven programming.
- 2) explain the basic principles of the object-oriented programming
- 3) utilize professionally acceptable coding and performance standard.
- 4) apply the process & memory management in Operating System and the basic Operating System organization.

Sr. No.	Content	Hrs.
1	Program to define a structure of a basic JAVA program.	60
2	Program to define the data types, variable and operator.	
3	Program to define the arrays and decision making and loop statements.	
4	Program to define the Jump statements and type casting.	
5	Program to define class and constructors. Demonstrate constructors.	
6	Program to define class and inheritance. Demonstrate simple inheritance.	
7	Program to define class and inheritance. Demonstrate multilevel inheritance.	
8	Program to define class and inheritance. Demonstrate hierarchical inheritance.	
9	Program to define class, methods, and objects. Demonstrate method overloading.	
10	Program to define inheritance and show method overriding, demonstrate user define Packages and API Packages, demonstrate Applet structure and event handling.	
11	Write a program to check status of keyboard using interrupt handler	
12	Write a program to implement copy command of DOS, Program to display date and time of system.	
13	Write a program to implement pwd and wc command of linux.	
14	Usage of following commands: ls, pwd, tty, cat, who, who am I, rm mkdir, rmdir, touch, cd.	
15	Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date.	

Reference Books: -

- 1) D. M. Dhamdhare, 'Operating Systems: A Concept-Based Approach', McGraw-Hill Education, 2012.
- 2) A. S. Godbole, 'Operating Systems', Tata McGraw-Hill, 2012.

- 3) H. M. Pandey, 'Java Programming', Pearson Education, 2011.
- 4) C. Xavier, 'Java Programming: A Practical Approach', Tata McGraw-Hill, 2011.
- 5) P. R. Krishna, 'Object-Oriented Programming Through Java', Universities Press, 2008.

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

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester - IV

Type: DSE (Minor VII)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Cyber Security (BCST 244)

Course Objectives: Students Should be able to...

- 1) know the fundamental concepts, principles, and importance of cyber security in protecting digital systems and information.
- 2) learn cyber laws, ethical hacking principles, digital forensics, and incident response strategies.
- 3) understand knowledge of authentication, access control, cryptography, network security, and secure communication techniques.
- 4) study cyber security concepts and best practices to identify, prevent, and mitigate security risks in real-world scenarios.

Course Outcomes: Students will be able to...

- 1) explain the fundamentals of cyber security, cyber threats, vulnerabilities, and security principles.
- 2) demonstrate different types of cyber-attacks and implement appropriate security measures to protect systems and networks.
- 3) illustrate cryptographic techniques, authentication methods, and access control mechanisms to secure information.
- 4) design knowledge of network security tools, ethical hacking concepts, malware protection, and digital forensics.

Module	Title and Contents	Hrs.
Module -1:	Operating System Organization 1.1 Basics of Cyber security. 1.2 Importance of Cyber security, Cyber security Fundamentals. 1.3 Types of Cyber Attacks. 1.4 Security vulnerabilities, threats and attacks, Types of Active attacks, Types of Passive attacks.	08
Module -1:	Cyberspace and the Law & Cyber Forensics 2.1 Introduction, Cyber Security Regulations, The INDIAN Cyberspace. 2.2 National Cyber Security Policy. 2.3 Digital Forensics Science, Forensics Analysis of Email, Digital Forensics Lifecycle. 2.4 Challenges in Computer Forensics.	07
Module -3:	Database Security 3.1 Introduction to Database Security, Authentication and Authorization. 3.2 Database Encryption. 3.3 Auditing and Monitoring. 3.4 Database Security in Cloud Environments.	07

