



M.C.E. Society's
ABEDA INAMDAR SENIOR COLLEGE OF ARTS, SCIENCE AND
COMMERCE (AUTONOMOUS), PUNE
AZAM CAMPUS, CAMP, PUNE – 411001

Syllabus of S.Y. B.C.A. (Science)

Applicable for the Autonomous College affiliated to

Savitribai Phule Pune University

**BCA Science (Honours) Four Year Degree Programme
(Choice Based Credit System)
(NEP 2023 Pattern)**

With effect from June 2024

SEMESTER III					
Course Type	Course Code	Course Name	Credits		
			Theory	Practical	Total
Major/Core Theory	23SBCA31MM	Python Programming	2		
Major/Core Theory	23SBCA32MM	Web Technology using PHP	2		
Major/Core Theory	23SBCA33MM	Software Engineering	2		
Major/Core Practical	23SBCA34MM	Lab I : Python Programming		2	
Minor Theory	23SBCA31MNA Or 23SBCA31MNB	Computer Network Or Computer Organization		2	
	23SBCA32MNA Or 23SBCA32MNB	Lab II: Computer Network Or Lab II – Computer Organization			2
GE/OE	23CBCO3OEE	From Basket of OE	2		
Vocational Skill Course	23SBCA31VS	Lab III - Web Technology using PHP			2
AECC	23ABHN31AE	Hindi	2		
Co-Curricular Courses	23ABHNCC	From Basket of CC	2		
Field Project	23SBCA4FP	Project		2	
			14	8	22

SEMESTER IV					
Course Type	Course Code	Course Name	Credits		
			Theory	Practical	Total
Major/Core Theory	23SBCA41MM	Data Structure using Python	2		
Major/Core Theory	23SBCA42MM	Object Oriented Programming using Java	2		
Major/Core Theory	23SBCA43MM	Cloud Computing	2		
Major/Core Practical	23SBCA44MM	Lab I : Data Structure using Python			2
Minor Theory	23SBCA41MNA Or 23SBCA41MNB	Introduction to Cyber Security Or 8051 Microcontroller Programming		2	
Minor Practical	23SBCA42MNA Or 23SBCA42MNB	Lab II – Introduction to Cyber Security Or Lab II – 8051 Micro-controller Programming			2
GE/OE	23CBCO4OEF	From Basket of OE	2		
SEC	23SBCA41SE	Lab III: Object Oriented Programming using Java			2
AECC	23ABHN31AE	Hindi	2		
Co-Curricular Courses	23ABENCC	From Basket of CC	2		
CEP	23SBCA4CEP	CEP	2		
			14	8	22



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S.Y.B.C.A (Science) SEM III (CBCS– NEP 2023Pattern)

Course Title	Python Programming
Course Code: 23SBCA31MM	No. Of Credits: 02
Course Type: MM(Major Mandatory)	Total Teaching Hours: 30

Sr.No.	Course Objectives
1.	Able to learn and understand the basics of Python programming.
2.	Able to understand Python programming functions, conditional statements and loops.
3.	Able to learn class object concept in python programming

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Solve basics programs of python programming.
2.	To implement object oriented program.
3.	To create user defined functions.
4.	To create modules in python.
5.	To create user defined packages.

Unit No	Title with Contents	No.of Lectures
Unit I	Introduction to Python	08
	<p>1. Introduction to Python</p> <p>2. Feature of Python</p> <p>3. Variable and data types</p> <p>4. Operators in python</p> <p>5. Conditional statements-If, If-Else, nested if-else</p> <p>6. Loops</p> <ul style="list-style-type: none"> i. For loop ii. While iii. Nested loops <p>7. Control Statements-</p> <ul style="list-style-type: none"> i. Break, ii. Continue iii. Pass. <p>8. String Manipulation-Accessing String, Basic Operations, and String Slices.</p>	1 1 1 1 1 1 1 1 1
Unit II	Data Structure and Functions in python	08
	<p>1. Lists in python</p> <ul style="list-style-type: none"> i. Lists-Introduction, ii. accessing list, iii. working with lists, iv. Function & methods. <p>2. Tuple-Introduction</p> <ul style="list-style-type: none"> i. Accessing tuples ii. Operations working function & methods, <p>3. Dictionaries-Introduction</p> <ul style="list-style-type: none"> i. Accessing values in dictionaries ii. Working with dictionaries <p>4. Functions</p> <ul style="list-style-type: none"> i. Defining a function ii. Calling a function iii. Function arguments iv. Anonymous function v. global & local variables 	2 2 2 2
Unit III	Modules and Packages	07
	<p>1. Modules and Packages</p> <ul style="list-style-type: none"> i. Built in Modules ii. Importing modules in python program iii. Working with Random Modules. iv. Example - time, date time, calendar v. User Defined functions. vi. Structure of Python Modules <p>2. Packages</p> <ul style="list-style-type: none"> i. Predefined Packages ii. User defined Package 	1 1 1 1 1 2

Unit IV	Classes ,Objects in Python	07
	<p>1. Classes and Objects</p> <ul style="list-style-type: none"> i. Classes as User Defined Data Type ii. Objects as Instances of Classes iii. Creating Class and Objects. iv. Creating Objects By Passing Values v. Variables & Methods in a Class <p>2. Inheritance</p> <ul style="list-style-type: none"> i. Single Inheritance ii. Multilevel Inheritance 	4 2

Suggested Reading	
1.	Programming Python, 4th Edition by Mark Lutz
2.	Python Programming: An introduction to computer, John Zelle, 3rd Edition.
3.	Learning Python, 4th Edition by Mark Lutz
Website Reference Link:	
1.	Python Tutorial : https://www.w3schools.com/python/
2.	Python For Beginners : https://www.python.org/about/gettingstarted/
3.	Python Tutorial Learn Python Programming https://www.geeksforgeeks.org/python-programming-language
4.	Python Tutorial : https://www.tutorialspoint.com/python/index.htm

Best IDE Tools:		
Sr.No.	Name of IDE or Tools	Operating System
1	PyCharm Professional Edition	Windows
2	Python 3.8.10	Windows



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S.Y.B.C.A (Science) SEM III (CBCS– NEP 2023Pattern)

Course Title	Web Technology Using PHP
Course Code: 23SBCA32MM	No. Of Credits: 02
Course Type: MM(Major Mandatory)	Total Teaching Hours: 30

Sr.No.	Course Objectives
1.	To introduce server-side programming concepts and terminology.
2.	To analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application
3.	To provide the necessary knowledge to design and develop Static, web applications using PHP

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Understand the PHP downloading, installation and configuring PHP process
2.	Familiar with Function String loop control statement & arrays.
3.	To analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.
4.	Creation of web pages that includes verification and validation of web pages using different web technologies.

