BCA

Syllabus

Effective from 2019-2020

Valid up to 2022-2023 batch

BCA (Program Specific Outcome)

PSO 1 . To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.

PSO 2. To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.

PSO 3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics , statistics, management and allied areas.

PSO 4 Learn web and mobile application development skills.

PSO 5 Learn Computer hardware with microprocessor architecture .

PSO 6 Learning Database management system along with designing ,query processing and managing databases using application programs.

PSO 7 Develop software solutions to address problems across broad range of application domains through software engineering principles.

PSO 8 Generating solutions in societal and environmental contexts.

PSO 9 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PSO 10 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming ,designing, analysing network applications.

	The Maharaja Sayajirao University of Baroda **Faculty o Science** **Department of Computer Applications**	**Academic Year**	**2020-2021**

BCA: Regular Program

Year	**II**	~~**Core /**~~ **Elective** ~~**/Foundation**~~ **BCA1025E12: Discrete Mathematics**	**Credits / Hours per week**	**02**
Semester	**III**	Year of Introduction:2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1025E12

CO1 Introduction to set theory including partially ordered set.
CO2 Introduction to trees and graphs
CO3 Boolean expressions and functions

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	The Partially ordered set, Hasse diagram, Lattice, Properties of lattice, Boolean algebra, Boolean expressions and Boolean functions, applications to logic gates and digital circuits,	15	50	1,2	CO1, CO3	PSO3	SD	G	PE

	Minimization of Gates. Definition, examples and applications of Graphs, isomorphism, various elementary concepts and their properties, connected graphs, Euler and Hamiltonian graphs and their applications, matrix representation of graphs, Plannar graphs.								
2	Definition and elementary properties of tree, Rooted and binary trees and their applications, Spanning trees, fundamental circuits and cut sets, Directed graphs, First Betti number, connectivity and separability, Network flows.	15	50	1,2	CO2	PSO3			

Reference Books

1.	Discrete mathematical structures with applications to computer science by J.P.Tremblay and R.Manohar (McCgraw -Hill International Edtition).
2.	Graph Theory with applications to engineering and computer science by Narsingh Deo (Prentice Hall of India, New Delhi).
3.	Elements of Discrete Mathematics by C.L.Liu (McCgraw Hill Book Co.).
4.	Discrete Mathematics (4th Edition) by Richard Johnsonbaugh, (Prentice Hall of India International Edition, 1997).
5.	Discrete mathematics and its applications (4th edition) by K.H. Rosen (Mc Graw Hill International Edition).
6.	Applied Discrete Structures for Computer Science by Alan Doerra and KennethLeuasieur (Gelgotia Publ., New Delhi).

	The Maharaja Sayajirao University of Baroda **Faculty Of Science** **Department of Computer Application**	**Academic Year**	**2019-20**

BCA: Regular Programme

Year	**II**	~~**Core**~~ **/ Elective /** ~~**Foundation**~~ **BCA1026E13: Web Publishing Lab**	**Credits / Hours per week**	**2 /02**
Semester	**III**	Year of Introduction: 2012 Year of Syllabus Revision:	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1009

CO1. Be able to list and explain the entire process of planning and building a Web site.
CO2. Be able to explain the differences between client-side and server-side programming.
CO3. Be able to describe and create methods for collecting user feedback and supporting interactivity.
CO4. Be able fully explain the reasons for using CSS
CO5. Be able to create both embedded and linked Cascading Style Sheets (CSS).
CO6. Be able to apply guidelines for good site design which include, but not limited to, color, balance, alignment, text etc.
CO7. Be able to explain about the different kinds of software tools that are used to build Web sites.
CO8. Be able to explain the importance, list the steps, and carry out the process for testing of a site.
CO9. Be able to publish a site on a Web server and register a domain name for a site and make it available to users.

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship (Ent)/ Skill Develop	**Relevance to** Local (L)/ National (N)/ Regional (R)/Global (G) develop	**Relation to** Gender (G), Environment and Sustainability (ES), Human

							ment (SD)	mental needs	Values (HV)and Professional Ethics (PE)
1	Introduction to Web Concepts, Use of Photoshop, Flash & Dreamweaver in Web, Introduction to Photoshop, SHOW SAMPLES Photoshop Interface, Resolution, File Browser, Marquee Tools, Feather, Deselect, Transform Tool, Layer Introduction, Move tool; Lasso Tools, Crop Tool, Magic Wand Tool. Transform Options; Brushes for Web; Color palette, Swatches, Gradient & Options, Stroke , Use of color Model in Web; Text Tool & Options; Blending Mode, layer Style; Image - Brightness & Contract, Desiderate; Filters, Slice Options for Web. Introduction to Flash, Use of Flash in Web Designing, Interface of flash , Library, Drawing Tools, Color Mixer.	15	50%	1,2	CO1, CO2, CO4, CO5 CO7	PSO1,PSO3PSO6	EMP	G	PE
2	Introduction to Animation, Show Banners & Advertisements, Intro to Timeline window, Explain Different Concepts of Animation, Key by Key Frame Animation; Motion Twining, Shape Twining & Shape Hint; Masking, Intro to Symbols , Graphics & Movie clips, Buttons Introduction to Dreamweaver, Use of Dreamweaver in web, Dreamweaver Interface, Protocols & Portals, WYSIWYG Technology, Domain Registration & Uploading & Downloading , Web 2.0 & Web 3.0; Dreamweaver Interface, How to define a New Site, Manage site, Properties, Files, Text Formatting Options.	5	50%	2,3	CO2, CO3, CO6, CO8, CO9	PSO1,PSO6,PSO7			

	Page Properties, Linking text with other documents, Code View & Design View, Rulers options, Guides & Grid, Size for Web Layout; Import Image & Type of image, image Property, Image Maps, Table , Standard View, Layout view – Tabular Site. Use of frames, Use of forms; Importing Flash file, Media, Video file, Rollover image, Navigation Bar; Create Web Photo album Photoshop & Dreamweaver, Special characters , Timeline, Behaviors. Intro to CSS, Use of CSS In web, New CSS, Remove CSS, Edit CSS, Delete CSS;								

Reference Books

1.	Adobe photoshop Bible, Flash Bible and Dreamweaver Bible.

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BCA: Regular Programme				
Year	**II**	~~**Core**~~ **/ Elective ~~/ Foundation~~** **BCA1027E09 : Fundamentals of**	**Credits / Hours per week**	**02**

		Management		
Semester	**III**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1027E09

CO1 Understanding the Basic Knowledge of Framework Management
CO2 Planning and Organization of organization Structure of Authority
CO3 Know the Concept of Leadership, communication and motivation
CO4 the Challenges of Management in 21 centaury.
CO6 Concept of Business Ethics and Corporate Governance.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Conceptual Framework of Management: Concept of Management, External Environment, Corporate social Responsibilities, Business Ethics & Corporate Governance(in Brief)	07	23	1	CO1,5	PSO1,5	ENT	G	PE
2	Planning & Organizing: Concept, Nature, Process Organizational Structures Authority & Responsibility Dynamics.	08	26	1	CO2	PSO2 PSO4 PSO5			
3	Directing Meaning , Concept	10	34	2, 3, 4	CO3	PSO3,6			

	I. Motivation: Concept, Nature, Process, Major Theories. II. Leadership: Concept, Nature, Type, Major Theories. III. Communication: Meaning & Concept, Process, Barriers to Communication.								
4	Controlling: Concept, Process, Designing control. The Challenges of Management in 21st Century.	05	16	1, 2, 3	CO4	PSO2,4			

Reference Books

1.	Principle of Management by L.M.PRASAD.

	The Maharaja Sayajirao University of Baroda **Faculty o Science** **Department of Computer Applications**		**Academic Year**	**2020-2021**
BCA: Regular Program				
Year	**II**	**Elective** **BCA 1027E10: Programming using C and C++**	**Credits / Hours per week**	**02/30**
Semester	**III**	Year of Introduction:2019 Year of Syllabus Revision:	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO)

CO1 Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
CO2 Understand dynamic memory management techniques using pointers, constructors, destructors, etc
CO3 Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Introduction:** Introduction to C and C++ (3 Lectures) History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++. Data Types, Variables, Constants, Operators and Basic I/O **Expressions, Conditional Statements and Iterative Statement** Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc). **Expressions, Conditional Statements and Iterative Statements. Functions and Arrays.** Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions,	15	50	1,2	CO1, CO3	PSO3	EMP,SD	G	PE

	Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. One Dimensional Arrays, Two Dimensional Array, Multi-dimensional arrays Structures and Unions								
2	Pointers and References in C++, Memory Allocation in C++ , File I/O, Preprocessor Directives. **Using Classes in C++** Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading Function Overloading and Operator Overloading. Inheritance, Polymorphism and Exception Handling	15	50	1,2	CO2	PSO3			

Reference Books

1.	Hubbard John (2000): Programming with C++, McGraw Hill, Schaum's outline series, 2nd Ed.
2.	Bjarne Stroustrup: The C++ programming language, Addison Wesley, 3nd Edition, 1998
3.	Cohoon, J.P. and Davidson, J.W.: C++ Program design : An introduction to programming and Object Oriented Design

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BCA: Regular Program

Year	**II**	**Core** **BCA1309C01: Shell Programming**	**Credits / Hours per week**	**02/30**
Semester	**III**	Year of Introduction: 2010 Year of Syllabus Revision:2019	**Maximum Marks / Grade**	**50**

Mode of Transaction	Lectures and Tutorials		

Course Outcome (CO)

CO1 Understanding the directory structure of Linux/Unix Operating System
CO2 Browse the directory/file system of Linux/Shell OS
CO3 Understanding the basic file handling commands in Linux/Unix
CO4 Use of simple and advanced filters in Linux/Unix OS
CO5 Basic and advanced shell programming skills.
CO6 Administration

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	**Relevance to** Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	**Relation to** Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Understanding Unix** Kernel, processes, Time-Sharing, Shell, Shell prompt, standard Input/ Output/ Error, Piping and Filters, Users and User Groups; Unix directory tree structure, creating/ removing directories,	05	20	1,2	CO1, CO2	PSO1	SD	N	PE

	obtaining system information. Command line options, Setting the PATH, understanding error messages, running commands unattended – Cron and Crontab.								
2	**Unix files** Files types, permissions on file, Working with files – Finding, Displaying, Printing, copying, moving, renaming, deleting, sorting, encrypting, compressing, and comparing; symbolic links, peripheral device as files, Unix spooling system, managing a print queue. Text Filtering: regular expressions, grep and regular expressions, Using sed. .	05	30	1,2	CO2, CO3, CO4	PSO1			
3	**User and System Administration** Login security, file and directory permissions, starting up the system – single and multi-user modes, Run levels, Shutting down the system, Automating jobs at startup or shutdown; Managing jobs, saving and restoring files, managing system resources	05	70	1,2	CO6	PSO1			
4	**Shell Programming & I/O Processing** Setting up the shell environment – setting up profile and environment file, environment variables, creating and running scripts and functions. Types of command, parts of a command, redirection of standard input and output; compound commands – sequential execution (i) concurrent execution (&), pipelines (¦) conditional commands (&& and ¦¦), co processes (¦&), Group commands, using group commands to control I/O redirection. Evaluating variables and assigning values to variables, Typed variables, arrays, compound variables,	15	30	1, 2, 3	CO4, CO5	PSO1, PSO2			

	scope of a variable. Passing Parameters to a function or script, special parameters (# @ *), using set and shift; Processing option parameters – using getopts command, OPTIND and OPTARG variables. Testing conditions with if command, using [[…]], Using Loops, case command, select command. Using patterns, using command substitution – for value of a variable, for value of a parameter; Using shell meta characters – Filename substitution, Process execution. Managing defaults and errors, distinguishing between Null variables and unset variables, working with strings and substrings. read and printf command, exec command; Trapping the events – intercept INT and EXIT traps, the DEBUG trap Introduction To advance filter: AWK Introduction to power shell, navigation and working with files and directories, scripting in power shell.								

Reference Books

1.	Stephen G. Kochan, Patrick H. Wood (2003): Unix Shell Programming, Sams Publishing
2.	Tansley D. S. W. (2000):Linux and UNIX shell programming, Addison Wesley
3.	KanitkarYashavant. (2003) : Unix Shell Programming, BPB Publications.

The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**		**Academic Year**	**2020-21**
Bachelor of Computer Applications: Higher Payment Programme			
Year	**II**	**Core / ~~Elective / Foundation~~** **BCA1311C03: Database Application Programming**	**Credits / Hours per week**	**03**

Semester	III	Year of Introduction: 2010 Year of Syllabus Revision:2019	Maximum Marks / Grade	100
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO)

CO1 Gain In depth knowledge of connections to different database management systems
CO2 Learn different types of database connectivity mechanisms like ODBC, OLEDB, ADO etc.
CO3 Understanding database applications design and issues
CO4 Learning the application of database connectivity to different database management systems , understanding database cursors

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Review of Databases and DBMS- tables, relations, query, views; Design concepts: E-R diagrams, normal forms; SQL, Functions provided by a database management system. An overview of Oracle: Instances and databases, Memory structures, Oracle processes, Server processes, Listener process; Database files, The logical structure of database, Data concurrency and Data	15	27	1,2	CO1, CO2	PSO6	SD	N	PE

	consistency, Schemas, SQL and PL/SQL, Oracle call Interface. An overview of Microsoft SQL Server: Service manager, Enterprise manager, diagrams, tables, views, stored procedures, business rules, used defined data types, Data transformation services, management, security, support services, The DB library.								
2	**Accessing Databases: ODBC Applications, JDBC Applications, .NET Applications, Python Applications.** Managing Connections, Managing Transactions, Executing SQL Statements, Retrieving Data, Updating Data Introduction to NOSQL database and its types, connectivity with MONGODB	15	25	2,3	CO2	PSO1,PSO2,PSO6			
3	Nature of a database application - The two-tier model - The client application, The database server; The three-tier model - Presentation layer, Application layer, Data layer. Design issues of database application: Logging on a database, accessing views, synonyms, and schemas, cursor selection, querying a database, updating database, transaction control, Locking issues, Error handling.	15	24	1,2,3	CO3	PSO1,PSO2,PSO6			

	Database meta data usage for generic database applications.								

Reference Books

1.	The Data Access Handbook, John Goodson and Robert A. Steward Prentice Hall
2.	MySQL Cookbook, Paul DuBois,O'Reilly Media
3.	Database System Concepts, AviSilberschatz Henry F. Korth S. Sudarshan, TMH
4.	MongoDB: The Definitive Guide 3e, Shannon Bradshaw, O'Reilly Media

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BCA: Regular Programme

Year	**II**	**Core / ~~Elective / Foundation~~** **BCA1313C05: Computer Networks-I**	**Credits / Hours per week**	**03**
Semester	**III**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lecture, Power-point presentation		

Course Outcome (CO)

CO1 Ability to grasp and understand the basics to develop further
CO2 To understand the Layer of OSI and TCP protocal
CO3 Identify the different functionality of different layer and understand its purpose in network configuration.
CO4 Understand the wireless Lan and Wan Technology

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)

1	**Introduction to computer networks, Packet switching & LAN Technologies**: a) Uses of Computer Networks- Resource Sharing, Communication; Growth of Computer Networking, Complexity in Network Systems, Growth of The Internet, Concepts And Terminology. b) Transmission media: Copper Wires, Glass Fibers, Radio, Satellites, Microwave, Infrared, and Light wave. The Concept Of Packets, Packets And Time-Division Multiplexing, Packets And Hardware Frames, Transmission Errors, Parity Bits And Parity Checking, C) Direct Point-to-Point Communication, Shared Communication Channels, Significance Of LANs And Locality Of Reference, LAN Topologies, Star Topology, Ring Topology, Bus Topology, The Reason For Multiple Topologies, Example Bus Network: Ethernet, History Of The Ethernet, Sharing On An Ethernet, Carrier Sense On Multi-Access Networks (CSMA), Collision Detection And Backoff With CSMA/CD, Wireless LANs And CSMA/CA, Another Example Bus Network: LocalTalk, Example Ring Network: IBM Token Ring, Another Example Ring Network: FDDI, Example Star Network: ATM.	11	25.0	1.,2	CO1	PSO9	SD	N	PE
2	**Hardware Addressing & LAN Implementation**: a) Specifying A Recipient, Use of addresses to filter Packets, Format of A Physical Address, Broadcasting, Multicasting, Multicast Addressing, Identifying Packet Contents, Frame Headers And Frame Format, An Example Frame Format, Using networks that do not have self-identifying Frames,	11	25.0	1,2,4	CO3	PSO9			

	Network analyzers, Physical addresses, Frame types, Ethernet address assignment. b) Speeds of LANs And Computers, Network Interface Hardware, The Connection Between an NIC and a network, Original thick Ethernet wiring, Connection multiplexing, Thin Ethernet wiring, Twisted pair Ethernet, Fast Ethernet, Giga-bit Ethernet (TX and FX), Advantages And Disadvantage of Wiring Schemes.								
3	**Wireless LANs & WAN technologies:** a) IEEE 802.11 / Wi-Fi, Blue Tooth, Infra red b) Extending LANs: Distance Limitation And LAN Design, Fiber Optic Extensions, Repeaters, Bridges, Frame Filtering, Start-up And steady state behaviour of bridged networks, Bridging between buildings, Bridging across longer distances, A Cycle of bridges, Distributed spanning tree, Use of switches, Bridging and switching with other technologies. c) Large networks and wide areas, packet switches, Forming a WAN, Store and forward physical addressing in a WAN, Next-Hop forwarding, Source independence, Relationship of hierarchical addresses to routing, routing In a WAN, Use of default Routes, Routing table computation, Shortest Path Computation in a graph, Distributed route computation, Distance vector routing, Link-State routing (SPF), Example WAN technologies - ARPANET, Frame Relay, SMDS, ATM., X.25 with implementation details (up to Layer 2).	11	25.0	2, 4	CO4				
4	**Protocols and Layering & Internetworking**	11	25.0	1, 2, 3	CO3	PSO8,9			

	a) The need for protocols, Protocol suites, A Plan for protocol design, The seven layers, Stacks: Layered Software. The scientific basis for layering, techniques used by protocols: Sequencing for Out-of-Order delivery, Sequencing to eliminate duplicate packets, Retransmitting lost packets, Avoiding replay caused by excessive delay, Flow control to prevent data overrun, Mechanisms to avoid network congestion. Network performance characteristics. b) The motivation for internetworking, the concept of universal service, physical network connections with routers, internet architecture, a virtual network, Protocols for internetworking, Layering and TCP/IP Protocols. c) Internet Protocol Addresses: The IP addressing scheme, classes of IP addresses, dotted decimal notation, division of the address space, special IP addresses.								

