

Rayat Shikshan Sanstha's

**YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE,
SATARA**

**Constituent College of Karamveer Bhaurao Patil
University, Satara**

Reaccredited by NAAC with 'A++' Grade

Bachelor of Science

Part - I

**Computer Application
Syllabus**

NEP 2020 Syllabus

(To be implemented from the academic year 2025-26)

➤ Course Structure

Class	Level	Sem	Major		Minor		OE	IKS	VEC	Total
			T	P	T	P				
B.Sc. I	4.5	I	4 (2 Theory Papers)	2 (1 Practical Paper)	8 (4 Theory Papers)	4 (2 Practical Papers)	2	2	-	22
		II	4 (2 Theory Papers)	2 (1 Practical Paper)	8 (4 Theory Papers)	4 (2 Practical Papers)	2	-	2	22

➤ Evaluation Structure

Type	Credit	CCE				ESE	Total
		CCE - I	CCE - I	Mid-term	Total		
Theory	2	5	5	10	20	30	50

Type	Credit	Journal	Vival	Stidents Performace	Exam	Total
Practical	2	10	5	5	30	50

SEMESTER-I



Karmaveer Bhaurao Patil University, Satara

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

Faculty of Science And Technology

Yashwantrao Chavan Institute Of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - I

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course: BCAT – 111 Computer Fundamentals & Applications

Course Objectives:

- 1) Understand fundamental of computers
- 2) Describe the concepts Central Processing Unit.
- 3) Understand the concept of computer language.
- 4) Learn the concept of Microsoft Office.

Course Outcomes:

- 1) Explain the basic concepts of computer
- 2) Use block diagram Central Processing Unit
- 3) Compare different computer language
- 4) Use different Microsoft tool.

Module	Title and Contents	Hrs
Module -1:	Introduction to Computer 1.1. Introduction to Computer 1.2. Characteristics of Computer 1.3. Applications of Computer 1.4. Generation of Computer 1.5. Types of Computers 1.6. Components of Computer System 1.7. Advantages of Computer 1.8. Limitations of Computer	15
Module -2:	Computer Memory and Computer Language 2.1 Computer Memory : 2.1.1. Introduction 2.1.2. Memory Hierarchy 2.1.3. Processor 2.1.4. Registers 2.1.5. Cache Memory 2.2 Computer Language: 2.2.1. Machine Language 2.2.2. Assembly Language 2.2.3. High Level Languages	15
Module -3:	MS – Word and MS – Excel 3.1 : MS – Word 3.1.1 Introduction 3.1.2 Shortcuts 3.1.3 Working and Formatting with Documents 3.1.4 Creating Tables 3.1.5 Macros 3.1.6 Mail merge 3.1.7 Printing Documents	15

	3.2 : MS-EXCEL 3.2.1 Introduction to Excel 3.2.2 Sorting 3.2.3 Queries 3.2.4 Graphs 3.2.5 Scientific functions	
Module -4:	MS – PowerPoint and MS – Access 4.1 POWERPOINT: 4.1.1 Introduction to Power Point 4.1.2 Creation of Slides 4.1.3 Inserting pictures 4.1.4 Preparing slide show with animation. 4.2 MS – ACCESS: 4.2.1. Creation 4.2.2. Manipulation of Files.	15
Reference Books:- 1) J. Glenn Brookshear (2022) - "Computer Science: An Overview". 2) P. K. Sinha and Priti Sinha (2021) - "Computer Fundamentals". 3) Peter Norton (2020) - "Introduction to Computers". 4) Faithe Wempen (2023) - "Computing Fundamentals: Introduction to Computers".		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): - CCE - I : 10 Marks: Objective - CCE - II: 10 Marks: Objective - Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		End Semester Examination (30 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 (Five questions of 5 Marks)

	Karmaveer Bhaurao Patil University, Satara (A State Public University Est. u/s 3(6) of MPUA 2016) Faculty of Science And Technology	
	Yashwantrao Chavan Institute Of Science, Satara	
	Board of Studies in Computer Application	
	Programme: Computer Application	Semester - I
	Type : Major	Marks: 50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: BCAT 112 Concept of Operating System	
Course Objectives: 1) Understand the basics and functions of Operating System. 2) Learn various memory management schemes. 3) Study Scheduling Algorithm and process Synchronization. 4) Understand Processes and threads.		
Course Outcomes: 1) Analyze various scheduling algorithms and process synchronization. 2) Explain deadlock prevention and avoidance algorithms. 3) Compare and contrast various memory management schemes. 4) Explain the functionality of file systems, I/O systems, and Virtualization		
Module	Title and Contents	Hrs
Module -1:	Introduction to Operating System 1.1. Computer System 1.2. Elements and organization 1.3. Operating System Overview 1.4. Objectives and Functions 1.5. Evolution of Operating System 1.6. Operating System Structures 1.7. Operating System Services 1.8. User Operating System Interface 1.9. System Calls – System Programs 1.10Design and Implementation - Structuring methods.	15
Module -2:	Process Management 2.1. Processes - Process Concept 2.2. Process Scheduling 2.3. Operations on Processes 2.4. Inter-process Communication 2.5. Deadlock - Methods for handling deadlocks 2.6. Deadlock prevention 2.7. Deadlock avoidance 2.8. Deadlock detection 2.9. Recovery from deadlock.	15
Module -3:	Memory Management 3.1. Main Memory wrapping 3.2. Contiguous Memory Allocation 3.3. Paging - Structure of the Page Table 3.4. Segmentation 3.5. Segmentation with paging 3.6. Virtual Memory - Demand Paging 3.7. Copy on Write - Page Replacement	15

	3.8. Allocation of Frames –Thrashing.	
Module -4:	Storage Management 4.1. Mass Storage system 4.2. Disk Structure - Disk Scheduling and Management 4.3. File-System Interface 4.4. File concept 4.5. Access methods 4.6. Directory Structure - Directory organization 4.7. File system mounting - File Sharing and Protection 4.8. File System Implementation - File System Structure 4.9. Directory implementation - Allocation Methods 4.10 Free Space Management 4.11 I/O Systems – I/O Hardware 4.12 Application I/O interface 4.13 Kernel I / O subsystem	15
Reference Books:- 1) Ramaz Elmasri , A. Gil Carrick, David Levine(2010), “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition. 2) William Stallings (2018), "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall. 3) Achyut S.Godbole, Atul Kahate(2014), “Operating Systems”, McGraw Hill Education. 4) M.V. Wilkes(May,1991) : "Software and the programmer", Comm.ACM 35#5.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		End Semester Examination (30 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 (Five questions of 5 Marks)

