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

SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA

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शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र

दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्याससमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

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

As per

National Education Policy (NEP-2020)

Syllabus for

Bachelor of Computer Application

(Under Faculty of Science and Technology)

PART-III SEMESTER V & VI

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

BCA Part III Semester V & VI

(NEP-2020)

Syllabus to be implemented from Academic year 2024-25

SEMESTER V																		
Courses	Sr.No	CourseCode	Teaching Scheme							Examination Scheme								
			Theory				Practical			Theory				Practical				
			Credits	No. of Lectures	Hours		Credits	No. of Lectures	Hours		Hours	Max	Total Marks	Min	Hours	Max	Min	
CGPA Courses	1	DSCE1	2	5	4		-	-	-		2	50	100	40	-	-	-	
	2	DSCE2	2								2	50			-	-	-	
	3	DSCE3	2	5	4		-	-	-		2	50	100	40	-	-	-	
	4	DSCE4	2								2	50			-	-	-	
	5	DSCE5	2	5	4		-	-	-		2	50	100	40	-	-	-	
	6	DSCE6	2								2	50			-	-	-	
	7	DSCE7	2	5	4						2	50	100	40	-	-	-	
	8	DSCE8	2								2	50			-	-	-	
	9	DSCE9	-	-	-		2	5	4		-	-	-	-	2	50	20	
	10	DSCE10	-	-	-		2	5	4		-	-	-	-	2	50	20	
	11	DSCE11	-	-	-		2	5	4		-	-	-	-	2	50	20	
		Total	16	20	16		6	15	12				400	-	-	150	-	

Discipline Specific Core (DSC) Courses
Semester V

Sr.No.	Course Code	Name of Paper	Marks
1.	DSCE1	Dot NET I	50 (Theory)
2.	DSCE2	Dot NET II	50 (Theory)
3.	DSCE3	Python Programming I	50 (Theory)
4.	DSCE4	Python Programming II	50 (Theory)
5.	DSCE5	Data Science I	50 (Theory)
6.	DSCE6	Data Science II	50 (Theory)
7.	DSCE7	E-Commerce I	50 (Theory)
8.	DSCE8	E-Commerce II	50 (Theory)
9.	DSCE9	Dot NET Lab	50 (Practical)
10.	DSCE10	Python Lab	50 (Practical)
11	DSCE11	Project I	50 (Practical)

- DSC: Discipline Specific Core Course

SEMESTER VI																	
Courses	Sr. No	Course Code	Teaching Scheme							Examination Scheme							
			Theory				Practical			Theory				Practical			
			Credits	No. of Lectures	Hours		Credits	No. of Lectures	Hours	Hours	Max	Total Marks	Min	Hours	Max	Min	
CGPA Courses	1	DSCF1	2	5	4		-	-	-	2	50	100	40	-	-	-	
	2	DSCF2	2							2	50			-	-	-	
	3	DSCF3	2	5	4		-	-	-	2	50	100	40	-	-	-	
	4	DSCF4	2							2	50			-	-	-	
	5	DSCF5	2	5	4		-	-	-	2	50	100	40	-	-	-	
	6	DSCF6	2							2	50			-	-	-	
	7	DSCF7	2	5	4					2	50	100	40	-	-	-	
	8	DSCF8	2							2	50			-	-	-	
	9	DSCF9	-	-	-		2	5	4	-	-	-	-	2	50	20	
	10	DSCF10	-	-	-		2	5	4	-	-	-	-	2	50	20	
	11	DSCF11	-	-	-		2	5	4	-	-	-	-	2	50	20	
		Total	16	20	16		6	15	12			400	-	-	150	-	

Discipline Specific Core (DSC) Courses
Semester IV

Sr. No.	Course Code	Name of Paper	Marks
1.	DSCF1	PHP I	50 (Theory)
2.	DSCF2	PHP II	50 (Theory)
3.	DSCF3	Java I	50 (Theory)
4.	DSCF4	Java II	50 (Theory)
5.	DSCF5	Machine Learning I	50 (Theory)
6.	DSCF6	Machine Learning II	50 (Theory)
7.	DSCF7	Cloud Computing I	50 (Theory)
8.	DSCF8	Cloud Computing II	50 (Theory)
9.	DSCF9	PHP Lab	50 (Practical)
10.	DSCF10	Java Lab	50 (Practical)
11	DSCF11	Project II	50 (Practical)

- AECC: Ability Enhancement Compulsory Course

Exit option after Level 6: Students can exit with Bachelor in Computer Application.