Reference Books

1.	Comer D. E. : Computer Networks and Internets. 4/e Pearson Asia
2.	Tanenbaum, A.S. : Computer Networks, 3/e, PHI
3.	Data Communication and Networking. Behrouz Forouzan

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BCA : (Regular Programme

Year	**II**	~~**Core**~~ **/ Elective ~~/ Foundation~~** **BCA1316A01: Java Programming**	**Credits / Hours per week**	**04**
Semester	**III**	Year of Introduction: 2010 Year of Syllabus Revision:2016	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO)

CO1 Introductionto JAVA language,Inheritance,Polymorphism
C02 Interface, Exception handling and File handling
C03 Multithreaded programming, Collection
C04 Java Swing

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Structure of a Java program,the concept of Java virtual machine (JVM). Data types in Java, operators, basic control structures; The	15	25	1,2,3	C01	PS01,PS02	EMP	G	PE

	methods in Math class; arrays in Java, Java's String class and Character class; Declaring classes, creating objects, internal storage of objects, garbage collection, the finalize method, the System class and its methods Inheritance: Extending existing classes, class hierarchy, using super and this keywords, using final key word with inheritance. Polymorphism: Casting object references, dynamic method dispatch, the object class and its methods, abstract classes and methods, final classes and methods. Writing JAVA applets, Writing a program that can run as an applet as well as a standalone application.								
2	Interfaces: creating interfaces using interface keyword, implementing interfaces with implements keyword, applying interfaces. Reusing code: writing packages, importing packages, the java.lang and other packages in Java. Exception handling: try/ catch blocks, the hierarchy of exception classes, multiple catch blocks, nested try statements, finally blocks, the throws clause, built in exceptions, creating exception subclasses. Working with files: Files and streams, stream layering, the File class, reading and writing bytes using FileInputStream and FileOutputStream classes; reading and writing data types and objects, ObjectInputStream and ObjectOutputStream classes.	15	25	1,2,3,4	C02	PS01,PS02			
3	Introduction, creating threads, extending the Thread class, stopping and blocking a thread, life cycle of a thread, using thread methods, thread exceptions, thread priority synchronization. Collections Frameworks Benefits of Collections Framework, Intefaces and Classes	15	25	1,2,3,4,56	C03	PS01,PS02			

	of Collection Framework								
4	.swing package: Class hierarchy in Java to support GUI mming, The classes Component, Container, Panel; Swing ols– Labels, text boxes, Push buttons, check boxes, radio s, dropdown Lists, List boxes, Scroll bars, Text editing, Event Handling in Java: The Delegation event model – Events, event sources, event listeners; Event classes – EventObject Class and other classes, the methods getsource and tostring; events defined in java.awt.event and javax.swing.event packages, sources of events, Event listener interfaces; Using Delegation event model. Understanding applet restrictions and applet advantages, packaging the applet in to a JAR file. Developing desktop GUI applications: Frame in swing: Jframe, methods associated with Jframe, adding components to a Jframe – Jpanel and ContentPane; Using menus and popup menus.	15	25	1,2,3,4,5 6	C04	PS01,P S02			

Reference Books

1.	Herbert Schildt: Java 2 – The Complete Reference, 4/e, TMH, 2001
2.	Arnold, K., J. Gosling, D. Holmes: The Java Programming language, 3/e, Addison-Wesley,2000.
3.	King, K. N.: Java programming from the beginning, W. W. Norton and Company
4.	Jain Pravin (2010): The Class of Java

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BCA: Regular Programme (HPP)

Year	**II**	~~**Core**~~ **/ Elective /** ~~**Foundation**~~ **BCA1318A01:** Programming in .Net	**Credits / Hours per week**	**4**
Semester	**III**	Year of Introduction: 2010 Year of Syllabus Revision: 2019	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO)

CO1 Understanding MS.NET framework and
CO2 Be able to understand use of C# basics, Objects and Types, Inheritance
CO3 Creation of console based Applications with C#.
CO4 To develop, implement, and demonstrate Multi Threading applications and File I/O based applications
CO5 To be able to create .net framework applications that can communicate with rdbms like MS SQL Server, oracle etc.
CO6 To develop Windows forms applications using .NET
CO7 To understand .net graphics interface basics

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics

									(PE)
1	**Overview of .net framework** CLR, .net framework classes, window forms CLR: the common runtime: The common type system, meta-data and Reflection API, managed heap and garbage collector, CLR services. .Net Class framework: benefits of the framework, the classes in System namespace, and System.Collections namespace; User interfaces – Console applications, window forms, web forms; Programmatic interfaces - web services, and ASP.net. Anatomy of .net applications – types, modules, and assemblies.	12	20%	1,2	CO1	PS02,PS03,PS04			
2	**Introduction to C#** General structure of a C# program, type system, value type v/s reference type, Boxing, namespaces, operators, control flow in C# - conditionals, loops, functions; Enumerations, arrays, and structures. Classes and objects, class members, access modifiers, constructor methods, termination and cleanup, operator and method overloading, inheritance, polymorphism; implementing interfaces, using delegates; using properties and property attributes; Partial classes.	13	22%	1,2,3	CO2,CO3	PS02,PS03,PS04			
3	**Exception handling, File Handling, Multithreaded programming** Exception handling in C# - declaring, catching and throwing exception, the System.Exception class. Accessing file system, using streams for I/O, Object	15	27%	1,2,4	CO4	PS02,PS03,PS04			

	serialization. Developing applications with Multiple Threads, Manipulating threads, Thread priorities, Synchronization, Using ThreadPool.								
4	**Windows forms Applications, Data Access using ADO.NET, .NET graphics Interface** Winforms for developing windows application, Control Class, standard controls and components, Creating and using event handler, working with forms, menus and submenus. Data access using ADO.Net- ADO.Net architecture, .Net Data providers, Using database connections, using the DataSet class - Populating a DataSet, Persisting DataSet Changes; using other classes for data access; Creating and using stored procedures, Building a data access component. Understanding the .net graphics interface GDI+ in brief; calling Windows API	20	31%	5,6	CO5,CO6, CO7	PS01,PS02,PS03,PS04,PS06			

Reference Books

1.	Christian Nagel,BillEvjen, Jay Glynn, karli Watson, Morgan Skinner(2010): Professional C# 4 and .NET 4, Wrox
2.	Karli Watson et al. (2008): Beginning Microsoft Visual C# 2008, Wrox
3.	Jack Purdum (2008): Beginning C# 3.0: An Introduction to Object Oriented Programming, Wrox
4.	Donis Marshall (2008): Programming Microsoft® Visual C#® 2008: The Language, Microsoft Press

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BCA: Regular Programme

Year	**II**	**Core / ~~Elective / Foundation~~** BCA1320F01 Exploratory Data Analysis	**Credits / Hours per week**	**02**
Semester	**III**	Year of Introduction: 2019 Year of Syllabus Revision:	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO)

CO1 Ability to understand data, statistics, visualization.

C02 Skill improvement in Programming Skills, Statistics, Data Visualization & Communication.

C03 The objective of Data analysis is to produce an economical description of data.

C04 Simple graphical representations are commonly used as a first step in realizing this goal.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Reasons for using statistical methods.	20	33	1,2,3,4	C01	PS01,P	EMP	G	PE

	Types of data: Numerical, categorical, structured, un-structured, text, audio, video, graph etc. Qualitative and Quantitative data, discrete and continuous data. Data Visualization: pie chart, bar chart, histogram, box plot, frequency curve, ogive curve, stem and leaf plot. Data Exploration: Various characteristics of frequency curves- central tendency, dispersion, skewness and kurtosis, various measures of these characteristics. Bivariate data scatter diagrams, two-way frequency table, Idea of correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of rank correlation. Study of attributes and their association, Yule's coefficient of association.					S03,			
2	The regression problem, simple linear regression, the coefficient of determination, idea of Multiple regression Analysis Multivariate data and its representation, Regressing a response variable on several explanatory variables (Multiple linear regression), multiple correlation coefficient.	10	33	1,2,3,4	C02 ,CO3	PS01,PS03,			

Reference Books

1.	Goon, Gupta and Dasgupta – Fundamentals of Statistics, Vol. I.
2.	Sanders, D.H.: Statistics – A first approach, 4th edition, McGraw Hill.
3.	Clarke and Cooke: A basic course in Statistics, 4th edition, Arnold International.
4.	Agresti,Franklin and Klingenberg: Statistics The Art and Science of learning from data 4th Edition,Pearson

SEMESTER-IV

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**	**Academic Year**	**2019-20**

B.C.A: Regular Programme

Year	**II**	~~**Core /**~~ **Elective** ~~**/ Foundation**~~ **BCA1029E14:Numerical Methods**	**Credits / Hours per week**	**02**
Semester	**IV**	Year of Introduction: 2012 Year of Syllabus Revision:	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1029E14

CO1 Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.

CO2 Apply numerical methods to obtain approximate solutions to mathematical problems.

CO3 Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

CO4 Analyze and evaluate the accuracy of common numerical methods.

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	**Relevance to** Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	**Relation to** Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)

1	**Error Analysis**: Approximation and errors in computing –inherent error, truncation error, and round off error, error analysis using process graphs, iterative procedures and their benefits**.** **Roots of Non-linear equations**:Bisection Method, Newton-Raphson method, secant method. **Solving a system of Linear equations**: Direct Solution **-** Gauss elimination method, pivoting strategies for Gauss elimination method, Gauss Jordan method. **Iterative Solutions:** Jacobi Method, Gauss - Seidel method.	15	50	1,2	CO1,CO4	PSO1	SD	G	PE
2	**Curve Fitting:** Lagrange's Interpolation, Newton's Interpolation. **Numerical Integration:** Trapezoidal Rule, Simpson's ⅓ rule, Simpson's ⅜ Rule; sequence of trapezoidal rules, Romberg integration.	15	50	1,2	CO2,CO3	PSO1			

Reference Books

1.	S.S. Sastry: Introductory methods of Numerical Analysis, PHI
2.	E. Balagurusamy: Numerical Methods, TMH
3.	M.K. Jain, S.R.K. Iyenrar, R.K. Jain: Numerical Methods for Scientific & Engineering computation, Willey Eastern Ltd.
4.	John H Mathews: Numerical methods for mathematics, science and engineering, 2/e, PHI

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B.C.A: Regular Programme

Year	**II**	**~~Core~~ / Elective ~~/ Foundation~~** **BCA1030E15Introduction to Multimedia Lab**	**Credits / Hours per week**	**03/03**

Semester	IV	Year of Introduction: 2012 Year of Syllabus Revision:	Maximum Marks / Grade							100
Mode of Transaction		Lectures and Tutorials								

Course Outcome (CO) BCA1517

CO1 possess problem-solving skills, especially the ability to analyze, design and implement solutions in multimedia.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Multimedia:** Concepts of hypertext/ hypermedia, Applications of multimedia; Enabling technology – digital representations, hardware, software, networks. Bitmapped Images: resolution, compression – lossy and lossless, JPEG compression. Image manipulation, Color models – RGB and CMYK. Video: digitizing video, video standards, video compression – Motion JPEG and DV, MPEG video; Streamed video. Sound: The nature of sound, digitizing sound, compression, file formats, MIDI	15	25	1,2,3	CO1	PSO1			

	3D graphics fundamentals: 3D effects – perspective, color and shading, light and shading, texture mapping, etc; common uses of 3D graphics.						EMP	G	PE
2	**3D programming principles:** Immediate mode and retained mode , coordinate systems – coordinate clipping, view ports; Projections – orthographic projections, perspective projections. Introduction to OpenGL, OPENGL implementations, OpenGL rendering pipeline, OpenGL Utility toolkit: GLUT. Data types, naming conventions, graphics calls; Drawing geometric objects – points, lines, and polygons; State management. Viewing: camera analogy, viewing and modeling transformations, projection transformations, viewport transformation; Using display lists – creating and executing a display list, executing multiple display lists; Using colors in OpenGL, Adding light, lighting effects. Real time programming: Windows animation techniques, using frames.	15	25	1,2,3	CO1	PSO1			
3	**Introduction to 3ds max, understanding view ports:** View port navigation controls, configuring view ports, working with view port backgrounds. Working with scene files, importing and exporting from other formats, referencing external objects – Using Xref Scenes, Using Xref objects. Creating primitive objects – standard primitives like Box, Sphere, Cylinder etc., extended primitives; setting object properties. Cloning objects, creating object arrays, grouping objects, linking	15	25	1,2,3,6	CO1	PSO1 PSO2 PSO4 PSO7 PSO8			

	objects, and using schematic views. Transforming objects- translating, rotating, and scaling, transformation tools, using pivot points, using align commands, using grids. Understanding modifiers, using the modifier stack, modifier types, parametric deformer modifiers, free form deformer modifiers.								
4	**Modeling basics:** Modeling types- parametric objects, editable objects, subobjects, using modeling helpers. Drawing and editing 2D splines and shapes, creating and editing polynomial objects, creating NURBS curves and surfaces. Understanding material properties, creating simple materials using material editor, shading types, using material maps. Working with cameras, camera properties; basic lighting techniques, animation- time controls, animating cameras, animation modifiers. Introducing MaxScript, MaxScript tools, variables and data types, program flow, collections and arrays, writing functions in MaxScript.	15	25	1,2,3,6	CO1	PSO1 PSO3 PSO6 PSO7 PSO9			

Reference Books

1.	Murdock Kelly L. (2004): 3ds Max 6 Bible, Wiley dreamtech India Pvt Ltd
2.	Woo et al. (2000): OpenGL Programming guide, 3e, Addison Wesley
3.	Mukherjee D. P. (1999): Fundamentals of Computer Graphics and Multimedia, PHI
4.	Jeff Burger (1993): Desktop multimedia bible, Addison Wesley

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BCA: Regular Programme

Year	**II**	~~**Core**~~ **/ Elective** ~~**/ Foundation**~~ **BCA1031E16: Cyber Law**	**Credits / Hours per week**	**02**
Semester	**IV**	Year of Introduction: 2012 Year of Syllabus Revision: 2016	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1031E16

CO1 Understanding and know knowledge the Law about cyber
CO2 The Internet has now become all-encompassing; it touches the lives of every human being.
CO3 We cannot undermine the benefits of Internet; however its anonymous nature allows miscreants to indulge in various cybercrimes
CO4 This is a brief tutorial that explains the cyber laws that are in place to keep cybercrimes in check. In addition to cyber laws,
CO5 it elaborates various IT Security measures that can be used to protect sensitive data against potential cyber threats.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Introduction to CyberLaw and INTELLECTUAL PROPERTY ISSUES IN CYBERSPACE	15	50	1,2,4,5	CO1,2	PSO1,2,3	Emp/Ent/SD	G	PE

	• Introduction to CyberLaw for Business: Text and Cases. • Innovations and Inventions • Financing and Exit Strategies • Trademarks. • Copyright. • Patents • Trade Secrets								
2	BUSINESS AND FINANCIAL ISSUES IN CYBERSPACE and SPECIAL ISSUES IN CYBERSPACE. • Jurisdiction. • Contracts. • Employment. • Regulation • Privacy. • Security and Crime. • International CyberLaw.	15	50	1, 2, 4,6	CO4 CO5	PSO2 PSO4 PSO5			
Reference Books									
1.	Cyber Law:-Text and Cases, 3/e By Ferrera Gerald R, Cengage Learning								

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<u>BCA</u>: Regular Programme			

Year	II	~~Core~~ / Elective / ~~Foundation~~ **BCA1032E17: Inventory Management**	Credits / Hours per week	2
Semester	IV	Year of Introduction: 2010 Year of Syllabus Revision:	Maximum Marks / Grade	50
Mode of Transaction				

Course Outcome (CO) BCA1032E17

CO1.Understand terms that are frequently used in inventory management

CO2. Identify the goals and objectives of inventory management and measure your process against these goals

CO3. To understand how Logistics, Supply Chain, Operations, Channels of Distribution fit in to various types of Business viz., Manufacturing, Service and Project.