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	Yashwantrao Chavan Institute Of Science, Satara	
	Board of Studies in Computer Applications	
	Programme: B.Sc	Semester - I
	Type : Major Practical	Marks: 50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: BCAP 113 Based on BCAT 111 and BCAT 112	
Course Objectives: 1) Understand Computer Fundamentals – hardware and Software. 2) Understand computer Architecture. 3) Study Office automation tools. 4) Learn Basic Number System		
Course Outcomes: 1) Create email and send mail. 2) Write basic program. 3) Write basic command. 4) Operate Windows operating system, Linux Operating System 5) Making directories.		
Module	Title and Contents	Hrs
Section-I	Computer Fundamentals & Application 1) Searching for a web site / application / text documents viewing and downloading 2) Create an E-mail account, retrieving messages from inbox, replying, attaching files filtering and forwarding 3) Preparing a Govt. Order / Official Letter / Business Letter / Circular Letter Covering formatting commands - font size and styles - bold, underline, upper case, lower case, superscript, subscript, indenting paragraphs, spacing between lines and characters, tab settings etc. 4) Preparing a newsletter: To prepare a newsletter with borders, two columns text, header and footer and inserting a graphic image and page layout. 5) Creating and using styles and templates to create a style and apply that style in a document to create a template for the styles created and assemble the styles for the template. 6) 6Creating and editing the table to create a table using table menu to create a monthly calendar using cell editing operations like inserting, joining, deleting, splitting and merging cells to create a simple statement for math calculations viz. Totaling the column. 7) Creating numbered lists and bulleted lists to create numbered list with different formats (with numbers, alphabets, roman letters) To create a bulleted list with different bullet characters. 8) Printing envelopes and mail merge. To print envelopes with from addresses and to addresses To use mail merge facility for sending a circular letter to many persons To use mail merge facility for printing mailing labels. 9) Using the special features of word to find and replace the text To spell check and correct. To generate table of contents for a document to prepare index for a document. 10) Create an advertisement Prepare a Template. Prepare a Corporate Circular letter inviting the shareholders to attend the Annual Meeting in PowerPoint.	15

	11) Creating a new Presentation based on a template – using Auto content wizard, design template and Plain blank presentation. 12) Creating a Presentation with Slide Transition – Automatic and Manual with different effects. 13) Creating a Presentation applying Custom Animation effects – Applying multiple effects to the same object and changing to a different effect and removing effects. 14) Creating and Printing handouts 15) Creating a table in Excel and perform various mathematical operation on it.	
Section: II	Concepts of Operating System 1) Study of Different OS Installation and its working. 2) Study of Basic commands to understand the system and working of Linux. 3) To make folder and subfolder. 4) To make directory and subdirectory. 5) To show system Date and Time. 6) To show Internal Protocol Configuration. 7) To show System Information. 8) Any 10 commands of Linux. 9) Write a menu driven shell script which will print the following menu and execute the given task. 1. Display calendar of current month 2. Display today's date and time 3. Display usernames those are currently logged in the system 4. Display your name at given x, y position 5. Display your terminal number 10) Write a shell script to read n numbers as command arguments and sort them in descending order. 11) Write a program for process creation using C. (Use of gcc compiler). 12) Write a shell script to check entered string is palindrome or not. 13) Study of Advance commands and filters of Linux/UNIX 14) Write an awk program using function, which convert each word in a given text into capital. 15) Write a shell script to find factorial of given number n.	15
Reference Books:- 1) Andrew S. Tanenbaum, “<i>Modern Operating System 6/c</i>”, PHI, 2011/12 2) Silberschatz, P.B. Galvin, G. Gagne, “<i>Operating System Concepts 8/e</i>”, Wiley India, 2014 3) ISBN: 9788126520510 4) Andrew S. Tanenbaum, “<i>Distributed Operating System</i>”, Pearson a. D M Dhamdhare, “<i>System Programming and Operating System</i>”, b. Tata McGraw-Hill, 2009		
Evaluation Pattern:		
Total Marks: 50		
Journal, Student's Performance Viva, Project(20 Marks): • Journal 1: 10 Marks • Students Performance: 05 Marks Viva: 05 Marks	Practical Exam Paper(30 Marks): Section I: Attempt any two questions (Four questions of 10+5 Marks) Section II: Attempt any two questions (Four questions of 10+5 Marks)	

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	Board of Studies in Computer Application	
	Programme: B.Sc.	Semester - I
	Type : Minor	Marks: 50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: BCAT-114 Fundamentals of Computational Electronics	
Course Objectives: 1) To familiarize students with fundamental electronic components such as resistors, capacitors, diodes, and transistors. 2) To teach students basic principles of circuit analysis including Ohm's Law, Kirchhoff's Laws, and circuit simplification techniques. 3) To Introduce students to Motherboard, PCB Design and Power Supply Components. 4) To explain the Interfacing Connection.		
Course Outcomes: 1) Students will be able to identify and explain the function of these components in electronic circuits. 2) Students will be able to analyze simple DC and AC circuits to determine voltage, current, and power relationships. 3) Students will understand how digital signals are processed and manipulated in computers and other digital devices. 4) Students will comprehend the methods used to convert signals between analog and digital formats in various applications.		
Module	Title and Contents	Hrs
Module -1:	Foundations and Evolution of Electronics in Computing 1.1 Introduction to Electronic Components: Overview of basic components, Importance in electronic circuits 1.2 Resistors: Function and types of resistors, Applications in circuits 1.3 Capacitors: Function and types of capacitors, Applications in circuits 1.4 Diodes: Function and types of diodes, Applications in circuits 1.5 Transistors: Function and types of transistors, Applications in circuits 1.6 Role of Electronic Components in Circuits: How components work together	15
Module -2:	Module -2: Fundamentals of Circuit Theory 2.1. Introduction to Circuit Theory: Basic concepts and terminology, Importance in electronics 2.2. Ohm's Law: Explanation and mathematical formulation. 2.3. Kirchhoff's Laws - Applications in circuit analysis, practical example 2.4. Series Circuits, Parallel Circuits: Characteristics and analysis, Practical examples 2.5. Thevenin, Norton Theorem, Maximum power transfer theorem: Characteristics and analysis, Practical examples	15
Module -3:	Motherboard, PCB Design and Power Supply Components 3.1. Printed Circuit Boards (PCBs): Function, Providing physical and electrical connections for components, Layers: Single-layer, multi-layer boards 3.2. Motherboard: Function: Main circuit board housing critical components, Key Sections: CPU socket, memory slots, expansion slots, power connectors	15

