Course Code:	**22BCA103**	**Program Code:**	**BCA2022**
Course Name:		**Basics of Web Technology**	
Credits :	**4**	**Course Type: Discipline Specific**	
Course Objectives		• To have an understanding of the introductory Internet and World Wide Web concepts. • To be able to configure text, color, and page layout with Cascading Style Sheets. • To have an understanding of configuring images & multimedia on web pages. • To have an understanding of some advanced technologies of web. • To develop the skill & knowledge of Web page design using HTML5.	
Mapping of Programme Outcome(PO) and Programme specific Outcome(PSO)		PO1, PO4, PO5, PSO1, PSO2, PSO3	
Prerequisites		• Basic knowledge in Internet, HTML tags & skill of creating web pages should be known. • Knowledge of basic Computer hardware & software is also necessary.	
Course outcomes (CO)		**The Student Will** CO1: Understand Web page designing in HTML. CO2: Design static and dynamic web pages using CSS. CO3: Ability to implement the JavaScript in web pages.	

Units	Contents	Total Hrs
I	**Internet : History, Application, World Wide Web, Web Standards,** **Basics in Web Design:** Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, World Wide Web Consortium (W3C). **History of HTML,Introduction toHTML Tags and Attributes**	12
	Mapping of CO: CO1	
II	**HTML5**: Features, Editing,First HTML5 Example,Headings, Linking, Images, Lists, Tables, HTML-Iframe, HTML-Form: <input><textarea><button><select><label>	12
	Mapping of CO: CO1	
III	**HTML5 Elements**: **Form input type element**:Colors, date, time, e-mail addresses, numbers, range, search, telephone numbers, URLs, Datalist Elements. Audio and Video elements.	12
	Mapping of CO: CO1	
IV	**CSS**: Benefits of CSS, CSS Versions History, CSS Syntax, CSS Properties **Selectors**: universal, type, id, class. Inline Styles Embedded Style Sheets, External Style Sheets.	12
	Mapping of CO: CO2	
V	**Introduction to scripting**: Java Script basics, operators, data types, popup boxes. Control structures: if, If-else, Switch. Looping structures: for, do-while, while.	12
	Mapping of CO: CO3	
	Text Books : 1. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet & World Wide Web: How to program", Fifth Edition Pearson ISBN 978-0-13-215100-9 2. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, McGraw-Hill, ISBN: 978-0-07-174170-5 3. Kogent Learning Solutions Inc, HTML5 Black Book: Covers CSS3, Javascript, XML, Dreamtech Press, New Delhi, 2011 4. Jeffery C. Jackson, "Web Technologies", A Computer Science Perspective, Pearson Education	

	References : 1. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009 2. Bankim Patel, LalBihariBarik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2009 3. Jonathan Chaffer, Karl Swedberg, ”Learning JavaScript in Detail” 4. Phil Ballard, Michael Moncur, Sams Teach CSS, JavaScript, Pearson Education, New Delhi, 2009	

Course Code:	**22BCA103**	**Program Code:**	**BCA2022**
Course Name:		**E-Commerce**	
Credits :	**4**	**Course Type: Discipline Specific**	
Course Objectives		• To have an understanding about basic E-commerce concepts. • To be able to configure knowledge about electronic commerce and the Trade Cycle, Electronic Markets, Electronic Data, Interchange, Internet Commerce, E-Commerce in Perspective. • To have an understanding about Electronic Data Interchange (EDI) & Electronic Payment Systems.	
Mapping of Programme Outcome(PO) and Programme Specific Outcome(PSO)		PO1, PO5, PSO1, PSO3	
Prerequisites		• Basic knowledge in traditional market and ecommerce market. • Basic knowledge about online shopping also necessary. • Knowledge of basic Computer hardware & software is also necessary.	
Course outcomes (CO)		**The Student Will** CO1: Understand Ecommerce and Online shopping related terms CO2: Learn types of Ecommerce and EDI. CO3: Understand Electronic Payment Systems and basic Business Strategies for Ecommerce.	

Units	**Contents**	**Total Hrs**
I	Introduction to E-Commerce: The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade Cycle, Electronic Markets, Electronic Data, Interchange, Internet Commerce, Ecommerce in Perspective.	12
	Mapping of CO: CO1	
II	Business Strategy in an Electronic Age: Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Strategy, Porter's Model, First Mover Advantage, Sustainable Competitive Advantage, Competitive Advantage using E-Commerce, Business Strategy.	12
	Mapping of CO : CO1, CO3	
III	Introduction to Business Strategy, Strategic Implications of IT, Technology, Business Environment, Business Capability, Existing Business Strategy, Strategy Formulation & Implementation Planning, E-Commerce Implementation, Ecommerce Evaluation.	12
	Mapping of CO : CO3	
IV	Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B, Supplier-Oriented, Marketplace, Intermediary-Oriented Marketplace, Just-in-Time Delivery, Auctions and Services from Traditional to Internet-Based EDI, Integration with Back-end Information Systems, The Role of Software Agents for B2B EC, Electronic Marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.	12
	Mapping of CO : CO2	
V	Electronic Payment Systems: Electronic Payments & Protocols, Security Schemes in Electronic Payment Systems, Electronic Credit Card System on the Internet, Electronic Fund Transfer and Debit Cards on the Internet, Stored-Valued Cards and E-Cash, Electronic Check Systems, Prospect of Electronic Payment Systems	12
	Mapping of CO : CO3	
	Text Books : 1. David Whiteley, "E-Commerce", Tata McGraw Hill, 2000. 2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce",	

	Pearson Education, 2000. 3. E-Commerce: Strategy, Technologies And Applications by David Whiteley, MC GRAW HILL INDIA; 1st edition (January 1, 2001) 4. E-COMMERCE: AN INDIAN PERSPECTIVE 5th Edition, Kindle Edition by by S.J. P.T. JOSEPH, PHI Learning; 5th edition (October 1, 2015)	
	References : 1. The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-Based Business by Janice Reynolds 2nd Edition. 2. Ecommerce Marketing Books The Complete Guide to B2B Marketing by Kim Ann King.	

Course Code	22BCA104	Programme Code	BCA2022
Course Name	Communication Skill-I		
Credits	3	Course Type: AECC	
Course Objectives	• To provide an overview of pre-requisites to Communication Skill. • To provide an outline to effective Organizational Communication. • To impart the correct practices of the strategies of effective Business Writing. • To underline the nuances of Communication Skill.		
Mapping of Programme Outcome(PO) and Programme Specific Outcomes (PSO)	PO3, PO8, PSO4		
Prerequisites:	• The students should have the basic knowledge of English. • The students should be able to use primary academic writing associated with Business Communication. • The students should possess the logical thinking ability.		
Course Outcomes (CO)	The students are expected to be able to demonstrate a good understanding of: CO1: Effective business writing. CO2: Effective business communication and its skill. CO3: Research approaches and information collection. CO4: Effective interpersonal communications. CO5: Effective reading and writing skills.		

Unit No.	Contents	Total Hrs: 45
I	**Grammar :** 1.1: Articles. 1.2: Preposition. 1.3: Tenses. 1.4: Synonyms and Antonyms.	09
	Mapping of CO:CO5	
II	**Forms of Written Communication:** 3.1: Structure of Job Application Letter. 3.2: Drafting Job Application Letter for various posts. 3.3: Structure of Resume/CV. 3.4: Drafting Resume for various posts.	09
	Mapping of CO:CO1,5	
III	**Inter-Departmental Communication:** 5.1: Memorandum 5.2: Office Circulars. 5.3: Office Orders. 5.4: Office Notes	09
	Mapping of CO:CO1,5	
IV	**Business Communication:** 2.1: Process of Communication. 2.2: Flow of Communication. 2.3: Verbal and non-verbal Communication. 2.4: Barriers of Communication.	09
	Mapping of CO:CO2,3	
V	**Dialogue Conversation:** 5.1: Meeting People. 5.2: Exchanging Greetings and Taking Leave. 5.3: Introducing yourself. 5.4: Making Requests and Responding to Request	09
	Mapping of CO:CO3,5	
	References: **1.** Urmila Rai, S.M.Rai, ` Business Communication, Himalaya Publishing House. **2.** Meenakshi Raman , Sangeeta Sharma , 'Technical Communication', Himalaya Publishing House. **3.** Raman S , Swami R, 'Business Communication', Professional Publications, Madras. **4.** R. C. Sharma, Krishan Mohan, ` Business Correspondence and Report Writing', Tata McGraw Hill, New Delhi.	

	5. Kaul, 'Business Communication', Prentice Hall, New Delhi.	

Course Code	**22BCA105**	**Program Code**	**BCA2022**
Course Name		**C Programming**	
Credits	**2**	**Course Type: Skill Enhancement Course**	
Course Objectives		In this course, the student will learn About: • Programming basics and the fundamentals of C • Data types in C • Operators in C • Using Conditional statements, Loops • Arranging data in arrays • Implementing pointers	
Mapping of Programme Outcome(PO) and Programme Specific Outcome(PSO)		PO1,PO5,PSO1,PSO2,PSO3	
Prerequisites		• The student should have the basic knowledge of mathematics. • The student should be able to do computations. • The students should pose the logical thinking ability.	
Course outcomes (CO)		**The Student will** CO 1: Learn how to build by the algorithms for problems. CO 2: Learn how to create pictorial representations of the program. CO3: Learn how to apply logic for programs. CO4: Enhance their programming skills. CO5: Learn about Conditional statements, Loops, Array, and Pointers etc.	