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSCE1
Title of course: Dot NET I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;
1. Understand the basics of .NET Framework
2. Develop ASP.NET application
3. Utilize SQL Server with ASP.NET

Unit I: (16 Hours)
Introduction: .NET framework and its architecture, CLR, JIT, CTS, Metadata, .NET Revolution, Characteristics of C#, Programming structure of C#, scope of variables, Nullable Data types, Conditional statements, Arrays, Loops, Procedures and functions, Exception handling, Windows form controls, containers, Data Controls, Dialog Controls, sample application development, Deployment of C# application

Unit II: (16 Hours)
ASP.NET: Page Life Cycle, Standard controls, Data Controls, Sample Application Development, Web services, Server side Validation Controls, Language Integrated Queries (LINQ) Working with DataBases : Working with ADO.NET, Data Binding using DataBound Control, Working With GridView Control, Working With DetailsView Control, Working With FormView Control, Connected architecture, Disconnected architecture. Microsoft SQL Server: Creation of Table, Views, Stored Procedures

References
1. Web Application Development : ASP.NET with C# by Himali Patel
2. Beginning ASP.NET for Visual Studio 2015 by William Penberthy

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSCE2
Title of course: Dot NET II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;
1. Understand the basics of state management
2. Understand the importance CSS
3. Utilize the JavaScript with websites

Unit I: (16 Hours)
State management, Caching, AJAX, AJAX Extenders. Building and understanding web services, anatomy of a web service, overview of web service namespaces, building a simple web service, Web Service Description Language (WSDL). Introduction to CSS, Types of CSS, Applying CSS to Master pages in ASP.NET, Language Integrated Queries

Unit II: (16 Hours)
JavaScript Overview, Data types, variables, scope of variables, data type conversion rules, Expressions and operators. Array, Built-in functions, and Built-in objects- String, Date, Math, Types of dialog boxes-alert, prompt, confirm. Custom Functions, Working with Frames

References

1. Head First HTML and CSS by Elizabeth Robson and Eric Freeman
2. HTML, CSS, and JavaScript All in One by Meloni and Kyrin's
3. You Don't Know JS by Kyle Simpson

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSC-E3
Title of course: Python Programming I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Understand principles of Python.
2. Understand installation of Python.
3. Explore concepts and modules in Python.

Unit I: (16 Hours)

Introduction – Installing Python, Features and principles of Python, applications of Python, Simple program using Python, Expressions and Values, Variables and Computer Memory, error detection, Multiple line statements, Identifiers ,Keywords , Statements and Expressions – Variables Operators , Arithmetic operators, Assignment operators , Comparison operators – Logical operators ,Bitwise operators - Precedence and Associativity, Data types , Number, Booleans , Strings , Indentation, Comments , Single line comment , Multiline comments - Reading Input , Print output ,Type Conversions.

UNIT II: (16 Hours)

Control flow statements If statement , If else statement , nested if statement - while loop , for loop ,continue and break statements ,catching exceptions using try and except statement ,syntax errors , exceptions, exception handling ,Strings function. Nesting loops in loops, looping until a condition is reached, and repetition based on user input, controlling Loops using Break and Continue.

Reading and Writing files: kinds of files, Opening a File, techniques for reading files, files over the internet, Writing files, file reading techniques.

Reference Books:

1. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication.
2. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr.
3. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India.
4. R. Nageswara Rao, "Core Python Programming", Dreamtech

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSCE4
Title of course: Python Programming II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Understand data structures in Python.
2. Understand concept of file handling.
3. Explore concept of GUI.

UNIT III: (16 Hours)

Storing Collections of Data Using Lists: storing and accessing data in Lists, modifying Lists, operations on Lists, slicing Lists, aliasing, List Methods, Working with a List of Lists. Repeating code using loops: processing items in a List, processing characters in Strings, Looping over a range of numbers, processing Lists using Indices, reading techniques, multiline Records.