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to PHP	6
	1. Introduction <ul style="list-style-type: none"> i. HTTP Basics ii. Web Server iii. Web Browser 2. Introduction PHP <ul style="list-style-type: none"> i. Installing PHP ii. Setting up a Development Environment 3. Language Basics <ul style="list-style-type: none"> i. Operators ii. Flow-Control Statements iii. Including Code Embedding PHP in Webpages 	2 2 2
Unit II	Web Techniques	8
	1. HTTP Basics 2. Variables 3. Server Information 4. Processing Forms 5. File uploading 6. Setting Response Headers 7. Maintaining State	1 1 1 2 1 1 1
Unit III	Functions and Strings	8
	1. Functions in PHP <ul style="list-style-type: none"> i. Calling a Function ii. Defining a Function iii. Variable Scope iv. Function Parameters v. Return Values vi. Variable Functions vii. Anonymous Functions 2. Strings in PHP <ul style="list-style-type: none"> i. Quoting String ii. Constants iii. Printing Strings iv. Accessing Individual Characters v. Cleaning Strings vi. Encoding and Escaping vii. Comparing Strings 	4 4
Unit IV	Arrays in PHP	8
	1. Indexed Versus Associative Arrays 2. Identifying Elements of an Array 3. Storing Data in Arrays 4. Multidimensional Arrays 5. Extracting Multiple Values 6. Converting Between Arrays and Variables 7. Traversing Arrays 8. Sorting	1 1 1 1 1 1 1 1

Suggested Reading	
1.	“Programming PHP”, RasmusLerdorf and Kevin Tatroe, O'Reilly publication, ISBN-13978-1565926103
2.	“Beginning PHP5, Apache, and MySQL Web Development (Programmer to Programmer)”, byElizabethNaramore,JasonGerner,YannLeScouarnec,JeremyStoltz,MichaelK.Glass,Wrox;2nd edition (27 January 2005), SB - 3978-0764579660.
3.	“Beginning PHP 5. FOR BEGG ERS” By: Ivan Byross, Sharanam Shah Publisher: The Team (SPD) ISBN 10:81-8404-075-X
4.	“Beginning PHP 5” by : Dave W. Mercer, Allent Kent, Steven D. Nowicki, David Mercer,Dan Squire, Wankyu Choi , Publisher: WROX (Wiley dreamTech), ISBN :81-265-0539
5.	The Complete Reference – Steven Holznerhttps://books.google.co.in/books?id=bGS4CmJY0I8C&printsec=frontcover&dq=PHP +ebook &hl=en&sa=X&ved=0ahUKEwj4PuNoKLpAhURwTgGHXadDbYQ6AEIVTAF#v=onepage &q&f=false
6.	Programming PHP – RasmusLerdorf , Kevin Tatroe and Peter Macintyre https://www.pdfdrive.com/programming-php-d38208381.html
Website Reference Link:	
1.	PHP 7.4.22 : www.php.net
2.	PHP Tutorial : https://www.w3schools.com/php/
3.	Learn PHP: https://www.tutorialspoint.com/php/index.html

Best IDE Tools:		
Sr.No	Name of IDE or Tools	Operating System
1	XAMPP Apache + PHP + Perl (Version 7.3)	Window Operating System
2	XAMPP Apache + PHP + Perl	RedHat/Linux/Ubuntu



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S.Y.B.C.A (Science) SEM III (CBCS– NEP2023Pattern)

Course Title	Software Engineering	
Course Code: 23SBCA33MM		No. Of Credits: 02
Course Type: MM(Major Mandatory)	Total Teaching Hours: 30	

Sr.No.	Course Objectives
1.	To learn and understand the principles of System and Software Engineering
2.	To be acquainted with methods of capturing, specifying, Visualizing and analyzing Software requirements.
3.	To learn design processes and software quality parameters

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Compare and contrast various Software Engineering models
2.	Decide on appropriate process model for a developing a software project
3.	Classify software applications and Identify unique features of various domains
4.	Prepare System Requirement Specification (SRS) for the given problem
5.	Design and analyse Data Flow diagrams

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to System Engineering	03
	1. Definition of system 2. Characteristic of a system 3. Basic Components 4. Elements of the system 5. Types Of System 6. System Components 7. Definition of Software 8. Characteristics of Software <ul style="list-style-type: none"> i. Software is manufactured or Engineered ii. Software does not wear out iii. Most software is custom built 9. Definition of Software Engineering 10. Layered Technology of Software Engineering 11. Need for software Engineering 12. Mc Call's Quality factors <ul style="list-style-type: none"> i. Product Operation ii. Product Revision iii. Product Transition 13. The Software Process <ul style="list-style-type: none"> i. Software Process Model ii. Software Process Framework Activities iii. Umbrella Activities 	1
Unit II	Software Process And Life Cycle Models	04
	1. Introduction 2. Activities of SDLC <ul style="list-style-type: none"> i. SDLC life-Cycle Phases ii. Advantages of SDLC 3. Types of SDLC process Model <ul style="list-style-type: none"> i. Descriptive Model ii. Prescriptive Model 4. Prescriptive Process models <ul style="list-style-type: none"> i. Waterfall Model ii. Incremental Process Models iii. Evolutionary process Models <ul style="list-style-type: none"> a. Prototyping b. Spiral Model iv. Concurrent Models 	1 1 2
Unit III	Software Requirements	06
	1. Introduction Requirement Engineering 2. Types of Requirements <ul style="list-style-type: none"> i. Functional- non-functional requirements ii. Domain Requirements iii. Software requirement 	1 1

	<ul style="list-style-type: none"> a. User requirement b. System requirements <p>3. Requirement Engineering Tasks</p> <ul style="list-style-type: none"> i. Inception ii. Elicitation iii. Elaboration iv. Negotiation v. Specification vi. Validation <p>4. Requirement Gathering</p> <ul style="list-style-type: none"> i. Collaborative Requirement Gathering ii. Quality Function Deployment(QFD) iii. Usage Scenarios iv. Elicitation Work Products <p>5. Feasibility Study</p> <ul style="list-style-type: none"> i. Technical Feasibility ii. Operational Feasibility iii. Economic Feasibility <p>6. Fact Finding Techniques</p> <ul style="list-style-type: none"> i. Interviews <ul style="list-style-type: none"> a. Structured Interview b. Unstructured Interview ii. Questionnaires iii. Record View iv. Observation 	1
Unit IV	Analysis And Design Tools	07
	<p>1. Introduction to Analysis and Design</p> <p>2. Decision Tree</p> <p>3. Decision Table</p> <p>4. Data Flow Diagram(DFDs)</p> <ul style="list-style-type: none"> i. Types Of DFDs ii. Levels of DFDs <p>5. Data Dictionary</p> <ul style="list-style-type: none"> i. Elements Of DD ii. Advantages and Disadvantages Of DD <p>6. Input and Output Design</p> <p>7. Pseudo code</p> <p>8. Case studies</p>	1 2 2
Unit V	Software Testing	03
	<p>1. Introduction</p> <ul style="list-style-type: none"> i. Need/Necessity of testing ii. Testing Terminology <p>2. Definition of Software Testing</p> <ul style="list-style-type: none"> i. Life cycle Of Software Testing ii. Types Of Testing <ul style="list-style-type: none"> a. Manual Testing 	1 1