Module -4:	Internet and Web Application Security 4.1 Web Security: Web authentication, Injection Flaws, SQL Injection. 4.2 Web Browser Security. 4.3 E-Commerce Security. 4.4 Web Application Firewalls (WAF).	08
Reference Books: - 1) P. K. Tripathi, N. K. Tiwari, 'Cyber Security', S. K. Kataria & Sons, 2024. 2) N. Dutta, N. Jadav, S. Tanwar, H. K. D. Sarma, 'Cyber Security: Issues and Current Trends', Springer, 2022. 3) N. Jain, R. Menon, 'Cyber Security and Cyber Laws', Wiley India, 2020. 4) S. K. Shukla, M. Agrawal, 'Cyber Security in India: Education, Research and Training', Springer Singapore, 2020. 5) O. N. Pandey, B. Aneja, N. Pandey, 'Cyber Security', S. K. Kataria & Sons, 2015.		
Evaluation Pattern: 40:60		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): - CCE - I: 10 Marks - CCE - II: 10 Marks - CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (50 Marks): - Question -1: Solve the following questions (5 questions of 2 Marks) - Question - 2: Attempt any two (3 questions of 10 marks) - Question – 3: Attempt any four (6 questions of 05 marks) (50 Marks converted to 30 marks)	



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Faculty of Science And Technology

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc.

Semester - IV

Type: DSE (Minor VIII)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Design Principle using CSS (BCST 245)

Course Objectives: Students Should be able to...

- 1) describe core CSS layout and styling concepts.
- 2) know design principles using CSS.
- 3) learn responsive and accessible web designs
- 4) understand dynamic websites.

Course Outcomes: Students will be able to...

- 1) discuss the role of CSS in separating structure and presentation in web design.
- 2) apply appropriate CSS selectors and properties to style HTML elements in alignment with design principles.
- 3) discuss aesthetically pleasing and user-friendly web pages using CSS box model, and layout techniques.
- 4) demonstrate responsive designs that adapt to various screen sizes using CSS media queries and flexible units.

Module	Title and Contents	Hrs.
Module -1:	Introduction to CSS and Web Design 1.1 History and Evolution of CSS, Role of CSS in Web Development. 1.2 Basic Syntax and Structure of CSS, Integrating CSS with HTML. 1.3 Inspecting and Editing CSS in Browsers. 1.4 Adding CSS in HTML.	08
Module -2:	Selectors 2.1 Introduction of selectors. 2.2 Types of Selectors. 2.3 CSS Elements Used in Web Design. 2.4 Web Styling with CSS.	07
Module -3:	CSS Box Model 3.1 Introduction to Box model. 3.2 Images and Background. 3.3 Display and Position, Colors, Fonts, lists and Tables. 3.4 Pseudo-classes and Combinators, Debugging and Dev tools, Flexbox and grid..	07
Module -4:	CSS Flexbox and Grid 4.1 Introduction, Flex Container, Flex Items, Responsive Flexbox. 4.2 Grid Introduction. 4.3 Grid Columns, Rows and Gaps. 4.4 Grid Container, Grid Item.	08

Reference Books: -

- 1) A. Antony Prakash, 'HTML and CSS', Nex Gen Publication, 2022.
- 2) S. Jain, A. K. Rai, M. Geetha, 'Web Designing and Development', BPB Publications, 2021.
- 3) H. Bhardwaj, 'Web Designing', Mudranik Technologies Pvt. Ltd., 2018.
- 4) C. Xavier, 'Web Technology and Design', New Age International, 2018.
- 5) R. Bangia, 'Learning Web Designing', Khanna Book Publishing, 2017.

Evaluation Pattern: 40:60**Total Marks: 50**

Internal Continuous Evaluation (20 Marks):	End Semester Examination (50 Marks):
• CCE - I: 10 Marks • CCE - II: 10 Marks • CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	• Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 marks) (50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

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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 - IV

Type: DSEP IV (Minor)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course and Code: Practicals based on theory paper BCST244 & BCST 245 (BCSP 246)

Course Objectives: Students Should be able to...

- 1) study and comprehend various types of cyber threats and attacks.
- 2) describe with cyber laws, regulations, and ethical considerations.
- 3) know responsive and accessible web designs
- 4) learn dynamic websites.

Course Outcomes: Students will be able to...

- 1) illustrate about common network attacks.
- 2) design web application attacks and vulnerabilities.
- 3) discuss aesthetically pleasing and user-friendly web pages using CSS box model, and layout techniques.
- 4) explain responsive designs that adapt to various screen sizes using CSS media queries and flexible units.

