SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA

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शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४, महाराष्ट्र

दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दूरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

Estd. 1962
"A++" Accredited by
NAAC (2021)
With CGPA 3.52

SU/BOS/Science/11

Date: 02/01/2024

To,

The Principal, All Concerned Affiliated Colleges/Institutions Shivaji University, Kolhapur	The Head/Co-ordinator/Director All Concerned Department (Science) Shivaji University, Kolhapur.

Subject: Regarding syllabi of as per NEP-2020 under the Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of degree programme under the Faculty of Science and Technology.

1.	B.Sc Part II Drug Chemistry (1.0)
2.	B.C.A. Part II NEP 2020 (2.0)
3.	B.C.A. Part III NEP 2020 (1.0)

4.	Department of AGPM:-Value Added Course :
	        1) Sericulture,
	        2)Bio-fertilizers and Manures

5.	Syllabus Open Elective for All Faculty UG & PG Program :
	        1.छत्रपती शिवाजी महाराज जीवनपरिचय(Online MOOC)
	        2.Innovation and Entrepreneurship-I
	        3. Innovation and Entrepreneurship-II

This syllabus, nature of question and equivalence shall be implemented from the academic year 2024-2025 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020 (Online Syllabus)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2024 & March/April 2025. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

By Registrar
Dr. S. M. Kubal

Copy to:

1	The Dean, Faculty of Science & Technology	5	P.G. Admission/Seminar Section
2	Director, Board of Examinations and Evaluation	6	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	7	Affiliation Section (U.G.) (P.G.)
4	B.Sc. Exam/ Appointment Section	8	Centre for Distance Education

SHIVAJI UNIVERSITY, KOLHAPUR

NAAC "A++" Grade with CGPA 3.52

Multiple Entry and Multiple Exit Option(NEP-2020)

Syllabus for
Bachelor of Computer Application
(Under Faculty of Science and Technology)

PART- II SEMESTER- III & IV

(Syllabus to be implemented from Academic year 2024-25)

Multiple Entry and Multiple Exit Option (NEP-2020)
BCA Program Structure
BCA Part - II (Level-5.0)

Sr. No.	Course Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectures (Per week)	Hours (Per week)	Credit	Max. Marks	Min. Marks	Exam. Hours	Max. Marks	Min. Marks	Exam Hours
1	CC-301: Basics of C++	2	2	2	40	16		10	04	
2	CC -302: Fundamentals of Software Engineering	2	2	2	40	16		10	04	
3	CCPR -303: Programming with C++ Lab	-	-	2	40	16		10	04	
4	Open Elective (OE): Data warehouse concepts	2	2	2	40	16		10	04	
5	Open Elective (OE): Basics of Networking	2	2	2	40	16		10	04	
6	VSC: Fundamentals of Cyber security	2	2	2	40	16		10	04	
7	SEC: Core Java	2	2	2	40	16		10	04	
8	AEC: Formal Communication	2	2	2	40	16		10	04	
9	VEC: Basics of Moral Education	2	2	2	40	16		10	04	
10	IKS: Basics of Yoga	2	2	2	40	16		10	04	
11	CC: Fundamentals of Statistics	2	2	2	40	16		10	04	
	Total (A)			22	440			110		

SEMESTER-III (Duration- Six Month)

SEMESTER-IV (Duration- Six Month)									
Sr. No.	Course Code	Teaching Scheme Theory and Practical			Examination Scheme					
					University Assessment (UA)			Internal Assessment (IA)		
		Lectures (Per week)	Hours (Per week)	Credit	Max. Marks	Min. Marks	Exam. Hours	Max. Marks	Min. Marks	Exam Hours
1	CC-401: Advanced C++	2	2	2	40	16		10	04	
2	CC -402: Advanced Software Engineering	2	2	2	40	16		10	04	
3	CCPR -403: Advanced C++ Lab	-	-	2	40	16		10	04	
4	Open Elective (OE): Data warehouse techniques	2	2	2	40	16		10	04	
5	Open Elective (OE): Advanced Networking	2	2	2	40	16		10	04	
6	VSC: Essentials of Cyber security	2	2	2	40	16		10	04	
7	SEC: Java Programming	2	2	2	40	16		10	04	
8	AEC: Soft skills	2	2	2	40	16		10	04	
9	VEC: Moral Education	2	2	2	40	16		10	04	
10	IKS: Yoga	2	2	2	40	16		10	04	
11	CC: Foundations of Statistics	2	2	2	40	16		10	04	
	Total (B)			22	440			110		
	Total (A+B)			**44**	**880**			**220**		