CO4.To understand how Managers, take decisions – strategic, tactical and operations - and how they are taken in Warehouse Management functional area

CO5. To understand how Warehouse Management and, other functions in Logistics fits into Logistics & Supply Chain Management.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional(R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1.	The need of inventory, purpose of inventory, Objectives of inventory control, types of inventory, inventory costs, and benefits of inventory management. Inventory and customer service, measuring availability, Demand management, estimating delivery times.	7	23	1,2	CO1,C02		Emp/Ent/SD	G	PE

2	Managing the inventory, Pareto analysis, ABC analysis, Stock cover, practical methods of reducing stock holding. Just in time (JIT) management, advantages of JIT, stock control using JIT. Safety stocks, demand patterns and demand distributions, Evaluation of safety stocks.	8	27	3,4,5	CO3				
3	Setting the right stock levels, assessment of review levels, managing lead times, dealing with inconsistent lead times, Target stock levels. Role of purchasing on inventory management, the ordering process, order quantities, economic order quantity, limitations of EOQ, Variants of inventory models.	8	27	3,4,5,6	CO4,CO5				
4	Forecasting demand, Basic forecasting techniques – moving averages, exponential smoothing; monitoring forecasts.	7	23	4,5,6	CO3,CO4,CO5				

Reference Books	
1.	Tony Wild (2002): Best practice in inventory management, 2nd Edition, Elsevier Science Ltd.
2.	Max Mullar (2003): Essentials of Inventory Management, American Management Association.

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Bachelor of Computer Applications: Higher Payment Programme				
Year	**II**	**Core / ~~Elective / Foundation~~** **BCA1408C01: WEB TECHNOLOGY**	**Credits / Hours per week**	**03**
Semester	**IV**	Year of Introduction: 2010 Year of Syllabus Revision: 2019	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1408C01

CO1 To be acquainted with History and development of the World Wide Web and associated technologies.
CO2 Understand the programming concepts in Web scripting languages and will be able develop web pages using scripting languages.
CO3 Understand the client and server side scripting technologies and challenges of web programming.
CO4 Design and development of web-pages and 3-tier data-driven web applications.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Develop	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) develop	Relation to Gender (G), Environment and Sustainability (ES), Human

							ment (SD)	mental needs	Values (HV)and Professional Ethics (PE)
1	Introduction to HTTP and World Wide Web Evolution of WWW, Basic features, Web browsers, Web servers, HTTP and URL's. Overview of HTTP- HTTP basics, Client request, server response; HTTP headers; Session management, persistent connections, Cookies. Configuration & administration of web server **Web Application Architecture.** Web Browsers, Web Servers, Basic features, client and server, personal preferences, Bookmarks, Plug-ins and Helper Applications.	10	22	1,2	CO1	PSO2	Emp/Ent/ SD	G	PE
2	**Introduction to Scripting** **Introduction to JavaScript:** Java Script language: Variable and data types in Java Script; control structures – if, switch, for, while, do-while. Functions: Defining and invoking Functions and function arguments. Calling function with timer. Objects – math object, date object, String, History, and Document object Model: window object, web document, location object; user defined objects – defining, creating an instance, customization of built-in objects. Form Validation Using Javascript. Event handling using the event object; dialog boxes, frames, graphics and animation; creating browser specific	17	38	2,3,6	CO2,C 03	PSO2,P SO4			

	scripts **Need for Data Exchange Technologies and Introduction:** The concept of a meta language, limitations of XHTML, logical structure of XML document, using XML markup, CDATA sections, XML and structured information, Document Type declarations (DTD), XML objects, processing XML, JSON Syntax, JSON datatypes, JSON parse, JSON Stringify, JSON array, JSON Objects , JSON vs XML.								
3	**Server side Technologies** Server side Technology, Dynamic Content on the Web and CGI, Problems with CGIs, Overview of current Server side technologies. **Node.JS** Setting up for Node.JS Development, Understanding the basics, Node.JS modules, Node.js file System, Node.JS NPM, Node.JS Events, Database connectivity	18	40	1,2,3,6	CO3,CO4	PSO2,PSO4			

Reference Books

1.	Brian Totty and David Gourley : HTTP: The Definitive Guide , O'Reilly
2.	David Flanagan : JavaScript: The Definitive Guide, O'Reilly
3.	Basarat Ali Syed: Beginning Node.js, Apress
4.	Shelly Powers :Learning Node: Moving to Server-Side, O'Reilly

The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**		**Academic Year**	**2019-20**
BCA (Software Engineering-I): Regular Programme			
Year	**II**	**Core / ~~Elective / Foundation~~** **BCA1410C03: Software Engineering-1**	**Credits / Hours per week**	**03 Cr**
Semester	**IV**	Year of Introduction: 2010 Year of Syllabus Revision: 2019	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures		

Course Outcome (CO) BCA1410C03

CO1 Describe software engineering layered technology and Process frame work.
CO 2 A general understanding of software process models such as the waterfall and evolutionary models.
CO 3 Select an appropriate design pattern
CO 4 Explain Design concepts and various UML diagrams
CO 5 Illustrate about domain models and conceptual classes
CO 6 Compare and contrast various testing techniques

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)

1	**INTRODUCTION TO SOFTWARE ENGINEERING**						Emp/Ent	G	PE
	Understanding the term Engineering, computer programming v/s software engineering, Science vs. Engineering, Software engineering concepts – Software project, stakeholder, system, activities, roles, work products, deliverables, methodology. Introduction to modelling, importance of modelling, Different views and their relationships, Methods and notation; Introduction to the unified modelling language (UML). Software development – Software development Lifecycle, processes and activities, IEEE Standards; Models for software development – sequential models, iterative models; the unified software development process. Unified process: The dynamic structure - Inception, Elaboration, Construction, and Transition phases; The static structure – different workflows, roles and artefacts.	10	22%	1	CO1, CO2	PSO3			
2	**DESIGNING AND UML** The concept of a use-case, capturing functional requirements, unified process as a Use-case driven process. Use case diagram, use case model of a system. Inception phase – objective; Activities of Inception phase: business modelling, requirements, analysis; Artifacts – vision document, candidate architecture, project plan, establishing the business case. Business modelling – objectives, advantages, business use-case model, business object model. Finding use cases, finding actors, relationship between actors, relationships between use cases, documenting use cases – using templates, using UML diagrams – activity diagram, sequence diagram. Elaboration phase – Objectives, activities – finding more actors and use cases, Prioritizing use cases, Detailing use cases. Prototyping user interfaces. Software architecture – Organization of the system, structural elements and their interfaces, composition, Architecture	10	22%	1,2,3	CO3	PSO5			

	representation. Unified process as architecture centric process.								
3	**ARCHITECTURE OF SOFTWARE SYSTEMS** Architectural analysis, analyzing use-cases, identifying and analyzing classes, Class diagram, representing relationships and associations, Object diagram. Package - a general organizing construct, analyzing packages. Representing the analysis model. Designing the system – The goal of design workflow, developing architectural design, Using component diagram and communication diagram. Designing use-cases, designing classes, designing subsystems; Using sequence diagrams and state diagrams. Design model; architectural implementation of the system. Test work flow: planning a test, designing a test – integration test, system test, regression tests, structuring test procedures, implementing tests, performing tests.	10	22%	1,2,3	CO4	PSO3			
4	PHASES OF CONSTRUCTION Construction phase – Objectives, activities – Detailing all remaining use-cases, structuring the use-case model, completing analysis and design activities, implementing classes, performing unit tests – black box tests and white box tests. Transition phase: objectives, beta release, responding to beta tests, adapting the product to various environments, ending the project, planning next release. Planning software deployment, deployment view - deployment diagrams, modeling of nodes, Allocating components to nodes. Tolls to support the life cycle: Requirement management, Visual modeling. Programming tools, Tools for quality assurance.	10	22%	1,2,4	CO5	PSO2			

5	PHASES OF CONSTRUCTION Recap of UML: Different parts – views, Diagrams, Model elements, General Mechanisms; General mechanisms – Adornments, Notes, Specifications. Modelling Dynamic and Physical structures of system, Model quality.	05	12%	4,5,6	CO6	PSO1,PSO3			

Reference Books

1.	Jacobson et al. (2005):The Unified Modelling Language User Guide, 2/e AWL
2.	Jacobson, I., Booch, G. and Rumbaugh, J. (1999): The Unified Software Development Process, AWL.
3.	Rumbaugh, J. et al. (1991): Object Oriented Modelling and Design, PHI.

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B.C.A: Regular Programme			
Year	**II**	**Core / ~~Elective / Foundation~~** **BCA1411C04 : Computer Networks-2**	**Credits / Hours per week**	**03**
Semester	**IV**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lecture, Power-point presentation		

Course Outcome (CO) BCA1411C04

CO1 To identify the different routing protocol and its usage in network configuration
CO2 To understand the network addressing scheme
CO3 To identify the different routing protocol and its usage in network configuration
CO4 Session layer and file transfer protocol layer and its usage in security functionality

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**INTRODUCTION TO NETWORKS**: a) A quick review of internetworking concepts, protocols for internetworking, TCP/IP model.OSI model. Types of	11	25.0	1	CO1	PSO1,9	Emp/Ent/ SD	G	PE

	Networks.LAN WAN MAN.Protocols.Gateways. b) Dynamic Routing Protocols: Vector Distance Routing Protocol – Routing Information Protocol (RIP), Link State Routing Protocol – OSPF. Route summarization, Loop Avoidance methods.								
2	IPV4 and IPV6: a) The Future of IP: The motivation for change, the new version IPv6, Features in IPv6-IPv6 Datagram format, IPv6 base header format, handling multiple headers, IPv6 addressing; Fragmentation, Reassembly and Path MTU. b) Transmission across an Internet, IP Routing, and Use of the mask field, destination and Next-Hop addresses (CIDR), MTU, datagram size and encapsulation, Reassembly. c) Error Reporting Mechanism: Internet control message protocol (ICMP), ICMP messages, Using ICMP-to test reach ability, to trace a route for path MTU discovery. d) Reliable Transport Service: The need, The Transmission Control Protocol (TCP), Service provided by TCP to applications, 3-way handshake, Achieving reliability, Retransmission of packets, congestion control, TCP segment format. e) Unreliable Transport Service : The need, User Datagram Protocol (UDP), Connectionless paradigm, UDP communication semantics, UDP datagram format, UDP checksum and Pseudo header	11	25.0	1	CO2	PSO6			
3	Client Server Model: a) Client- Server Interaction: The client-server paradigm, server programs & server-class computers, Transmission protocols & client-server interaction, multiple services on one computer, Multiple Copies of a server for single service, A service reachable through multiple protocols. b) Address Resolution Protocol (ARP): Address resolution techniques-with table lookup, with closed form computation, with message exchange; ARP, ARP message format, identifying ARP frames, Processing ARP messages. c) Domain Name System: Structure of computer names, Domain names within an organization, DNS client-server model, Server architectures, Links among servers, Resolving a name, Multiple types of DNS entries, Using the CNAME	12	25.0	2, 3, 4	CO3	PSO8			

	type. d) E-Mail: Electronic mail paradigm, Mail boxes and addresses, Mail message format, Mail transfer and Protocols, The SMTP, Mail gateways, dialup connections and POP. IP Datagrams: Virtual packets & IP Datagram, IP datagram header format, Datagram transmission and frames.								
4	FTP,SECURITY: a) File Transfer Service: Data transfer and distributed computation, File transfer service, The File Transfer Protocol (FTP).- FTP general model and user interface, FTP commands, File permissions, File types and transfer modes, Client-server interaction in FTP, Trivial File Transfer Protocol (TFTP), Network file system. b) Remote Login : Telnet , SSH (Secure Shell) c) Network Security: Secure networks and Polices, Aspects of Security, Integrity mechanisms, Access Control, Encryption - Conventional Encryption, Public Key Encryption, certification services, Digital signatures, Internet Firewall concept-Packet filtering firewall. d) Initialization of Protocol Software-Automatic protocol configuration, Bootstrap Protocol (BOOTP), Dynamic Host configuration Protocol (DHCP)-DHCP message format, DHCP and domain names, PXE (**P**reboote**X**ecution**E**nvironment).	11	25.0	1, 2, 3	CO4	PSO9			

Reference Books

1.	Comer, D.E. (2000): computer Networks and Internets, 4e, Pearson Education Asia. (Addison Wesley)
2.	Tanenbaum, A.S. : Computer Networks, 3/e, PHI
3.	Behrouz A Forouzan, Sophia Chung Fegan : Data Communications and Networking.

The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**		**Academic Year**	**2019-20**
BCA (Bachelor of Computer Applicaions)			
Year	**II**	**Core / Elective~~/ Foundation~~** **BCA1415A01 : Advanced Java Programming**	**Credits / Hours per week**	**04**
Semester	**IV**	Year of Introduction: 2010 Year of Syllabus Revision: 2016	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1415A01

CO1 To connect java applications with different databases
CO2 Develop Client/Server Applications
CO3 Multiple language support for an application

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	IntrodIntroduction, Database drivers, JDBD-ODBC bridge, brief	15	25	1,2	CO1	PSO1	Emp/Ent/	G	PE

	introduction of JDBC drivers, java.sql package. DriverManager class – getConnection method, ConnectionObject – createStatement method, Statement object – execute, executeQuery, executeUpdate methods. ResultSet object – various methods of ResultSet object – next, beforeFirst, afterLast, first, last, previous, getObject, getDate, getDouble, getFloat etc.					PSO2 PSO6	SD		
2	Concept of a reusable software component, Bean concepts, creating a simple bean, bean properties, manipulating events. Persistence- object serialization, Instantiating Serialized Objects Introspection- BeanInfo and related Interfaces.	15	25	1,2	CO1 CO2	PSO1 PSO2 PSO6			
3	HTTP protocol, Servlet implementation and configuration, Life cycle of servlet, Interfacing with client. Servlet sessions, servlet context and servlet collaboration; Web deployment. Java Server Pages (JSP): The concept of page compilation, Writing simple JSPs, the role of JSP Engine; Implicit object request for writing request time expressions. Using Beans to react to the user input or the information sent by the browser. <jsp:useBean> tag, <jsp:getProperty> tag and <jsp:setProperty> tag, Bean instances and serialization. Declaration and explicit objects, using scriptlet tag to include Java code in the page, Using control structures of Java to write more sophisticated JSPs, using try and catch blocks of Java for error handling, using Beans and scriptlets together.	15	25	1,2	CO2	PSO1 PSO2 PSO6			
4	Socket and Server socket classes, writing a simple server, Multithreading revision, converting it into a multithreaded server, Using URL and URLC classes. Overview of Remoting technologies in java:-RMI: Building remote interface, writing an RMI client and RMI server, compiling with rmic utility, registering the object; parameter passing and object serialization.,SOAP based services, Security features in Java; Internationalisation – Basic concepts and support in Java.	15	25	1,2	CO3	PSO1 PSO2 PSO6			

Reference Books

1.	Horstmann C. S. and Cornell G. : Core Java, Volume II: Advanced features, Sunsoft Press, Prentice Hall, 1998.
2.	Robert Englander: Developing Java Beans, O'Reilly, 1997.
3.	Marty Hall, et al. : Core Servlets and Java Server Pages.