	3.3. Power Supply Unit (PSU): Function: Converting AC to DC power, providing stable power to components half wave, full wave, Linear, switching power supplies 3.4. Voltage Regulators: Function: Maintaining constant voltage levels, Applications: Power management in various computer sections, Zener, transistorized regulators 3.5. SMP and UPS: Introduction, types, Block diagram and explanation	
Module -4:	Interfacing and Connectivity 4.1. Buses: Function ,Types: Data bus, address bus, control bus 4.2. Connectors and Ports: Function, Providing external connectivity, Types: USB (USB 2.0, 3.0, 3.1, and USB4), HDMI, Ethernet (10/100/1000 Mbps, Gigabit Ethernet), SATA	15
Reference Books:- 1) Sedha.R.S. (New Delhi: S Chand Publication,2012), “<i>A text of Applied Electronics</i>” 2) Thereja.B.L. (New Delhi: S. Chand & Company LTD,2005), “<i>Basic Electronics Solid State</i>”. 3) Streetman Ben Z and S. Banerjee, (New Delhi: Pearson Education, 2006) “<i>Solid State Electronic Devices</i>”. 4) Mithal.G.K , (Delhi: Khanna publication,1997) “<i>Electronic Devices and Circuits</i>”.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		End Semester Examination (30 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 (Five questions of 5 Marks)



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Faculty of Science And Technology

Yashwantrao Chavan Institute Of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - I

Type : Minor

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course: BCAT-115 Computational Digital Electronics- I

Course Objectives:

- 1) To introduce students to the principles of digital logic including Boolean algebra, logic gates, and truth tables.
- 2) To teach students Number System for digital applications.
- 3) To explore sequential Combinational circuits including flip-flops, counters, and state machines.
- 4) To enable students to design and simulate digital systems for logic gates.

Course Outcomes:

- 1) Students will be able to design, analyze, and optimize basic digital circuits using Boolean expressions and logic gates.
- 2) Students will verify truth table using digital designs on hardware platforms.
- 3) Students will understand the behavior of sequential circuits and their applications in digital systems such as Encoder, Decoder and multiplexer, de- multiplexer.
- 4) Students will be able to use software tools (e.g., FPGA design software, circuit simulation tools) to simulate and validate digital designs before implementation.

Module	Title and Contents	Hrs
Module -1:	Computer Number System 1.1 Introduction: Overview of number system. 1.2 Study of Number System. 1.2.1. Binary Number system 1.2.2. Decimal number system 1.2.3. Octal number system 1.2.4. Hexadecimal Number system and conversions. 1.3 Code: ASCII code, EBCDIC code, parity code	15
Module -2:	Logic Gates and Boolean Algebra 2.1. Introduction: Concept, Classification of logic gates. 2.2. Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR gates 2.3. Universal Gate: NOR, NAND Gate. 2.4. Introduction to Boolean algebra: Boolean Laws and Rules (commutative, Associative, distributive law's) and Logic Families: Introduction to digital logic family such as RTL, DTL, TTL	15
Module -3:	Arithmetic Circuit 3.1. Introduction: arithmetic Circuit. 3.2. Importance: arithmetic circuit. 3.3. Binary arithmetic: Addition, subtraction, Multiplication, Division. 3.4. Adder: Half adder, Full adder, Parallel half adder, parallel full subtractor. 3.5. Subtractor: Half subtractor, full subtractor 3.6. Parallel Adder	15

	3.7. Multipliers and Divider	
Module -4:	Combinational Circuit: 4.1. Multiplexer: 2:1 MUX, 4:1 MUX, 8:1 MUX. 4.2. De-multiplexer: 1:2 De-MUX, 1:4 MUX, 1:8 MUX. 4.3. Design and Implement Encoder Decoder: Priority Encoder. 4.4. Design and Implement Decoder 4.5. Comparator: 1- bit and 4-bit Comparator. 4.6. Code Converter: Binary to Gray and Gray to Binary.	15
Reference Books:- 1) Sedha.R.S. (New Delhi: S Chand Publication,2012), “A text of Applied Electronics” 2) Thereja.B.L. (New Delhi: S. Chand & Company LTD,2005), “Basic Electronics Solid State”. 3) Streetman Ben Z and S. Banerjee, (New Delhi: Pearson Education, 2006) “Solid State Electronic Devices”. 4) Mithal.G.K , (Delhi: Khanna publication,1997) “Electronic Devices and Circuits”.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		End Semester Examination (30 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 (Five questions of 5 Marks)

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	Yashwantrao Chavan Institute Of Science, Satara	
	Board of Studies in Computer Applications	
	Programme: B.Sc.	Semester - I
	Type : Minor Practical	Marks: 50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: BCAP 116 : Based on BCAT 114 and BCAT 115	
Course Objectives: 1) Understand Fundamentals of Electronics – hardware 2) Learn How to Design hardware. 3) Understand the basic of logic. 4) Study Digital electronics.		
Course Outcomes: 1) Understand the Conversions of number systems. 2) Develop the concept of digital electronics. 3) Understand the different electrical component. 4) Understand the foundations of mathematics. 5) Develop and maintain problem- solving skills.		
Module	Title and Contents	Hrs
Section-I:	Fundamentals of Computational Electronics 1.1 Study of Electronics Components and Tools. 1.2 Study of Resistor color code technique. 1.3 Study of the ohms law. 1.4 Kirchhoff’s law with an example. 1.5 Study of the I-V characteristics of Diode. 1.6 Study of the thevinins theorem and Nortons theorem. 1.7 Design and study 5v regulated power supply. 1.8 Study of different types of connectors. 1.9 Study of different types of bus(Data bus,address bus) 1.10 Study the voltage source in series and parallel combination.	15
Section: II	Computational Digital Electronics-1 1.1 Study of adder circuit(half adder and full adder) 1.2 Study of subtractor circuit(half subtractor and full subtractor) 1.3 Study of Logic Gates (AND, OR, NOT). 1.4 Study of Universal Gates. 1.5 Study and Design 4:1Multiplexer circuit. 1.6 Study and Design 1:4Demultiplexer Circuit. 1.7 Study of code converter technique. 1.8 Study of the Encoder Circuit 1.9 Study of Decoder Circuit. 1.10 Study of the comparator circuit.	15

Reference Books:-

- 1) Sedha.R.S. (New Delhi: S Chand Publication,2012), "*A text of Applied Electronics*"
- 2) Thereja.B.L. (New Delhi: S. Chand & Company LTD,2005), "*Basic Electronics Solid State*".
- 3) Streetman Ben Z and S. Banerjee, (New Delhi: Pearson Education, 2006) "*Solid State Electronic Devices*".
- 4) Mithal.G.K , (Delhi: Khanna publication,1997) "*Electronic Devices and Circuits*".