	b. Automation Testing 3. Verification and Validation 4. Black Box Testing 5. White Box Testing	1
Unit VI	Agile Development	07
	1. Agility 2. Agile Process i. Principles ii. The Policies of Agile Development iii. Human Factors 3. Extreme Programming(XP) 4. Adaptive Software Development(ASD) 5. Scrum 6. Dynamic System Development Model(DSDM)	2 2 1 1 1

Suggested Reading	
1.	Software Engineering A Practitioner's Approach- Roger S. Pressman, McGrawhill
2.	International Editions 2010(Seventh Edition)
3.	Software Testing: A Craftsman's Approach, Third Edition by Paul Jorgensen
4.	System Analysis, Design and Introduction to Software Engineering (SADSE) –S. Parthsarthy, B.W. Khalkar
5.	System Analysis and Design- Elias Awad, Galgotia Publication, SecondEdition
6.	Fundamentals of Software Engineering- Rajib Mall, PHI Publication, FourthEdition
Website Reference Link:	
1.	Open Source Initiative: https://opensource.org/
2.	Software Engineering - Wikipedia, the free encyclopaedia : http://en.wikipedia.org/
3.	System Engineering: https://aaq.auburn.edu/node/9050/take
4.	SOFTWARE PROCESS And Life Cycle Models : https://www.tutorialspoint.com/sdlc/index.htm



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Course Title	Lab I : Python Programming
Course Code: 23SBCA34MM	No. Of Credits: 02
Course Type: MM(Major Mandatory)	Total Teaching Hours: 60

Sr.No.	Course Objectives
1.	To learn the syntax and semantics of the python Programming language
2.	To learn the object oriented programming concepts of python programming.
3.	To learn the modules and package in python.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	To implement object oriented program.
2.	To create user defined functions.
3.	To create modules in python.
4.	To create user defined packages.

Assignment No	Assignment Name	No. Of Sessions
1	Assignment on Conditional statements and loops	02
2	Assignment on Data Types(List, Tuple, dictionary and Sets) in python	04
3	Assignment on Functions	03
4	Assignment on Modules and package	02
5	Assignment on Class and objects	03
Total Number of Sessions		14

Best IDE Tools:		
Sr.No	Name of IDE or Tools	Operating System
1	PyCharm Professional Edition	Windows
2	Python 3.8.10	Windows



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S.Y.B.C.A (Science) SEM III (CBCS– NEP 2023Pattern)

Course Title	Computer Networks	
Course Code: 23SBCA31MNA		No. Of Credits: 02
Course Type: MN(Minor Theory)		Total Teaching Hours: 30

Sr.No.	Course Objectives
1.	Ability to build an understanding of the fundamental concepts of computer Networking.
2.	To able to Identify the different types of network topologies and protocols.
3.	Independently understand basic computer network technology.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Able to understand the basic concepts of networking
2.	Able to understand how networks connected through transmission media.
3.	Able to understand how networks connected through network devices.

Unit No	Title with Contents	No .of Lectures
Unit I	Introduction to Computer Networks	04
	1. Introduction 2. Definition <ul style="list-style-type: none"> i. Goals ii. Applications iii. Components 3. Topology <ul style="list-style-type: none"> i. Types of Topology 3. Types of Networks <ul style="list-style-type: none"> i. LAN ii. MAN iii. WAN iv. Internet 4. Broadcast & Point-To-Point Networks <ul style="list-style-type: none"> i. Communications Types 5. Modes of Communication : <ul style="list-style-type: none"> i. Simplex ii. Half Duplex iii. Full Duplex 	1 1 1 1 3
Unit II	Network Models	05
	1. OSI Reference Model 2. Functionality of OSI layer 3. TCP/IP Reference Model 4. Comparison of OSI and TCP/IP model 5. TCP/IP Protocol Suite 6. UDP 7. Addressing – <ul style="list-style-type: none"> i. Physical, ii. Logical iii. Port addresses 	1 1 1 1 1 1 1 1 1 1 1 1
Unit III	Network Connectivity Devices and Technologies	06
	1. Categories of Connectivity Devices <ul style="list-style-type: none"> i. Passive & Active Hubs ii. Repeaters iii. Bridges (Transparent Bridges, Spanning Tree, Bridges, Source Routing Bridges) iv. Switches (2-Layer Switch, 3-Layer Switch(Router)) v. Gateways vi. Network Security Devices (firewalls , Proxy Server) 2. Ethernet and wireless technologies	1 1 1 1 2 2 2

Unit IV	IP Addressing and Sub-netting	06
	1. Introduction to IPv4 2. Introduction to IPv6 3. IPv4 addressing and sub-netting 4. Subnet mask calculations 5. IPv6 addressing basics	1 1 2 2
Unit V	Routing Protocols	09
	1. Forwarding 2. Structure of a Router 3. Routing Tables 4. Intra – And Inter-Domain Routing 5. Distance Vector Routing 6. RIP 7. OSPF 8. BGP 9. Multicast Routing	

Suggested Reading	
1.	Computer Networks - Andrew Tanenbaum (III Edition)
2.	Data Communications & Networking - Behrouz Ferouzan (III Edition)
3.	Complete Guide to Networking - Peter Norton
4.	Computer Networks: A Systems Approach - Larry Peterson, Bruce Davie
5.	Computer Networking: A Top-down Approach-Book by Jim Kurose
6.	Gary A. Donahue:" Network Warrior" O'Reilly
Website Reference Link:	
1.	Computer Networks - https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm
2.	Fundamentals of computer networking : https://www.javatpoint.com/fundamentals-of-computer-networking
3.	Basic computer network: https://www.guru99.com/basic-computer-network.html
4.	Basic Computer networking: https://www.geeksforgeeks.org/basics-computer-networking/



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S.Y.B.C.A (Science) SEM III (CBCS– NEP 2023Pattern)

Course Title	Computer Organization
Course Code: 23SBCA31MNB	No. Of Credits: 02
Course Type: MN(Minor Theory)	Total Teaching Hours : 30

Sr.No.	Course Objectives
1.	To study number system, logic gates
2.	To understand combinational & Sequential circuits.
3.	To provide a broad overview of architecture and functioning of computer systems
4.	To learn the basic concepts behind the architecture and organization of computers.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Data representation and Computers Arithmetic
2.	Design of Combinational Circuit
3.	Design of Sequential circuit.