Units	**Contents**	**Total Hrs:45**
I	**Programming Concept:** Algorithm, Flowchart, Programming languages, Assembler, Interpreter, and Compiler. **Programming Process:** Program design, coding, compilation, execution, testing, debugging, documentation, structured programming, Features and approaches.	9
	Mapping of CO : CO1,CO2	
II	**Introduction to C :** Brief history of C Language, C tokens : Character set, keywords, Identifiers, basic data types, enumerated data type, constant, variables, structure of C Program, data type modifiers, symbolic constant.	9
	Mapping of CO: CO3	
III	**Operators and Expressions in C:** Arithmetic, Relational, logical, assignment, increment/decrement, conditional operator, bitwise operators, comma operator, type casting. **I/O Operations in C :** Formatted I/O : printf(), scanf(), Unformatted I/O : getchar(), putchar(), gets(), puts(), getch(), putch(), getche(), putche()	9
	Mapping of CO:CO4	
IV	**Control structures in C:** if, if—else, elseif ladder, nested if, switch, goto label, looping structures for, while, do-while, nesting of loops, break, continue statements.	9
	Mapping of CO: CO5	
V	**Arrays:** Declaration and initializations of arrays, types of arrays: one and two dimensional arrays, accessing array elements. **Pointers:** Declaration and initialization, pointer arithmetic, array of pointers.	9
	Mapping of CO:CO5	

	Text Books: 1. E Balgurusamy, Programming in ANSI C, fourth edition, Tata Mc Graw- Hill, New Delhi, India, (2008). 2. Yashwant Kanetkar, Let us C, 2nd edition, BPB publication, ,New Delhi, India, (1995). 3. K.R.Venugopal, S.R. Prasad, Mastering C, Tata Mc Graw- Hill ,New Delhi, India, (2008).	
	References :1. B. S. Gottfried, Programming With C, 2nd Edition, Tata Mc Graw-Hill, New Delhi, India, (2007). 2. B.W. Kernighan, D.M. Ritchie, The C Programming Language, 2nd Edition, Dorling Kindersley (India) Pvt. Ltd, New Delhi, India,(2008). 3. D. Ravichandran, Programming in C, 1st Edition, new age international publishers, (2009).	

Course Code	**23BCA1F102**
Course Name	**Lab-I On [CFOS]**
Course Category	**MAJOR**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No.	Practical List	Total Hrs:30
1	To create a Resume in MS-Word containing Personal and Educational details of your own.	2
2	To create a Time Table for BCA-I using Table Option in MS- Word.	2
3	To create Mail Merge in MS- Word.	2
4	To create a Student List in MS- Excel by using different Sorting Options.	2
5	To create a Mark sheet in MS-Excel containing Student Educational Information.	2
6	To create Bill in Ms- Excel for Popular Book Depot.	2
7	To create a Presentation in MS- PowerPoint on Basics of Computer.	2
8	To create a Presentation in Ms- PowerPoint on Memories of Computer.	2
9	To create a Presentation in Ms- PowerPoint on Computer Network.	2
10	To study Internal DOS Commands DIR, COPY,MD,CD,RD	2
11	To study Internal DOS Commands DEL,PROMPT,DATE,TIME,CLS	2
12	To study External DOS Commands FORMAT, XCOPY, CHKDSK, PATH, ATTRIB,	2
13	To Study My-Computer with its different applications.	2
14	To Study Control Panel with its different tools.	2
15	To Study Recycle Bin.	2

Course Code	**23BCA1F103**
Course Name	**Lab-II On [C PROGRAMMING]**
Course Category	**VSC**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No.	Practical List	Total Hrs.: 30
1	Practical Based on structure of C program.	2
2	Practical Based on use of logical and relational operators.	2
3	Practical Based on use of conditional operators.	2
4	Practical Based on the use of if, if-else statement.	2
5	Practical Based on the use of nested- if statement.	2
6	Practical Based on the use of switch-case statement.	2
7	Practical Based on the use of break, continue statement.	2
8	Practical Based on the use of while, do-while statement.	2
9	Practical Based on the use of for statement.	2
10	Practical Based on the use of nested loop.	2
11	Practical Based on the use of data input and output statement.	2
12	Practical Based on reversing a number.	2
13	Practical Based on the use of one dimensional array.	2
14	Practical Based on the use of two dimensional array.	2
15	Practical Based on the matrix manipulation	2

Course Code	**22BCA108**
Course Name	**Lab-III : Practical on Fundamental Electronics**
Course Category	**DSE-P**
Total Teaching Hrs.	**88**
Total Credits	**2**

Sr. No.	**Contents**	**Total**
1	To study basic logic gate	6
2	To study universal logic gates	6
3	To study half adder and 3 bit full adder	6
4	To study 4 bit binary parallel adder	6
5	To study 4 bit binary parallel adder/subtractor	6
6	To verify demorgan's theorem	6
7	To study flip-flops	16
8	Study of shift register	12
9	Study of ring counter	6
10	Study of 4 bit ripple counter	6
11	Study of decade counter	6
12	Study of 4 bit synchronous counter	6

Course Code	**22BCA108**
Course Name	**Lab-III [E-commerce] (Practical Based On Elective-I)**
Course Category	**DSE-P**
Total Teaching Hrs.	**88**
Total Credits	**2**

Sr.No	**Contents**	**Total Hrs:88**
1	What is E-commerce? Explain advantages and disadvantages of E-Commerce.	5
2	Explain the Architecture of E-Commerce.	6
3	Explain the components of E-Commerce.	6
4	Explain different applications of E-Commerce.	6
5	What are the different models of E-Commerce.	6
6	Explain about B2C model?	6
7	Explain about the Web-based E-commerce architecture?	6
8	What are the different types of issues to be considered in E-commerce?	6
9	Explain about E-marketing.	6
10	What are the different types of E-marketplaces?	6
11	What is an EDI explain the advantages of EDI?	5
12	Write about EDI architecture?	6
13	What are the different security methods for E-Commerce?	6
14	What are the key technologies for B2B E-commerce? Explain architectural models of B2B E-commerce.	6
15	What is e-payment? Why is orientation and standardization required for epayment businesses?	6

Course Code	**22BCA108**
Course Name	**Lab-III [WEB] (Practical Based On Elective-I)**
Course Category	**DSE-P**
Total Teaching Hrs.	**88**
Total Credits	**2**

Sr. No.	**Contents**	**Total Hrs:88**
1	Create a webpage in HTML5 using various Headings tags.	5
2	Create a webpage in HTML5 for strength of BCA using <table> tag	5
3	Create a webpage in HTML5 using <form> tag with new input type. Create a webpage in HTML5 for strength of BCA using <a> tag	6
4	Create a webpage in HTML5 using IFrame tag.	6
5	Create a webpage in HTML5 for new Input form elements.	6
6	Create a webpage in HTML5 for Ordered List	6
7	Create a webpage in HTML5 for Unordered List	6
8	Create a webpage in HTML5 using <img> tag with its attributes.	6
9	Create a webpage in HTML5 for DATALIST elements.	6
10	Create a webpage in HTML5 with audio and video Elements	6
11	Write a program for inline CSS	6
12	Write a program for internal style sheet	6
13	Write a program for external style sheet	6
14	WAP for simple Javascript using if-else conditional statements.	6
15	WAP for simple Javascript using for looping statements.	6

Course Code:	22BCA101	Program Code:	BCA2022
Course Name:		Computer Fundamental	
Credits :	4	Course Type: Core	
Course Objectives		• To acquire the basic knowledge about computer system functions. • To learn the basic knowledge about various components, capabilities and limitations of computer. • To understand the various hardware and software components of computer.	
Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO)		PO1, PSO1	
Prerequisites		• Basic knowledge of Computer hardware & software should be known.	
Course outcomes (CO)		**The Student Will** CO1: Converse in basic computer terminology. CO2: To able to identify and demonstrate peripherals of computer system. CO3: To able to demonstrate operating system functions. CO4: To able to demonstrate DOS commands and how they are used. CO5: Student will be able to demonstrate how to organize files & folders and window exploring.	