Evaluation Pattern:**Total Marks: 50****Journal, Student's Performance Viva, Project(20 Marks):**

- Journal 1: 10 Marks
 - Students Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper(30 Marks):

Section I: Attempt any two questions
(Four questions of 10+5 Marks)

Section II: Attempt any two questions
(Four questions of 10+5 Marks)

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	Programme: B.Sc.		Semester - I
	Type : Minor		Marks: 50
	Credits : 2		From: A. Y. 2025-26
	Name of the Course: BCAT-117 Computational Mathematics - I		
Course Objectives: 1) Understand recursive techniques to count element of set and knowledge of set theory. 2) Solve simple application problems related to computer based on these. 3) Construct simple mathematical proofs and possess ability to verify them . 4) Learn the concept of Divisibility of integers .			
Course Outcomes: 1) Apply logic when creating systems. 2) Demonstrate mathematical skills, analytical and critical thinking abilities. 3) Analyse the types of relations and function.			
Module	Title and Contents		Hrs
Module -1:	Logic 1.1 Introduction, Definition: Statement (Proposition). 1.2 Types of Statements: Simple and compound statements, Truth values of a statement, Truth Tables and construction of truth tables. 1.3 Logical Operations: Negation, Conjunction, Disjunction, Implication, Double Implication, Equivalence of Logical statements. 1.4 Statement forms: Tautology, Contradiction, and Contingency. 1.5 Laws of logic: Idempotent laws, Commutative laws, Associative laws, Distributive laws, Complement laws, De Morgan's Law.		15
Module -2:	Set Theory 2.1 Introduction, definition of set, subset. 2.2 Methods of describing of a set: Tabular form, Set builder Form, Cardinality of set. 2.3 Types of set: Finite set, Infinite set, Empty set, Universal set, Equal sets, Disjoint sets, complementary set. 2.4 Operation on Sets: Union of sets, Intersection of sets, Difference of sets. 2.5 De Morgan's Laws. 2.6 Cartesian product of two sets. 2.7 Properties of set operations: Commutative law, Associative law, Distributive law.		15
Module -3:	Functions and Relation 3.1 Introduction of function, Domain, Codomain, Range of 3.2 Function, Operation on function 3.3 Definition of Relation, Reflexive relation, Symmetric relation, 3.4 Transitive relation, Inverse Relation, Equivalence Relation, 3.5 Identity Relation		15

Module -4:	Divisibility of integers 4.1 Introduction, Divisibility Definition and Properties. 4.2 Division algorithm. 4.3 Greatest common Divisor (GCD). 4.4 Least common multiple (LCM), Prime number. 4.5 Euclidean algorithm. 4.6 Fundamental theorems of Arithmetic (Statement)	15
Reference Books:- 1) 1. S.R. Patil and others “A text book of Discrete mathematics” (India : NIRALI Prakashan .2008). 2) 2. Oscar Levin, Discrete Mathematics – An Open Introduction (Greeley University of Northern Colorado Press,2013). 3) 3. Gaisi Takeuti, SAML (2018), “Advances in Mathematical Logic by professor “. 4) 4. S.C. Malik and Savita Arora, “Mathematical Analysis (Fifth Edition)”, New Age International (P) Limited, 2017 (UNIT I, II, III, IV).		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	End Semester Examination (30 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 (Five questions of 5 Marks)	

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	Programme: B.Sc.	Semester - I
	Type : Minor	Marks: 50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: BCAT118 Computational Statistics I	
Course Objectives: 1) Understand the basic concepts of statistics. 2) Perform the frequency distribution and data presentation. 3) Compute various measures of central tendency, dispersion. 4) Analyze the data and interpret the results.		
Course Outcomes: 1) Create and interpret frequency tables. 2) Display data graphically and interpret graphs. 3) Recognize, describe, and calculate the measures of central tendency and dispersion. 4) Compute examples on sample space, simple examples on probability		
Module	Title and Contents	Hrs
Module -1:	Introduction of Statistics, Data Condensation and Presentation 1.1 Introduction of statistics, Definition, Importance, Scope and limitations of statistics. 1.2 Data Condensation: Primary data, Secondary data, Qualitative & Quantitative data, variables, Scales of measurements: Nominal, Ordinal, Interval & Ratio. Collection and Summarization of univariate data and frequency distribution. 1.3 Data Presentation: Diagrammatic & graphical presentation of data, Pie diagram, line diagram. Simple, multiple & partial bar diagram, histogram, ogive curves.	15
Module -2:	Descriptive Statistics 2.1 Measure of Central tendency: Concept of Central tendency, Criteria for Good measures of central tendency, Types: Arithmetic mean (A.M.), Geometric Mean (G.M.), Harmonic Mean (H.M.), Relation between them and their properties (without proof). Median, Mode, Partition values, Numerical problems. 2.2 Measure of dispersion: Concept of measures of dispersion, absolute and relative measures of dispersion, Range, Quartile Deviation (Q.D.), Mean Deviation (M.D.), Standard deviation (S.D.), Variance, Coefficient of Variation, with their properties (without proof). Numerical problems.	15
Module -3:	Probability 3.1 Concepts of experiments and random experiments. 3.2 Definitions: Sample space, Discrete sample space. 3.3 Event, Types of events: Elementary event, Compound event, favourable event, mutually exclusive events, Exhaustive events, Impossible events, Certain event. Power set. 3.4 Illustrative examples. 3.5 Apriori definition of probability. Axiomatic definition of Probability with	15

	reference to a finite and countably infinite sample Space. Results: i. $P(\Phi) = 0, P(A^c) = 1 - P(A)$, ii. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ (without proof)	
Module -4:	Conditional Probability and Independence of events 4.1 Definition of conditional Probability of an event. 4.2 Multiplication Theorem for two events. 4.3 Statement and proof of Baye's Theorem and Example. 4.4 Concept of Independence of two event. 4.5 Examples.	15
Reference Books:- 1) 1. B. L. Agarwal, Basic Statistics (New Age International (P)Ltd.,2015) for Unit-I, II, III, IV; Unit-I: P. No. 13-41, Unit-II: P. No.42-97, Unit-III: P.. No. 368-384. 2) 2. D. N. Elhance, Fundamentals of Statistics, (Kitab Mahal, 1978), Unit-II : P. No. 87- 177, Unit- III: P. No. 236-249. 3) 3. S. P. Gupta, Statistical Methods (Sultan Publication, 2014), Unit-I, II, III, IV: P. No. 751-803. 4) 4. S. Saxena, J. N. Kapoor, Mathematical Statistics (SChand&Company,2010),Unit- I: P. No. 69-85, Unit-II: P. No. 86 -105.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): - CCE - I : 10 Marks: Objective - CCE - II: 10 Marks: Objective - Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		End Semester Examination (30 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 (Five questions of 5 Marks)