UNIT IV: (16 Hours)

Storing data using other collection Types: storing data using Sets, storing data using Tuple, storing data using Dictionaries, Inverting a Dictionary. Comparison of List, Tuple, Set and Dictionary.
Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Widgets, Object-Oriented GUIs, Regular expressions.

Reference Books:

1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul ries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Python for Informatics: Exploring Information, Charles Severance
3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSC-E5
Title of course: Data Science I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Learn basic statistics required for data science.
2. Visualize the data in different forms.
3. Learn and implement different visualization tools for data science.

Unit I: (16 Hours)

Data science: Introduction, overview, Components, Model building process , Data types and its measures, Random Variables ,its applications with exercise, Tools ,Applications, Sources of data.

Unit II: (16 Hours)

Basics of statistics: Measures of central tendency (Mean, Median, Mode),Measures of dispersion(Variance, standard deviation, range),Measures of Skewness and Kurtosis – Graphical representation and its application, Measures of correlation coefficient and it analysis, Various graphical representation of data for analysis, Concept of Probability and it's Applications, probability distributions, Central limit theorem for sampling variations, Confidence Interval –computation and analysis. Basic concepts related to hypothesis testing.

Reference Books:

1. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An introduction to statistical learning* (Vol. 112, p. 18). New York: springer.
2. Friedman, J., Hastie, T., & Tibshirani, R. (2001). The elements of statistical learning (Vol. 1, No. 10). New York: Springer series in statistics.
3. Spiegel halter, D. (2020). Introducing The Art of Statistics: How to Learn from Data. *Numeracy*, *13*(1), 7.
4. Kuhlman, D. (2009). *A python book: Beginning python, advanced python, and python exercises* (pp. 1-227). Lutz: Dave Kuhlman.
5. Grus, J. (2019). *Data science from scratch: first principles with python*. O'Reilly Media.
6. Montgomery, D. C., Peck, E. A., & Vining, G. G. (2012). *Introduction to linear regression analysis* (Vol. 821). John Wiley & Sons.

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSC-E6
Title of course: Data Science II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Learn, understand and apply the concepts of probability theory for data science.
2. Learn and apply various clustering techniques for data science.
3. Get introduce with latest techniques in Data Science

Unit I: (16 Hours)

Regression Analysis: Regression model using ordinary least squares, Coefficient of determination as strength of model, Prediction interval and confidence interval, Prerequisites to regression, Model building using regression, Measures of accuracy, Model improvement techniques, listwise, pairwise deletion, Imputation techniques: Regression Imputation ,Hot Deck, KNN imputation.

Unit II: (16 Hours)

Data analysis using Excel, Overview of tools SQL, Hadoop, Hive, Weka, Tableau, Introduction of Hadoop Ecosystem(Pig ,Hive and Hbase), Big data analysis.

Reference Books:

1. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An introduction to statistical learning* (Vol. 112, p. 18). New York: springer.
2. Friedman, J., Hastie, T., & Tibshirani, R. (2001). The elements of statistical learning (Vol. 1, No. 10). New York: Springer series in statistics.
3. Spiegel halter, D. (2020). Introducing The Art of Statistics: How to Learn from Data. *Numeracy*, *13*(1), 7.
4. Kuhlman, D. (2009). *A python book: Beginning python, advanced python, and python exercises* (pp. 1-227). Lutz: Dave Kuhlman.
5. Grus, J. (2019). *Data science from scratch: first principles with python*. O'Reilly Media.
6. Montgomery, D. C., Peck, E. A., & Vining, G. G. (2012). *Introduction to linear regression analysis* (Vol. 821). John Wiley & Sons.

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSC-E7
Title of course: E-Commerce I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Understand the basics of E-Commerce
2. Differentiate different E-payment systems available for E-commerce.