Unit No	Title with Contents	No. of Lectures
Unit I	Data representation and Computers Arithmetic	8
	<ol style="list-style-type: none"> 1. Introduction to Decimal, Binary and Hexadecimal Number Systems and their inter-conversions 2. BCD code, Gray code and ASCII Code 3. 1's and 2's complement of binary numbers 4. Binary Addition , Binary Subtraction , Binary subtraction using 1'sand 2's complement Method 	
Unit II	Logic Gates and Boolean Algebra	10
	<ol style="list-style-type: none"> 1. Logic gates (With their symbols, Boolean Equation and Truth Table) 2. Boolean theorems, Boolean Laws, De Morgan's Theorem, simplifying of Boolean expression using Boolean Algebra, Implementation of other gates using universal gates 3. Karnaugh Maps: Introduction, Reduction technique using Karnaugh maps ,2/3/4 variable K-maps, Grouping of variables in K-maps, simplifying of Boolean expression using K-map 	
Unit III	Combinational Circuits and Sequential Circuits	12
	<ol style="list-style-type: none"> 1. Arithmetic Circuits: Half Adder, Full Adder, Parallel Adder, Half Subtractor, Universal Adder / Subtractor 2. Study of Multiplexer and Demultiplexer 3. Study of Encoder and Decoder 4. Flip Flops: Introduction and Types 5. Shift Registers: Introduction, Types of Shift registers, Ring Counter. 6. Counters -Synchronous and Asynchronous type (3 -bit Up, Down and Up - Down counter) 7. IC 7490: Internal Block Diagram and designing Mod-N counters 	

Suggested Reading	
1.	R.P. Jain, "Modern Digital Electronics",McGraw-Hill Publications.
2.	Floyd and Jain, " Digital Fundamentals", Pearson Publication
3.	Morris Mano , "Computer System Architecture",Prentice-Hall
Website Reference Link:	
1.	Tutorial Points https://www.tutorialspoint.com/microprocessor/microcontrollers_overview.htm
2.	Electronic Tutorials : https://www.electronics-tutorials.ws/boolean/bool_7.html



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Course Title	Lab II : Computer Networks	
Course Code: 23SBCA32MNA		No. Of Credits: 02
Course Type: MN(Minor Practical)		Total Teaching Hours: 60

Sr.No.	Course Objectives
1.	Provide students with hands-on experience in configuring, managing, and troubleshooting computer networks.
2.	Help students understand the components of computer networks such as routers, switches, servers, and client devices, and their roles in network communication.
3.	Enable students to apply networking concepts learned in theory, such as IP addressing, subnetting, routing, switching, and network security, in practical scenarios.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Be proficient in configuring network devices such as routers, switches, and access points, including setting up IP addressing, subnetting, and routing protocols.
2.	Understand the network protocols such as TCP/IP, DHCP, DNS, and HTTP, and be able to configure and troubleshoot them in practical scenarios.
3.	Develop proficiency in capturing and analyzing network packets using Wireshark, gaining insights into network traffic patterns, protocols, and communication behaviors.

Assignment No	Assignment Name	No. Of Sessions
1.	To learn computer network administration commands and command line tools for system administration.	01
2.	To learn the basic Switch Configuration.	01
3.	To learn the Linux Operating Systems and Application Environments	02
4.	To learn the Learning about Windows Operating System.	02
5.	To learn the Operating Systems for Networked Environment.	02
6.	To learn the Wireshark for simple packet capture and observations.	02
7.	To learn the DNS using Wireshark.	02
8.	To learn the Packet Tracer: Building Network and Configuring Router.	02
Total		14

Best IDE Tools:		
Sr.No	Name of IDE or Tools	Operating System
1	Packet Tracer	Windows
2	Wireshark.	Windows/Kali Linux



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S.Y.B.C.A (Science) SEM III (CBCS– NEP 2023Pattern)

Course Title	Lab II-Computer Organization	
Course Code: 23SBCA32MNB		No. Of Credits: 02
Course Type: MN(Minor Practical)		Total Teaching Hours : 60

Sr.No.	Course Objectives
1.	To study architecture and functioning of computer systems
2.	To learn the basic concept behind the architecture and organization of computers

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Design and implement combinational circuits
2.	Design and implement sequential circuits
3.	Translate real world problems into digital logic formulations

Assignment No	Assignment Name	No. Of Sessions
1.	Study of Basic Logic Gates (Verification of Truth tables)	1
2.	Study of Derived Logic Gates (Verification of Truth tables)	1
3.	Study Of De Morgan's Theorem	1
4.	Study of Binary to Gray & Gray to Binary Converter (K- Map based design)	1
5.	Study of Half Adder and Full Adder using Logic Gates.	1
6.	Study of Half Subtractor using Logic Gates.	1
7.	Study of Decimal to BCD (Binary) Converter using Gates.	1
8.	Study of Multiplexer and Demultiplexer	1
9.	Study of flip flops.	1
10.	Study of counter ICs: IC 7490 and designing Mod-N counters	1
11.	Study of Asynchronous Up/Down Counter	1
12.	Study of Synchronous Up/Down Counter	1
13.	Study of Shift Registers	1
14.	Study of Four-bit ALU	1
Total Number of Sessions		14



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S.Y.B.C.A (Science) SEM III (CBCS– NEP 2023Pattern)

Course Title	Lab III - Web Technology using PHP	
Course Code: 23SBCA31VS		No. Of Credits: 02
Course Type: VSC(Vocational Skill Course)		Total Teaching Hours: 60

Sr.No.	Course Objectives
1.	To understand installation process
2.	To get familiar with basics of the Internet Programming
3.	To acquire knowledge and skills for creation of web site using client and server side.
4.	To understand process of developing Static web applications

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Design and implement static websites using appropriate client side and server side technologies.
2.	Build Static web site using PHP Programming.