	Karmaveer Bhaurao Patil University, Satara (A State Public University Est. u/s 3(6) of MPUA 2016) Faculty of Science and Technology	
	Yashwantrao Chavan Institute Of Science, Satara	
	Board of Studies in Computer Applications	
	Programme: B.Sc.	Semester - I
	Type :Minor Practical	Marks: 50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: BCAP 119 Based on BCAT 117 and BCAT 118	
Course Objectives: 1) Understand the basic of logic. 2) Understand the basic set theory. 3) Understand the basic of Divisibility of integers. 4) Understand the basic concepts of statistics.		
Course Outcomes: 1) Apply logic when creating systems. 2) Demonstrate mathematical skills, analytical and critical thinking abilities. 3) Analyse the types of relations and function. 4) Draw diagram and graphs based on frequency distribution. 5) Uderstand how to summarized data and find averages as well as spread of the data from central value. 6) Find the probabilities of events and conditional probabilities.		
Module	Title and Contents	Hrs
Section-I:	Computational Mathematics–I 1.1 Problems on Logical operation. 1.2 Laws of logic with an example. 1.3 Examples on Tautology, Contradiction, and Contingency. 1.4 De Morgan’s law with an example. 1.5 Cartesian product of set and Difference of set with an example. 1.6 Example of Functions and Relation. 1.7 Greatest common divisor and Least common Multiplier with an example. 1.8 Examples of Operations and function. 1.9 Examples of Division algorithm. 1.10 Euclidian algorithm with an example.	15
Section: II	Computational Statistics - I 2.1 Construction of Discrete Frequency Distribution 2.2 Construction of Continuous Frequency Distribution 2.3 Graphical Representation I 2.4 Graphical Representation II 2.5 Measure of Central Tendency I (Individual data and Discrete frequency distribution) 2.6 Measure of Central Tendency II (Continuous frequency distribution) 2.7 Measure of Dispersion I (Individual data and Discrete frequency distribution)	15

	2.8 Measure of Dispersion II (Continuous frequency distribution) 2.9 Probability I 2.10. Application of Probability and Conditional Probability	
Reference Books:- 1) S.R. Patil and others “A text book of Discrete mathematics” (India : NIRALI Prakashan .2008). 2) Oscar Levin, Discrete Mathematics – An Open Introduction (Greeky University of Northen Colorado Press,2013). 3) GaisiTakeuti,SAML (2018), “Advances in Mathematical Logic by professor “. 4) S.C. Malik and Savita Arora, “Mathematical Analysis (Fifth Edition)”, New Age International (P) Limited, 2017(UNIT I, II, III, IV).		
Evaluation Pattern:		
Total Marks: 50		
Journal, Student’s Performance Viva, Project(20 Marks): • Journal 1: 10 Marks • Students Performance: 05 Marks Viva: 05 Marks	Practical Exam Paper(30 Marks): Section I: Attempt any two questions (Four questions of 10+5 Marks) Section II: Attempt any two questions (Four questions of 10+5 Marks)	

SEMESTER-II



Karmaveer Bhaurao Patil University, Satara

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

Faculty of Science and Technology

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - II

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course: Computer Programming-I

Course Objectives:

- 1) Understand algorithmic thinking and algorithm presentations
- 2) Learn Basic data types and control structures in C.
- 3) Studies of structured programming concepts.
- 4) Able to use standard library functions in C Language.

Course Outcomes:

- 1) Uses Variables and Constants.
- 2) Use Basic data types of C.
- 3) Do concept of modular programming
- 4) Work with Array & its types.
- 5) Create functions

Module	Title and Contents	Hrs
Module -1:	Module -1: Introduction to programming 1.1 Character set, Variables and Constants 1.2 Rules for naming the Variables/Identifiers 1.3 Basic data types of C Int, char, float, double 1.4 storage capacity – range of all the data types, Storage classes	15
Module -2:	Module -2: Control Structure 2.1 Operators and Expressions 2.2 Precedence of Operators 2.3 Simple I/O statements 2.4 Control structures – if, if else, switch- case, for, while, do-while, break, continue.	15
Module -3:	Module -3: Arrays 3.1 Arrays 3.2 Declaration, initialization and processing 3.3 Defining simple arrays, Multi-dimensional arrays 3.4 Strings: Strings Manipulation, Arrays of Strings.	15
Module -4:	Module -4: Function 4.1 Functions: Definition 4.2 Return values & their types 4.3 function call, recursion, passing Arrays to Functions 4.4 String functions (strcpy(), strcmp(), strcat(), strlen(), strrev()).	15

Reference Books:-

- 1) Greg Perry, C Programming Absolute Beginner's Guide, Que Publishing
- 2) Tim Warren, C Programming for beginners, Ingram Publishing (17 December 2019)
- 3) Tim Warren, C Programming for beginners, Ingram Publishing (17 December 2019)

Evaluation Pattern:**Total Marks: 50****Internal Continuous Evaluation (20 Marks):**

- CCE - I : 10 Marks: Objective
- CCE - II: 10 Marks: Objective
- Mid Semester Exam: 20 Marks: Subjective

Note: Conversion of 40 marks of internal evaluation to 20 Marks

End Semester Examination (30 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 (Five questions of 5 Marks)

Note: Conversion of 50 marks of ESE evaluation 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	
	Yashwantrao Chavan Institute of Science, Satara	
	Board of Studies in Computer Application	
	Programme: B.Sc.	Semester - II
	Type : Major	Marks:50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: Database Management System	
Course Objectives: 1) Learn fundamental concepts of data. 2) Describe the basic concepts of DBMS and various databases used in real applications 3) Learn the principles behind systematic database design approaches. 4) 4) Study the database structure by applying the concepts of Entity relational model and Normalization..		
Course Outcomes: 1) Demonstrate basics of different database models for software development. Department of B.Sc. Computer Applications 2) Identify the basic concepts and various data model used in database design 3) Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression for queries. 4) Identify the purpose of query processing and optimization and also demonstrate the basic of query 5) evaluation.		
Module	Title and Contents	Hrs
Module -1:	Module -1: Introduction to programming 1.1 Definition of Database , Characteristics of database 1.2 Data models, Importance of data models 1.3 ER Model, Relational Model, Network Model, Hierarchical Model, Object Oriented Model 1.4 Concept of DBMS, DBMS architecture and data independence.	15
Module -2:	Module -2: Entity Relationship Modeling and Relational Data Model 2.1 Entities, Attributes and Entity Sets, Relation and Relationships sets 2.2 Features of E-R Model , Relational Model - Basic concepts 2.3 Types of constraints(relational constraints) 2.4 DFD and its Types, ERD and types of relationship	15
Module -3:	Module -3: Basics of Structured Query Language 3.1 Basic SQL Queries 3.2 DDL (Create, Alter, Drop) Commands, DML (Insert, Update, Delete) Commands 3.3 Select Statement 3.4 Constraints(Primary Key, Foreign Key, Unique Key, Null ,Check, Default, Super Key, Candidate Key) 3.5 Strings: Strings Manipulation, Datatypes, Operators, Functions	15