Unit I: (16 Hours)

Definition of E-Commerce; Difference between e-commerce and traditional commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Process of E-Commerce; Types of E-Commerce: Business - to - Business (B2B), Business - to - Consumer (B2C), Consumer - to - Consumer (C2C), Consumer - to - Business (C2B), Applications of E-Commerce, Advantages and limitations of E-Commerce

Unit II: (16 Hours)

Overview of Electronics Payments, Types of Electronic Payment Systems; Digital Token-Based Electronic Payment Systems, Smarts Cards, Credit Card, Debit Card, Digital wallets, Net Banking, Trends in E-Payments: Real Time Gross Settlement (RTGS); National Electronic Funds Transfer (NEFT); Immediate Payment Service (IMPS); Unified Payments Interface (UPI), Unstructured Supplementary Services Data (USSD), Steps for Electronic Payment

Reference Books:

1. E-Commerce - Concepts, Models and Strategies, C. S. V. Murthy, Himalaya, Publishing House.
2. E-Business and E-Commerce Management: Strategy, Implementation and Practice, 5th edition, Dave Chaffey, Pearson Publications.
3. E-Commerce: An Indian Perspective, P.T. Joseph, PHI Publications

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSC-E8
Title of course: E-Commerce II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Identify different tools used to design and develop E-commerce web sites.
2. Analyze different security issues and security tools in E-Commerce

Unit I: (16 Hours)

Technologies Used in E-Commerce; Pre-requisites of E-Commerce; Role of Internet and Web in E Commerce; Web Site Communication; EDI Definition; EDI Requirement in E-Commerce, Definition of Intranet, Component of an Intranet, Role of Intranet in B2B Application; Definition of XML, Business importance in using XML Based Technology, Steps to Design and Develop an E-Commerce Website, Introduction to Mobile computing; Introduction to mobile commerce, Advantage of M Commerce.

Unit II: (16 Hours)

Client-Server network, Emerging client server security threats, Threats to Servers, Software Agents and Malicious code Threat, Trojan horses, Malwares, Worms, Viruses, Fraud schemes in E-commerce and E-payments, Security tool in E-Commerce: Introduction to web security, Firewalls & its types, Configuration of firewalls, Data and Transaction security in E-Commerce, Customer Protection and Security of Digital Payments.

Reference Books:

1. E-Commerce - Concepts, Models and Strategies, C. S. V. Murthy, Himalaya, Publishing House.
2. E-Business and E-Commerce Management: Strategy, Implementation and Practice, 5th edition, Dave Chaffey, Pearson Publications.
3. E-Commerce: An Indian Perspective, P.T. Joseph, PHI Publications

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM VI

Course code: DSCF1
Title of course: PHP-I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to:

4. Installation & Configuration of PHP,
5. Handle Operators & Variables.
6. Handle Loop & Arrays in PHP.

Unit I: (16 Hours)

Introduction to PHP, History and Features of PHP, Installation & Configuration of PHP, Embedding PHP code in Your Web Pages, Understanding PHP, HTML, and White Space. Writing Comments in PHP, Sending Data to the Web Browser, Data types in PHP, Keywords in PHP, Using Variables, Constants in PHP, Expressions in PHP, Operators in PHP.

Unit – II (16 Hours)

Programming with PHP, Conditional statements: if, if-else, switch, The ? Operator, Looping statements: while Loop, do...while Loop, for Loop, Arrays in PHP: Introduction- What is Array?, Types of Arrays: Indexed Vs. Associative arrays, Multidimensional arrays, Creating Array, Accessing Array, Manipulating Arrays, Displaying arrays…..use of for.. each as loop, Using Array Functions, Including and Requiring Files- use of Include() and Require(), Implicit and Explicit Casting in PHP.

Reference Books:

1. PHP &MySQL for Dynamic Web Sites- Fourth Edition By Larry ULLman
2. Learning PHP, MySQL and JavaScript By Robin Nixon -O‟REILLY Publications
3. Programming PHP By Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre
4. SAMS Teach yourself PHP in 24 hours, Author: Matt Zandstra, Sams Publishing.

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM VI

Course code: DSCF2
Title of course: PHP-II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Design dynamic and interactive web pages.
2. Run PHP scripts on server and retrieve results.
3. Handle databases like MySQL using PHP.