Sr. No.	Content	Hrs.
1	Study of the features of firewall in providing network security and to set Firewall Security in windows.	60
2	Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome).	
3	Study of different types of vulnerabilities for hacking a websites / Web Applications.	
4	Case Study On basic technology in cyber security.	
5	Analysis the security vulnerabilities of Email application.	
6	Perform encryption and decryption of Caesar cipher Write a script for performing these operations.	
7	Case Study on – Cyber Law.	
8	Case Study on – Cyber Harassment.	
9	Case Study on – Patent Law.	
10	Case Study on – Confidentiality, integrity, and availability (CIA triad).	
11	Write a program on basic CSS Styling.	
12	Inspecting and Editing CSS.	
13	Build structured layouts with CSS Grid.	
14	Apply CSS rules to specific HTML elements using various selectors.	
15	Design a simple webpage layout with CSS.	

Reference Books: -

- 1) N. Godbole, S. Belapure, 'Cyber Security', Wiley India, 2011.
- 2) D. N. Shah, 'Information Security Principles and Practice', Wiley India, 2009.

- 3) N. Godbole, 'Information Systems Security', Wiley India, 2008.
- 4) R. Bangia, 'Web Technology (including HTML, CSS, XML, ASP, JAVA)', Firewall Media, 2008.
- 5) P. Pandey, R. Pandey, 'Web Designing', S. K. Kataria & Sons, 2007.

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

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: Adobe Photoshop (BCSPVSC II)

Course Objectives: Students Should be able to...

- 1) understand and applying Principals for photoshop.
- 2) study the ways to balance between formal theories with practical applications.
- 3) describe deep knowledge of Adobe photoshop cs2.
- 4) know the fundamental concepts of photo editing.

Course Outcomes: Students will be able to...

- 1) demonstrate in between drawing and execution with squash and stretch, staging, arc, principle
- 2) utilize organize content and sequences for photo editing.
- 3) illustrate a thorough understanding of the elements of photoshop design.
- 4) explain advanced editing techniques for documentary.

Sr. No.	Content	Hrs.
1	Study of the graphics design software's, its types and uses.	60
2	Understand the menus of software of Adobe.	
3	Draw the elements of design: (line, shape, Forms, space, colors etc.)	
4	Study of the photoshop software's.	
5	Browse the image and resize the image in Adobe Photoshop.	
6	Perform the properties of image in photoshop.	
7	Design the images.	
8	Redesign an existing image.	
9	Drawing and sketching the image and logo.	
10	Sketching of natural and manmade objects and environment.	
11	Sketching of representational Drawing.	
12	Draw the image and use color Correction property in it.	
13	Understand the features and 3D effects.	
14	Create a Poster or Flyer Design in Photoshop.	
15	Design a Creative Typographic Quote Poster.	

Reference Books: -

- 1) S. Jain, 'Photoshop CS6 Training Guide', BPB Publications, 2015.
- 2) S. Jain, M. G. Iyer, 'Adobe Photoshop CS3', BPB Publications, 2009.
- 3) V. Gupta, 'Comdex DTP Course Kit', Dreamtech Press, 2009.
- 4) R. Bangia, 'Multimedia and Web Technology', Laxmi Publications, 2007.
- 5) S. Chavan, 'Rapidex DTP Course', Unicorn Books, 2005.

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: XML Programming (BCSPSEC II)

Course Objectives: Students Should be able to...

- 1) learn all the essential elements of programming.
- 2) understand all the main XML techniques.
- 3) study to present raw data attractively and efficiently in browsers using XSL style sheets.
- 4) describe how to reuse basic code to create any kind of XML data management program.

Course Outcomes: Students will be able to...

- 1) demonstrate how to create an XML Schema.
- 2) illustrate how to verify that an XML document is valid according to its Schema.
- 3) design a Program using XML.
- 4) discuss knowledge and skills to develop XML programming.