Assignment No	Assignment Name	No. Of Sessions
1	Assignment on loops in PHP	2
2	Assignment on Control Statements	2
3	Assignment on Processing Forms & File Uploading	4
4	Assignment on Functions	2
5	Assignment on Strings	2
6	Assignment on Arrays	2
Total Number of Sessions		14

Best IDE Tools:		
Sr.No	Name of IDE or Tools	Operating System
1	XAMPP Apache + PHP + Perl (Version 7.3)	Window Operating System
2	XAMPP Apache + PHP + Perl	RedHat/Linux/Ubuntu

SEM-IV



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Data Structure using Python	
Course Code: 23SBCA41MM		No. Of Credits: 02
Course Type: MM(Major Mandatory)		Total Teaching Hours: 30

Sr.No.	Course Objectives
1.	To understand analysis of algorithms.
2.	To learn different searching and sorting techniques.
3.	To understand different types of linked list.
4.	To learn use of stack and queue.
5.	To understand the use of tree as a data structure.
6.	To learn graph and its traversal methods.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Analyse the algorithms on the scale of their performance.
2.	Develop searching and sorting techniques to solve real world computing problems.
3.	Apply linked list data structure for developing applications.
4.	Implement various applications of stack and queue.
5.	Illustrate tree terminology and its traversal techniques.

Unit No	Title with Contents	No .of Lectures
Unit I	Introduction to Data Structure	02
	1. Need of Data Structure 2. Data object, Data Structure, Abstract Data Type (ADT) 3. Types of Data Structures 4. Algorithm Analysis – Frequency counts, Space and Time complexity 5. Asymptotic notations – Big O, Omega (Ω), Theta(θ)	1 1
Unit II	Array as Data Structure	07
	1. Array representation – i. Row major ii. column major 2. Application – Sorting and Searching 3. Comparison based sorting methods - i. Bubble Sort ii. Insertion Sort 4. Divide and Conquer strategy i. Merge Sort, ii. Quick Sort 5. Searching techniques with time Complexity - i. Linear search ii. Binary search	1 1 2 2 1
Unit III	Linked List	08
	1. Introduction 2. Dynamic implementation of Linked List 3. Types of linked lists – i. Singly ii. Doubly iii. Circular 4. Operations on Linked List i. Create ii. Traverse iii. Insert, iv. Delete, v. Search, vi. Reverse vii. Merge viii. Union ix. intersection	2 1 2 3

Unit IV	Stacks and Queues	09
	<p>1. Representation of Stack - Static and Dynamic</p> <p>2. Operations on Stack –</p> <ul style="list-style-type: none"> i. init() ii. push() iii. pop() iv. isEmpty() v. isFull() vi. peek() <p>3. Applications of Stack</p> <ul style="list-style-type: none"> i. Expression types - infix, prefix and postfix, ii. Implementation of infix to postfix iii. Evaluation of postfix expression <p>4. Representation of Queues –</p> <ul style="list-style-type: none"> i. Static ii. Dynamic <p>5. Operations on queue –</p> <ul style="list-style-type: none"> i. Insert ii. delete iii. empty iv. full v. peek <p>6. Types of Queue</p> <ul style="list-style-type: none"> i. Linear Queue ii. Circular Queue, iii. Priority Queue iv. Double Ended Queue <p>7. Application of queue –</p> <ul style="list-style-type: none"> i. Priority Queue ii. CPU scheduling 	<p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>1</p>

Unit V	Trees	04
	<p>1. Introduction and Tree terminologies</p> <p>2. Binary trees: Types - full, complete and skewed</p> <p>3. Representation of Binary Trees – Dynamic</p> <p>4. Types of Traversal (Recursive implementation)</p> <ul style="list-style-type: none"> i. Preorder ii. Inorder iii. Postorder <p>5. Binary Search Tree –</p> <ul style="list-style-type: none"> i. Create ii. Insert iii. Delete 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

Suggested Reading	
1.	Fundamentals of Data Structures - Horowitz Sahani (Galgotia)
2.	Data Structures & Algorithms in Python, by John Canning Alan Broder Robert Lafore, Addison Wesley.
3.	Data Structures and Algorithms Using Python, by Rance D. Necaise, JOHN WILEY & SONS, INC,2011
4.	Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
5.	Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L.
6.	Data Structures and Program Design Using Python, by Dheeraj Malhotra, Neha Malhotra, , MERCURY LEARNING AND INFORMATION,2021
Website Reference Link:	
1.	Python Data Structures and Algorithms : https://www.geeksforgeeks.org/python-data-structures-and-algorithms/
2.	Data Structures and algorithm in python : https://www.javatpoint.com/data-structures-and-algorithms-in-python
3.	Learn Data structures and algorithm in python : https://jovian.com/learn/data-structures-and-algorithms-in-python
4.	Learn Data structures and algorithm with python : https://www.codecademy.com/learn/learn-data-structures-and-algorithms-with-python

Best IDE Tools:		
Sr.No	Name of IDE or Tools	Operating System
1	PyCharm Professional Edition	Windows
2	Python 3.8.10	Windows



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Object Oriented Programming using Java
Course Code: 23SBCA42MM	No. Of Credits: 02
Course Type: MM(Major Mandatory)	Total Teaching Hours: 30

Sr. No	Course Objectives
1.	To learn implementation of object-oriented concepts with Java.
2.	To understand Inheritance and interfaces.
3.	To know the process of application development using Graphical User Interface (GUI).
4.	To acquire knowledge about handling databases using Java.

Sr. No	Course Outcome
After completing course students will be able to -	
1.	Identify classes, objects, class members and relationships for a given problem.
2.	Design end to end applications using object oriented constructs.
3.	Use Java APIs for program development.
4.	Handle abnormal termination of a program using exception handling

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to JAVA	06
	1. A Short History of Java 2. Features of Java 3. Java Environment – Compiler, Interpreter, JVM 4. Simple java program 5. Types of Comments 6. Declaring single and multi-dimensional arrays 7. Accepting input using Command line arguments 8. Accepting input from console (UsingBufferedReader and Scanner class)	1 2 1 2
Unit II	Classes and Object	06
	1. Defining Your Own Classes 2. Access Specifiers (public, protected, private, default) 3. Array of Objects 4. Constructor, Overloading Constructors and use of “this” Keyword 5. static blocks, static Fields and static methods 6. Predefined classes – Object class methods>equals(), toString(),hashcode() 7. Garbage Collection (finalize()Method)	1 1 1 1 1 1
Unit III	Inheritance and Interface	08
	1. Inheritance Basics (extends Keyword) and Types of Inheritance 2. Superclass, Subclass and use of Super Keyword 3. Method Overriding and run time polymorphism 4. Use of final keyword related to variable, method and class 5. Use of abstract class and abstract methods Interface 6. Defining and Implementing Interfaces 7. Runtime polymorphism using interface Packages	1 1 2 2 1 1
Unit IV	Exception Handling	04
	1. Exception class, Checked and Unchecked exception	1