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**	**Academic Year**	**2019-20**

BCA: Regular Programme

Year	**II**	**Core / Elective ~~/ Foundation~~** **BCA1415A01:** Advanced .Net Programming	**Credits / Hours per week**	**4**
Semester	**IV**	Year of Introduction: 2010 Year of Syllabus Revision: 2019	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1415A01

CO1 To understand the basic concepts of ASP.NET
CO2 To develop implement and demonstrate ASP.NET applications
CO3 To understanding basic concepts of distributed computing available in .net : .net remoting, networking, web services
CO4 Understand .NET remoting architecture and basic concepts, develop and implement .net remoting based applications
CO5 Understand .Net based networking classes , architecture and create applications based on the same.
CO6 To understand Xml concepts, System.XML and SOAP/WSDL based web services
CO7 to be able to create and consume SOAP/WSDL web services in .NET
CO8 To understand the concept of assembiles, their types, security aspects for .NET applications
CO9 To introduce the basics of WPF,WCF.WF and Windows Card Space

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental	Relation to Gender (G), Environment and Sustainability (ES), Human Values

							(SD)	needs	(HV)and Professional Ethics (PE)
1	**Web Application Development** Base Class Library, CLR, CTS, Common Language Specification, Namespaces, Assemblies, Application Domains. Developing Web applications using ASP.net - The code-behind programming model, ASP.net WebForms – creating user controls, server controls, server-side data access; ASP.net data access, State Management in ASP.NET, .aspxand .aspx.cs files, a configuration file Web.config; User Authentication and Authorization. Developing user controls and custom controls	17	26%	1,2	CO1,CO2	PS02,PS03,PS04	Emp/Ent/SD	G	PE
2	**The .NET Distributed Architecture** Remote Processing, World Wide Web and the .Net Solution. Messaging - Messaging Architecture, setting up Messaging Network, Creating and Referencing Message Queues, Sending and receiving Messages, Message Queue Security, Sending and	16	26%	1,2,3	CO3,CO4,CO5	PS02,PS03,PS04			

	Receiving Complex Objects. Remoting - Remoting Architecture, Instantiating Using Activator Methods: GetObject() and CreateInstance(), Communicating From the Remote Object Using Events, Asynchronous Calls; Transactions - Manual Transactions and automatic Transactions. Networking in .NET: System.NET Namespace, The WebClient Class, HTTP Derivations of WebRequest and WebResponse, TCP and Socket Classes								
3	lass **Parsing XML with the Xml Namespace and Web Services** g XML - XmlReader Classes, XmlDocument Class; XML DOM and the XmlDocument class, Modifying an XmlDocument. XML Web services – overview, understanding the SOAP and WSDL, creating and using a Web service, state management for XML Web services.	12	22%	1,2,4	CO6,CO7	PS02,PS03,PS04			
4	**.NET Security** Socket Code Access Security, Cryptographic Security, Web Service Security. Assemblies and deployment – The manifest, private assemblies and shared assemblies, Global Assembly Cache, Deploying .Net windows applications, deploying .Net web applications, VS.NET Build Configurations, Copying a Web Application. Introduction to Windows Presentation Foundation (WPF), Windows Communication Foundation (WCF), Windows	15	26%	5,6	CO8,CO9	PS01,PS02,PS03,PS04,PS06			

	Workflow Foundation (WF), and Windows CardSpace, .Net Core								

Reference Books

1.	Christian Nagel,BillEvjen, Jay Glynn, karli Watson, Morgan Skinner(2010): *Professional C# 4 and .NET 4, Wrox*
2.	Macdonald Matthew(2012): Beginning ASP.NET 4.5 in C#:, Apress
3.	Christian Nagel :Professional C# 6 and .NET Core 1.0, Wrox

The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**			**Academic Year**	**2019-20**
BCA (Software Engineering-I): Regular Programme				
Year	**II**	~~**Core / Elective /**~~ **Foundation** **BCA1417F01 : Business Modeling Project**	**Credits / Hours per week**	**01**
Semester	**IV**	Year of Introduction: 2010 Year of Syllabus Revision: 2019	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures		

Course Outcome (CO) BCA1417F01

CO1 To get acquainted with UML diagrams in detail

C02 To understand the whole system and visualize

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)

1	Project Presentation on particular business domain. Uml Diagrams: Structural, Behavioral, Grouping, Annotation Use case Diagram, Sequence Diagram, Class Diagram, State Machine Diagram, Activity Diagram, Component diagram, Deployment Diagram	15	100%	1,2	C01,C02		Emp/Ent/SD	G	PE

Reference Books

1.	**Jacobson, I., Booch, G. and Rumbaugh, J. (1999): *The unified software development process*, AWL.**
2.	**Rumbaugh, J. et al. (1991): *Object Oriented Modelling and Design*, PHI.**

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**		**Academic Year**					**2019-20**	
B.C.A: Regular Programme									
Year	**II**	~~**Core / Elective /**~~ **Foundation** **BCA1418F02: Soft Skills**	**Credits / Hours per week**					**01**	
Semester	**IV**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**					**50**	
Mode of Transaction		Lectures and Tutorials							

Course Outcome (CO) BCA1418F02

CO1 Demonstrate in both oral and written work a discipline-specific critical facility through convincing and well-supported analysis of related arterial.

CO2. Demonstrate fluency in a grammatically accurate and rhetorically engaging style of writing. Develop Assertive Skills Leadership Skills

Unit	**Topic/Unit**	**Contact**	**Weightage**	**BT**	**CO**	**PSO**	**Element**	**Relevan**	**Relation**

No.		Hours	(%)	Level			s of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	ce to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Interpersonal, Listening and Negotiation Skills** Presenting Oneself, for talking to people in business situations Knowing modern communication techniques. mobile etiquettes, email ethics, messaging ethics, chatting, video conferencing Developing Professional Approach making / taking notes, summarizing business conversations, art of negotiating, cultural awareness in International negotiations	6	40	1,2,3	CO1 CO2	PSO1	Emp/Ent/ SD	G	PE
2	**Group Discussion and Interview Skills Group Discussion** Purpose, Group norms. Phases, Discussion strategies Interview Skills Problems, Role of Interviewer interviewee, Techniques, FAQs	3	20	1,2,3	CO1 CO2	PSO1			
3	**Assertive Skills** Positive/ Negative Thinking Strategies for assertive behavior, Indicators of Assertive behavior,	3	20	1,2,3,6	CO1 CO2	PSO1 PSO2			

	How to say 'No' politely.								
4	**Leadership Skills** Defining leadership, Leadership styles, Leadership skills - Team Building, Collaborating and Delegating	3	20	1,2,3,6	CO1 CO2	PSO1 PSO3			
Reference Books									
1.	Hollett, V. Business Opportunities, Oxford: Oxford University Press, 1995.								
2.	Kaul, A. Business Communication, New Delhi: Prentice Hall of India Pvt. Ltd, 2003.								
3.	Ludlow, R. & Panton, F. The Essence of Effective Communication, Prentice Hall of India Pvt. Ltd, 1995.								

SEMESTER-V

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA (Software Engineering-II)

Programme Specific Outcome(PSO)

PSO 1 . To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.
PSO 2. To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
PSO 3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics , statistics, management and allied areas.
PSO 4 Learn web and mobile application development skills.
PSO 5 Learn Computer hardware with microprocessor architecture .
PSO 6 Learning Database management system along with designing ,query processing and managing databases using application programs.
PSO 7 Develop software solutions to address problems across broad range of application domains through software engineering principles.
PSO 8 Generating solutions in societal and environmental contexts.
PSO 9 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO 10 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming ,designing, analysing network applications.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**	**Academic Year**	**2021-2022**

BCA (Software Engineering-II): Regular Programme				
Year	**3**	**Core / ~~Elective / Foundation~~** **BCA1501: Software Engineering-2**	**Credits / Hours per week**	**04 Cr**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures		

Course Outcome (CO) BCA1501

CO1 Describe software engineering layered technology and Process frame work.
CO 2. A general understanding of software process models such as the waterfall and evolutionary models.
CO 3. Understanding of software requirements and the SRS documents.
CO 4. Understanding of the role of project management including planning, scheduling, risk management, etc.
CO 5. Describe data models, object models, context models and behavioral models.
CO 6. Understanding of different software architectural styles.
CO 7. Understanding of implementation issues such as modularity and coding standards.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepre	Relevance to Local (L)/ National (N)/	Relation to Gender (G), Environment and

							neurship (Ent)/ Skill Development (SD)	Regional (R)/Global (G) developmental needs	Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Software Project Management** Metrics of process and project, Project Scheduling and tracking, Cost Estimation,Configuration Management , Change management, Release Management Risk Management,Risk Estimation, RMMM plan	14	23	1	CO1	PSO3			
2	**Agile Methods** Agile principals, Methodology Agile Models: Extreme programming, Scrum.	14	23	1	CO2, CO3	PSO5			
3	**Managing Software requirements** Need for requirements managements, requirements management techniques, Problem analysis, Requirement Analysis, Stages of requirement engineering, understanding user and stakeholder needs, Defining the system, managing the scope. Design Patterns for solving designing problems, Describing design patterns, selecting and using design patterns; Creational Patterns – Abstract factory, Factory method, singleton; Structural patterns – Adapter, decorator, Façade, Proxy; behavioural patterns – command, mediator, observer, state, template method Introduction to Software Architecture	16	27	2, 3, 4	CO4, CO5	PSO3 PSO5			

4	**Quality Management** Quality concepts, Software quality assurance, Software reviews, Statistical software quality assurance, Six sigma model, Software reliability, availability, and safety, SQA plan	16	27	1, 2, 3,4	CO6, CO7	PSO3, PSO2			

Reference Books

1.	Software Engineering: A Practitioner's Approach by Roger S. Pressman
2.	Lee Copeland: A Practitioner's Guide to Software Test Design, Artech House
3.	Erich Gamma et al.: Design Patterns: Elements of Reusable Object Oriented Software, Addison Wesley
4.	Richard E Fairley: Managing and leading Software Projects, CS Press
5.	Leffingwell and Widrig: Managing Software Requirements (2003): A Usecase approach, 2nd edition, Addison Wesley Professional.
6.	Penny Grubb and Armstrong A. Takang: Software Maintenance: Concepts and Practices, World Scientific Publishing
7.	Anne Matte Jonassen Hass: Configuration Management Principles and Practices, Addison Wesley.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA

Programme Specific Outcome(PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector
PSO2 To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
PSO3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics , statistics, management and allied areas.
PSO4 Learn web and mobile application development skills.
PSO5 Learn Computer hardware with microprocessor architecture .
PSO6 Develop software solutions to address problems across broad range of application domains through software engineering principles.
PSO7 Generating solutions in societal and environmental contexts.
PSO8 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PSO9 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming ,designing, analysing network applications.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**		**Academic Year**	**2021-22**
BCA: Software Testing				
Year	**III**	**Core / ~~Elective / Foundation~~** **BCA XXXX: Software Testing**	**Credits / Hours per week**	**02**
Semester	**V**	Year of Introduction: 2019 Year of Syllabus Revision:	**Maximum Marks / Grade**	**50**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO)

CO1 You will learn the basics of creating Testing Process and Important terminologies

CO2 More specifically, you will learn the Structural Testing, Software Verification

CO3 You will learn how to create test cases from requirements

CO4 You will learn different Levels of Testing

CO5 You will also learn, how to test Web Applications, Usability Testing and Security and Performance Testing

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	What is testing? What should we test? Who should do testing? Role of a tester, Reporting and analyzing bugs, bug lifecycle. Program and software, Verification and Validation, test case, test suite, Alpha, Beta and Acceptance testing, Static and Dynamic testing, testing and Debugging Structural Testing – Control Flow testing(Statement coverage, Branch Coverage, Condition Coverage, Path Coverage), Data Flow testing, Slice Based Testing, Mutation Testing	15hrs	50	1,2	CO1, CO2	PSO1 PSO3			
2	Software Verification- Verification methods: Peer Reviews, Walkthroughs, Inspection and Applications Creating Test cases from requirements and Use cases	15hrs	50	4.5,6	CO3 CO4 CO5	PS01 PSO3 PSO6			

	Regression Testing and prioritization of Test Cases for Regression Testing. Software Testing Activities Levels of Testing- Unit Testing, Integration Testing, System Testing and Acceptance Testing, Software Testing Tools. Testing Web Applications- Web Testing, Usability Testing, Configuration and Compatibility Testing, Security testing and Performance Testing								

Reference Books

1.	Software Testing- Yogesh Singh, Cambridge
2.	Software Testing, A Craft's Man Approach 4th Edition - Paul C. Jogensen. CRC Press
3.	The Art of Software Testing- Glenford J .Myers, Corey Sandler, Tom Badgett. John Wiley & Sons. Inc.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name

Programme Specific Outcome(PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector

PSO2 To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.

PSO3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics , statistics, management and allied areas.

PSO4 Learn web and mobile application development skills.

PSO5 Learn Computer hardware with microprocessor architecture .

PSO6 Develop software solutions to address problems across broad range of application domains through software engineering principles.

PSO7 Generating solutions in societal and environmental contexts.

PSO8 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PSO9 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming ,designing, analysing network applications.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**	**Academic Year**	**2021-22**

BCA(Bachelor of Computer Applications)

Year	**III**	**Elective** **BCA1523 Mobile Application Development**	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction:2012 Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lecture, Power-point presentation, practical demonstration		

Course Outcome (CO)

CO1 To understand different mobile operating systems.

CO2 Develop applications using Android operating system

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Developing for mobile devices**	15	25	1,2	CO1	PSO1			

	Mobile operating systems, Android – Introduction the Development Framework, Android development tools; application manifest, Using Intents to launch activities, Intent filters and their use. Android application lifecycle. Android Studio Debugging, Activities and Intents, Activity Life Cycle,App Testing								
2	**Creating User Interfaces** Views, Layouts, Drawable resources, Resolution and density independence, Creating and Using menus. User Navigation, Displaying and managing dialogs. User Navigation, RecyclerView ,CardView, Material Design .	15	25	1,2,4	CO2	PSO2 PSO4			
3	**Working in the Background** Creating map based activity. Creating and registering services, interacting with a service, binding activities to services; Using background threads, Notifications and alarms. AsyncTask and Asynctask Loader. Using Job Scheduler. Connecting to the Internet, Broadcast Receivers	15	25	1,2,4	CO2	PSO2 PSO4			
4	**Saving User Data** Using Shared Preferences, File Storage, App Settings ,Introduction to SQlite Database , Room LiveData and View Model	15	25	1,2,4	CO2	PSO2 PSO4			

Reference Books

1.	https://google-developer-training.github.io/android-developer-fundamentals-course-concepts-v2/index.html
2.	**Codelabs for Android Developer Fundamentals**
3.	Developer.android.com

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA (Web Application Development)

Programme Specific Outcome(PSO)

PSO 1 . To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.

PSO 2. To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
PSO 3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics , statistics, management and allied areas.
PSO 4 Learn web and mobile application development skills.
PSO 5 Learn Computer hardware with microprocessor architecture .
PSO 6 Learning Database management system along with designing ,query processing and managing databases using application programs.
PSO 7 Develop software solutions to address problems across broad range of application domains through software engineering principles.
PSO 8 Generating solutions in societal and environmental contexts.
PSO 9 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO 10 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming ,designing, analysing network applications.