Sr. No.	Content	Hrs.
1	Creating a simple XML document.	60
2	Creating a simple XML document with attributes.	
3	Create an XML file using the Internal DTD.	
4	Create an external DTD and implement it in XML file.	
5	Creating a XML Schema.	
6	Create an XML file to implement CSS concept.	
7	To create a simple XSLT transformation from XSL to XML.	
8	Create Two or more XML namespaces for different categories.	
9	Create XML code to student profile with optional and nested elements.	
10	Create a XML file to implement XPATH concept.	
11	Creating a XML DOM class.	
12	Create an XML document for student information and college course listing.	
13	Create a well-formed XML document containing details of a car like: id, company name, model, engine and mileage.	
14	Create a valid XML document containing details of a car like: id, company name, model, engine and mileage using DTD.	
15	Write a program to connect a XML web page to any database engine.	

Reference Books: -

- 1) C. Xavier, 'Web Technology and Design', Tata McGraw-Hill, 2008.
- 2) P. Jain, 'XML and XSL', Centrum Press, 2008.
- 3) I. Bayross, 'Practical XML with Java', BPB Publications, 2003.
- 4) A. S. Godbole, A. Kahate, 'Web Technologies: TCP/IP to Internet Applications Architectures', Tata McGraw-Hill, 2003.

5) N. P. Gopalan, J. Akilandeswari, 'Web Technology: A Developer's Perspective', PHI Learning, 2003. McGraw-Hill, 2003.

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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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: Computer Science for Environmental Awareness BCSTVEC II

Course Objectives: Students Should be able to...

- 1) understand the environmental impacts of computing technologies and their life cycles.
- 2) study sustainable software engineering and green coding practices to reduce resource consumption.
- 3) describe environmental policies and ethical issues to assess and minimize the carbon footprint of digital systems.
- 4) know innovative and sustainable computing solutions while demonstrating leadership in environmental sustainability.

Course Outcomes: Students will be able to...

- 1) explain the environmental impacts of computing technologies and life cycle assessment principles.
- 2) utilize sustainable software engineering and green coding techniques to develop energy-efficient software.
- 3) apply environmental policies, ethical issues, and the carbon footprint of digital systems and data centers.
- 4) demonstrate innovative computing solutions that promote environmental sustainability and responsible technology practices.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Environmental Awareness 1.1 Definition of environmental awareness in the context of computer science. 1.2 Importance of integrating environmental considerations into technology development. 1.3 Historical background: evolution of environmental consciousness in the tech industry. 1.4 Overview of key environmental challenges (e.g., climate change, e-waste, energy consumption).	08
Module -2:	Environmental Impact of Computing 2.1 Understanding the environmental footprint of computing devices (e.g., laptops, smartphones, servers). 2.2 Life cycle assessment (LCA) of digital products: extraction, production, use, and disposal phases. 2.3 Carbon footprint analysis in data centres and cloud computing-waste management. 2.4 Challenges and solutions for proper disposal and recycling.	07

Module -3:	Sustainable Software Development 3.1 Principles of sustainable software engineering: efficiency, scalability and resource optimization. 3.2 Green coding practices: writing energy-efficient code, minimizing computational resources, Tools. 3.3 Methodologies for measuring and reducing software-related environmental impact. 3.4 Case studies of companies implementing sustainable software practices.	07
Module -4:	Environmental Policies and Ethical Considerations 4.1 Overview of global environmental policies and regulations relevant to the tech industry. 4.2 Ethical considerations in technology development: balancing innovation with environmental responsibility. 4.3 Corporate social responsibility (CSR) in tech: case studies of companies leading in environmental sustainability. 4.4 Future trends and opportunities in green computing and environmental awareness.	08

Reference Books: -

- 1) E. Bharucha, 'Textbook of Environmental Studies for Undergraduate Courses', Universities Press, 2025.
- 2) D. Dave, S. S. Katewa, 'Textbook of Environmental Studies', Cengage India, 2024.
- 3) S. Gupta, 'Environmental Studies: An Analytical View', Sultan Chand & Sons, 2024.
- 4) A. Borthakur, P. Singh, 'Addressing the Climate Crisis in the Indian Himalayas: Can Traditional Ecological Knowledge Help?', Springer, 2024.
- 5) A. K. Maqbool, 'Environmental Studies', Kalyani Publishers, 2023.

Evaluation Pattern: 40:60

Total Marks: 50

Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks • CCE - II: 10 Marks • CCE - III: 10 Marks (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (50 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 marks) (50 Marks converted to 30 marks)
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