	2. Catching exception and exception handling – try, catch, finally, throw and throws, multiple catch block 3. Creating user defined exception	1 2
Unit V	User Interface with AWT and Swing	6
	1. What is AWT? What is Swing? 3. Difference between AWT and Swing 4. The MVC Architecture And Swing 5. Layout Manager and Layouts, 6. Components – JComponent JLabel, JButton, JTextField, JTextArea, JCheckBox, JRadioButton, JList, JComboBox, JMenu and JPopupMenu Class,JMenuItem 7. Dialogs (Message, confirmation, input),JFileChooser Event Handling: Event sources, Listeners – ActionListener, ItemListener	1 1 3 1

Suggested Reading	
1.	“Core Java Volume – Fundamentals”, Author – Cay S. Horstmann, Latest Edition – 11th Edition, Publisher – PrenticeHall
2.	“Effective Java”, Author – Joshua Bloch, Latest Edition – 3rd Edition,Publisher – Addison Wesley
3.	“Java - The Complete Reference”, Author – Herbert Schildt, Latest Edition – 11th Edition, Publisher – McGraw Hill Education
4.	“Head First Java”, Author – Kathy Sierra & Bert Bates, Latest Edition – 2nd Edition Publisher –Shroff/O'Reilly
Website Reference Link:	
1.	Java Programming : https://www.programiz.com/java-programming
2.	Java Tutorial : https://www.geeksforgeeks.org/java/
3.	Java Tutorial : https://www.javatpoint.com/java-tutorial
4.	Learn Java Programming: https://www.tutorialspoint.com/java/index.htm

Best IDE Tools:		
Sr. No.	Name of IDE or Tools	Operating System
1.	ECLIPSE, NETBEANS & JDK	Window Operating System
2.	NETBEANS, ECLIPSE & JDK	Red Hat /Linux / Ubuntu



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Cloud Computing
Course Code: 23SBCA43MM	No. Of Credits: 02
Course Type: MM(Major Mandatory)	Total Teaching Hours: 30

Sr.No.	Course Objectives
1.	To understand the principles and paradigm of Cloud Computing
2.	To appreciate the role of Virtualization Technologies
3.	Ability to design and deploy Cloud Infrastructure
4.	Understand Cloud Security Issues And Solutions

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2.	Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost, and then study how to leverage and manage single and multiple data centers to build and deploy cloud applications that are resilient, elastic and cost-efficient.
3.	Discuss system, network and storage virtualization and outline the role in enabling the cloud computing system model.
4.	Illustrate the fundamental concepts of cloud storage and demonstrate the use in storage systems such as Amazon S3.
5.	Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Cloud Computing	08
	<p>1. Overview,</p> <ul style="list-style-type: none"> i. Layers and Types of Cloud, Desired ii. Features of a Cloud, iii. Benefits and Disadvantages of Cloud Computing, iv. Cloud Infrastructure Management, Infrastructure as a Service Providers, v. Platform as a Service Providers vi. Multitenant Technology. <p>2. Cloud-Enabling Technology:</p> <ul style="list-style-type: none"> i. Broadband Networks and Internet Architecture, ii. Data Center Technology, iii. Virtualization Technology. <p>3. Infrastructure as a Service,</p> <ul style="list-style-type: none"> i. Platform as a Service, ii. Software as a Service, iii. Cloud Deployment Models. 	<p>4</p> <p>2</p> <p>2</p>
Unit II	Abstraction and Virtualization	07
	<p>1. Introduction to Virtualization Technologies,</p> <ul style="list-style-type: none"> i. Application Virtualization. ii. Network Virtualization. iii. Desktop Virtualization. iv. Storage Virtualization. v. Server Virtualization. <p>2. Load Balancing and Virtualization,</p> <ul style="list-style-type: none"> i. Software-based load balancers ii. Hardware-based load balancers <p>3. Understanding Hypervisors,</p> <ul style="list-style-type: none"> i. Type 1 Hypervisor ii. Type 2 Hypervisor <p>4. Virtual Machines Provisioning and Manageability</p> <p>Virtual Machine Migration Services,</p> <p>5. Provisioning in the Cloud Context</p> <p>Virtualization of CPU, Memory , I/O Devices,</p> <p>6. Virtual Clusters and Resource management</p>	<p>2</p> <p>2</p> <p>2</p> <p>1</p>
Unit III	Programming, Environments and Applications	08
	<p>1. Features of Cloud and Grid Platforms,</p> <ul style="list-style-type: none"> i. Programming Support of Google App Engine, ii. Programming on Amazon AWS and Microsoft Azure, iii. Emerging Cloud Software Environments <p>2. Applications:</p> <ul style="list-style-type: none"> i. Moving application to cloud, ii. Microsoft Cloud Services, Google Cloud 	<p>4</p> <p>4</p>

	Applications, iii. Amazon Cloud Services, Cloud Applications.	
Unit IV	Security In The Cloud	07
	1. Security Overview 2. Cloud Security 3. Challenges and Risks 4. Software-as-a-Service Security 5. Security Governance 6. Risk Management 7. Security Monitoring 8. Security Architecture Design 9. Data Security, Application Security, Virtual Machine Security. 10. Identity Management Access Control 11. Disaster Recovery in Clouds	2 2 1 1 1

Suggested Reading	
1.	Cloud Computing: Technologies and strategies of the Ubiquitous Data Center:Brian J.S. Chee and Curtis Franklin.
2.	Mastering Cloud Computing Foundations and Applications Programming: Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi.
3.	Distributed and Cloud Computing From Parallel Processing to the Internet of Things: Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra.
Website Reference Link:	
1.	Cloud Computing: <u>https://www.javatpoint.com/cloud-computing</u>.
2.	Cloud Computing Tutorial : https://intellipaat.com/blog/cloud-computing-tutorial/
3.	Cloud Computing For beginners : https://www.guru99.com/cloud-computing-for-beginners.html



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Lab I : Data Structure using Python	
Course Code: 23SBCA44MM		No. Of Credits: 02
Course Type: MM(Major Mandatory)		Total Teaching Hours: 60

Sr.No.	Course Objectives
1.	Design an efficient algorithm for the given problem and implement it Using Python Programming.
2.	Apply appropriate data structures for the given problem.
3.	Determine the time and space complexity of a given algorithm.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	To understand algorithms and analysis of algorithms
2.	To learn static and dynamic data structures

Assignment No	Assignment Name	No. Of Sessions
1	Assignment on sorting techniques	03
2	Assignment on Linked List	03
3	Assignment on Stack	03
4	Assignment on Queue	02
5	Assignment on Tress	03
Total Number of Sessions		14

Best IDE Tools:		
Sr.No	Name of IDE or Tools	Operating System
1	PyCharm Professional Edition	Windows
2	Python 3.8.10	Windows



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Introduction to Cyber Security	
Course Code: 23SBCA41MNA		No. Of Credits: 02
Course Type: MN(Minor)		Total Teaching Hours: 30

Sr.No.	Course Objectives
1.	To define the fundamentals of cybersecurity, including key terms and concepts.
2.	To understand protocols, firewalls, and intrusion detection/prevention systems.
3.	To apply security measures to operating systems and end-user devices.
4.	To understand basic encryption and decryption techniques.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Identify and analyze various types of cyber threats, including malware, phishing, ransomware, and other forms of cyber-attacks.
2.	Gain knowledge of cryptographic principles and techniques to secure data and communication.
3.	Understand legal and regulatory requirements related to cybersecurity.
4.	Implement secure coding practices for web development.