• Student contact hours per week : **24** Hours (Min.)	Total Marks for BCA-I: **1100**
• Theory and Practical Lectures : **60** Minutes Each	• Total Credits for B.C.A-II (Semester III & IV) : 44
• CC-Core Course • CCPR-Core Course Practical • RM: Research Methodology • OJT: On job training Internship: Student must complete on job training/ Internship during summer break.	• Practical Examination is **Semester wise before theory Examination**. • Examination for CCPR -303shall be based on Semester-III Practical • Examination for CCPR -403 shall be based on Semester-IV Practical. • *Duration of Practical Examination as per respective BOS guidelines • Separate passing is mandatory for Theory, Internal and Practical Examination
• **Requirement for Entry at Level 5.0:** Must have completed Level 4.5	
• **Exit Option at Level 5.0:** Students can exit after Level 5.0 with under **Diploma course in Computer Application** if he/she completes the coursesequivalent to minimum of **44** credits	

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM III

Course code	:	**CC-301**
Title of course	:	**Basics of C++**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

The course will enable students to;

1. Describe OOPs concepts

2. Define constructors and destructors

3. Implement inheritance and their types

UNIT I   **(15 HOURS)**

Introduction to Object Oriented Paradigms: Advantages of OOP, Difference between POP and OOP, Basic terminology and features, Skeleton of OOP, Data types, Loops, Function, Inline Function, Class, Constructor and their types, destructor. Constant objects and member functions, Static data members and functions, Friend Function, friend class, non-member functions, this pointer, Nested classes

UNIT II   **(15 HOURS)**

Operator overloading and user defined conversions – function overloading, operator overloading fundamentals, Restrictions, overloading unary & binary operators, **Inheritance-** defining a class hierarchy, types of inheritance, Base class member access, Base and Derived class constructor, Direct base classes & indirect base classes, Function overriding, Types of inheritance

Reference Books:

1. Object Oriented Programming with C++ by E Balagurusamy

2. The C++ programming language by Bajarne Stroustrup

3. C++: The Complete Reference by Herbert Schildt

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM III

Course code	:	**CC-302**
Title of course	:	**Fundamentals of Software Engineering**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

After completion of this course students will be able to;

1. Understand various models of software development.
2. Understand requirement gathering and requirement modelling.
3. Explore concepts and models in software design.
4. Calculate size estimation

UNIT I: (15 HOURS)

Introduction – Software problem, need of Software Engineering, Software Engineering problem, Software Engineering approach, Causes of and solutions for software crisis, Program vs. software product, Software process - Software process, characteristics, Software development process: A Process Step Specification, **Process Model:** Waterfall Model, Prototyping Model, Iterative Enhancement, The Spiral Model, Rapid Application Development (RAD), Time boxing Model

UNIT II: (15 HOURS)

Software requirement analysis and specification – Software requirement, problem analysis, Fact finding methods, requirement specification, characteristics of SRS, Structure of SRS, Types of requirements - functional and non- functional, **Matrices**: size estimation, function point, quality metrics.

Reference Books:

1. An interpreted approach to software engineering by Pankaj Jalote
2. Software Engineering by A Practitioners Approach 5th and 6th edition, Roger Pressman
3. Software engineering concepts by Richard Fairley
4. The Practical guide to Structural design by Miller Paige Jones
5. Software Engineering by Martin Shooman

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM III

Course code	:	**Open Elective (OE) I**
Title of course	:	**Data warehouse concepts**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

The course will enable students to;

1. To understand fundamental concepts of data warehouse.
2. To learn ETL concepts of data warehouse

UNIT-I (15 HOURS)

Data warehousing, history of data warehouse, types of data warehouse, general stages of data warehouse, components of data warehouse, who needs data warehouse, applications of data warehouse, steps to implement data warehouse, advantages and disadvantages, the future of data warehousing, data warehouse tools, difference between database and data warehouse, use and characteristics of data warehouse, data warehouse architecture.