Syllabus of Courses

The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**		**Academic Year**	**2021-22**
BCA (Web Application Development): Regular Programme			
Year	**3**	**Elective** **BCA1513: Web Application Development**	**Credits / Hours per week**	**04 Cr**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures		

Course Outcome (CO) BCA1501

CO1 To gather knowledge about backend and frontend technologies
CO2 To develop web applications using latest tools.
CO3 Creating fullstack applications with all JavaScript technologies.
CO4 Using MongoDB for database connectivity
CO5 Creating API with NodeJS
CO6 Develop fully working applications that can be used on cross-platforms.
CO7 Implement a RESTful backend API.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professio

									nal Ethics (PE)
1	Introduction to Back-end technologies: ASP.NET,JSP, PHP,NodeJS,Express **NodeJS** Introduction to Node.js, Installing node js, basics of Node terminal, node in built modules, npm **Express** Introduction to express, starting our own localhost server using express, request and response using express, Installing and using the nodemon routing, responding the request, body parser module	12	20	1,2,4	CO1 CO2 CO3 CO5	PSO1 PSO2 PSO4			
2	**Creating APIs with Node & Express** Introduction to API's, Introduction to JSON and using openweather api, Weather forecasting-web application, https get request for JSON, parsing the JSON, Getting live api data using express **REST API** REST API introduction, GET method, POST Method, DELETE Method **MongoDB** An Introduction to MongoDB and NoSQL Databases,Using MongoShell (Command Line Interface), Using Mongo Compass (Graphic Interface),Working with robo 3T(mongo db gui), Connecting MongoDB to Our Node/Express Backend, JSON for MongoDB data storage, Creating, Updating, and Deleting Data, Filtering Data with MongoDB, Refactoring and Improving Our Code	12	20	1,2,3	CO1 CO2 CO3 CO4 CO5 CO7	PSO1 PSO2 PSO4			
3	Introduction to Front-end Technologies: React, Angular, Vue **React** Introduction to React, Hello World in React, Folder	18	30	1,2,3	CO1 CO2 CO3 CO6	PSO1 PSO2 PSO4			

	Structure, JSX,UI Components with JSX, React Components, React Props, React State Lists Using Map function, Using CSS in ReactJs, Form Handling in React, Routing with React Route								
4	**React Hooks** Introduction to React Hooks, useState React Hook, Form Handling in React with Hooks, useEffect React Hook Deploying project on Heroku **Working with JavaScript frameworks** Strapi, Next.js, GraphQL etc. **Redux** Introduction to Reduxm, How Redux works, Why use Redux, Pure functions, Redux middleware, Asynchronous actions, Redux-logger, Redux-thunk, API requests in React, Context API, Connecting React & Redux	18	30	1,2,3	CO1 CO2 CO3 CO6	PSO1 PSO2 PSO4			

Reference Books

1.	Node.js in Action By Alex R. Young, Bradley Meck, Mike Cantelon, Tim Oxley, Marc Harter, TJ Holowaychuk, Nathan Rajlich · 2017 Manning
2.	Learning React Functional Web Development with React and Redux By Alex Banks, Eve Porcello · 2017 Oreilly
3.	Building React. Js Applications with Redux By David Geary Addison Wesley
4.	Pro MERN Stack Full Stack Web App Development with Mongo, Express, React, and Node By Vasan Subramanian · 2019 Apress
5.	Full-Stack React Projects Modern Web Development Using React 16, Node, Express, and MongoDB By Sai Kishore Komanduri, Shama Hoque · 2018 Packt
6.	MERN Quick Start Guide Build Web Applications with MongoDB, Express.js, React, and Node By Eddy Wilson · 2018 Packt
7.	Full-Stack React Projects Learn MERN Stack Development by Building Modern Web Apps Using MongoDB, Express, React, and Node.js, 2nd Edition By Shama Hoque · 2020 Packt

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4.Analysis 5.Evaluation 6. Creation

Programme Name: B.C.A

Programme Specific Outcome (PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.
PSO2 To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
PSO3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics, statistics, management and allied areas.
PSO4 Learn web and mobile application development skills.
PSO5 Learn Computer hardware with microprocessor architecture.
PSO6 Learning Database management system along with designing, query processing and managing databases using application programs.
PSO7 Develop software solutions to address problems across broad range of application domains through software engineering principles.
PSO8 Generating solutions in societal and environmental contexts.
PSO9 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO10 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming, designing, analyzing network applications.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**	**Academic Year**	**2021-22**

BCA: Regular Programme

Year	**III**	~~**Core**~~ **/ Elective** ~~**/ Foundation**~~ **BCAXXXX: Algorithms Design and Analysis**	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCAXXXX

CO1. Analyze the asymptotic performance of algorithms.
CO2. Write rigorous correctness proofs for algorithms.
CO3. Demonstrate a familiarity with major algorithms and data structures.
CO4. Apply important algorithmic design paradigms and methods of analysis.
CO5. Synthesize efficient algorithms in common engineering design situations.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics

									(PE)
1	**Basics of Algorithms and Mathematics:** What is an algorithm?, Mathematics for Algorithmic Sets, Functions and Relations, Vectors and Matrices, Linear Inequalities and Linear Equations. **Analysis of Algorithm:** The efficient algorithm, Average, Best and worst case analysis, Amortized analysis , Asymptotic Notations, Analyzing control statement, Loop invariant and the correctness of the algorithm, Sorting Algorithms and analysis: Bubble sort, Selection sort, Insertion sort, Shell sort Heap sort, Sorting in linear time : Bucket sort, Radix sort and Counting sort	22	36%	1,2, 3, 6	CO1, CO2, CO3	PS02,PS03,PS04			
2	**Divide and Conquer Algorithm:** Introduction, Recurrence and different methods to solve recurrence, Multiplying large Integers Problem, Problem Solving using divide and conquer algorithm - Binary Search, Max-Min problem, Sorting (Merge Sort, Quick Sort), Matrix Multiplication, Exponential. **Dynamic Programming:** Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming – Calculating the Binomial Coefficient, Making Change Problem, Assembly Line-Scheduling, Knapsack problem, All Points Shortest path, Matrix chain multiplication, Longest Common Subsequence.	18	30%	1,2,4,5,6	CO4,	PS02,PS03,PS04			
3	**Greedy Algorithm** General Characteristics of greedy algorithms, Problem solving using Activity selection problem, Elements of Greedy Strategy, Minimum	12	20%	1,2,3,6	CO5	PS02,PS03,PS04			

	Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem, Job Scheduling Problem, Huffman code. **Stochastic Algorithm**								
4	**Introduction to NP-Completeness:** The class P and NP, Polynomial reduction, NP-Completeness Problem, NP-Hard Problems. Travelling Salesman problem, Hamiltonian problem, Approximation algorithms	08	14%	1,4,5,6	CO6, CO7	PS01,PS02,PS03,PS04,PS05			

Reference Books

1.	Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, PHI.
2.	Fundamental of Algorithms by Gills Brassard, Paul Bratley, PHI.
3.	Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson.
4.	Foundations of Algorithms, Shailesh R Sathe, Penram
5.	Design and Analysis of Algorithms, Dave and Dave, Pearson.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4.Analysis 5.Evaluation 6. Creation

Programme Name: B.C.A

Programme Specific Outcome (PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.
PSO2 To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
PSO3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics, statistics, management and allied areas.
PSO4 Learn web and mobile application development skills.
PSO5 Learn Computer hardware with microprocessor architecture.

PSO6 Learning Database management system along with designing, query processing and managing databases using application programs.
PSO7 Develop software solutions to address problems across broad range of application domains through software engineering principles.
PSO8 Generating solutions in societal and environmental contexts.
PSO9 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO10 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming, designing, analyzing network applications.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**	**Academic Year**	**2021-22**

BCA: Regular Programme

Year	**III**	~~**Core**~~ **/ Elective / ~~Foundation~~** **BCAXXXX:** ApplicationFrameworks in Java	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCAXXXX

CO1. Understand the core principles of Spring, and of Dependency Injection (DI)/Inversion of Control
CO2. Use the Spring Core module and DI to configure and wire application objects (beans) together
CO3. Understand and use the complete capabilities of the Core module, such as lifecycle events, bean scopes, and the Spring API
CO4. Work with the DAO and/or ORM modules to create a well structured persistence layer with JDBC
CO5. Use Springs Data Integration with JDBC and technologies such as Hibernate or JPA.
CO6. Understand and use Spring's powerful new AOP capabilities for programming cross-cutting concerns across multiple points in an application
CO7. Understand and use Spring's transaction support, including its easy to use tx/aop XML configuration elements and Java 5 annotations
CO8. Integrate Spring with Java EE Web applications
CO9. Understand how Spring MVC works using the new @Controller model, and use it to build basic Web applications
C10. Understand the basics of Spring Security, and how to secure Web apps and Spring managed beans with it
CO11. Understand and use Spring Web Flow 2 to define complex user interface flow in Web applications.
CO12. Be able to develop a web application with Spring MVC and to develop a RESTFul Web Services.

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship	**Relevance to** Local (L)/ National (N)/ Regional	**Relation to** Gender (G), Environment and Sustaina

							(Ent)/ Skill Development (SD)	(R)/Global (G) developmental needs	bility (ES), Human Values (HV)and Professional Ethics (PE)
1	**Java Frameworks and Spring** What is a Framework? MVC Framework Architecture. Introduction to Spring, Spring Documentation, Spring Tool Suite (STS), Dependency Injection, Dependency Injection in Spring **Spring Core-IoC** BeanFactory,ApplicationContext, Spring Container, Singleton Vs. Prototype, Setter Injection, Ref Attribute, Constructor Injection,Autowire, Primary Bean **Spring AOP** Why AOP, AOP Terms, Aspect and Before Annotation, Logger	15	25%	1,2, 3, 6	CO1, CO2, CO3	PS02,PS03,PS04			
2	**Spring MVC** Spring MVC Getting Started,Creating Controller,Model and ModelMap, ModelAttribute, Need of ModelAttribute, Creating View,Post Mapping,Get Mapping **Spring ORM** Spring ORM Theory, MySQL and DAO, DAO Creation **Spring Data JPA** Spring Data JPA Configuration, JPARepository, JPARepository Add and Fetch, Query DSL	15	25%	1,2,4,5,6	CO4,	PS02,PS03,PS04			
3	**Hibernate** Introduction to Hibernate, Hibernate and JDBC, JPA vs. Hibernate Setting Up the Hibernate Development Environment, Hibernate Configuration, Hibernate CRUD operations, HQL,	15	25%	1,2,3,6	CO5	PS02,PS03,PS04			

	HQCL, Hibernate Mapping, Named Query, Hibernate Caching, Hibernate Integration with Spring, **Spring REST** What is REST, Postman Setup, REST Getmapping, Jackson, PathVariable, RestController, PostMapping, Jackson XML, Produces Attribute, RequestBody and Consumes Attribute' **Spring Boot** Spring Boot CLI, SB Example-STS, Spring Boot AOP,Spring Boot Autowire, Components, Spring Boot JPA, Spring Boot JDBC, SB JDBC Example, SB H2 Database, SB CRUD Operations								
4	**Spring Cloud** What is Spring Cloud, Spring Cloud Features, Spring Cloud Components, Spring Cloud vs Spring Boot **Microservice Architecture** Introduction to Microservices, Docker and Microservices,Docker Images,Docker Containers, Docker, Kubernetes and Microservices, Google Kubernetes Engine, Eureka Discovery Service, Zuul API Gateway, RabbitMQ, Distributed Tracing with Zipkin, Connecting Microservices to Zipkin, Understanding the need for Spring, Cloud Bus, Implementing Spring Cloud Bus, Fault Tolerance with Hystrix **Spring Security** What is Spring Security, Spring Security MySQL, Spring Security BCrypt Password Encoder, Spring Boot Security OAuth2	15	25%	1,4,5,6	CO6, CO7	PS01,PS02,PS03,PS04,PS05			

Reference Books	
1.	Beginning Spring 5 From Novice to Professional By Joseph B. Ottinger, Andrew Lombardi · 2019 Apress
2.	Spring MVC: A Tutorial (Second Edition) By Paul Deck ·2016 Brainy Software
3.	Pro Spring 5 An In-Depth Guide to the Spring Framework and Its Tools By Iuliana Cosmina, Rob Harrop, Chris Schaefer, Clarence Ho ·

	2017 Apress
4.	Mastering Spring Boot 2.0 Build Modern, Cloud-native, and Distributed Systems Using Spring Boot By Dinesh Rajput · 2018 Packt
5.	Spring MVC: Designing Real-World Web ApplicationsBy Shameer Kunjumohamed, Hamidreza Sattari, Alex Bretet, Geoffroy Warin · 2016 Packt
6.	Spring 5 Recipes A Problem-Solution Approach By Marten Deinum, Daniel Rubio, Josh Long · 2017 Apress
7.	Hands-On Microservices with Spring Boot and Spring Cloud Build and Deploy Java Microservices Using Spring Cloud, Istio, and Kubernetes By Magnus Larsson · 2019 Packt
8.	Mastering Spring Cloud Build Self-healing, Microservices-based, Distributed Systems Using Spring Cloud By Piotr Mińkowski · 2018 Packt
9.	Learning Spring Boot 2.0Simplify the Development of Lightning Fast Applications Based on Microservices and Reactive ProgrammingBy Greg L. Turnquist · 2017 Packt
10.	Spring 5 Recipes A Problem-Solution Approach By Marten Deinum, Daniel Rubio, Josh Long · 2017 Apress

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4.Analysis 5.Evaluation 6. Creation

Programme Name: B.C.A

Programme Specific Outcome (PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.
PSO2 To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
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Syllabus of Courses

The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**		**Academic Year**	**2021-22**
BCA: Regular Programme			
Year	**III**	~~**Core**~~ **/ Elective ~~/ Foundation~~** **BCA1511:** ApplicationFrameworks in .NET	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1511

CO1.Learn about.NET framework developed by Microsoft.
CO 2. You will be able to useWPF in C#.NET
CO 3. Create and Design the architecture and implementation of a web application using MVC.
CO4.Understand Entity Framework to connect to a database including Microsoft SQL Server using LINQ Operations
CO 5. To be able to create Web Services in .NET using C#.
CO 6. To understand .NETCore and features over .NET previous versions
CO 7. To develop Applications in .NET, Mobile Application Development (Xamarin).

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and

									Professional Ethics (PE)
1	**Overview of WPF** Windows Presentation Foundation – WPF Controls, Layout, Overview of XAML, Events and Data binding, Style, Navigation, Animation and Media, 3D Graphics, **MVC Framework** MVC Architecture, Designing Models, Controllers and Views, Writing Controllers and Actions, Creating Views with razor syntax, Validate MVC Application, MVC Authentication, MVC Routing	22	36%	1,2, 3, 6	CO1, CO2, CO3	PS02,PS03,PS04			
2	**Entity Framework** Understanding of Entity Framework, Workflow in EF, Entity Data Model, EF Architecture, DbContext, Types of Entities, Relationships with Entity Framework, Entity State, Development Approaches for EF, CRUD Operations in Entity Framework **LINQ** Common LINQ Operations – Projection and filtering, Sorting data, Set operations, Quantifiers and Partitioning, Aggregation operation, LINQ to Entities, LINQ to XML	18	30%	1,2,4,5,6	CO4,	PS02,PS03,PS04			
3	**Overview of WCF** Windows Communication Foundation for implementation of SOA, addresses, bindings, and contracts. Creating and launching a service, consuming a service.	12	20%	1,2,3,6	CO5	PS02,PS03,PS04			
4	**Introducing .NET Core** Features of .NET Core, Traditional .NET Framework vs .NET Core, creating application in .NET Core, Targeting multiple frameworks, Introduction to Xamarin	08	14%	1,4,5,6	CO6, CO7	PS01,PS02,PS03,PS04,PS05			
Reference Books									

1.	Programming WPF (2nd Edition) - Chris Sells and Ian Griffiths, O'Reilly
2.	Programming ASP.NET MVC 4 - Jess Chadwick, Todd Snyder, and Hrusikesh Panda, O'Reilly
3.	Professional ADO.NET 3.5 with LINQ and the Entity Framework - Roger Jennings, Wrox
4.	Microsoft ADO.NET Entity Framework Step by Step – John Paul Mueller
5.	Learning WCF - Michele Leroux Bustamante. O'Reilly

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA

Programme Specific Outcome(PSO)

PSO 1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector
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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty o Science** **Department of Computer Applications**	**Academic Year**	**2021-22**

BCA: Regular Program

Year	**III**	**Core Elective** **BCA 1521: Artificial Intelligence**	**Credits / Hours per week**	**04/60**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO)

CO1 Basics of artificial intelligence and logical reasoning
CO2 Applications of artificial intelligence
CO3 Understanding fuzzy logic
CO4 Understanding machine learning

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)

1	**Introduction**: The The meaning of Artificial Intelligence (AI) and its importance.Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields. AI: LISP – brief introduction, Other languages – PROLOG, Small Talk etc Python for AI : Python Basics, Jupyter notebook – installation and function, Python functions, packages and routines, Pandas, NumPy, Matplotlib, Seaborn, working with data structures , arrays, vectors and data frames.	20	30	2,3,4	CO1, CO2	PSO1, PSO2, PSO3			
2	Symbolic logic – Propositional logic: syntax and semantics, First Order Predicate Logic (FOPL): syntax and semantics, well formed formulas and their properties, Clausal form, Inference rules, the resolution principle, non-deductive inference methods; representations using rules. Search and control strategies: Graph and Tree representations of a search space, uninformed search, informed search – Hill climbing methods, best–first search, branch and bound search, Searching AND-OR graphs. Algorithms A A* AO*. Matching techniques: Structures used in matching, measures for matching – distance matrices, probabilistic measures, qualitative measures, similarity measures. Probabilistic reasoning – Bayesian inference, Possible world representations, Heuristic reasoning methods.	10	20	2,3,4,5,6	CO1, CO2	PSO1, PSO2, PSO3			

	Blocks world Problem Game Playing and its Techniques								
3	Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification Neural Networks – Gradient Descent, Introduction to perceptron and Neural Networks, Batch Normalization, Activation and loss function, tensorflow and keras for Neural Networks. Genetic Algorithms: A simple genetic algorithm, computer implementation of genetic algorithm, data structures, reproduction, cross over and mutation. Time to reproduce and time to cross mapping objective function to fitness form, fitness scaling, application of genetic based machine learning.	20	30	2,3,4,5,6	CO1, CO2, CO3, CO4	PSO1, PSO2, PSO3			
4	AI in Real World: Natural Language Processing (NLP) – Introduction to NLP, accessing text and lexical resources, processing raw text, categorizing and tagging words, analyze sentence structure, interactive chat-bot. Fuzzy Systems - Fuzzy Logic, classical set theory,	10	20	2,3,4,5,6	CO1, CO2, CO3, CO4	PSO3			

	membership function, inference system, quantification Image Processing – Visualization, Image sharpening and restoration, Image enhancement, morphological processing and image recognition. Case study – Credit card fraud analysis, customer segmentation and value AI in Healthcare, Defense and Agriculture, Cyber Security, Agriculture, E-Commerce, Gaming, Finance, Smart Devices.								