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Cybersecurity	2
	<p>1.1. Overview of Cyber Security,</p> <p>1.2. Internet Governance – Challenges and Constraints,</p> <p>1.3. Cyber Threats: - Cyber Warfare-Cyber Crime-Cyber Terrorism-Cyber Espionage</p> <p>1.4. Need for a Comprehensive Cyber Security Policy</p> <p>1.5. Need for a Nodal Authority</p> <p>1.6. Need for an International convention on Cyberspace</p> <p>1.7 CIA Triad.</p>	
Unit II	Cyber Security Threats and Vulnerabilities	8
	<p>2.1 Overview of Security threats and Vulnerability:</p> <p>2.1.1 Vulnerability and Threats</p> <p>2.1.2 Types of attacks on confidentiality,</p> <p>2.1.3 Types of attacks Integrity and Availability.</p> <p>2.1.4 Types of Malware and Threats (Spyware, Virus and Worms, Trojan and backdoors,)</p> <p>2.2 Web attack: Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks</p> <p>2.3 Network Vulnerabilities: Overview of vulnerability scanning,</p> <p>2.1.5 Open Port / Service Identification, Banner /Version Check</p> <p>2.1.6 Traffic Probe, Vulnerability Probe</p> <p>2.1.7 Vulnerability Examples, OpenVAS,</p> <p>2.1.8 Metasploit</p> <p>2.1.9 Networks Vulnerability Scanning using Netcat, Socat</p> <p>2.1.10 Network Sniffers and Injection tools</p>	
Unit III	Network Defense tools	8
	<p>3.1 Firewall: Introduction, Linux Firewall, Windows Firewall.</p> <p>3.2 Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall</p> <p>3.3 How a Firewall Protects a Network, Packet Characteristic to Filter</p> <p>3.4 Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding.</p> <p>3.5 VPN: the basic of Virtual Private Networks.</p> <p>3.6 Snort: Introduction Detection System</p>	

Unit IV	Web Application Tools	8
	<p>4.1 Scanning for web vulnerabilities tools:</p> <ul style="list-style-type: none"> 4.1.1 Nikto 4.1.2 W3af <p>4.2 HTTP utilities –</p> <ul style="list-style-type: none"> 4.2.1 Curl 4.2.2 OpenSSL 4.2.3 Stunnel. <p>4.3 Application Inspection tools –</p> <ul style="list-style-type: none"> 4.3.1 Zed Attack Proxy 4.3.2 Sqlmap 4.3.3 DVWA 4.3.4 Webgoat. <p>4.4 Password Cracking and Brute-Force Tools:</p> <ul style="list-style-type: none"> 4.4.1 John the Ripper 4.4.2 L0htcrack 4.4.3 Pwdump 4.4.4 HTC-Hydra. 	
Unit V	Introduction to Cyber Crime, law and Investigation	4
	<p>5.1 Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors</p> <p>5.2 Cyberspace and Criminal Behavior, Clarification of Terms</p> <p>5.3 Traditional Problems Associated with Computer Crime</p> <p>5.4 Introduction to Incident Response, Digital Forensics</p> <p>5.5 Computer Language, Network Language, Realms of the Cyber world.</p> <p>5.6 Internet crime and Act: A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.</p> <p>5.7 Steganography, DOS and DDOS attack, SQL injection, Buffer.</p>	

Suggested Reading	
1.	W Stallings, "Cryptography and Network Security: Principles and Practice, 6/e", Prentice Hall
2.	Cryptography and Network Security, 2 EDITION, by Atul Kahate
3.	A. Menezes, P. van Oorschot, S. Vanstone. "Handbook of Applied Cryptography", CRC press, 1997.
4.	Douglas R. Stinson, "Cryptography: Theory and Practice 3/e", CRC Press, 2006
5.	Nina Godbole, Sunit Belapure, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives" , Wiley: April 2011 India Publications Released.
6.	James Graham Richard Howard Ryan Olson, "Cyber Security Essentials"-
Website Reference Link:	
1.	Cyber Security Tutorial : https://www.geeksforgeeks.org/cyber-security-tutorial/
2.	Cyber Security Tutorial: A Step-by-Step Guide : https://www.simplilearn.com/tutorials/cyber-security-tutorial
3.	Cyber Security Tutorial for Beginners (Full Course Lecture Series) Starter Tutorials : https://www.youtube.com/playlist?list=PL_RcVnBPGmSLAGyNa6wiAf8bbVwxYYzCi



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	8051 Microcontroller Programming	
Course Code: 23SBCA41MNB	No. Of Credits: 02	
Course Type: Minor (Theory)		Total Teaching Hours: 30

Sr.No.	Course Objectives
1.	To study the basics of 8051microcontroller
2.	To understand the internal architecture of 8051 Microcontrollers.
3.	To understand and acquire knowledge in programming 8051 Microcontroller using assembly and Embedded C
4.	To study the interfacing techniques of 8051microcontroller

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Understands basics and architecture of 8051 Microcontroller
2.	Write 8051 Assembly level programs using 8051 instructions Set and C
3.	Interface simple switches, simple LEDs, LCD , DC motor and Stepper Motor to 8051 using 8051 I/O ports.
4.	Design 8051 Microcontroller based applications.
5.	The students can design mini project based on 8051 microcontrollers using Assembly and/or C language

Unit No	Title with Contents	No .of Lectures
Unit I	The 8051 Architecture	08
	<ol style="list-style-type: none"> 1. Introduction to the concepts of microprocessors and microcontrollers 2. Architecture of 8051microcontroller 3. Features of 8051microcontroller 4. Functional Pin out diagram and description of pins 5. Special function registers (SFRs) 6. Memory Organization 7. Interrupts 	
Unit II	8051 Instruction Set and Programming	14
	<ol style="list-style-type: none"> 1. Classification of Instruction Set: Data transfer group, Arithmeticgroup, Logical group, Branching group, Bit Manipulation Group. 2. Addressing modes - Immediate, register, direct, register indirect andindexed addressing modes 3. Features of machine language, assembly language, middle-level andhigh-level languages. 4. Programs using Assembly Language <ol style="list-style-type: none"> i. Arithmetic Operations ii. Sum of n-numbers iii. Block transfer iv. Finding smallest and largest number from a set of numbers 5. Assembly languageprogramming for interfacing LED 6. Embedded C and Programming. 	
Unit III	Interfacing the 8051 with Peripherals	08
	<ol style="list-style-type: none"> 1. Interfacing of LEDs 2. Interfacing of 7-Segment LED Display 3. Interfacing of Switches 4. Interfacing of 16x2 LCD Display 5. Interfacing of DC Motor 6. Interfacing of Stepper motor 7. Interfacing of Servo motor 8. Interfacing of different sensors 9. Interfacing ADC and DAC 	