Unit I: (16 Hours)

Forms in PHP, Functions in PHP: Defining and calling a function, Returning Value from function, Date and Time in PHP: Date and Time Functions, Strings in PHP: String Functions, Objects in PHP: What is Class & Object, Creating and accessing a Class & Object, Object properties, object methods, Overloading, inheritance, Constructor and Destructor, Creating HTML Form, Handling HTML Form data in PHP.

Unit II: (16 Hours)

Database Handling Using PHP with MySQL. Introduction to MySQL: Database terms, Data Types, Accessing MySQL –Using MySQL Client and Using php MyAdmin MySQL Commands, Using PHP with MySQL: PHP MySQL Functions, Connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Counting Returned Records, Updating Records with PHP.

Reference Books:

1. PHP &MySQL for Dynamic Web Sites- Fourth Edition By Larry ULLman
2. Learning PHP, MySQL and JavaScript By Robin Nixon -O‟REILLY Publications
3. Programming PHP By Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre
4. SAMS Teach yourself PHP in 24 hours, Author: Matt Zandstra, Sams Publishing.

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM IV

Course code: DSCF3
Title of course: Java I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able 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: (16 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: (16 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).

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM IV

Course code: DSCF4
Title of course: Java II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to;

1. Develop programs using the concepts of inheritance, interfaces and packages.
2. Understand the multithreading concepts.
3. Handle exceptions while executing programs.
4. Understand the JDBC connectivity.

Unit I: (16 Hours)

Inheritance, packages and interfaces Inheritance- definition, syntax, types of inheritance, Method overriding, use of super keyword, difference between method overloading and overriding ,Abstract class and method, use of final keyword, Interface- defining and implementing interface, implementation of multiple inheritance using interface, difference between abstract class and interface. Packages- Java API package, Defining and accessing user defined package

Unit II: (16 Hours)

Exception Handling and Multithreading Concept of exception, difference between error and exception, Types of exceptions-checked and unchecked, Exception handling using try and catch block, Multiple catch block, finally block, throws keyword, User defined exception, Concept of multithreading in java, Difference between process and thread Creating thread by extending Thread class and by implementing Runnable interface Life cycle of thread, Thread class methods- start(), run(),yield(), suspend() ,resume(), sleep(), wait(), notify(), stop() Thread synchronization.

Introduction to JDBC: Architecture, JDBC Drivers, JDBC Connectivity, Inserting, Retrieving, deleting, updating data in database.

Reference Books:

1. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
2. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.
3. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
4. Introduction to Java programming, By Y.DanielLiang,Pearson Publication.

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM V

Course code: DSCF5
Title of course: Machine Learning -I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:

After completion of this course students will be able to:

1 To acquire fundamental knowledge of developing machine learning models.
2 To study phases of predicative modeling.
3 To demonstrate Learning with Trees.

Unit I: (16 Hours)

Introduction to Machine Learning, Evolution of machine learning, Difference between AI and Machine learning, Developments in machine learning, Introduction to K-nearest neighbor method, different phases of predicative modeling. Aspects of Machine Learning, Definition of learning System, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation.

Unit – II (16 Hours)

Types of Machine Learning, Issues in Machine Learning, Application of Machine Learning, Steps in developing a Machine Learning Application. Training Error, Generalization error, Overfitting, Underfitting, Bias Variance trade-off. Learning with Regression and Trees, Learning with Regression: Linear Regression, Multivariate Linear Regression, Logistic Regression. Learning with Trees: Decision Trees, Constructing Decision Trees using Gini Index (Regression), Classification and Regression Trees (CART) Performance Metrics: Confusion Matrix, [Kappa Statistics], Sensitivity, Specificity, Precision, Recall, F-measure, ROC curve.

Reference Books:

1. Peter Harrington, ―Machine Learning n Action‖, DreamTech Press
2. Ethem Alpaydın, ―Introduction to Machine Learning‖, MIT Press
3. Tom M. Mitchell, ―Machine Learning‖ McGraw Hill
4. Stephen Marsland, ―Machine Learning An Algorithmic Perspective‖, CRC Press

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM VI

Course code: DSCF6
Title of course: Machine Learning -II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:

After completion of this course students will be able to:

1 To acquire fundamental knowledge of Ensemble Learning.
2 To select, apply clustering in Machine Learning.
3 To demonstrate Dimensionality Reduction.