Units	Contents	Total Hrs:60
I	**Computer Basics:** Definition of Computer, Few Application, uses and Characteristic of Computer, block diagram of computer, types of computer, Generation of Computer, ASCII Codes, EBCDIC Code. **Memory:** Primary Memory: RAM, ROM, PROM, EPROM.	12
	Mapping of CO : CO1	
II	**Input/ Output Devices:** Description of I/O units, Keyboard, Mouse, MICR, OCR, Bar coding, Monitor, Printer and its Types. **Secondary storage**: Floppy disk, Hard disk, optical disk, and other types of secondary storage devices.	12
	Mapping of CO : CO2	
III	**Software:** Types of software, system software, application software, utility software, assembler, compiler, Interpreter. **Operating System**: Need of Operating System, Batch operating System, Multi programming, Multitasking, Real time OS.	12
	Mapping of CO : CO3	
IV	**Introduction to operating system:** DOS: Booting processing, Formatting, directory structure, FAT. **Internal DOS operating Commands:** REN,CD,MD,RD,DIR,DEL,COPY,TYPE,DATE, TIME,COPYCON. **External DOS operating Commands:** FORMAT, XCOPY, CHKDSK, PATH, ATTRIB.	12
	Mapping of CO : CO4	
V	**Windows:** Introduction Features of windows, Customizing Desktop, Creating shortcuts, moving, deleting icons. **Windows Explorer**: Copying, renaming, moving, deleting operations on files and folders. **Standard Folders**: My computer, My documents, Control Panel, Recycle bin. **Windows Accessories**: Paint, Notepad, Calculator.	12
	Mapping of CO : CO5	
	Text Books : 1. V. Rajaraman, Fundamental of computer, Prentice Hall India Pvt., Limited Prentice-Hall Of India Pvt. Limited, 01-Oct-2003. 2. B. Ram, Computer Fundamental , Nas. Age Pub. 2014 3. Pradeep K. Sinha, Priti Sinha, Computer Fundamental, BPB Publications, 01-Nov-2004 4. D. M. Dhamdhere, System Software and operating system, TMH 5. Silberschatz, Galvin, Gagne, Operating System Concepts, 7th Edition,Addision Education 6. Achyut S. Godbole, Operating system, Tata McGraw-Hill Education, 2005.	

	References : 1. Roger Hunt & John Shelly, Computers and Commonsense, Prentice-Hall of India Pvt. Ltd. New Delhi 2. William Stalling, Operating Systems: Internals and Design Principles,8th Edition. 3. Crowley, Operating System,Tata McGraw-Hill Education, 2001. 4. Peterson, Operating System concepts (2nd edition) Addison-Wesley Longman Publishing Co.1985	

Course Code:	**22BCA102**	**Program Code:**	**BCA2022**
Course Name:		**DATA COMMUNICATION NETWORK**	
Credits :	**4**	**Course Type: Core**	
Course Objectives		• To understand the basic concept of data communication, layered model, protocols. • To learn the inter working between computer networks and switching components in telecommunication systems. • To understand the nature, uses and implications of internet technology.	
Mapping of Programme Outcome(PO)) and Programme Specific Outcome (PSO)		PO1, PSO1	
Prerequisites		• Basic knowledge of Computer hardware & software should be known.	
Course outcomes (CO)		**The Student Will** CO1: To able to understand various types of transmission media. Evaluation of performance for each media and device. CO2: To able to identify and demonstrate interconnected computing devices that can exchange data and share resources with each other. CO3: To able to recognize the multiplexing technologies used for modern communication. CO4: To describe the concept of world wide web and requirements of effective web design. CO5: Study the function of OSI layers. Gain familiarity with common networking and application protocol	

Units	Contents	Total Hrs:60
I	**Introduction to Computer Network**, Advantages of computer network, Types of computer networks: LAN, MAN, WAN **Introduction to Transmission Media**- Bounded media: Twisted pair cable, Coaxial cable, Fiber optic cable. Unbounded Media: Microwave, Satellite, Infrared. **Mapping of CO : CO1**	12
II	**Communication:** Communication system and its components. **Mode of Transmission:** Simplex, Half duplex, full duplex. Asynchronous and Synchronous transmission of data, Digital signal, Analog Signal , bit rate, baud rate **Network Topology:** Bus, Ring, Star, Mesh **Mapping of CO : CO2**	12
III	**Modulation:** Amplitude modulation, Frequency Modulation, Phase Modulation. **Multiplexing:** Multiplexers, Frequency Division Multiplexing, Time Division Multiplexing **Switching Techniques:** Switching Concept, Circuit switching, packet switching, Message switching, PBX (Private Branch Exchange) **Mapping of CO : CO3**	12
IV	**Network Devices:** NIC, Hub, Bridges, Router, Switches, Gateways, modem and modem types **Internet:** History, applications of Internet- WWW, E-mail, FTP, Telnet, Voice chat, Video conferencing. **Mapping of CO : CO4**	12
V	**Network Protocols:** OSI Model, X.25 Protocol, Transmission Control Protocol/Internet Protocol (TCP/IP), Ethernet, Token Ring, Datagram . Broadband ISDN, Fascimile(FAX) **Mapping of CO : CO5**	12
	Text Books: 1.Jerry FitzGerald, Alan Dennis, Fundamentals of Business Data Communications, Tenth Edition, Wisley India Pvt Ltd. New Delhi, India(2009) 2. Michael A. Miller, Introduction to digital and data Communications, JAICO Publishing House, Mumbai,India(2006)	

	References: 1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Fifth Edition, Pearson Publications, New Delhi, India(2011) 2. Pradeep K Sinha, Priti Sinha ,Computer Fundamentals ,Sixth Edition, BPB Publications,New Delhi, , India, (2011) 3. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition, Tata Mc Graw- Hill ,New Delhi, India, (2008). 4. Uyless D. Black, data Communications and Distributed Networks, Third Edition, PHI Learning private Limited, New Delhi, , India, (2009)	

Course Code:	**22BCA103**	**Program Code:**	**BCA2022**
Course Name:		**Fundamentals of Electronics**	
Credits :	**4**	**Course Type: Discipline Specific**	
Course Objectives		• To introduce the binary numbers used in computer system. • To make understand how logic circuit works inside microprocessor. • To expose the students to the concepts of digital systems.	
Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO)		PO1, PSO1	
Prerequisites		• Basic knowledge of electronics • Basic knowledge of binary numbers	
Course outcomes (CO)		**The Student Will** CO1: Understand digital circuits CO2: Design basic digital circuits	

Units	Contents	Total Hrs:60
I	**Number Systems and inter conversions:** Decimal, Binary, Octal, Hexadecimal and their mutual conversion, addition and subtraction of binary numbers, addition and subtraction using 1's and 2's complement method, BCD, 8421.	12
	Mapping of CO : CO1	
II	**Logic gates:** OR, AND, NOT, NAND, NOR, XOR gates and their truth table, Boolean Laws, De Morgans and Duality theorems, use of NAND and NOR as universal building blocks	12
	Mapping of CO : CO1	
III	**Karnaugh Maps:** pair, quads, octets, minterm, max term in K Map, K-map for 2, 3, 4 variables, concept of SOP and POS, simplification of SOP and POS logic expressions using K-map	12
	Mapping of CO : CO1	
IV	**Combinational Logic Circuits:** Half Adder, full adder, half subtractor and full subtractor, Concept of Encoder, Concept of Decoder: BCD to seven segment converter, 4-bit Full Adder/ subtracter, Concept of multiplexer, 4:1 mux using gate, Concept of demultiplexer, 1:4 demux using gate	12
	Mapping of CO : CO1,2	
V	**Sequential Logic Circuits:** Construction, working of R-S,Clocked R-S, JK, D and T- type, JKMS Flip Flop, Concept of preset and clear terminals, Race around Condition in JK FF. Counters: Modulus of counter,4 bit Ripple counter, decade counter.	12
	Mapping of CO : CO1,2	
	Text Books: 1. R. P. Jain :Modern Digital Electronics:4Th edition Tata Mc-Graw Hill(2010) 2. A. Anand Kumar :Fundamental of Digital Circuits:2nd edition (PHI)(2003) 3. A. P. Malvino, D. P. Leach: Digital principles and applications 4th edition: McGraw Hill (1975)	
	References: 1. M.B.Matsagar,V.S.Kale: Principles of digital Electronics, Vision publication 2. Floyd,Jain : Digital fundamentals, Pearson 3. S.P.Bali, Y.N.Bapat :Electronic circuits and systems Analog and digital, Tata McGraw Hill 4. B.S.Nair :Digital electronics and logic design, Prentice hall 5. Malvino,Brown :Digital computer electronics, Tata McGraw Hill 6. C.V.Dhuley and V. M. Ghodki :Fundamentals of Digital Electronics	

Course Code:	**22BCA103**	**Program Code:**	**BCA2022**
Course Name:		**Basics of Web Technology**	
Credits :	**4**	**Course Type: Discipline Specific**	
Course Objectives		• To have an understanding of the introductory Internet and World Wide Web concepts. • To be able to configure text, color, and page layout with Cascading Style Sheets. • To have an understanding of configuring images & multimedia on web pages. • To have an understanding of some advanced technologies of web. • To develop the skill & knowledge of Web page design using HTML5.	
Mapping of Programme Outcome(PO) and Programme specific Outcome(PSO)		PO1, PO4, PO5, PSO1, PSO2, PSO3	
Prerequisites		• Basic knowledge in Internet, HTML tags & skill of creating web pages should be known. • Knowledge of basic Computer hardware & software is also necessary.	
Course outcomes (CO)		**The Student Will** CO1: Understand Web page designing in HTML. CO2: Design static and dynamic web pages using CSS. CO3: Ability to implement the JavaScript in web pages.	