Reference Books

1.	Patterson D. W. (1990) Introduction to Artificial Intelligence and Expert systems, Prentice Hall of India, New Delhi.
2.	Bratko, Ivan (1986): PROLOG: Programming for Artificial Intelligence, Addison-Wesley.
3.	Winston, P. T. (1977): Artificial Intelligence, Addison Wesley.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA

Programme Specific Outcome(PSO)

PSO 1 . To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.
PSO 2. To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
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Syllabus of Courses

The Maharaja Sayajirao University of Baroda **Faculty Of Science** **Department of Computer Application**		**Academic Year**	**2021-22**
BCA: Regular Programme			
Year	**III**	~~**Core /** **Elective** **/ Foundation**~~ CA527 Computer Graphics	**Credits / Hours per week**	**04Cr**
Semester	**V**	Year of Introduction: 2007 Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA527

CO1 Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2 Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO3 Use of geometric transformations on graphics objects and their application in composite form.
CO4 Extract scene with different clipping methods and its transformation to graphics display device.
CO5 Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
CO6 Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development	**Relevance to** Local (L)/ National (N)/ Regional (R)/Global (G) developmental	**Relation to** Gender (G), Environment and Sustainability (ES), Human Values

							(SD)	needs	(HV)and Professional Ethics (PE)
1	Introduction: Application of Computer Graphics, interactive input/output devices, display, colour display techniques, LCD & LED display, Raster Scanning, Raster Refresh Drawing geometry: DDA algorithm, Bresenham's line drawing algorithm, translation, rotation, scaling, mirror reflection; Zooming and panning; Rubber band methods, dragging. Bresenham's circle drawing algorithm, generation of ellipse, parametric representation of curves, drawing the Bezier and B-Spline curves, smoothly joining curve segments; Character generation. .	15	25%	1,2	CO1, CO2	PSO1,PSO2,PSO3			
2	Graphic Operations: Clipping – Window port and view port, Sutherland-Cohen line clipping algorithm, Midpoint subdivision algorithm; Filling – Stack based fill algorithm, scan line seed fill algorithm. 3D Graphics: Transformations – transformation matrices, scaling and rotation, parallel projection, perspective projection, Hidden surface elimination algorithms.	15	25%	2,3	CO3	PSO2,PSO3,PSO8			

3	Illumination and Shading - Modeling a shiny surface, Goraud Shading (linear intensity interpolation), Phong Shading (Normal vector Interpolation); Tweening – the interpolation; Morphing – Warping, colour dissolve. Graphic Standards: GKS standards – brief discussion	15	25%	3,4,	CO4	PSO1,PSO3			
4	Introduction to OpenGL, Functions, pipeline, sample programs for drawing 2D, 3D objects, handling and view manipulation. Drawing geometric objects – points, lines, and polygons; State management. Viewing: camera analogy, viewing and modeling transformations, projection transformations, viewport transformation; Using display lists – creating and executing a display list, executing multiple display lists.	15	25%	5,6	CO5, CO6	PSO1,PSO3,PSO8			

Reference Books

1.	Mukherjee D. P. (1999): Fundamentals of Computer Graphics and Multimedia, PHI.
2.	Stevens R. T. (1994): Object Oriented graphics programming in C++, A.P Professional.
3.	Plastock R. A. and Kalley: Computer Graphics, Schaum's Outline Series.
4.	Woo, Mason et al. (2000): OpenGL Programming guide, 3e, Addison Wesley.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4.Analysis 5.Evaluation 6. Creation

Programme Name: B.C.A

Programme Specific Outcome (PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.

PSO2 To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
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Syllabus of Courses

The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**		**Academic Year**	**2021-22**
BCA: Regular Programme			
Year	**III**	~~**Core**~~ **/ Elective /** ~~**Foundation**~~ **BCAXXXX:** Data Warehousing and Mining	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCAXXXX

CO1. Be familiar with mathematical foundations of data mining tools..
CO2. Understand and implement classical models and algorithms in data warehouses and data mining
CO3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
CO4. Master data mining techniques in various applications like social, scientific and environmental context.
CO5. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics

									(PE)
1	**Decision support systems, the evolution.** Data warehouse environment – the structure of data ware house, subject orientation, granularity, partitioning of data, structuring data, data homogeneity and heterogeneity. Data warehousing architectures – single layer and multilayer architectures. **Data warehouse** Data warehouse data model, the mid level data model, the physical data model, mata data, profile records, managing volume, Granularity in the data warehouse Accessing warehouse data – Reports, OLAP, dashboards.	15	25%	1,2, 3, 6	CO1, CO2, CO3	PS02,PS03,PS04			
2	**Data warehouse technologies** Managing large amounts of data, managing multiple media, indexing and monitoring data, language interface, loading of data, compactation of data, multidimensional DBMS The distributed data warehouse – the local and global data warehouse, developing for distributed data warehouse, building the ware house on multiple levels	15	25%	1,2,4,5,6	CO4,	PS02,PS03,PS04			
3	**Data Mining – Introduction** Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilaritymeasures.	15	25%	1,2,3,6	CO5	PS02,PS03,PS04			

4	Data Mining – Frequent Pattern Analysis Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns Classification And Clustering Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.	15	25%	1,4,5,6	CO6, CO7	PS01,PS02,PS03,PS04,PS05			

Reference Books

1.	Matteo Golfarelli and Stefano Rizzi (2009):Data Warehouse Design: Modern Principles and Methodologies, McGraw-Hill Osborne Media
2.	W. H. Inmon (2005): Building the Data Warehouse, 4e, Wiley
3.	Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.
4.	Ian H.Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.
5.	K.P. Soman, Shyam Diwakar and V. Ajay, ―Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name

Programme Specific Outcome(PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector

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PSO4 Learn web and mobile application development skills.

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PSO6 Develop software solutions to address problems across broad range of application domains through software engineering principles.

PSO7 Generating solutions in societal and environmental contexts.

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**	**Academic Year**	**2021-22**

BCA(Bachelor of Computer Applications)

Year	**III**	**Core** **BCA1523 Mobile Application Development**	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction:2012 Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lecture, Power-point presentation, practical demonstration		

Course Outcome (CO)

CO1 To understand different mobile operating systems.

CO2 Develop applications using Android operating system

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Developing for mobile devices**	15	25	1,2	CO1	PSO1			

	Mobile operating systems, Android – Introduction the Development Framework, Android development tools; application manifest, Using Intents to launch activities, Intent filters and their use. Android application lifecycle. Android Studio Debugging, Activities and Intents, Activity Life Cycle,App Testing								
2	**Creating User Interfaces** Views, Layouts, Drawable resources, Resolution and density independence, Creating and Using menus. User Navigation, Displaying and managing dialogs. User Navigation, RecyclerView ,CardView, Material Design .	15	25	1,2,4	CO2	PSO2 PSO4			
3	**Working in the Background** Creating map based activity. Creating and registering services, interacting with a service, binding activities to services; Using background threads, Notifications and alarms. AsyncTask and Asynctask Loader. Using Job Scheduler. Connecting to the Internet, Broadcast Receivers	15	25	1,2,4	CO2	PSO2 PSO4			
4	**Saving User Data** Using Shared Preferences, File Storage, App Settings ,Introduction to SQlite Database , Room LiveData and View Model	15	25	1,2,4	CO2	PSO2 PSO4			

Reference Books

1.	https://google-developer-training.github.io/android-developer-fundamentals-course-concepts-v2/index.html
2.	**Codelabs for Android Developer Fundamentals**
3.	Developer.android.com

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: B.C.A: Regular Programme

Programme Specific Outcome(PSO)

PSO 1 . To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.

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PSO 9 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming ,designing, analysing network applications.

Syllabus of Courses

<table>
<tr><td>  </td><td colspan="2">The Maharaja Sayajirao University of Baroda
Faculty of Science
Department of Computer Applications</td><td>Academic Year</td><td>2021-22</td></tr>
<tr><td colspan="5">B.C.A: Regular Programme</td></tr>
<tr><td>Year</td><td>III</td><td><s>Core</s> / Elective<s> / Foundation</s>
BCA1517 Multimedia Programming</td><td>Credits / Hours per week</td><td>04</td></tr>
<tr><td>Semester</td><td>V</td><td>Year of Introduction: 2007
Year of Syllabus Revision: 2021</td><td>Maximum Marks / Grade</td><td>100</td></tr>
<tr><td colspan="2">Mode of Transaction</td><td>Lectures and Tutorials</td><td></td><td></td></tr>
<tr><td colspan="5">Course Outcome (CO) BCA1517
CO1 Learn problem-solving skills
CO2 You will able to analyze, design and implement solutions in multimedia.
CO3 Learn 2D and 3D Graphics
CO4 You will get to know various projection techniques
CO5 Learn Flash and other multimedia animation tools.</td></tr>
<tr><td colspan="5"></td></tr>
</table>

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional(R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	**Multimedia:** Concepts of hypertext/ hypermedia, Applications of multimedia; Enabling technology – digital representations, hardware, software, networks.Bitmapped Images: resolution, compression – lossy and lossless, JPEG compression. Image manipulation, Color models – RGB and CMYK. Video: digitizing video, video standards, video compression – Motion JPEG and DV, MPEG video; Streamed video. Sound: The nature of sound, digitizing sound, compression, file formats, MIDI 3D graphics fundamentals: 3D effects – perspective, color and shading, light and shading, texture mapping, etc; common uses of 3D graphics.	12	20	1,2,3	CO1, CO2, CO3	PSO1			
2	**3D programming principles:** Immediate mode and retained mode , coordinate systems – coordinate clipping, view ports; Projections – orthographic projections, perspective projections. Introduction to OpenGL, OPENGL implementations, OpenGL	12	20	1,2,3	CO1, CO2, CO3	PSO1			

	rendering pipeline, OpenGL Utility toolkit: GLUT. Data types, naming conventions, graphics calls; Drawing geometric objects – points, lines, and polygons; State management. Viewing: camera analogy, viewing and modeling transformations, projection transformations, viewport transformation; Using display lists – creating and executing a display list, executing multiple display lists; Using colors in OpenGL, Adding light, lighting effects. Real time programming: Windows animation techniques, using frames.								
3	**Introduction to 3ds max, understanding view ports:** View port navigation controls, configuring view ports, working with view port backgrounds. Working with scene files, importing and exporting from other formats, referencing external objects – Using Xref Scenes, Using Xref objects. Creating primitive objects – standard primitives like Box, Sphere, Cylinder etc., extended primitives; setting object properties. Cloning objects, creating object arrays, grouping objects, linking objects, and using schematic views. Transforming objects- translating, rotating, and scaling, transformation tools, using pivot points, using align commands, using grids. Understanding modifiers, using the modifier stack, modifier types, parametric deformer modifiers, free form deformer modifiers.	12	20	1,2,3,6	CO1, CO2, CO4	PSO1 PSO2 PSO4 PSO7 PSO8			

4	**Modeling basics:** Modeling types- parametric objects, editable objects, subobjects, using modeling helpers. Drawing and editing 2D splines and shapes, creating and editing polynomial objects, creating NURBS curves and surfaces. Understanding material properties, creating simple materials using material editor, shading types, using material maps. Working with cameras, camera properties; basic lighting techniques, animation- time controls, animating cameras, animation modifiers. Introducing MaxScript, MaxScript tools, variables and data types, program flow, collections and arrays, writing functions in MaxScript.	12	20	1,2,3,6	CO1, CO2	PSO1 PSO3 PSO6 PSO7 PSO9			
5	Flash: Introduction, logging onto server, basic Macintosh skills, Working in Flash, Drawing with Flash, Basic animation, Working in the timeline, Working with symbols, Shape tween, staggering animation effect, Animation Review, Break apart and distribute, Intro to Motion Guide, Motion Guide Paths, Mask layers, Button Intro, Intro to scripting	12	20	1,3,5,6	CO1, CO4, CO5	PSO1 PSO3 PSO6 PSO7 PSO9			

Reference Books

1.	Murdock Kelly L. (2004): 3ds Max 6 Bible, Wiley dreamtech India Pvt Ltd
2.	Woo et al. (2000): OpenGL Programming guide, 3e, Addison Wesley
3.	Mukherjee D. P. (1999): Fundamentals of Computer Graphics and Multimedia, PHI
4.	Jeff Burger (1993): Desktop multimedia bible, Addison Wesley
5.	Macromedia Flash mx express- By Leon cych

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4.Analysis 5.Evaluation 6. Creation

Programme Name: B.C.A

Programme Specific Outcome (PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector.
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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**	**Academic Year**	**2021-22**

BCA: Regular Programme

Year	**III**	~~**Core**~~ **/ Elective** ~~**/ Foundation**~~ **BCA1515: Oracle DBA**	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:2019	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA1515

CO1. Establish and in depth understanding of Database Administration using the DBMS interfaces.
CO 2. Apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.
CO 3. Understand the functions of the Oracle Database Server and Oracle Database Client.
CO4. Management of database files.
CO 5. Understand and apply the Data Dictionary.
CO 6. Understand and apply database statistics in relation to performance and integrity of the database.
CO 7. Understand the concepts of Backup and Recovery Procedures.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and

									Professional Ethics (PE)
1	Tasks of a database administrator**,** types of DBA. Creating the Database Environment - Defining DBMS Strategy, Choosing a DBMS, DBMS Architectures, Hardware Requirements, DBMS Upgrade Strategy; Database Standards and Procedures, Naming Conventions. A quick review of data modeling and normalization, review of database design performance design, Denormalization- prejoined tables, report tables, mirror tables, split tables, combined tables Data Availability - Cost of Downtime, different types of availability Problems Recovery Issues, Ensuring availability; Database Backup and Recovery, Designing backup strategy; Recovery Options, Types of Recovery; database Replication; Disaster Planning.	18	30%	1,2, 3,4, 6	CO1, CO2, CO3	PS02,PS03,PS04			
2	Database Storage Management, Database Performance Management. System Performance, Database Performance and Application Performance. Metadata Management - Types of Metadata, Repositories and Data Dictionaries. Database Change Management**:** Types of Changes, Impact of Change on Database Structures. Database Security **-** Granting and Revoking Authority, Types of Privileges, Security Reporting, Stored Procedures for Security, Auditing.	18	30%	1,2,4,5,6	CO4, CO5	PS02,PS03,PS04			
3	Oracle Databse 11g architecture - Database Structures, Processes, Memory structures,Oracle data dictionary; Installation of Oracle, Creating a database. Managing Tablespaces, Schema management, Transaction Management Oracle Networking and Database Connectivity. User management, Controlling database access, Auditing database	12	20%	1,2,3,6	CO4, CO5	PS02,PS03,PS04			

	usage.								
4	Loading and transforming data, importing and exporting data, Backing up databases – recovery manager, enhanced data protection for disaster recovery. Managing and monitoring the operational database – types of performance statistics, The management advisory framework. Oracle performance tuning, optimizing query processing, SQL performance tuning tools, the SQL tuning advisor; Tuning the instance.	12	20%	1,4,5,6	CO6, CO7	PS01,PS02,PS03,PS04,PS05			
Reference Books									
1.	Mullins (2002): Database Administration: The Complete Guide to Practices and Procedures, Addison-Wesley Professional.								
2.	Sam R. Alapati (2009): Expert Oracle Database 11g Administration, Apress								