Module -4:	Module -4: Organization of Database System 4.1 Introduction of file, File types 4.2 Organization of file- heap file organization, Serial file organization ,Sequential ,Index sequential file ,Random access file (direct access file) 4.3 function call, recursion 4.4 Types of Database System, Centralized database system , Client-server system ,Distributed database system	15
Reference Books:- 1) Abraham Silber Schatz , Henry F. Korth, S. Sudarshan (2021) - Database System Concept . 2) C.J. Date(2009)- SQL and Relational Theory: How to Write Accurate SQL Code. 3) C.J. Date(1905) - An Introduction to Database Systems.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	End Semester Examination (30 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 (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation 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

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - II

Type : Major Practical

Marks:50

Credits : 2

From: A. Y. 2025-26

Name of the Course: BCAP 213 : Based on BCAT 211 and BCAT 212

Course Objectives:

- 1) Learn Basic Programming Concepts
- 2) Study different basic concepts arrays in C
- 3) Understand the different concepts of operations on Pointers.
- 4) Learn the DDL and DML Query.

Course Outcomes:

- 1) Develop skills for writing programs using 'C'.
- 2) Develop a Programming logic.
- 3) Exhibit critical and creative thinking skills for analysis and evaluation of problems.
- 4) Create database and used SQL command.

Module	Title and Contents	Hrs
Section -1:	Computer Programming-I 1) Write a C program to display "This is my first C Program". 2) Write a C program to find if a given no. is prime or not 3) Write a C program to compute Fibonacci series 4) Write a C program to insert an element in one dimensional array at a given position 5) Write a C program to delete an element from one dimensional array. 6) Write a C program to multiply a 3*3 matrix. 7) Write a C program to check if given string is palindrome or not. 8) Write a C program using function to find sum of two numbers with no argument & no return value 9) return value 10) Write a C program to perform addition, subtraction, division and multiplication of two numbers. 11) numbers. 12) Write a C program to reverse the entered string from command line arguments. 13) Write a program to input two numbers and display the maximum number. 14) Write a C program to calculate area and circumference of a circle. 15) Write a C program to check prime and Armstrong number by making functions 16) Write a C program to calculate the factorial of a number using recursion 17) Write a C program to calculate the factorial of a number using recursion	15

Section -2:	Database Management System 1) In the Database file Add these Fields: (Total: Datatype- Number 3 digits, Percentage: Datatype – Number 3 digits with 2 decimal places, Grade: Datatype- Char with 2 letters) 2) Insert more 3 records in MARKSHEET using SQL mode 3) Update the values for newly added columns i.e. Total, Percentage, Grade table using UPDATE command. (Grades should be A1 to E2 as per CBSE exam pattern) 4) Display all records of the marksheet table, write SQL command 5) Display name, rollno, marks of 3 subjects, total and percentage using design view. 6) Write SQL command to display name, rollno, grades from the marksheet table. 7) Display the maximum and minimum marks for Sub101 using design 8) Display the sum of marks for Sub102 using SQL command. 9) Display the rollno, student name and percentage whose name starts with A using SQL command. 10) Display the rollno, student name and percentage whose name second letter is 'I' using SQL command. 11) Display all the records from the marksheet table whose name ends with 'N' using SQL command. 12) Display the rollno, name and percentage whose percentage are more than 70. 13) Display the records who secured the grade A1 and A2. 14) Display all the record in ascending order of names using SQL view. 15) Delete the records from table who is failed in any of the subject. (You can use any mode)	15
Reference Books:- 1) Carlos Coronel and Steven Morris (2014) - Database Systems: Design, Implementation, and Management 2) Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom (2008) - Database Systems: The Complete Book 3) Yashavant Kanetkar, <i>Let Us C</i>, bpb Publication (2021).		
Evaluation Pattern:		
Total Marks: 50		
Journal, Student's Performance Viva, Project(20 Marks): • Journal 1: 10 Marks • Students Performance: 05 Marks - Viva: 05 Marks	Practical Exam Paper(30 Marks): Section I: Attempt any two questions (Four questions of 10+5 Marks) Section II: Attempt any two questions (Four questions of 10+5 Marks)	

	Karmaveer Bhaurao Patil University, Satara (A State Public University Est. u/s 3(6) of MPUA 2016) Faculty of Science and Technology	
	Yashwantrao Chavan Institute of Science, Satara	
	Board of Studies in Computer Application	
	Programme: B.Sc.	Semester - II
	Type : Major	Marks: 50
	Credits : 2	From: A. Y. 2025-26
	Name of the Course: Integrated Circuits for Computational Course	
Course Objectives: 1) To familiarize students with Integrated circuit such as IC 555 2) To teach students basic principles of Operational amplifier. 3) To introduce students to digital logic integrated circuits. 4) To explain the digital logic families.		
Course Outcomes: 1) Students will be able to identify and explain the about timer Ic. 2) Students will be able to understand Basics of operational amplifier. 3) Students will understand digital logic integrated circuits with details. 4) Students will comprehend the digital logic families.		
Module	Title and Contents	Hrs
Module -1:	Module -1: IC 555 1.1 Introduction, Block diagram 1.2 Astable multivibrator using IC 555 1.3 Bistable multivibrator using IC 555 1.4 Application of Multivibrator	15
Module -2:	Module -2: Operational Amplifier 2.1 Introduction, Pin Diagram of Op-Amp 2.2 Characteristics of ideal Op-Amp 2.3 Characteristics of ideal Op-Amp 2.4 Applications	15
Module -3:	Module -3: 74XX-series of digital logic integrated circuits 3.1 Introduction 3.2 List 3.3 Pin diagrams with its function 3.4 Applications	15
Module -4:	Module -4: Digital Logic Families 4.1 Introduction 4.2 Classification, Characteristics 4.3 Difference 4.4 Applications	15

Reference Books:-

- 1) Sedha.R.S. (New Delhi: S Chand Publication,2012), “*A text of Applied Electronics*”
- 2) Mithal.G.K , (Delhi: Khanna publication,1997) “*Electronic Devices and Circuits*”.
- 3) S.R.Patil and others “*A text book of Discrete mathematics*” (India : NIRALI Prakashan .2008)

Evaluation Pattern:**Total Marks: 50****Internal Continuous Evaluation (20 Marks):**

- CCE - I : 10 Marks: Objective
- CCE - II: 10 Marks: Objective
- Mid Semester Exam: 20 Marks: Subjective

Note: Conversion of 40 marks of internal evaluation to 20 Marks

End Semester Examination (30 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
(Five questions of 5 Marks)

Note: Conversion of 50 marks of ESE evaluation 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

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - II

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course: Computational Digital Electronics-II

Course Objectives:

- 1) To introduce students to the sequential Combinational circuits such as flip-flops.
- 2) To explore sequential circuits including shift registers with its types.
- 3) To enable students to design counter.
- 4) To explain about basics of computer organization.