Units	Contents	Total Hrs
I	**Internet : History, Application, World Wide Web, Web Standards,** **Basics in Web Design:** Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, World Wide Web Consortium (W3C). **History of HTML,Introduction toHTML Tags and Attributes**	12
	Mapping of CO: CO1	
II	**HTML5**: Features, Editing,First HTML5 Example,Headings, Linking, Images, Lists, Tables, HTML-Iframe, HTML-Form: <input><textarea><button><select><label>	12
	Mapping of CO: CO1	
III	**HTML5 Elements**: **Form input type element**:Colors, date, time, e-mail addresses, numbers, range, search, telephone numbers, URLs, Datalist Elements. Audio and Video elements.	12
	Mapping of CO: CO1	
IV	**CSS**: Benefits of CSS, CSS Versions History, CSS Syntax, CSS Properties **Selectors**: universal, type, id, class. Inline Styles Embedded Style Sheets, External Style Sheets.	12
	Mapping of CO: CO2	
V	**Introduction to scripting**: Java Script basics, operators, data types, popup boxes. Control structures: if, If-else, Switch. Looping structures: for, do-while, while.	12
	Mapping of CO: CO3	
	Text Books : 1. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet & World Wide Web: How to program", Fifth Edition Pearson ISBN 978-0-13-215100-9 2. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, McGraw-Hill, ISBN: 978-0-07-174170-5 3. Kogent Learning Solutions Inc, HTML5 Black Book: Covers CSS3, Javascript, XML, Dreamtech Press, New Delhi, 2011 4. Jeffery C. Jackson, "Web Technologies", A Computer Science Perspective, Pearson Education	

	References : 1. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009 2. Bankim Patel, LalBihariBarik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2009 3. Jonathan Chaffer, Karl Swedberg, ”Learning JavaScript in Detail” 4. Phil Ballard, Michael Moncur, Sams Teach CSS, JavaScript, Pearson Education, New Delhi, 2009	

Course Code:	**22BCA103**	**Program Code:**	**BCA2022**
Course Name:		**E-Commerce**	
Credits :	**4**	**Course Type: Discipline Specific**	
Course Objectives		• To have an understanding about basic E-commerce concepts. • To be able to configure knowledge about electronic commerce and the Trade Cycle, Electronic Markets, Electronic Data, Interchange, Internet Commerce, E-Commerce in Perspective. • To have an understanding about Electronic Data Interchange (EDI) & Electronic Payment Systems.	
Mapping of Programme Outcome(PO) and Programme Specific Outcome(PSO)		PO1, PO5, PSO1, PSO3	
Prerequisites		• Basic knowledge in traditional market and ecommerce market. • Basic knowledge about online shopping also necessary. • Knowledge of basic Computer hardware & software is also necessary.	
Course outcomes (CO)		**The Student Will** CO1: Understand Ecommerce and Online shopping related terms CO2: Learn types of Ecommerce and EDI. CO3: Understand Electronic Payment Systems and basic Business Strategies for Ecommerce.	

Units	**Contents**	**Total Hrs**
I	Introduction to E-Commerce: The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade Cycle, Electronic Markets, Electronic Data, Interchange, Internet Commerce, Ecommerce in Perspective.	12
	Mapping of CO: CO1	
II	Business Strategy in an Electronic Age: Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Strategy, Porter's Model, First Mover Advantage, Sustainable Competitive Advantage, Competitive Advantage using E-Commerce, Business Strategy.	12
	Mapping of CO : CO1, CO3	
III	Introduction to Business Strategy, Strategic Implications of IT, Technology, Business Environment, Business Capability, Existing Business Strategy, Strategy Formulation & Implementation Planning, E-Commerce Implementation, Ecommerce Evaluation.	12
	Mapping of CO : CO3	
IV	Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B, Supplier-Oriented, Marketplace, Intermediary-Oriented Marketplace, Just-in-Time Delivery, Auctions and Services from Traditional to Internet-Based EDI, Integration with Back-end Information Systems, The Role of Software Agents for B2B EC, Electronic Marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.	12
	Mapping of CO : CO2	
V	Electronic Payment Systems: Electronic Payments & Protocols, Security Schemes in Electronic Payment Systems, Electronic Credit Card System on the Internet, Electronic Fund Transfer and Debit Cards on the Internet, Stored-Valued Cards and E-Cash, Electronic Check Systems, Prospect of Electronic Payment Systems	12
	Mapping of CO : CO3	
	Text Books : 1. David Whiteley, "E-Commerce", Tata McGraw Hill, 2000. 2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce",	

	Pearson Education, 2000. 3. E-Commerce: Strategy, Technologies And Applications by David Whiteley, MC GRAW HILL INDIA; 1st edition (January 1, 2001) 4. E-COMMERCE: AN INDIAN PERSPECTIVE 5th Edition, Kindle Edition by by S.J. P.T. JOSEPH, PHI Learning; 5th edition (October 1, 2015)	
	References : 1. The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-Based Business by Janice Reynolds 2nd Edition. 2. Ecommerce Marketing Books The Complete Guide to B2B Marketing by Kim Ann King.	

Course Code	22BCA104	Programme Code	BCA2022
Course Name	Communication Skill-I		
Credits	3	Course Type: AECC	
Course Objectives	• To provide an overview of pre-requisites to Communication Skill. • To provide an outline to effective Organizational Communication. • To impart the correct practices of the strategies of effective Business Writing. • To underline the nuances of Communication Skill.		
Mapping of Programme Outcome(PO) and Programme Specific Outcomes (PSO)	PO3, PO8, PSO4		
Prerequisites:	• The students should have the basic knowledge of English. • The students should be able to use primary academic writing associated with Business Communication. • The students should possess the logical thinking ability.		
Course Outcomes (CO)	The students are expected to be able to demonstrate a good understanding of: CO1: Effective business writing. CO2: Effective business communication and its skill. CO3: Research approaches and information collection. CO4: Effective interpersonal communications. CO5: Effective reading and writing skills.		

Unit No.	Contents	Total Hrs: 45
I	**Grammar :** 1.1: Articles. 1.2: Preposition. 1.3: Tenses. 1.4: Synonyms and Antonyms.	09
	Mapping of CO:CO5	
II	**Forms of Written Communication:** 3.1: Structure of Job Application Letter. 3.2: Drafting Job Application Letter for various posts. 3.3: Structure of Resume/CV. 3.4: Drafting Resume for various posts.	09
	Mapping of CO:CO1,5	
III	**Inter-Departmental Communication:** 5.1: Memorandum 5.2: Office Circulars. 5.3: Office Orders. 5.4: Office Notes	09
	Mapping of CO:CO1,5	
IV	**Business Communication:** 2.1: Process of Communication. 2.2: Flow of Communication. 2.3: Verbal and non-verbal Communication. 2.4: Barriers of Communication.	09
	Mapping of CO:CO2,3	
V	**Dialogue Conversation:** 5.1: Meeting People. 5.2: Exchanging Greetings and Taking Leave. 5.3: Introducing yourself. 5.4: Making Requests and Responding to Request	09
	Mapping of CO:CO3,5	
	References: **1.** Urmila Rai, S.M.Rai, ` Business Communication, Himalaya Publishing House. **2.** Meenakshi Raman , Sangeeta Sharma , 'Technical Communication', Himalaya Publishing House. **3.** Raman S , Swami R, 'Business Communication', Professional Publications, Madras. **4.** R. C. Sharma, Krishan Mohan, ` Business Correspondence and Report Writing', Tata McGraw Hill, New Delhi.	

	5. Kaul, 'Business Communication', Prentice Hall, New Delhi.	

Course Code	**22BCA105**	**Program Code**	**BCA2022**
Course Name		**C Programming**	
Credits	**2**	**Course Type: Skill Enhancement Course**	
Course Objectives		In this course, the student will learn About: • Programming basics and the fundamentals of C • Data types in C • Operators in C • Using Conditional statements, Loops • Arranging data in arrays • Implementing pointers	
Mapping of Programme Outcome(PO) and Programme Specific Outcome(PSO)		PO1,PO5,PSO1,PSO2,PSO3	
Prerequisites		• The student should have the basic knowledge of mathematics. • The student should be able to do computations. • The students should pose the logical thinking ability.	
Course outcomes (CO)		**The Student will** CO 1: Learn how to build by the algorithms for problems. CO 2: Learn how to create pictorial representations of the program. CO3: Learn how to apply logic for programs. CO4: Enhance their programming skills. CO5: Learn about Conditional statements, Loops, Array, and Pointers etc.	

Units	**Contents**	**Total Hrs:45**
I	**Programming Concept:** Algorithm, Flowchart, Programming languages, Assembler, Interpreter, and Compiler. **Programming Process:** Program design, coding, compilation, execution, testing, debugging, documentation, structured programming, Features and approaches.	9
	Mapping of CO : CO1,CO2	
II	**Introduction to C :** Brief history of C Language, C tokens : Character set, keywords, Identifiers, basic data types, enumerated data type, constant, variables, structure of C Program, data type modifiers, symbolic constant.	9
	Mapping of CO: CO3	
III	**Operators and Expressions in C:** Arithmetic, Relational, logical, assignment, increment/decrement, conditional operator, bitwise operators, comma operator, type casting. **I/O Operations in C :** Formatted I/O : printf(), scanf(), Unformatted I/O : getchar(), putchar(), gets(), puts(), getch(), putch(), getche(), putche()	9
	Mapping of CO:CO4	
IV	**Control structures in C:** if, if—else, elseif ladder, nested if, switch, goto label, looping structures for, while, do-while, nesting of loops, break, continue statements.	9
	Mapping of CO: CO5	
V	**Arrays:** Declaration and initializations of arrays, types of arrays: one and two dimensional arrays, accessing array elements. **Pointers:** Declaration and initialization, pointer arithmetic, array of pointers.	9
	Mapping of CO:CO5	

	Text Books: 1. E Balgurusamy, Programming in ANSI C, fourth edition, Tata Mc Graw- Hill, New Delhi, India, (2008). 2. Yashwant Kanetkar, Let us C, 2nd edition, BPB publication, ,New Delhi, India, (1995). 3. K.R.Venugopal, S.R. Prasad, Mastering C, Tata Mc Graw- Hill ,New Delhi, India, (2008).	
	References :1. B. S. Gottfried, Programming With C, 2nd Edition, Tata Mc Graw-Hill, New Delhi, India, (2007). 2. B.W. Kernighan, D.M. Ritchie, The C Programming Language, 2nd Edition, Dorling Kindersley (India) Pvt. Ltd, New Delhi, India,(2008). 3. D. Ravichandran, Programming in C, 1st Edition, new age international publishers, (2009).	