UNIT-II (15 HOURS)

ETL process in data warehouse, ETL tools, best practices ETL process, Difference between ETL and ELT, ETL testing tutorial, ETL testing process, types of ETL testing, types of ETL bugs, Responsibilities of ETL tester, ETL developer: role and responsibilities and skills, applications of ETL, OLAP: Cube, analytical operations in data warehouse, types of OLAP systems, advantages and disadvantages of OLAP, MOLAP: MOLAP architecture, advantages and disadvantages of MOLAP, OLTP: characteristics, architecture, OLTP vs OLAP, advantages, disadvantages and challenges of OLTP, difference between OLTP and OLAP,

Reference Books:

1. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.

4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.
5. Arun K Pujari, "Data Mining Techniques", 3rd Edition, Universities Press, 2005
6. PualrajPonnaiah, Wiley, "Data Warehousing Fundamentals", Student Edition, 2004.
7. Ralph Kimball, Wiley, "The Data warehouse Life Cycle Toolkit", Student Edition, 2006.

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM III

Course code	:	**Open Elective (OE) II**
Title of course	:	**Basics of Networking**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

The course will enable students to;

1. Understand the various components of a computer network and its functionality.
2. Become familiar with layered communication architectures (OSI and TCP/IP).
3. Familiar with network basics concepts like protocols, topology etc.
4. Familiar with OSI layered model services.

UNIT I   (15 HOURS)

Introduction, Network topologies, network classifications, Layered network architecture, LAN,WAN, MAN, The telephone network fundamental of communication theory, Data transmission modes, Network topologies, Transmission Media, Guided media, twisted-pair cable, coaxial cable, fiber-optic cable. Unguided media (wireless), radio waves, microwaves, infrared, Asynchronous and synchronous transmission

UNIT II   (15 HOURS)

Overview of OSI reference model, it's all layer's services. Token passing – Token ring, Token bus, Token passing, (priority systems).   Fiber Distributed Data Interface (FDDI). Overview of TCP/IP, Introduction to TCP/IP and internetworking, operations related protocols and sockets, Connection-oriented and connectionless Services, service primitives. OSI protocols, TCP/IP protocols. Physical Layer: Physical Layer Basic Concepts - Bit rate, bit length, base band transmission, Switching Circuit switching, Packet Switching, Message switching.

Reference:

1. Black C "Computer networks protocols, standards and Interface", prentice hall of India,
2. Stlling W, "Computer communication network" (4th Edition), prentice hall of India,
3. Tanenbaum A.S. "Computer Network", prentice hall of India, 1981
4. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill.
5. Walrand&Varaiya,"High Performance Communication Networks", 2/e, Elsevier", 2003

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM III

Course code	:	VSC
Title of course	:	**Fundamentals of Cyber security**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

The course will enable students to;

1. Understand importance of cyber security and security management.
2. Learn different security threats.

UNIT I **(15 HOURS)**

Introduction to Cyber Security Cyber Security: Definition, Importance, cyber security fundamentals: confidentiality, Integrity, availability, layers of cyber security, Cyber Security Policy, Data Security, Mobile Device Security, User Security, File Security, Password Security, Browser Security, Email Security, Encryption, Decryption, Digital Signature

UNIT II **(15 HOURS)**

Types of Security and Security Management Types of Security: Goals for Security ,security policies, need of security policies , Types of Attacks, DoS attack, , Digital forensics, lifecycle of digital forensics, E-commerce Security, dimensions of E-commerce security, Security protocols, Computer Forensics, Steganography, Security Management- Overview of Security Management, Information Classification Process, Security Policy, Risk Management.