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4.Analysis 5.Evaluation 6. Creation

Programme Name: BCA

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Syllabus of Courses

The Maharaja Sayajirao University of Baroda **Faculty Of Science** **Department of Computer Application**		**Academic Year**	**2021-22**
BCA: Regular Programme			
Year	**III**	~~**Core /**~~ **Elective** ~~**/ Foundation**~~ **CA534 : SQL server DBA**	**Credits / Hours per week**	**04Cr/60Hr**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) CA534

CO1Overview of SQL Server Management Studio and Transact-SQL language
CO2 Master writing simple and complex queries that retrieve data from the database
CO3 Calculate information across result sets using aggregate queries (sum, min, max,•avg, etc.)
CO4 Insert, update, and delete data
CO5 Retrieve data from tables
CO6 Joins, Sub-queries
CO7 Working with Data Types, Procedure and Functions
CO8 Ensure the integrity of multiple, related database updates by using transactions

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental	Relation to Gender (G), Environment and Sustainability (ES), Human Values

							(SD)	needs	(HV)and Professional Ethics (PE)
1	Tasks of a database administrator**,** types of DBA. Creating the Database Environment - Defining DBMS Strategy, Choosing a DBMS, DBMS Architectures, Hardware Requirements, DBMS Upgrade Strategy; Database Standards and Procedures, Naming Conventions. A quick review of data modeling and normalization, review of database design performance design, Denormalization- prejoined tables, report tables, mirror tables, split tables, combined tables Data Availability - Cost of Downtime, different types of availability Problems Recovery Issues, Ensuring availability; Database Backup and Recovery, Designing backup strategy; Recovery Options, Types of Recovery; database Replication; **Disaster** Planning.	15	22%	1,2	CO1	PSO1,PSO3PSO6			
2	Database Storage Management, Database Performance Management. System Performance, Database Performance and Application Performance. Metadata Management - Types of Metadata, Repositories and Data Dictionaries. Database Change Management**:** Types of Changes, Impact of Change on Database Structures. Database Security **-** Granting and Revoking Authority, Types of Privileges, Security Reporting, Stored Procedures for Security, Auditing.	15	28%	2,3	CO2, CO3	PSO1,PSO6,PSO7			

3	SQL server system design and Architecture - I/O subsystem planning and RAID configuration, Capacity planning, Choosing storage system; SQL server Installation, Configuring SQL server on the network. Creating databases and database snapshots, Creating tables, views, and indexes User and security management.	15	28%	2,3,4	CO4, CO5				
4	Back up fundamentals, backup strategy, restoring data; SQL server automatic recovery. Transaction and locking, SQL server memory allocation. SQL server disaster recovery solutions, failover clustering Performance tuning, database system tuning, SQL server management studio, Database engine tuning; dynamic management views; SQL server hints for tuning queries. Scalability options – scaling up, scaling out	15	22%	4,5,6	CO6, CO7, CO8	PSO1,PSO3,PSO6,PSO7			

Reference Books

1.	Mullins (2002): Database Administration: The Complete Guide to Practices and Procedures, Addison-Wesley Professional.
2.	Edward Whalen et al. (2007) Microsoft SQL Server 2005 Administrator's Companion, Microsoft Press

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: B.C.A: Regular Programme

Programme Specific Outcome(PSO)

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Syllabus of Courses

The Maharaja Sayajirao University of Baroda **Faculty Technology and Engineering** **Department of Applied Physics**		**Academic Year**	**2021-22**
B.C.A: Regular Programme			
Year	**III**	~~**Core**~~ **/ Elective ~~/ Foundation~~** **BCAXXXX :System Simulation**	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2007 Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCAXXXX

CO1. Understand the concept of simulation, the fundamental logic, structure, Components, types of simulation models and discrete event simulation.
CO2. Develop solutions for application problems using manual simulation and Time Advance algorithm on discrete event simulation.
CO3. Understand the concepts of Statistical models and queuing models.
CO4. Apply acceptance rejection technique and inverse transform technique to generate Random Variates and Random numbers using LCM.
CO5. Understand the useful model of input data, absolute performance and estimation with respect to output analysis.
CO6. Understand the model building, verification, calibration, validation of models and optimization.

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	**Relevance to** Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	**Relation to** Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics

									(PE)
1	**Introduction to Modelling and Simulation :** Nature of Simulation. Systems , Models and Simulation, Continuous and Discrete Systems, system modelling, Components of a simulation study, Introduction to Static and Dynamic System simulation , Application areas, Advantages ,Disadvantages and pitfalls of Simulation.	15	25	1,2,3	CO1	PSO1			
2	**System Dynamics & Probability concepts in Simulation :** Exponential growth and decay models, Generalization of growth models , Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.	15	25	1,2,3	CO1	PSO1			
3	**Simulation of Queuing Systems and Discrete System Simulation** : Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue. Application of queuing theory in computer system. Discrete Events ,Generation of arrival patterns ,Simulation programming tasks , Gathering statistics, Measuring occupancy and Utilization , Recording Distributions and Transit times .	20	33	1,2,3,6	CO1	PSO1 PSO2 PSO4 PSO7 PSO8			
4	**Analysis of Simulation output :** Sensitivity Analysis, Validation of Model Results	10	17	1,2,3,6	CO1	PSO1 PSO3 PSO9			

Reference Books

1.	Discrete event system simulation, Jerry Banks and John S Carson.
2.	System Models by Geoffrey Gordon
3.	Mathematical Mmodeling by J. N. Kapoor
4.	*System Simulation and Modeling,* 1e Paperback – 1 January 2013. by*Sankar Sengupta*

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty o Science** **Department of Computer Applications**	**Academic Year**	**2021-22**

BCA: Regular Program

Year	**III**	**Theory of Computation**	**Credits / Hours per week**	**04/60**
Semester	**V**	Year of Introduction: 2019 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA 1304

CO1 understand Finite autometa
CO2 Types of languages and their grammer
CO3 NP hard and NP complete
CO4 Understand Turing machine

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	**Relevance to** Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	**Relation to** Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)

1	Motivation – Computability, Formulation of computational problems as membership in a suitable language, Introduction of Turing machines. Deterministic Finite Automata, Non-deterministic Finite Automata, Languages defined by DFA and NFA, Advantages of using NFA, Regular Expression – syntax and semantics, Regular Languages – representation of regular languages, Properties of Regular Languages.	20	30	2,3,4	CO1, CO2	PSO1, PSO2, PSO3			
2	Context Free Languages - Context Free Grammar, Pushdown Automata, Grammars And Equivalences, Properties of Context Free Languages, Deterministic Parsing. Turing Machines- definition, example, acceptance by final state, instantaneous descriptions (ID), converting a DFA into an equivalent TM.	10	20	2,3,4,5,6	CO1, CO2	PSO1, PSO2, PSO3			
3	Deterministic and Non-deterministic TMs and their equivalence, Equivalence of a Random Acces Memory machine and von Neumann computer and basic TM model; Decidable Problems and Recursive Languages.	20	30	2,3,4,5,6	CO1, CO2, CO3, CO4	PSO1, PSO2, PSO3			
4	Undecidability - Diagonalization And Halting Problem, More Undecidable Problems Recursive Functions. Complexity Theory- Time Complexity, Space Complexity, NP completeness.	10	20	2,3,4,5,6	CO1, CO2, CO3, CO4	PSO3			
Reference Books									
1.	Patterson D. W. (1990) Introduction to Artificial Intelligence and Expert systems, Prentice Hall of India, New Delhi.								

2.	Bratko, Ivan (1986): PROLOG: Programming for Artificial Intelligence, Addison-Wesley.
3.	Winston, P. T. (1977): Artificial Intelligence, Addison Wesley.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: B.C.A: Regular Programme

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Applications**		**Academic Year**	**2021-22**
B.C.A: Regular Programme				
Year	**III**	~~**Core**~~ **/ Elective~~/ Foundation~~** **BCA 1520: Unix Systems Programming**	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision:	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) BCA 1520

CO1 Effectively use the UNIX/Linux system to develop system programs using c or any other related language to perform tasks of file handling, process management , inter-process communication and network programming.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Limitations of shell programming, Unix and C programming	15	25	1,2,3	CO1	1,2,3			

	language, Programming with standard I/O, program arguments using function main, file I/O operations, writing small utility programs; Debugging tools – adb, lint. Accessing the environment from within a C program **Unix system calls** **Low level I/O:** File descriptors, File I/O – read and write, file creation – open, create, close, unlink; error processing – errorno, random access – lseek								
2	**Working with file system** – directories, inodes. Files, System Files, File Formats, Buffered I/O File Systems Files, Devices, Drivers	15	25	1,2,3	CO1	1,2,3			
3	**Signals and interrupts:** the system call signal, Alarms – the system call alarm. The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers. Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.	15	25	1,2,3	CO1	1,2,3			
4	**Processes in Unix:** Low level process creation – execlp and execvp; control of processes – fork and wait. Inter-Process Communication, I/O Redirection and Pipes	15	25	1,2,3	CO1	1,2,3			

	make: a program for specifying and controlling the process by which a complex program is compiled. Network Programming: Sockets, Servers, Clients Network Programming: A Web Server, : Concurrent Programming								

Reference Books

1.	Kay A. Robbins, Steven Robbins (2003): UNIX systems programming: communication, concurrency, and thread, Prentice Hall PTR.
2.	Robert Love (2007): Linux system programming, O'Reilly Media, Inc
3.	Kernighan and Pike: Unix Programming, PHI.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA (Web Application Development)

Programme Specific Outcome(PSO)

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Science** **Department of Computer Application**		**Academic Year**	**2021-22**
BCA (Web Application Development): Regular Programme				
Year	**III**	**Elective** **BCA1513: Web Application Development**	**Credits / Hours per week**	**04 Cr**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures		
Course Outcome (CO) BCA1501				

CO1 To gather knowledge about backend and frontend technologies
CO2 To develop web applications using latest tools.
CO3 Creating fullstack applications with all JavaScript technologies.
CO4 Using MongoDB for database connectivity
CO5 Creating API with NodeJS
CO6 Develop fully working applications that can be used on cross-platforms.
CO7 Implement a RESTful backend API.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Introduction to Back-end technologies: ASP.NET,JSP, PHP,NodeJS,Express **NodeJS** Introduction to Node.js, Installing node js, basics of Node terminal, node in built modules, npm **Express** Introduction to express, starting our own localhost server using express, request and response using express, Installing and using the nodemon routing, responding the request, body parser module	12	20	1,2,4	CO1 CO2 CO3 CO5	PSO1 PSO2 PSO4			

2	**Creating APIs with Node & Express** Introduction to API's, Introduction to JSON and using openweather api, Weather forecasting-web application, https get request for JSON, parsing the JSON, Getting live api data using express **REST API** REST API introduction, GET method, POST Method, DELETE Method **MongoDB** An Introduction to MongoDB and NoSQL Databases,Using MongoShell (Command Line Interface), Using Mongo Compass (Graphic Interface),Working with robo 3T(mongo db gui), Connecting MongoDB to Our Node/Express Backend, JSON for MongoDB data storage, Creating, Updating, and Deleting Data, Filtering Data with MongoDB, Refactoring and Improving Our Code	12	20	1,2,3	CO1 CO2 CO3 CO4 CO5 CO7	PSO1 PSO2 PSO4			
3	Introduction to Front-end Technologies: React, Angular, Vue **React** Introduction to React, Hello World in React, Folder Structure, JSX,UI Components with JSX, React Components, React Props, React State Lists Using Map function, Using CSS in ReactJs, Form Handling in React, Routing with React Route	18	30	1,2,3	CO1 CO2 CO3 CO6	PSO1 PSO2 PSO4			
4	**React Hooks** Introduction to React Hooks, useState React Hook, Form Handling in React with Hooks, useEffect React Hook Deploying project on Heroku **Working with JavaScript frameworks** Strapi, Next.js, GraphQL etc. **Redux** Introduction to Reduxm, How Redux works, Why use	18	30	1,2,3	CO1 CO2 CO3 CO6	PSO1 PSO2 PSO4			

	Redux, Pure functions, Redux middleware, Asynchronous actions, Redux-logger, Redux-thunk, API requests in React, Context API, Connecting React & Redux								

Reference Books

1.	Node.js in Action By Alex R. Young, Bradley Meck, Mike Cantelon, Tim Oxley, Marc Harter, TJ Holowaychuk, Nathan Rajlich · 2017 Manning
2.	Learning React Functional Web Development with React and Redux By Alex Banks, Eve Porcello · 2017 Oreilly
3.	Building React. Js Applications with Redux By David Geary Addison Wesley
4.	Pro MERN Stack Full Stack Web App Development with Mongo, Express, React, and Node By Vasan Subramanian · 2019 Apress
5.	Full-Stack React Projects Modern Web Development Using React 16, Node, Express, and MongoDB By Sai Kishore Komanduri, Shama Hoque · 2018 Packt
6.	MERN Quick Start Guide Build Web Applications with MongoDB, Express.js, React, and Node By Eddy Wilson · 2018 Packt
7.	Full-Stack React Projects Learn MERN Stack Development by Building Modern Web Apps Using MongoDB, Express, React, and Node.js, 2nd Edition By Shama Hoque · 2020 Packt

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: BCA

Programme Specific Outcome(PSO)

PSO1 To train students in focused emerging areas and result in development of skills as per the demands of career opportunities in the IT sector

PSO2 To develop basic and advanced skills in programming of different languages and increasing their level of expertise through the specialization approach.
PSO3 Formulate, review and analyze complex technical problems reaching conclusions using principles of mathematics , statistics, management and allied areas.
PSO4 Learn web and mobile application development skills.
PSO5 Learn Computer hardware with microprocessor architecture .
PSO6 Develop software solutions to address problems across broad range of application domains through software engineering principles.
PSO7 Generating solutions in societal and environmental contexts.
PSO8 Communicate effectively on topics for being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO9 Understand basic principles of data communication and networking with allied areas like intranet, internet and all communication resources with focus on programming ,designing, analysing network applications.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Science Department of Computer Applications		**Academic Year**	**2021-22**
BCA: Regular Programme				
Year	**III**	**Elective BCA1502: XML and Related Technologies**	**Credits / Hours per week**	**04**
Semester	**V**	Year of Introduction: 2010 Year of Syllabus Revision: 2019	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		
Course Outcome (CO) CO1 You will learn the basics of creating XML documents, transforming XML documents, and validating XML documents.				

CO2 More specifically, you will learn the basics and history of XML and how to write your own XML documents, specify Xpath Expressions.

CO3 You will learn how to transform XML documents into documents of other types using XSLT and XSD.