Course Code	**23BCA1F102**
Course Name	**Lab-I On [CFOS]**
Course Category	**MAJOR**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No.	Practical List	Total Hrs:30
1	To create a Resume in MS-Word containing Personal and Educational details of your own.	2
2	To create a Time Table for BCA-I using Table Option in MS- Word.	2
3	To create Mail Merge in MS- Word.	2
4	To create a Student List in MS- Excel by using different Sorting Options.	2
5	To create a Mark sheet in MS-Excel containing Student Educational Information.	2
6	To create Bill in Ms- Excel for Popular Book Depot.	2
7	To create a Presentation in MS- PowerPoint on Basics of Computer.	2
8	To create a Presentation in Ms- PowerPoint on Memories of Computer.	2
9	To create a Presentation in Ms- PowerPoint on Computer Network.	2
10	To study Internal DOS Commands DIR, COPY,MD,CD,RD	2
11	To study Internal DOS Commands DEL,PROMPT,DATE,TIME,CLS	2
12	To study External DOS Commands FORMAT, XCOPY, CHKDSK, PATH, ATTRIB,	2
13	To Study My-Computer with its different applications.	2
14	To Study Control Panel with its different tools.	2
15	To Study Recycle Bin.	2

Course Code	**23BCA1F103**
Course Name	**Lab-II On [C PROGRAMMING]**
Course Category	**VSC**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No.	Practical List	Total Hrs.: 30
1	Practical Based on structure of C program.	2
2	Practical Based on use of logical and relational operators.	2
3	Practical Based on use of conditional operators.	2
4	Practical Based on the use of if, if-else statement.	2
5	Practical Based on the use of nested- if statement.	2
6	Practical Based on the use of switch-case statement.	2
7	Practical Based on the use of break, continue statement.	2
8	Practical Based on the use of while, do-while statement.	2
9	Practical Based on the use of for statement.	2
10	Practical Based on the use of nested loop.	2
11	Practical Based on the use of data input and output statement.	2
12	Practical Based on reversing a number.	2
13	Practical Based on the use of one dimensional array.	2
14	Practical Based on the use of two dimensional array.	2
15	Practical Based on the matrix manipulation	2

Course Code	**22BCA108**
Course Name	**Lab-III : Practical on Fundamental Electronics**
Course Category	**DSE-P**
Total Teaching Hrs.	**88**
Total Credits	**2**

Sr. No.	**Contents**	**Total**
1	To study basic logic gate	6
2	To study universal logic gates	6
3	To study half adder and 3 bit full adder	6
4	To study 4 bit binary parallel adder	6
5	To study 4 bit binary parallel adder/subtractor	6
6	To verify demorgan's theorem	6
7	To study flip-flops	16
8	Study of shift register	12
9	Study of ring counter	6
10	Study of 4 bit ripple counter	6
11	Study of decade counter	6
12	Study of 4 bit synchronous counter	6

Course Code	**22BCA108**
Course Name	**Lab-III [E-commerce] (Practical Based On Elective-I)**
Course Category	**DSE-P**
Total Teaching Hrs.	**88**
Total Credits	**2**

Sr.No	**Contents**	**Total Hrs:88**
1	What is E-commerce? Explain advantages and disadvantages of E-Commerce.	5
2	Explain the Architecture of E-Commerce.	6
3	Explain the components of E-Commerce.	6
4	Explain different applications of E-Commerce.	6
5	What are the different models of E-Commerce.	6
6	Explain about B2C model?	6
7	Explain about the Web-based E-commerce architecture?	6
8	What are the different types of issues to be considered in E-commerce?	6
9	Explain about E-marketing.	6
10	What are the different types of E-marketplaces?	6
11	What is an EDI explain the advantages of EDI?	5
12	Write about EDI architecture?	6
13	What are the different security methods for E-Commerce?	6
14	What are the key technologies for B2B E-commerce? Explain architectural models of B2B E-commerce.	6
15	What is e-payment? Why is orientation and standardization required for epayment businesses?	6

Course Code	**22BCA108**
Course Name	**Lab-III [WEB] (Practical Based On Elective-I)**
Course Category	**DSE-P**
Total Teaching Hrs.	**88**
Total Credits	**2**

Sr. No.	**Contents**	**Total Hrs:88**
1	Create a webpage in HTML5 using various Headings tags.	5
2	Create a webpage in HTML5 for strength of BCA using <table> tag	5
3	Create a webpage in HTML5 using <form> tag with new input type. Create a webpage in HTML5 for strength of BCA using <a> tag	6
4	Create a webpage in HTML5 using IFrame tag.	6
5	Create a webpage in HTML5 for new Input form elements.	6
6	Create a webpage in HTML5 for Ordered List	6
7	Create a webpage in HTML5 for Unordered List	6
8	Create a webpage in HTML5 using <img> tag with its attributes.	6
9	Create a webpage in HTML5 for DATALIST elements.	6
10	Create a webpage in HTML5 with audio and video Elements	6
11	Write a program for inline CSS	6
12	Write a program for internal style sheet	6
13	Write a program for external style sheet	6
14	WAP for simple Javascript using if-else conditional statements.	6
15	WAP for simple Javascript using for looping statements.	6

Program Code: BCA2023	Course Type: Core Course Theory
Course Code: 22BCA301	Credits: 4
Course Name : System Analysis And Design	Mapping of Programme Outcome (PO) & Programme Specific Outcome (PSO) : PO1, PSO1

Course Objectives:

- To be able to transform the requirements into a design of the system. Evolve a robust architecture for the system.
- To provide adequate understanding of systems concept, system analysis and design.
- To analyze in order to study people, technology, organizations and relationships among them.
- To develop Problem Solving abilities using computers.
- To teach basic principles of development.
- To develop skills for project development & frame work activity.

Prerequisites:

- General understanding of Information technology.

Course outcomes (CO): The Student Will

CO1. Gather data to analyse and specify the requirement of a system
CO2. Design system components and environments
CO3. Ability to demonstrate an understanding of and apply various models and techniques that provide a basis for the SDLC.
CO4. Ability to learned different categories of software requirements.
CO5. Demonstrate an ability to use the techniques and tools
CO6. Learned about the importance of project management including cost estimation.

Units	Contents	Total Hrs:60
I	**Basic Concept of systems:** The system: Definition and concepts, Element of system: Input, Output processor, Control, Feedback, Environment, Boundaries and Interface. Characteristics of a System; Types of systems -Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories. **System Development Life Cycle**: Introduction to SDLC Various phases: planning, analysis, design, development, testing, implementation, maintenance. **System Analyst**: Role and need of system	12
	Mapping of CO : CO1,CO2	
II	**System Planning and Information Gathering Initial Investigations** Identification of user needs, Project Identification and Selection; Needs of Information Gathering, Determination of requirements, Information gathering tools: interviews, group communication, questionnaires, presentations and site visits. **Feasibility Study**: Definition, Importance of feasibility study, Types of feasibility study, System selection plan and proposal, Prototyping, Cost-Benefit Analysis: Tools and Techniques.	12
	Mapping of CO: CO2,CO4	
III	**Tools for System Analysis:** Data Flow Diagram (DFD), Logical and Physical DFDs, Developing DFD; **System Design:** Module specifications, Module Coupling and cohesion, Top-down and bottom-up design; Logical and Physical design, Structured design. **Input and Output Input design**: Input data, Input media and devices; Output design; Form Design: Classification of forms, Requirements of Form design.	12
	Mapping of CO: CO5	
IV	**System Implementation and Maintenance:** Need of System Testing, Types of System Testing, **Quality Assurance**; System Conversion, Conversion methods, procedures and controls, System evaluation and performance, Maintenance activities and issues. **System Security:** Security Threats, Risk Analysis, Control measures.	12
	Mapping of CO: CO3,CO6	
V	**Management Information systems:** A framework: Importance concepts, management, information system Definition, Nature & Scope: Characteristics, function, structure Decision making. **MIS:** Classification, level, utility Management of Information System: Implementation, Planning, organization & development, user training, testing.	12
	Mapping of CO: CO6,CO2	

	Text Books: 1. D.P. Goyal, Management information systems‖, Macmillan India Ltd. System Analysis & Design by Igon-H-PHI 2.Perry Edwards: system analysis & design Mc Graw Hill 3. Robert G. Murdick & Joel E. Ross & James R. Claggett, —Information Systems for Modern Management‖ PHI. 4. J. Kanter, Management/Information Systems‖, PHI.	
	References: 1.Elias m. Awad: system analysis and design 2.Bentley, System Analysis and Design‖, TMH 3. A. Ziya Aktas, Structured Analysis & Design of Information System, PHI. 4. V. Rajaraman, Analysis & Design of Information Systems‖, PHI.	