Course Outcomes:

- 1) Students will be able to design, analyze, and optimize basic digital circuits using Boolean expressions and logic gates.
- 2) Students will verify truth table using digital designs on hardware platforms.
- 3) Students will understand the behavior of sequential circuits and their applications in digital systems such as Encoder, Decoder and multiplexer, de- multiplexer.
- 4) Students will be able to use software tools (e.g., FPGA design software, circuit simulation tools) to simulate and validate digital designs before implementation.

Module	Title and Contents	Hrs
Module -1:	Module -1: Flip Flops 1.1 Difference between combinational circuits and sequential circuits 1.2 Concept of clock 1.3 Introduction of flip flop, Types of flip flop, it's truth table 1.4 Application of flip flop	15
Module -2:	Module -2: Shift Resistors 2.1 Introduction of Shift resistor 2.2 SISO, SIPO, PISO, PIPO, Ring counter 2.3 Universal 4-bit shift register, IC 7495 2.4 Applications of counter	15
Module -3:	Module -3: Counter 3.1 Introduction of Counter 3.2 Basic building block of counter, Ripple counter, up counter, down counter, UpDown counter. 3.3 Concept of modulus counters, Decade counter, IC 7490 3.4 Applications of counter	15
Module -4:	Module -4: Computer Organization 4.1 Memory 4.2 Introduction, classification, 4.3 Characteristics (RAM,ROM,DRAM,EPR0M, Cache memory, FLASH memory)	15

	4.4 Computer architecture, von Neuman architecture, parallel processing	
Reference Books:- 1) M. Morris Mano, Digital System Design, Pearson Education Asia, 4th Edition, (2001) 2) Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia, 5th Edition, (1994) 3) W. H. Gothmann, Digital Electronics: An Introduction to Theory and Practice, Prentice		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	End Semester Examination (30 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 (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation 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		
	Yashwantrao Chavan Institute of Science, Satara		
	Board of Studies in Computer Application		
	Programme: B.Sc.		Semester - II
	Type : Major Practical		Marks: 50
	Credits : 2		From: A. Y. 2025-26
	Name of the Course: BCAP 126: Based on BCAT 124 and BCAT 125		
Course Objectives: 1) Understand Fundamentals of Electronics – hardware 2) Learn How to Design hardware.. 3) Understand the basic of logic. 4) Study Digital electronics.			
Course Outcomes: 1) Understand the timer IC application. 2) Develop the concept of Shift register. 3) Understand the different types of counter. 4) Understand the concept of computer architecture.			
Module	Title and Contents		Hrs
Section -1:	Integrated Circuits for Computational Application 1) Study of Astable multivibrator using IC 555. 2) Study of Bistable multivibrator using IC 555. 3) Study IC 555 timer Application. 4) Study of Characteristics of ideal Op-Amp 5) Study of Op-Amp as Inverting amplifier 6) Study of op-Amp as non-inverting amplifier. 7) Study of 74XX-series of digital logic integrated circuits. 8) Study IC 74XX Applications. 9) Study of TTL NAND gate 10) Study TTL NOR gate.		15
Section -2:	Computational Digital Electronics-II 1) Study of RS flip-flop. 2) Study of JK flip-flop. 3) Study of ripple counter. 4) Study of up-down counter. 5) Study of SIPO shift register. 6) Study of ripple counter. 7) Study of up-down counter. 8) Study of up-down counter. 9) Study of decade counter. 10) Study of Computer Architecture.		15

Reference Books:-

- 1) Sedha.R.S. (New Delhi: S Chand Publication,2012), “A text of Applied Electronics”
- 2) Thereja.B.L. (New Delhi: S. Chand & Company LTD,2005), “Basic Electronics Solid State”.
- 3) Mithal.G.K , (Delhi: Khanna publication,1997) “Electronic Devices and Circuits”.

Evaluation Pattern:**Total Marks: 50****Journal, Student's Performance Viva, Project(20 Marks):**

- Journal 1: 10 Marks
 - Students Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper(30 Marks):

Section I: Attempt any two questions
(Four questions of 10+5 Marks)

Section II: Attempt any two questions
(Four questions of 10+5 Marks)



Karmaveer Bhaurao Patil University, Satara

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

Faculty of Science and Technology

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - II

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course: Computational Mathematics – II

Course Objectives:

- 1) Learn relationship between numbers.
- 2) Study different logical problems.
- 3) 3) Understand relationship concept.

Course Outcomes:

- 1) Understand different types of matrix and their types.
- 2) Find rank of Matrix for a Matrix.
- 3) Find matrix form of basic geometric transformations.
- 4) Draw Matrix Representation of Graph.

Module	Title and Contents	Hrs
Module -1:	Module -1: Matrix 1.1 Definition of Matrix, Types of Matrices-Square Matrix, Row Matrix, Column, 1.2 Zero Matrix, Diagonal Matrix, Scalar Matrix, Identity Matrix, Transpose of Matrix, Symmetric Matrix, Skew-symmetric Matrix, Examples. 1.3 Determinants: Definition and properties of Determinants of order 2nd and 3rd and their expansions, Minors and Cofactors, Examples. 1.4 Cramer's Rule singular and non-singular matrix, Examples Caley HamiltonTheorem (without proof).	15
Module -2:	Module -2: Algebra of Matrix and Inverse of Matrix 2.1 Properties of matrix: Equality of Matrices, Scalar Multiplication of Matrix, Addition of Matrix, Subtraction of matrix, Multiplication of matrix, Invertible Matrix, Examples . 2.2 Rank of Matrix, Computation of inverse using definition, Examples. 2.3 Method of Inverse of matrix: Inversion Method, Elementary rows transformation, Elementary column transformation, Inverse of Matrix (Using Elementary Transformations), Examples.	15
Module -3:	Module -3: Graph and Operation on graphs 3.1 Introduction, Components of Graph, Simple graph, Multigraph, Pseudo Graph, Definition and elementary Results. 3.2 Types of graphs: Complete, Regular, Bi-Partite, Complete Bi-partite. 3.3 Matrix Representation of Graph: Adjacency and Incidence Matrix, sub graphs and induced graph, complement of a graph. 3.4 Operation on Graph: Union of graph, Intersection of graph, Complement of graph.	15

Module -4:	Module -4: Connected, Tree and Directed graph 4.1 Definitions: Walk, Trail, Path and circuit, Dijkstra's shortest path algorithm, Definition of Euler's and Hamilton Graph and Example, Tree Definition. 4.2 Theorem: A tree with n vertices has $n - 1$ edges. Theorem: A connected graph G with n vertices and $n - 1$, edges is a tree. 4.3 Definition of Directed graph, Types of directed graphs.	15
Reference Books:- 1) Lancaster, P., Tismenetsky, M. The Theory of Matrices with Applications, 2nd edn. 2) Graph Theory GTM 173, Sixth edition 2024Springer-Verlag, Heidelberg Graduate Texts in Mathematics 3) 8 Jan 2010 — Jonathan Gross and Jay Yellen's Graph Theory With Applications is the best textbook there is on graph theory PERIOD.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): - CCE - I : 10 Marks: Objective - CCE - II: 10 Marks: Objective - Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	End Semester Examination (30 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 (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation 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

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - II

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course: Computational Statistics - II

Course Objectives:

- 1) Understand concepts of time series.
- 2) Introduce concept of correlation coefficient and how to interpret its value.
- 3) Understand concept of simple linear regression and multiple linear regression.