CO4 You will learn how to write valid XML documents based on a DTD. Use XML with JAVA and ASP.NET

CO5 You will also learn, about JavaScript Object Notation (JSON), which is an emerging alternative to XML.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	XML Basics, Processing XML, Document Type Definition (DTD) - Structuring Content with XML, XML Schema - XSD, Processing XML, XML Namespaces XML Path Language - XPath, XPath 2.0	15hrs	25		CO1, CO2	PSO1 PSO2			
2	XML Query (XQuery),	15hrs	25		CO3	PS01 PSO2			

	XML Transformations - XSLT, XLST 2.0. XProc XQuery 1.0 and XPath 2.0 Data Model (XDM) Modelling					PSO4 PSO9			
3	XML and JAVA- Basics of Parsing, JAXP XML and ASP.NET- Introduction, XMLReader, XML Writer, Extracting Data from a Database as an XML Database, XML Security- Threats and Risks	15hrs	25		CO4	PS01 PSO2 PSO4 PSO9			
4	Web Services and AJAX, JSON-datatypes, accessing objects in JSON, Modifying JSON, AJAX calls with JSON,Parsing JSON Data	15hrs	25		CO5	PS01 PSO2 PSO4 PSO9			

Reference Books

1.	XML and Related Technologies- Atul Kahate, Pearson
2.	Erik T. Ray (2003): Learning XML, O'Reilly & Associates, Inc.
3.	David Hunter et al. (2007): Beginning XML, 4th Edition, Wrox
4.	JavaScript and JSON Essentials, Sai Srinivas Sriparasa, Packt Publishing, Limited
5.	Introduction to JavaScript Object Notation A To-the-Point Guide to JSON, Lindsay Bassett, O'Reilly

	The Maharaja Sayajirao University of Baroda Faculty of Science Department of Computer Applications	ACADEMIC YEAR 2018-2019

B.C.A: Regular Programme

Year		**Elective** **: Customer Relationship Management**	Credit / Hrs per week	2/ 2
Semester		Year of Introduction: -2010		
Theory / Lab		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	The objective of this course is that the students can understand the principles and concepts of CRM and appreciate the role and changing face of CRM as an IT enabled function
Employability/ Entrepreneurship / Skill Development Aspects	The students gain conceptual foundations of relationship of customers with suppliers, relationship marketing and its implications for further knowledge development in the field of business
Course Outcome	The students gain insight in the area of customer relationship management and CRM as IT enabled function
Mode of Transaction	Lecture and Tutorial

COURSE CONTENT / SYLLABUS

		Weightage (%)
Unit-1	**Environmental Hazards & Disasters** Meaning and Concept of Environmental Hazard, Environmental Disaster and Environmental Stress	30
Unit-2	**Types of Environmental hazards & Disasters** Natural hazards and Disasters – Exogenous and Endogenous Hazards/Disasters Man induced hazards & Disasters – Physical, Chemical and Biological Hazards	15
Unit-3	**Emerging approaches in Disaster Management**	20

	Pre-disaster Stage – Disaster preparedness plan, awareness. Emergency Stage – Immediate relief, Rescue training for search & operations at local and regional level. Post Disaster Stage – Rehabilitation – Political, Administrative Aspect, Environmental Aspects.	
Unit-4	**Disaster Reduction & Management** Prediction of Hazards and Disasters. Risk assessment, Emergency Preparedness and Planning and Emergency.	20
Unit-5	**Disaster Mitigation** Environmental Politics & Programmes in India – Role of Institutions & NGOs in Natural Disaster Reduction, Environmental Legislation in India.	15

REFERENCES

1	Kumar A.(2006), Disaster Management- Recent Approaches-Anmol Publications
2	Murthy K. R. (2004), Disaster Management, Dominant Publishers and Distributors.
3	Gupta H.K.(2004), Disaster Management, University Press(India)Pvt. Ltd
4	Ghosh G. K.(2006) Disaster Management, A.P.H. Publishing Corporation

The Maharaja Sayajirao University of Baroda
Faculty of Science
Department of Computer Applications

ACADEMIC YEAR 2020-21

B.C.A: Regular Programme

Year	I	**Elective:** Course Name: Cyber Law	Credit / Hrs per week	2
Semester	II	Year of Introduction: 2010		
Theory/Lab		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	**Objectives** of the Cyber law is to provide guidance and assistance to all netizens and digital users on legal challenges and issues concerning use of their computers and communication devices .
Employability/ Entrepreneurship / Skill Development Aspects	Cyber Consultant, Research Assistants, Security Auditors, Network Administrators
Course Outcome	Ability to understand cyber crimes and prevent the attacks. Work includes managing and maintaining the online security of businesses and government organization from getting hacked of important information.
Mode of Transaction	Lecture, Power-point presentation

COURSE CONTENT / SYLLABUS

		Weightage (%)
Unit-I	Introduction to CyberLaw • Introduction to CyberLaw for Business: Text and Cases. • Innovations and Inventions • Financing and Exit Strategies	21
Unit-II	INTELLECTUAL PROPERTY ISSUES IN CYBERSPACE • Trademarks. • Copyright. • Patents • Trade Secrets	24
Unit-III	BUSINESS AND FINANCIAL ISSUES IN CYBERSPACE • Jurisdiction. • Contracts. • Employment. • Regulation	24
UNIT-IV	SPECIAL ISSUES IN CYBERSPACE. • Privacy. • Security and Crime. • International CyberLaw.	21

REFERENCES	
1.	Cyber Law: Text and Cases, 3/e By Ferrera Gerald R, Cengage Learning

	The Maharaja Sayajirao University of Baroda Faculty of Science Department of Computer Applications			ACADEMIC YEAR 2020-2021
Bachelor of Computer Applications : Under Graduation				
Year		**Elective** **Human Resource Management**	Credit / Hrs per week	2
Semester		Year of Introduction: 2010		
Theory/Lab		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	**Human resource management** is the process of **managing** people across an organization in order to achieve the organization's **goals**. The responsibilities of **human resource management** within an organization include staffing, **human resource** development, compensation, safety and health and employee and labor relations.
Employability/ Entrepreneurship / Skill Development Aspects	Skill development in development, operation, maintenance of Software.
Course Outcome	Ability to grasp and understand the basics to develop further
Mode of Transaction	Lecture, Power-point presentation
COURSE CONTENT / SYLLABUS	
	Weightage (%)

Unit-I	**INTRODUCTION TO HUMAN RESOURCE MANAGEMENT**: c) Introduction to human resource management, Models of Human Resource Management. Function and Professional of Human Resource Management. d) HRM Planning and Sourcing Management; Career and Competence Management. Management Development and Training Management. Performance Management. e) Leadership Development, Team Management. f) Employee Communication, Involvement and Empowerment Management.	60.0
Unit-II	f) Intelligence and Motivational Management, Creativity and Decision Making Management. Self Management. g) Organizational Learning and Knowledge Management, Organizational Management, Culture Management, Change Management. h) Audits, Assessments, Measurements and Evaluations.	40.0

REFERENCES

1.	Kandula, Srinivas R: Human Resource Management in Practice: With 300 Models, Techniques and Tools, PHI
2.	Pattanayak, Biswajeet: Human Resource Management, 3e, PHI

The Maharaja Sayajirao University of Baroda
Faculty of Science,
Department of Computer Applications

ACADEMIC YEAR 2020-21

B.C.A: Regular Programme

Year	III	**Elective** **Course Name: Introduction to Multimedia**	Credit / Hrs per week	2
Semester	V	Year of Introduction: 2012		
Theory		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	To Provide artistic skills needed in web designing

Employability/ Entrepreneurship / Skill Development Aspects	It Provide Professional skills in web page designing.	
Course Outcome	The student has all art and designing skills needed in web Designing	
Mode of Transaction	Lecture	
COURSE CONTENT / SYLLABUS		
		Weightage (%)
Unit-1	**Multimedia:** Concepts of hypertext/ hypermedia, Applications of multimedia; Enabling technology – digital representations, hardware, software, networks. Bitmapped Images: resolution, compression – lossy and lossless, JPEG compression. Image manipulation, Color models – RGB and CMYK. Video: digitizing video, video standards, video compression – Motion JPEG and DV, MPEG video; Streamed video. Sound: The nature of sound, digitizing sound, compression, file formats, MIDI 3D graphics fundamentals: 3D effects – perspective, color and shading, light and shading, texture mapping, etc; common uses of 3D graphics. **3D programming principles:** Immediate mode and retained mode , coordinate systems – coordinate clipping, view ports; Projections – orthographic projections, perspective projections. Introduction to OpenGL, OPENGL implementations, OpenGL rendering pipeline, OpenGL Utility toolkit: GLUT. Data types, naming conventions, graphics calls; Drawing geometric objects – points, lines, and polygons; State management. Viewing: camera analogy, viewing and modeling transformations, projection transformations, viewport transformation; Using display lists – creating and executing a display list, executing multiple display lists; Using colors in OpenGL, Adding light, lighting effects.	50.0

	Real time programming: Windows animation techniques, using frames.	
Unit-2	**Introduction to 3ds max, understanding view ports:** View port navigation controls, configuring view ports, working with view port backgrounds. Working with scene files, importing and exporting from other formats, referencing external objects – Using Xref Scenes, Using Xref objects. Creating primitive objects – standard primitives like Box, Sphere, Cylinder etc., extended primitives; setting object properties. Cloning objects, creating object arrays, grouping objects, linking objects, and using schematic views. Transforming objects- translating, rotating, and scaling, transformation tools, using pivot points, using align commands, using grids. Understanding modifiers, using the modifier stack, modifier types, parametric deformer modifiers, free form deformer modifiers. **Modeling basics:** Modeling types- parametric objects, editable objects, subobjects, using modeling helpers. Drawing and editing 2D splines and shapes, creating and editing polynomial objects, creating NURBS curves and surfaces. Understanding material properties, creating simple materials using material editor, shading types, using material maps. Working with cameras, camera properties; basic lighting techniques, animation- time controls, animating cameras, animation modifiers. Introducing MaxScript, MaxScript tools, variables and data types, program flow, collections and arrays, writing functions in MaxScript.	50.0

References

1. Murdock Kelly L. (2004): 3ds Max 6 Bible, Wiley dreamtech India Pvt Ltd

2. Woo et al. (2000): OpenGL Programming guide, 3e, Addison Wesley

	The Maharaja Sayajirao University of Baroda Faculty of Science, Department of Computer Applications	ACADEMIC YEAR 2020-21

B.C.A: Regular Programme

Year	III	**Elective** **Inventory Management**	Credit / Hrs per week	2
Semester	I	Year of Introduction: 2010		
Theory		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	The objective of inventory management is to maintain inventory at an approved level to avoid excess or shortage of inventory. Inventory management systems reduce the cost of carrying inventory and ensure the supply of raw material and finished goods remains continuous.
Employability/ Entrepreneurship / Skill Development Aspects	Career prospects for students span a range of contemporary sectors, where logistics and warehousing play key roles in business operations.
Course Outcome	Understand terms that are frequently used in inventory management Identify the goals and objectives of inventory management and measure your process against these goals
Mode of Transaction	Lecture and Lab

COURSE CONTENT / SYLLABUS

		Weightage (%)
UNIT-I	Introduction to inventory management The need of inventory, purpose of inventory, Objectives of inventory control, types of inventory, inventory costs, and benefits of inventory management. Inventory and customer service, measuring availability, Demand management, estimating delivery times.	23.0
UNIT-II	Managing inventory Managing the inventory, Pareto analysis, ABC analysis, Stock cover, practical methods of reducing stock holding. Just in time (JIT) management, advantages of JIT, stock control using JIT. Safety stocks, demand patterns and demand distributions, Evaluation of safety stocks.	27.0
UNIT-III	Managing Stock Setting the right stock levels, assessment of review levels, managing lead times, dealing with inconsistent lead times, Target stock levels. Role of purchasing on inventory management, the ordering process, order quantities, economic order quantity, limitations of EOQ, Variants of inventory models.	27.0
UNIT-IV	Demand and supply Forecasting demand, Basic forecasting techniques – moving averages, exponential smoothing; monitoring forecasts.	23.0

REFERENCES

1.	Tony Wild (2002): Best practice in inventory management, 2nd Edition, Elsevier Science Ltd.
2.	Max Mullar (2003): Essentials of Inventory Management, American Management Association.

	The Maharaja Sayajirao University of Baroda Faculty of Science, Department of Computer Applications		ACADEMIC YEAR 2020-21

B.C.A: Regular Programme

Year	III	**Elective** **Numerical Methods**	Credit / Hrs per week	2
Semester	V	Year of Introduction: 2010		
Theory		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	The purpose of this course is to provide participants with the skills, knowledge and attitudes required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical techniques, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analysing and interpreting the results obtained.
Employability/ Entrepreneurship / Skill Development Aspects	This course provides skills of numerical ability to integrate the scientific and numerical solutions in the software products
Course Outcome	After this completion student will be familiar with • Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems. • Apply numerical methods to obtain approximate solutions to mathematical problems. • Derive numerical methods for various mathematical operations and

	tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. • Analyse and evaluate the accuracy of common numerical methods.
Mode of Transaction	Lecture

COURSE CONTENT / SYLLABUS

		Weightage (%)
Unit-1	**Error Analysis**: Approximation and errors in computing –inherent error, truncation error, and round off error, error analysis using process graphs, iterative procedures and their benefits**.** **Roots of Non-linear equations**:Bisection Method, Newton-Raphson method, secant method. **Solving a system of Linear equations**: Direct Solution **-** Gauss elimination method, pivoting strategies for Gauss elimination method, Gauss Jordan method. **Iterative Solutions:** Jacobi Method, Gauss - Seidel method.	50.0
Unit-2	**Curve Fitting:** Lagrange's Interpolation, Newton's Interpolation. **Numerical Integration:** Trapezoidal Rule, Simpson's ⅓ rule, Simpson's ⅜ Rule; sequence of trapezoidal rules, Romberg integration.	50.0

REFERENCES

1.	S.S. Sastry: Introductory methods of Numerical Analysis, PHI
2.	E. Balagurusamy: Numerical Methods, TMH
3.	M.K. Jain, S.R.K. Iyenrar, R.K. Jain: Numerical Methods for Scientific & Engineering computation, Willey Eastern Ltd.
4.	John H Mathews: Numerical methods for mathematics, science and engineering, 2/e, PHI
5.	V. Rajaraman: Computer oriented numerical methods by, PHI

	The Maharaja Sayajirao University of Baroda Faculty of Science Department of Computer Applications	ACADEMIC YEAR 2021

B.C.A: Regular Programme

Year		**Elective1:** **Optimization Techniques**	Credit / Hrs per week	2
Semester		Year of Introduction: 2010		
Theory/Lab		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	Understand the need and origin of the optimization methods.
Employability/ Entrepreneurship / Skill Development Aspects	
Course Outcome	Ability to understand optimization methods.
Mode of Transaction	Lecture

COURSE CONTENT / SYLLABUS

		Weightage (%)
Unit-I	**Optimization**: An optimization problem, formulation; Objective function, decision variables, design constraints, classification of optimisation problems. **Linear Programming**: Applications (formulation), Graphical method, slack/surplus variables, standard form, simplex method, artificial variables, big M method, transportation problem, assignment problem.	50.0
Unit-II	**Network Analysis:** Terminology of networks, shortest route problem, minimal spanning tree, and maximal flow problem.	50.0

	Project networks, Critical Path method (CPM), float, cost analysis, crashing the network, PERT, probability of meeting the scheduled dates, updating of schedules.	

REFERENCES

1.	Operations Research – An introduction by Hamdy A. Taha (Macmillan publishing company, New York).
2.	Gärtner, Bernd (2007): Understanding and Using Linear Programming, Springer

	The Maharaja Sayajirao University of Baroda Faculty of Science Department of Computer Applications	ACADEMIC YEAR 2021

Bachelor of Computer Applications : Under Graduation

Year		**Elective:** Course Name: Project Management	Credit / Hrs per week	2
Semester		Year of Introduction: 2010		
Theory/Lab		Year of Syllabus Revision:	Max marks / Grade	50

Objectives	The Purpose of Project Management and Setting Objectives. The purpose of project management is to foresee or predict as many dangers and problems as possible; and to plan, organize and control activities so that the project is completed as successfully as possible in spite of all the risks.
Employability/ Entrepreneurship / Skill Development Aspects	Skill development in development, operation, maintenance of Software.
Course Outcome	Ability to grasp and understand the basics IT Project Management.
Mode of Transaction	Lecture, Power-point presentation

COURSE CONTENT / SYLLABUS		
		Weightage (%)
Unit-I	**Project & Project Management** The project, Project Management, Types of project, Contractual arrangements. The Nature of Project Management, Management principle, Some factors in Project Management, The Project Manager, Factors for Project Success and Failure.	15
Unit-II	**Project planning** Project planning, scheduling, Organizational Structures, The Project Organization, The Functional Organization, The Matrix organization, Designing an Organization, Building the Team, Leadership.	15
Unit-III	**Project Administration** Project Authority and Project Control, Principles of Project Administration, TQM. Defining and Financing the Project. How Project Evolve - the Client Brief, Financing the Project. Sources of finance and cash flow.	10
Unit-IV	**Feasibility of Project** Feasibility Studies and Approvals, Conducting feasibility Study, the regulations, controlling projects, decision making, economic analysis.	10

REFERENCES

1. Jack Meredith and Samuel: Project Management: A Managerial Approach, Wiley India.
2. Bonnie Biafore: Managing Your Projects Successfully With MS Project, PHI
3. Joel Henry : Software Project Management : Areal Guide to Success , Pearson Education