Program Code: BCA2023	**Course Type: Core Course Theory**
Course Code: 22BCA302	**Course Name : Object Oriented Programming using C++**
Credits: 4	**Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO):** PO1, PSO1

Course Objectives:

- To build the basic skills of programming.
- To learn and implement the OOPs features.
- To acquire the importance of C++ programming using various methodologies.

Prerequisites :

- The student should have the basic knowledge of C Programming
- The student should be able to do computations.
- The students should posses the logical thinking ability.

Course outcomes (CO): The Student Will

CO1: Able to implement the OOP concepts like class, objects, Inheritance, Polymorphism, Constructor, Destructor, Polymorphism, Virtual Function, etc.

CO2: Programming logic is developed which will help them to create efficient programs & applications, providing the students better opportunity in software industry.

CO3: Ability to follow professional programming, practices to align with Industry Expectations.

Units	Contents	Total Hrs:60
I	**Introduction to C++**: Basic introduction, structure of C++ program, tokens, keywords, identifiers, basic data types, Constants, variables, declaration of variables and initialization. **Control structures:** if, if- else, switch, while, do-while, for statements.	12
	Mapping of CO : CO1,CO2,CO3	
II	**Operators:** Scope resolution operator, member dereferencing operator, Type conversion, implicit & explicit conversions. **Functions:** Function prototype, Function calling and returning, their types, inline functions, default arguments, constant arguments, function overloading.	12
	Mapping of CO : CO1,CO2,CO3	
III	**Classes and Objects:** Defining class**,** class specification, creating objects, accessing class members, defining member functions, Nesting of member function, friend functions. **Visibility modes:** public, private, protected **Constructors:** Defining constructor, parameterized constructor, multiple constructors in a class, constructor with default argument, destructor, difference between constructor & destructor, copy constructor.	12
	Mapping of CO : CO1,CO2,CO3	
IV	**Arrays and pointers:** Arrays as class member, Arrays of objects, Pointers to objects, this pointer, memory management using new and delete. **Operator overloading:** Overloading unary and binary operator, rules for overloading operators. **Inheritance:** Definition ,Types of Inheritance, concept of base & derived class.	12
	Mapping of CO : CO1,CO2,CO3	
V	**Polymorphism and Virtual Functions:** Introduction to Polymorphism, types of Polymorphism, pointers to derived class, definition of virtual functions, pure virtual functions, Rules for Virtual functions.	12
	Mapping of CO : CO1,CO2,CO3	
	Text Books : 1. E. Balagurusamy , Object oriented programming with C++, 4th edition, Tata Mc Graw- Hill , New Delhi, India, (2008). 2. K. R. Venugopal, B. Rajkumar and T. Ravishankar, Mastering C++, Tata McGraw Hill, New Delhi, (2006). 3. Yashwant Kanetkar, Let Us C++, 1st edition, BPB Publications, New Delhi, (1999)	
	References : 1. Robert Lafore, Object Oriented Programming with C++, 4th edition, Pearson Education, (2008). 2. D. Ravichandran ,Programming with C++, 2nd edition, Tata Mc Graw- Hill, New Delhi, India, (2002). 3. Al Stevens, Teach Yourself C++, 4th edition, BPB Publications, New Delhi, (2006). 4. B.M. Harwani, C++ for beginners, SPD Publications.	

Program Code: BCA2022	**Course Type: Discipline Specific Elective Theory**
Course Code: 22BCA303	**Course Name: Discrete Mathematical Structures**
Credits: 4	**Mapping of Programme Outcome(PO) & Programme Specific Outcome (PSO): PO1, PSO1**

Course Objectives:

- To be able to explain and apply basic methods of discrete mathematics in computer science.
- Introduce concepts of mathematical logic for analyzing propositions and proving theorems.
- Use sets for solving applied problems, and use the properties of set operations algebraically.
- Work with relations and investigate their properties.
- Knowledge of Discrete Mathematics is a prerequisite for algorithms, probabilities, logic, graph theory, set theory.
- Graph theory is used in compilers, operating systems, and networks while Set theory is used in software engineering and databases.

Prerequisites:

- Basic concepts of mathematics required
- Students should be familiar with sequences and series.

Course outcomes (CO): The Student Will

CO 1. Apply sets, Combinations, to solve problem
CO2. Relation, Function and digraphs to solve the problems.
CO 3. Understand the basic concepts of graph theory and theoretical problems.
CO 4. Examine the validity of arguments by using propositional and predicate calculus.

Units	Contents	Total Hrs:60
I	**Set Theory:** Basic concepts, Types of sets, Operations on set, Examples, Principle of Inclusion–Exclusion. Combinatorics: Permutation and Combination, Pigeonhole principle.	12
	Mapping of CO : CO1	
II	**Relations:** Definition, Types of Relation, Operations on Relation, Composition of Relation, Properties. **Functions:** Representation of Function, Types of Function, Composition, Inverse of Function	12
	Mapping of CO: CO2	
III	**Generating Functions:** Ordinary and Exponential Generating function, Ferrer's Diagram, Conjugate or Dual of Ferrer's diagram, Probability Generating Functions..	12
	Mapping of CO: CO4	
IV	**Recurrence Relations:** Linear Recurrence Relation, Homogenous solution, Particular Solution, Total solution. Lattice: Definition and properties.	12
	Mapping of CO: CO4	
V	**Graph Theory:** Introduction to Graph, Types, Matrix Representation of graph: Adjacency and Incidence Matrix. Trees: Properties of Trees, Rooted and Binary tree.	12
	Mapping of CO: CO 1, CO3	
	Text Books : 1. T.VEERARJAN, Discrete Mathematics with Graph Theory and Combinatorics,2nd edition,Tata McGraw-Hill,(2008). 2. Narsingh Deo, Graph Theory with applications to engineering and computer science, 1st edition, PHI,(2008). 3. A.P.Hillmon,C.L.Alexanerson and R.M.Grassl,Discrete and Combinatorial Mathematics, 4 th edition,San Francisco, Dellen (Macmillan), (1987).	
	References : 1. C. L. Liu ,Elements of Discrete Mathematics, 2nd edition, Tata McGrawHill,(2006). 2. K.D.Joshi, Foundations of Discrete Mathematics,2nd edition, New Age International Publishers, (2007). 3. 3. Medelson, Boolean Algebra and Switching circuits, Tata McGraw Hill Publication Co-Ltd,4/12 Asaf Ali Road, New Delhi.	

Program Code: BCA2022	Course Type: Discipline Specific Elective Theory
Course Code: 22BCA303	Course Name: Network Security
Credits: 4	Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO): PO1, PO4, PSO1, PSO2

Course Objectives:

- To be able to explain and implement basic security techniques.
- To gain sound necessary knowledge of network and internet security.
- To get acquainted with symmetric and asymmetric cryptographic algorithms.
- To understand various cryptographic techniques.

Prerequisites:

- Students should be familiar with networking.
- Basic concepts related to security are required.

Course outcomes (CO): The Student Will be able to

CO1. Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks.

CO2. Understand the concept of encryption and analyze the various symmetric encryption algorithms and asymmetric algorithms.

CO3. Apply modern algebra and number theory to understanding of cryptographic algorithms and vulnerabilities.

CO4. Examine and understand the techniques and algorithms used for message authentication: MAC, Digital Signatures and Hash functions.

CO5. Familiarize with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc).

Units	Contents	Total Hrs:60
I	**Introduction**: Security Trends, Security Services, Security attacks, Security mechanisms, A Module for Network security. **Classical Encryption techniques**: Symmetric cipher model, substitution techniques and Transposition techniques**.**	12
	Mapping of CO : CO1,CO2	
II	**Block Ciphers and Data encryption standard**: Block cipher principles, Data Encryption standard, AES Evaluation criteria of AES, The AES cipher	12
	Mapping of CO: CO2	
III	**Finite Fields:** Groups, Rings and Fields, Modular Arithmetic, Euclidean Algorithm**.** **Introduction to Number theory:** Prime numbers, Fermats and Euler's theorem, Testing for primalily.	12
	Mapping of CO: CO3	
IV	**Public key cryptography and RSA:** Principles of Public key crypto systems, RSA algorithm Message authentication and Hash functions- Authentication requirements, authentication, Functions, Message authentication codecs, Hash function, Digital Signatures.	12
	Mapping of CO: CO4	
V	**Security**: Email Security – Pretty good privacy, S/MIME, IP Security And Web Security- IP security over view, IP Security Architecture, Web Security, Considerations, Secure Socket Layer and Transport layer Security, System Security – Intruders , Viruses and related Threats, Firewalls	12
	Mapping of CO: CO5	
	Text Books : 1. William Stallings, Cryptography and Networking Security Principles & Practice , fourth edition 2. John F. Chavwan, The Fundamentals of New Security, Artch. House. 3. Juaniata, The Internet Security Guide Book.	
	References : 1. Atul kahate, Cryptography and Network Security, Tata McGraw-Hill Education, 2003 2. Behrouz A. Forouzan, Cryptography & Network security, (TMH) 3. Charlie Kaufman, Radia Perlman and Mike Speciner, Network security private Communication in a public world, 2nd Edition, (LPE)	

Program Code: BCA2022	Course Type: Discipline Specific Elective Theory
Course Code: 22BCA303	Course Name: Operating System
Credits: 4	Mapping of Programme Outcome(PO) & Programme specific Outcome(PSO): PO1, PO4,PO5,PSO1,PSO2,PSO3

Course Objectives:

- To acquire the basic knowledge about operating system.
- To learn the basic knowledge about various components of operating system, capabilities and services of operating system.
- To understand the various types of operating system and their management and techniques.