Reference Books:

1. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin,
2. Cyber Security for Beginners: Everything you need to know about it (Cyber security, Cyber war, Hacking) - Harry Colvin.
3. E-Commerce- Indian Perspective- P.T. Joseph S.J.
4. E-Commerce and Security- KjellOrsborn

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM III

Course code	:	SEC
Title of course	:	Core Java
Theory	:	30
Marks	:	50
Credit	:	02

Course Outcomes:

The course will enable students to;

1. Understand the working of java virtual machine

2. Implement Object oriented concepts using java

3. Implement control structures ,operators of java

4. Understand the constructor, garbage collection in java

UNIT I   **(15 HOURS)**

Java Language Basics History and features of Java, Java Virtual Machine (JVM), JDK tool(Folder structure-for practical purpose only), Structure of java program, compilation and execution of java program , Java keywords, Data types, Java variables- declaration and assigning values to variables(using assignment statement and Scanner class object), scope of variables Type casting- Implicit and Explicit casting, Operators of java, Control structures of java –Branching statements- If , if ….else, if …else if and switch statement ,Iterative statements- for loop, do… while, while loop, jumping statements-break and continue statement

UNIT II   **(15 HOURS)**

Introducing classes and objects Introduction : Classes, Objects and methods, Defining a class, field declaration, method declaration, Accessing class members, access specifiers in java, Static variables and methods .Method overloading, Constructor- types of constructor, constructor overloading. Use of this keyword, Garbage collection-finalize(), wrapper classes, Array, types of array, array of object, Collection-Iterator interface, List interface,

Reference Books:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.

2. Herbert Schildt, The Complete Reference Java 2.0, Fifth edition, TATA McGraw-Hill Company.

3. Debasish Jana, Java and Object-Oriented programming Paradigm, PHI.

4. Jana, Java and Object Oriented Programming Paradigm, PHI (2007)

Bachelor of Computer Application

Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM IV

Course code	:	CC -401
Title of course	:	Advanced C++
Theory	:	30
Marks	:	50
Credit	:	02

Course Outcomes:

The course will enable students to;

1. Understand the working of java virtual machine
2. Implement Object oriented concepts using java
3. Implement control structures ,operators of java
4. Understand the constructor, garbage collection in java

UNIT I   (15 HOURS)

Java Language Basics History and features of Java, Java Virtual Machine (JVM), JDK tool(Folder structure-for practical purpose only), Structure of java program, compilation and execution of java program , Java keywords, Data types, Java variables- declaration and assigning values to variables(using assignment statement and Scanner class object), scope of variables Type casting- Implicit and Explicit casting, Operators of java, Control structures of java –Branching statements- If , if ….else, if …else if and switch statement ,Iterative statements- for loop, do… while, while loop, jumping statements-break and continue statement

UNIT II   (15 HOURS)

Introducing classes and objects Introduction : Classes, Objects and methods, Defining a class, field declaration, method declaration, Accessing class members, access specifiers in java, Static variables and methods. Method overloading, Constructor- types of constructor, constructor overloading. Use of this keyword, Garbage collection-finalize(), wrapper classes, Array, types of array, array of object, Collection-Iterator interface, List interface, ArrayList class.

Reference Books:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.

2. Herbert Schildt, The Complete Reference Java 2.0, Fifth edition, TATA McGraw-Hill Company.

3. Debasish Jana, Java and Object-Oriented programming Paradigm, PHI.

4. Jana, Java and Object Oriented Programming Paradigm, PHI (2007)

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM IV

Course code   :   CC -402

Title of course   :   **Advanced Software Engineering**

Theory   :   **30**

Marks   :   **50**

Credit   :   **02**

Course Outcomes:

The course will enable students to;

1. Apply design principles for various types of software
2. Design object oriented software using UML tools.
3. Implement testing strategies thoroughly using testing tools
4. Calculate the cost estimations

UNIT I   (15 HOURS)

Planning a software project: Process Planning, Cost estimation (COCOMO Model), Project scheduling, Staffing, Software configuration management plan, Quality assurance plan: Verification and Validation, Risk management: Risk Management Overview, Risk Assessment, Risk Control. Verification, Validation

UNIT II   (15 HOURS)

Design and testing: Design principles, Module level concepts- Coupling and cohesion, Design notation and specification-structure charts, structured design methodology, **UML**: Class diagram, Sequence diagram, Collaboration diagram, Activity diagram, Component diagram, deployment diagram, **Testing**: Testing fundamentals and types of Testing- Black Box, White Box, Levels of Testing

Reference Books:

1. An interpreted approach to software engineering by Pankaj Jalote
2. Software Engineering by A Practitioners Approach 5th and 6th edition, Roger Pressman
3. Software engineering concepts by Richard Fairley
4. The Practical guide to Structural design by Miller Paige Jones