Unit I: (16 Hours)

Ensemble Learning, Understanding Ensembles, K-fold cross validation, Boosting, Stumping, XGBoost, Bagging, Subagging, Random Forest, Comparison with Boosting,
Different ways to combine classifiers, Learning with Classification, Support Vector Machine
Constrained Optimization, Optimal decision boundary, Margins and support vectors, SVM as constrained optimization problem, Quadratic Programming, SVM for linear and nonlinear classification, Basics of Kernel trick. Support Vector Regression, Multiclass Classification.

Unit II: (16 Hours)

Learning with Clustering, Introduction to clustering with overview of distance metrics and major Clustering approaches. Graph Based Clustering: Clustering with minimal spanning tree
Model based Clustering: Expectation Maximization Algorithm, Density Based Clustering: DBSCAN, Dimensionality Reduction, Dimensionality Reduction Techniques, Principal Component Analysis, Linear Discriminant Analysis, Singular Valued Decomposition.

Reference Books:

1. Peter Harrington, ―Machine Learning n Action‖, DreamTech Press
2. Ethem Alpaydın, ―Introduction to Machine Learning‖, MIT Press
3. Tom M. Mitchell, ―Machine Learning‖ McGraw Hill
4. Stephen Marsland, ―Machine Learning An Algorithmic Perspective‖, CRC Press

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM VI

Course code: DSCF7
Title of course: Cloud Computing I
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:

After completion of this course students will be able to:

1. Acquire knowledge of cloud computing and its usage.
2. Understand components and operations of cloud computing system.
3. Understand the concept of Virtualization and design of cloud Services

Unit I: (16 Hours)

Fundamentals of cloud computing Evolution of cloud computing, characteristics of cloud computing, need of cloud computing, Components of cloud computing, cloud computing architecture, client server architecture, grid computing environment, Cloud computing vs. Cluster computing, types of cloud, major players in cloud computing, advantages and challenges of cloud computing.

Unit II: (16 Hours)

Virtualization Virtualization architecture and its needs, benefits and challenges, types of virtualization, Levels of Virtualization Implementation, virtualization of CPU, Memory and I/O devices, server virtualization, virtualization design requirements, virtualization structure, open source virtualization technology, Pros and cons of virtualization. Hypervisor, Virtual Machine Types, load balancing, Examples of cloud services- Microsoft azure, Google cloud, VMware, Amazon EC2.

Reference Books:

1. Fundamentals of Cloud Computing, by Prasant Kumar Pattnaiket.al.
2. Cloud Computing", Black Book, Dreamtech

Choice Based Credit System with Multiple Entry and Multiple Exit Option(NEP-2020)

BCA PART III SEM VI

Course code: DSCF8
Title of course: Cloud Computing II
Theory: 32 Hrs (40 lecturers of 48 minutes)
Marks: 50 (Credit: 02)

Course Outcomes:
After completion of this course students will be able to:

1. Enhance the skills for data management, storage and operations in cloud computing system.
2. Study recent trends in cloud computing

Unit I: (16 Hours)

Cloud computing services & security Cloud services-IaaS, SaaS, PaaS, DaaS, MaaS, CaaS, DBaas, Implementation and Architecture of Eucalyptus, Nimbus &OpenNebula, cloud development techniques, cloud based storage, cloud backup, Cloud security - Cloud Security Challenges and Risks, disaster recovery, data integration, data transformation, data migration, challenges with data security

Unit II: (16 Hours)

Recent trends in cloud computing Cloud standards, service oriented architecture (SOA) for cloud application, mobile cloud computing its application, architecture and working. MongoDB, MapReduce implementations for the Cloud.Multi cloud approach, Role of AI in Cloud Computing, Hybrid and on-premise cloud.IoT cloud platforms.

Reference Books:

1. Fundamentals of Cloud Computing, by Prasant Kumar Pattnaiket.al.
2. Cloud Computing", Black Book, Dreamtech