Prerequisites:

- Basic knowledge about computer system, its components and functions.

Course outcomes (CO): The Student Will

CO1. Understand basics of operating system components, characteristics and services.
CO2. Understand the concepts of CPU scheduling, Process synchronization, Deadlocks.
CO3. Understand basic functions of Memory management and ability to implement Memory management techniques.
CO4. Understand basic functions of Device Management.
CO5. Understand the basics of Unix operating system.

Units	Contents	Total Hrs:60
I	**Operating system:** Introduction, Components, Characteristics and Services. **Process concept**: Definition, process state, process state transition, operation on process, inter-process communication, process scheduling.	12
	Mapping of CO: CO1	
II	**CPU scheduling**: Concepts, scheduling criteria and algorithm. **Process synchronization:** Concept, Critical section problem, semaphores, monitors, preemptive vs non preemptive scheduling. **Deadlocks:** Definition and characterization, deadlocks prevention, avoidance, detection and recovery from deadlocks.	12
	Mapping of CO: CO2	
III	**Memory management:** Background, functions, Allocation methods, memory management system, partitions, paging, segmentation, swapping. **Virtual memory management:** Demand paging, process creation, page replacement, allocation of frames, thrashing.	12
	Mapping of CO: CO3	
IV	**Device Management:** I/O Hardware, application I/O interface, kernel I/O sub system, Disk scheduling & management, swap-space management.	12
	Mapping of CO: CO4	
V	**Study of Unix Operating system:** Features, History, Architecture, process management, scheduling, memory management, file systems, security.	12
	Mapping of CO: CO5	
	Text Books : 1. H. M. Dietel, Operating System, 3rd edition, Pearson Education, (2008). 2. A. Silberschatz, P.B. Galvin, Operating System Concepts, 7th Edition, Addision Education. 3. Achyut S. Godbole, Operating system, Tata McGraw-Hill Education, (2005). 4. Maurice J. Bach, The Design of UNIX operating system, Pearson Publication, First impression, 5. Sumitabh Das, Unix concepts and Application, Fourth Edition, Tata McGraw-Hill Education, (2010). Fifth Edition, McGrawHill Publication.	
	References : 1. William Stalling, Operating Systems: Internals and Design Principles, Prentice Hall. 2. Crowley, Operating Systems, Tata McGraw-Hill Education, (2001). 3. Peterson, Operating System concepts, 2nd edition, Addison-Wesley Longman Publishing 4. M. Milankovic, Operating systems, McGraw-Hill. 5. A. S. Tananbum, Operating systems, Pearson Education.	

Program Code: BCA2022	Course Type: Life Skill Course
Course Code: 22BCA305	Course Name: Environment Science and Disaster Management
Credits: 2	Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO): PO1, PSO1

Course Objectives:

- To Create Awareness about the Environment among the Students.
- To impart basic knowledge about the Environment and its applied problem.
- To develop an attitude of concern for the Environment.
- To provide students an exposure to disasters, their types and causes.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and Risk Reduction.
- To enhance awareness and to develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Prerequisites: -

Course outcomes (CO): The Student Will

CO 1. Be able to understand Environmental issues and their causes.
CO2. Gain knowledge of Ecosystem, Biodiversity, Environmental Pollution and control.
CO3. Achieve awareness about Environment Protection and conservation.
CO4. Gain Knowledge about disasters, their types, causes, and impacts.
CO5. Be able to understand the relationship between vulnerability, disasters, disaster prevention and Risk Reduction.
CO6. Be achieve awareness and to develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Units	Contents	Total Hrs:30
I	**The Multidisciplinary Nature of Environmental Studies:** Definition, Scope and importance, Need for Public Awareness. **Social Issues and the Environment:** Population Explosion, Sustainable Development, Water Conservation, Global warming, Acid-rain, Environment Protection Act.	6
	Mapping of CO : CO1,CO2	
II	**Ecosystem, Biodiversity and its Conservation: Ecosystem-** Concept of Ecosystem, Structure and function of Ecosystem, Forest ecosystem and Desert ecosystem. **Biodiversity:** Introduction-Definition, Genetic, Species and Ecosystem diversity, Values of diversity, Hotspots of biodiversity, Threats to biodiversity, Conservation of biodiversity, In-situ and Ex-situ conservation.	6
	Mapping of CO: CO2	
III	**Environmental Pollution and Control:** Definition, Causes, effects and control measures of Air Pollution, Soil Pollution, Water Pollution, Noise Pollution, Thermal Pollution, Solid Waste Management.	6
	Mapping of CO: CO3	
IV	**Introduction to Disasters:** Definitions and Concepts of Disaster, Hazard, Vulnerability, Capacity, Risks. Classification of Disaster, Causes, Impacts (including social, economic, environmental, health, psychosocial, etc.) Differential impacts – in terms of caste, class, gender, age, location, disability, Pandemics, Climate change.	6
	Mapping of CO: CO4	
V	**Approaches to Disaster Risk Reduction:** Disaster Management Cycle- Its analysis, Phases. Prevention, Mitigation and Preparedness. Factors affecting Vulnerabilities. Structural and Non-structural measures, Roles and responsibilities of- community, States, Centre and other Stake-holders. Disaster Management Act.	6
	Mapping of CO: CO2,CO5	
	Text Books : 1. Prof. K. J. Gawai, Environmental Studies, Sanskar publications. 2. Environmental Studies, Mr. D.L. Bhade, Mr. S.B. Sonone, Pioneer publications. 3. Gupta Anil K. Seerja S. Nair, 2011 Environmental knowledge for Disaster Risk Management, NIDM, New Delhi. 4. KapurAnu 2010:Vulnerable India: A Geographic Study of Disasters, IIAS and Sage	

	Publishers, New Delhi.	
	References : 1. Agarwal, K.C. Environmental Biology, Nidi Publ.Ltd. Bikaner. 2. Brunner R.C. ,1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB) 3. De A.K. Environmental Chemistry, Wiley Eastern Ltd. 4. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press 2000. 5. Andharia J., Vulnearability in Disaster Discourse , JTCDM, Tata Institute of Social Sciences Working Paper No.8, 2008. 6. Govt.of India: Disaster Management Act, 2005, Government of India, New Delhi.	

Course Code	**22BCA306**
Course Name	**LAB-I (SAD & MIS)**
Course Category	**Core Course Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No.	**Contents**	**Total Hrs: 30**
1	Case Study on System and its components.	2
2	Case Study on System Development Life Cycle	2
3	Case Study on System analyst with his Role and Importance	2
4	Case Study on Feasibility Study	2
5	Case Study on Data Flow Diagram.	2
6	Case Study to develop a data flow diagram for Inventory Management System.	2
7	Case Study to develop a data flow diagram for Student feedback system.	2
8	Case Study to develop a data flow diagram for Attendance Management System.	2
9	Case Study on Input Design.	2
10	Case Study on Output Design.	2
11	Case Study on Quality Assurance.	2
12	Case Study on System Testing.	2
13	Case Study on System Security.	2
14	Case Study on Computer Information System.	2
15	Case Study on Management Information System.	2

Course Code	**22BCA307**
Course Name	**Lab-II [Object Oriented Programming using C++]**
Course Category	**Core Course Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No.	**Contents**	**Total Hrs: 30**
1	Practical based on use of different operators.	2
2	Practical based on if-else statement.	2
3	Practical based on do-while statement.	2
4	Practical based on switch statement.	2
5	Practical based on nested for loop.	2
6	Practical based on Function Prototype.	2
7	Practical based on function overloading.	2
8	Practical based on use of inline function.	2
9	Practical based on use of class and objects.	2
10	Practical based on Friend function.	2
11	Practical based on constructor.	2
12	Practical based on copy constructor.	2
13	Practical based on Array of objects.	2
14	Practical based on virtual function.	2
15	Practical based on pure virtual function	2

Course Code	**22BCA308**
Course Name	**Lab-III: (Practical based on NS)**
Course Category	**Discipline Specific Elective -Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr.No.	**Contents**	**Total Hrs. 30**
1	Write programs for encryption using Caesar Cipher	2
2	Write programs for decryption using Caesar Cipher	2
3	Write programs for encryption using Monoalphabetic Cipher	2
4	Write programs for decryption using Monoalphabetic Cipher	2
5	Write programs for encryption using vernam Cipher.	2
6	Write programs for decryption using vernam Cipher.	2
7	Write case study on DES Algorithm	2
8	Write case study on AES Algorithm	2
9	Write case study on RSA algorithm	2
10	Write case study on Secure Socket Layer and Transport layer Security	2