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM IV

Course code	:	**Open Elective (OE) I**
Title of course	:	**Advanced Networking**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

The course will enable students to;

1. Understand with switching and routing concepts in networking technologies.

2. This course will help a student understand the various network protocols

3. Familiar with IPV4 and IPV6 address

UNIT I   **(15 HOURS)**

Introduction, Link-Layer Addressing, DLC Services, Data-Link Layer Protocols, HDLC, PPP, Media Access Control, Wired LANs: Ethernet, Wireless LANs, Introduction, IEEE 802.11, Bluetooth, Connecting Devices.Network Layer Services, Packet switching, Performance, IPV4 Addresses, Forwarding of IP Packets, Network Layer Protocols: IP, ICMP v4, Unicast Routing Algorithms, Protocols, Multicasting Basics, IPV6 Addressing, IPV6 Protocol

UNIT II   **(15 HOURS)**

Transport Layer, Process to process delivery, TCP-UDP, Operation and uses, Three-way Handshake, for connection establishment and termination. Application Layer, Domain Name Space, Remote Logging, Electronic Mail - File Transfer- Email, FTP.WWW and HTTP- HTTP.

Reference Books:

1. Black C "Computer networks protocols, standards and Interface", prentice hall of India, 1996

2. stlling W, "Computer communication network" (4th Edition), prentice hall of India, 1993

3. Tanenbaum A.S. "Computer Network", prentice hall of India, 1981

4. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill.

5. Walrand&Varaiya,"High Performance Communication Networks", 2/e, Elsevier", 2003

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM IV

Course code	:	VSC
Title of course	:	**Essentials of Cyber security**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

The course will enable students to;

1. To learn threats and risks within context of the cyber security
2. Understand network security and cyber crime

UNIT I   (15 HOURS)

Security Threats and Access Controls Security Threats: Definition, Types of Threats - Virus, Worms, Trojan Horse, Malware, Ransomware, Identity theft etc, Torrent and infected websites, Antivirus-Definition, Types, features, advantages, limitations. Access Controls: Overview of Authentication and Authorization, Email authentication.

UNIT II   (15 HOURS)

Wireless Network Security- Components of wireless networks, Security issues in wireless, Wi-Fi Security, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall. Cyber crime: Introduction, Causes of cyber crime, cyber terrorism.

Reference Books:

1. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
2. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by
4. Fundamentals of Network Security by E. Maiwald, McGraw Hill.
5. Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001).

Bachelor of Computer Application
Multiple Entry and Multiple Exit Option
(NEP-2020)
BCA PART II SEM IV

Course code	:	SEC
Title of course	:	**Java Programming**
Theory	:	**30**
Marks	:	**50**
Credit	:	**02**

Course Outcomes:

The course will enable students to;

1. Understand the working of java virtual machine
2. Implement Object oriented concepts using java
3. Implement control structures ,operators of java
4. Understand the constructor, garbage collection in java

UNIT I   (15 HOURS)

Java Language Basics History and features of Java, Java Virtual Machine (JVM), JDK tool(Folder structure-for practical purpose only), Structure of java program, compilation and execution of java program , Java keywords, Data types, Java variables- declaration and assigning values to variables(using assignment statement and Scanner class object), scope of variables Type casting-Implicit and Explicit casting, Operators of java, Control structures of java –Branching statements- If , if ….else, if …else if and switch statement ,Iterative statements- for loop, do… while, while loop, jumping statements-break and continue statement

UNIT II   (15 HOURS)

Introducing classes and objects Introduction : Classes, Objects and methods, Defining a class, field declaration, method declaration, Accessing class members, access specifiers in java, Static variables and methods .Method overloading, Constructor- types of constructor, constructor overloading. Use of this keyword, Garbage collection-finalize(), wrapper classes, Array, types of array, array of object, Collection-Iterator interface, List interface, ArrayList class.

Reference Books:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.

2. Herbert Schildt, The Complete Reference Java 2.0, Fifth edition, TATA McGraw-Hill Company.

3. Debasish Jana, Java and Object-Oriented programming Paradigm, PHI.

4. Jana, Java and Object Oriented Programming Paradigm, PHI (2007).