Suggested Reading	
1.	Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. Mc Kinlay , The 8051 Microcontroller and Embedded Systems – using assembly and C, Pearson
2.	Kenneth J. Ayala, The 8051 Microcontroller, 3rd Edition, Delmar Cengage Learning
3.	Manish K Patel ,The 8051 Microcontroller Based Embedded Systems , McGraw Hill
4.	Rao, Dr. K Uma, The 8051 Microcontrollers: Architecture, Programming and Applications, Pearson Education India, New Delhi



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Lab II – Introduction to Cyber Security	
Course Code: 23SBCA42MNA		No. Of Credits: 02
Course Type: MN(Minor)		Total Teaching Hours: 60

Sr.No.	Course Objectives
1.	Develop practical skills in configuring and managing various cybersecurity tools and technologies.
2.	Understand and implement network security measures such as firewalls, intrusion detection/prevention systems, and VPNs.
3.	Secure network infrastructure against common attacks.
4.	Implement encryption and decryption processes.

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Demonstrate practical proficiency in configuring and managing various cybersecurity tools
2.	Conduct comprehensive vulnerability assessments on networks.
3.	Implement and configure network security measures, including firewalls, intrusion detection/prevention systems, and virtual private networks (VPNs).
4.	Implement encryption and decryption processes using industry-standard algorithms.

Assignment No	Assignment Name	No. Of Sessions
1.	Installation and Configuration of Kali Linux	01
2.	Assignment on setup virtual Environment using platform like VMware or virtual box	01
3.	Assignment on to Configure a small network with routers, switches, and firewalls using Packet Tracer or GNS3.	03
4.	Assignment on analyzing network traffic and network attacks using Wire Shark tool.	03
5.	Assignment on vulnerability scanning using OpenVAS tool	02
6.	Assignment on implementing IDS using Snort on the network.	02
7.	Assignment on phishing awareness exercises	02
Total Number of Sessions		15



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S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Lab II: 8051 Microcontroller and Programming	
Course Code: 23SBCA42MNB	No. Of Credits:02	
Course Type: MN(Minor Practical)		Total Teaching Hours: 60

Sr.No.	Course Objectives
1.	To get hands on training of Embedded C
2.	To study experimentally interfacing of 8051 microcontroller
3.	To design, build and test modulator and demodulators of digital communication
4.	To build and test experimentally various techniques of wired communication

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	To design and build his/her own microcontroller based projects
2.	To acquire skills of Embedded C programming
3.	To know multiplexing and modulation techniques useful in developing wireless application
4.	Do build and test own network and do settings.

Assignment No	Assignment Name	No. Of Sessions
1.	Assembly language programs for <ol style="list-style-type: none"> Addition of two 8-bit numbers (Using Registers & Memory) Subtraction of two 8-bit numbers. (Using Registers & Memory) 	1
2.	Assembly language programs for <ol style="list-style-type: none"> Multiplication of two 8-bit numbers using MUL instruction. Division of two 8-bit numbers using DIV instruction. 	1
3.	Assembly language programs for Code Conversion <ol style="list-style-type: none"> Transfer block of data from one memory locations to another memory locations Sum of two arrays. 	1
4.	Assembly language programs for Transfer block of data from one memory locations to another memory locations	1
5.	Assembly language programs for Sum of two arrays.	1
6.	Traffic light controller using 8051 microcontrollers	1
7.	Interfacing LCD to 8051Microcontroller	1
8.	Interfacing 7 segment Display to 8051Microcontroller	1
9.	Speed Control of stepper motor using 8051 microcontrollers	1
10.	Speed Control of DC motor using 8051 microcontrollers	1
11.	Interfacing Servo Motor to 8051Microcontroller	1
12.	Interfacing DAC to 8051Microcontroller	1
13.	Interfacing ADC to 8051Microcontroller	1
14.	Interfacing IR sensor to 8051Microcontroller	1
15.	Interfacing PIR sensor to 8051Microcontroller	1
16.	Interfacing temperature sensor to 8051Microcontroller	1
17.	Develop a 4 bit binary counter with 8051 and display out put on LCD	1
Total Number of Sessions		17

The practical course consists of 10 experiments. After studying the theory and practical student can design and develop working models using 8051 Microcontroller

- The practical course consists of 10 experiments out of which ONE (Compulsory) will be working model using 8051 Microcontroller.
- These will be evaluated in an oral examination for 15% marks at internal and external semester examination.
- Each Practical batch will have maximum 12 students
- **List of Major Equipment/ Instrument with Broad Specifications**
 - i) Microcontroller 8051 trainer Kit
 - ii) 8051 Simulator software (Free downloadable)
 - iii) Computer System(p-IV and latest version)
 - iv) Peripheral Interfacing Trainer kits



M.C.E. Society's

Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune- 1 (Autonomous)

Affiliated to Savitribai Phule Pune University NAAC accredited 'A' Grade

S.Y.B.C.A (Science) SEM IV (CBCS– NEP 2023Pattern)

Course Title	Lab III: Object Oriented Programming using Java	
Course Code: 23SBCA41SE		No. Of Credits: 02
Course Type: SEC(Skill Enhancement Course)		Total Teaching Hours : 60

Sr.No.	Course Objectives
1.	To learn implementation of object-oriented concepts with Java.
2.	To understand the concept of exceptional handling
3.	To know the process of application development using Graphical User Interface (GUI).

Sr.No.	Course Outcome
After completing course students will be able to -	
1.	Design end to end applications using object oriented constructs.
2.	Apply collection classes for storing java objects
3.	Use Java APIs for program development.

Assignment No	Assignment Name	No. Of Sessions
1	Assignment on classes and method implementation	02
2	Assignment on Inheritance and Interface	03
3	Assignment on Exception Handling	03
4	Assignment on I/O	03
5	Assignment on Interface with AWT and Swing	03
Total Number of Sessions		14

Best IDE Tools:		
Sr.No	Name of IDE or Tools	Operating System
1	Eclipse, Netbeans&Jdk	Window Operating System
2	Netbeans, Eclipse &Jdk	Red Hat /Linux / Ubuntu