Course Outcomes:

- 1) Understand fundamental concept of hypothesis testing.
- 2) Frame simple hypothesis and alternative hypothesis.
- 3) Measure the correlation between two variables and estimate the value.
- 4) Interpretation of multiple and partial correlation coefficient.

Module	Title and Contents	Hrs
Module -1:	Module -1: Time Series 1.1 Meaning and need of time series analysis, Zero Matrix, Diagonal Matrix, Scalar Components of times: Secular trend, Seasonal Variation, Cyclical variation, Irregular Variation. Additive and Multiplicative model, Utility of time series. Measurement of trend: Moving averages method, Progressive average method, least square method, Measurement of seasonal indices by simple average method 1.2 Concept of Bivariate data, covariance. Correlation: Definition of correlation, Types of Correlation, Methods of 1.3 Studying correlation, Scatter diagram. Karl Pearson's coefficient of correlation, Properties of correlation coefficient, 1.4 interpretation of correlation coefficient, Spearman's Rank Correlation coefficient (formula with & without ties).	15
Module -2:	Module -2: Regression (for ungrouped data) 2.1 Concept of dependent and independent variables. Concept of regression, Lines of regression Identification of response & predictor variables & relation between them. Difference between correlation and regression. 2.2 Fitting of line $Y = a + bX$. a and b are estimated using least Square method. 2.3 Regression Coefficients and their significance. Properties of Regression Coefficients. Multiple regression: Concept of multiple regressions. Yule's Notations, Fitting of multiple regression planes 2.4 Partial regression coefficients, interpretations.	15

Module -3:	Module -3: Regression (for ungrouped data) 3.1 Concept of dependent and independent variables. Concept of regression, Lines of regression 3.2 Identification of response & predictor variables & relation between them. Difference between correlation and regression. 3.3 Fitting of line $Y = a + bX$. a and b are estimated using least Square method. 3.4 Regression Coefficients and their significance. Properties of Regression Coefficients. 3.5 Multiple regression: Concept of multiple regressions. Yule's Notations, Fitting of multiple regression planes. 3.6 Partial regression coefficients, interpretations.	15
Module -4:	Module -3: Testing of Hypothesis 1) Notion of Population, Sample, Parameter, Statistic, Sampling distribution of Statistic. 2) Hypothesis, Simple and composite hypothesis, Null and alternative hypothesis, type I and type II errors, Critical region, level of significance, p-value, one and two tailed test, power of test. 3) General procedure of testing of hypothesis.	15
Reference Books:- 1) S. P. Gupta, Statistical methods (New Delhi : Sultan Chad & Son's, 2002) (Unit-I, II): P. No- 389-493. 2) P. S. Grewal, Methods of Statistical Analysis (Sterling Publishers, 1990), Unit-I, II : P. No. 366-486. 3) V. K. Kapoor, Gupta S. C., Fundamental of Mathematical Statistics (S Chand & Company, 2008) , Unit – III, IV: P. No. 3.1 to 3.98.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): - CCE - I : 10 Marks: Objective - CCE - II: 10 Marks: Objective - Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		End Semester Examination (30 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 (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation 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

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computer Application

Programme: B.Sc.

Semester - II

Type : Major Practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course: BCAP 129 : Based on BCAT 127 and BCAT 128

Course Objectives:

- 1) Understand the basic of logic.
- 2) Understand the basic set theory.
- 3) Understand the basic of Divisibility of integers.
- 4) Understand the basic concepts of statistics.

Course Outcomes:

- 1) Understand different types of matrix and their types.
- 2) Find rank of Matrix for a Matrix.
- 3) Find matrix form of basic geometric transformations.
- 4) Draw Matrix Representation of Graph.

Module	Title and Contents	Hrs
Section -1:	Computational Mathematics-II 1) Symmetric and Skew-symmetric Matrix with an Example. 2) Examples on singular and non-singular matrix. 3) Examples of Crammer's Rule. 4) Examples on Elementary rows transformation. 5) Inverse of matrix using Elementary Transformation. 6) Examples of Rank of matrix. 7) Determinant of order 2nd and 3 rd. and their Expansion Examples. 8) Find the vertices: Even Vertices, odd vertices, number of edges in graph 9) Union of graph, Intersection of graph and degree of vertex with an example. 10) Dijkstra's shortest path algorithm with an example.	15
Section -2:	Computational Digital Electronics-II 1) Time Series I (Moving Average Method) 2) Time Series II (Progressive Average Method) 3) Correlation I (Bivariate data) Correlation II (Karl Pearson's Correlation coefficient) 4) Correlation III (Spearman's Rank Correlation coefficient) 5) Regression I (ungrouped data) 6) Regression II (Grouped data) 7) Testing of hypothesis I (Type I error, Type II error) 8) Testing of hypothesis (Power of test) Department of B.Sc. Computer Applications 9) Case Study.	15

Reference Books: - 1) Lancaster, P., Tismenetsky, M. The Theory of Matrices with Applications, 2nd edn. 2) Graph Theory GTM 173, Sixth edition 2024Springer-Verlag, Heidelberg Graduate Texts in Mathematics 3) 4. 8 Jan 2010 — Jonathan Gross and Jay Yellen's Graph Theory With Applications is the best textbook there is on graph theory PERIOD. 4) 4.31May2023 Websites and online courses. Memgraph: Memgraph playground, Memgraph blog; Coursera: Algorithms on graphs;	
Evaluation Pattern:	
Total Marks: 50	
Journal, Student's Performance Viva, Project(20 Marks): • Journal 1: 10 Marks • Students Performance: 05 Marks Viva: 05 Marks	Practical Exam Paper(30 Marks): Section I: Attempt any two questions (Four questions of 10+5 Marks) Section II: Attempt any two questions (Four questions of 10+5 Marks)