Course Code	**22BCA308**
Course Name	**Lab-III [DMS] (Practical Based On Elective-III)**
Course Category	**Discipline Specific Elective -Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No	**Contents**	**Total Hrs:30**
1	Case study on Types of Sets.	2
2	Case study on Operations on Sets.	2
3	Case study on Principle of Inclusion and Exclusion.	2
4	Case study on Combinations.	2
5	Case study on Types of Relation.	2
6	Case study on Composition of Relation.	2
7	Case study on Types of Function.	2
8	Case study on Composition of Function.	2
9	Case study on Generating Function.	2
10	Case study on Probability Generating Function.	2
11	Case study on Homogeneous Solution.	2
12	Case study on Particular Solution.	2
13	Case study on Types of Graph.	2
14	Case study on Matrix representation of Graph.	2
15	Case study on Binary and Rooted tree.	2

Subject Code	**22BCA308**
Subject Name	**Lab-III [OS] (Practical Based On Elective-III)**
Course Category	**Discipline Specific Elective -Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr. No	**Contents**	**Total Hrs:30**
1	Case study on CPU scheduling algorithm.	2
2	Case study on Shortest Job first (SJF) algorithm.	2
3	Case study on Round robin algorithm.	2
4	Case study on algorithm of Deadlock avoidance (Bankers algorithm).	2
5	Case study on algorithm of Deadlock detection	2
6	Case study on Linked files allocation technique.	2
7	Case study on memory management with fixed partitioning technique.	2
8	Case study on memory management with variable partitioning technique.	2
9	Case study on Paging technique for memory management.	2
10	Case study on Page replacement algorithm.	2
11	Case study on Disk scheduling algorithm	2
12	Case study on basics of UNIX operating system	2
13	Case study Process Management of Unix operating system	2
14	Case study Memory Management of Unix operating system	2
15	Case study on Unix File system.	2

Program Code: BCA2022	Course Type: Core Course Theory
Course Code: 22BCA401	Course Name: Programming in Java
Credits: 4	Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO): PO1, PSO1

Course Objectives:

- To provide the knowledge of basic concept of Object Oriented Programming and their implementations.
- To analyze the programming complexity.
- To be able to perform specific program & arrange data.

Prerequisites:

- Basic knowledge of C++ programming must be known.

Course Outcomes (CO): The Student will:

CO1. Develop Programming skill which will help them to create programs & applications.
CO2. Able to implement class, objects, Interface, Packages, Exception Handling, Multithreaded Programming, Applet Programming etc.
CO3. Get better opportunity in software industry.
C04. Get better understanding & the ability to follow professional programming, practices to align with Industry Expectations.

Units	Contents	Total Hrs: 60
I	**Introduction to JAVA:** Introduction, Features, Java Virtual Machine(JVM), Java Development Kit(JDK),Data Types, Keywords, Operators & Expressions, Basic Programming Structure, Steps for implementing & running Java programs, Control Structures(if, if-else, switch statement),Looping Structures(for, while, do-while, continue, break statement).	12
	Mapping of CO : CO1,CO2	
II	**Class & Inheritance:** Introduction to class & objects, defining a class, Creating an Objects, Method Overloading, Constructor, Constructor Overloading, Static variables & methods, new, delete & this keyword. Introduction to Inheritance, types of Inheritance, Super & Extended Class, Final variables, methods & classes, Abstract methods & class, Overriding methods.	12
	Mapping of CO: CO2	
III	**Interface & Packages:** Introduction to Interface, Defining & Implementing Interface, Defining Packages, Importing Packages, API Packages, difference between Interface & Package. **Access Specifiers:** public, private & protected.	12
	Mapping of CO: CO3	
IV	**Exception Handling & Multithreaded Programming:** Concept of Exception & Exception Handling, Types of Exception, use of try-throw-catch mechanism, Multiple catch blocks, use of finally block, Catch all & Uncaught Exception. Thread basics, Thread Life Cycle, Concept of Multithreading, Creating & Running Threads.	12
	Mapping of CO: CO4	
V	**Applet & AWT Event Handling:** Introduction to Applet, Applet Life Cycle, Difference between Application & Applet, Applet tag, Different Applet methods, Introduction to AWT, Working with Text, Windows, Graphics & Colors, Drawing lines, Circles, Polygon, Rectangles, Ellipses, Circles, Arcs, working with Colors.	12
	Mapping of CO: CO 2, CO4	
	Text Books : 1. E. Balagurusamy - Programming with Java (4/e) (Tata-McGraw Hill) 2. Herbert Schildt- The Complete Reference Java 2 (5/e) (Tata-McGraw Hill) 3. Dietel & Dietel - Java How to Program (Pearson Education)	
	References : 1. Y. Daniel Liang – Introduction to Java Programming (2/e) (PHI). 2. Horstmann & Cornell - Core Java 2 (Vol-1) (Sun Microsystems) 3. S. Chavan - Programming in Java Shroff Publication.	

Program Code: BCA2022	Course Type: Core Course Theory
Course Code: 22BCA402	Course Name: Advanced Web Technology
Credits: 4	Mapping of Programme Outcome(PO) and Programme specific Outcome(PSO): PO1, PO4,PO5,PSO1,PSO2,PSO3

Course Objectives:

- To have an understanding of the introductory and advanced JavaScript concepts.
- To be able to write code with bootstrap.
- To have an understanding of some advanced technologies of web.
- To develop the skill and knowledge of Web page design using JSON, jQuery and AngularJS.

Prerequisites:

- Basic knowledge of HTML tags & skill of creating web pages should be known.
- Knowledge of Computer hardware and software is necessary.

Course outcomes (CO): The Student Will be able to

CO1. Build dynamic web pages using JavaScript (client side programming).

CO2. Use scripting languages and web services to transfer data and add interactive components to webpages.

CO3. Conceptualize and plan an internet-based business that applies appropriate web technologies like JSON, JavaScript, JQuery, and Anguler JS etc.

CO4. Combine multiple web technologies to create advanced web components.

Units	Contents	Total Hrs: 60
I	JavaScript: Advantages, JavaScript functions, Calling Functions, Function Parameters. JavaScript Events: onclick, onsubmit, onmouseover and onmouseout. JavaScript Objects: Number, Boolean, String, Array, Date, Math.	12
	Mapping of CO: CO1	
II	JavaScript - Errors & Exceptions Handling: Syntax Errors, Runtime Errors, Logical Errors, try, catch, finally Statement. JavaScript Browser Object Model: Window, History, Navigator, Screen. JavaScript DOM: getElementById() , GetElementsByClassName(), getElementsByName().	12
	Mapping of CO: CO1	
III	JavaScript OOPs: JavaScript Classes, JavaScript Objects, Constructor Method, static Method, Encapsulation, Inheritance, Polymorphism, Bootstrap: advantage, Bootstrap package, Bootstrap Example, Bootstrap Container, Bootstrap Tables. Bootstrap Forms: Vertical form, Horizontal for, Inline form.	12
	Mapping of CO: CO1, CO2, CO3	
IV	JSON : Introduction, JSON Syntax, JSON v/s XML, JSON Data Types, JSON Example, JSON Objects: - Creating Simple Objects, Creating Array Objects. JQuery: Features, Syntax, and Selectors:#id Selector, .class Selector. JQuery Effects: Display Effects: hide, show, and toggle. Fading Effects: FadeIn, FadeOut, Sliding Effect: SlideDown, SlideUp,	12
	Mapping of CO: CO4	
V	Angular JS: Advantage, AngularJS MVC Architecture, AngularJS Data Binding: One-Way Data Binding, Two-Way Data Binding. AngularJS Expressions, AngularJS Directives: ng-app, ng-init, ng-model, ng-repeat. AngularJS Controllers. AngularJS Forms.	12
	Mapping of CO: CO4	
	Text Books: 1. Paul Deitel, Harvey Deiteland Abbey Deitel, "Internet, World Wide Web:How to program", Fifth Edition Pearson ISBN 978-0-13-215100-9 2. Kogent Learning Solutions Inc, HTML5 Black Book: Covers CSS3, Javascript, JSON, XHTML, Ajax, AngularJS and jQuery, Dreamtech Press, New Delhi,	

	3. Jeffery C. Jackson, “Web Technologies”, A Computer Science Perspective, Pearson Education. 4. Bootstrap: by Jake Spurlock, 2013, Publisher(s): O'Reilly Media, ISBN:9781449344597	
	References: 1. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009 2. Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, ACM Learning Private Limited, New Delhi, 2009 3. Jonathan Chaffer, Karl Swedberg, ”Learning jQuery” 4. Bootstrap 4 Quick Start: by Jacob Lett Responsive Web Design and Development Basics for Beginners Bootstrap Creative (20 March 2018) B07BLSRJJ1. **Reference Sites:** 1.www.w3schools.com 2.www.tutorialspoint.com	

Program Code: BCA2022	Course Type: Discipline Specific Elective Theory
Course Code: 22BCA403	Course Name: Data Mining and Warehousing
Credits: 4	Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO): PO1, PSO1

Course Objectives:

- To learn the basics of Data Mining
- To understand the need of data mining

Prerequisites:

- Basic database algorithm design and analysis concepts.

Course outcomes (CO): The Student Will

CO1. Learn basic about data mining.
CO2. Use basic and advanced techniques to mine the data.
CO3. Learn Data Warehousing and identify Online Analytical processing.
CO4. Identify the patterns in the data
CO5. To understand use of web and text mining.

Units	Contents	Total Hrs:60
I	**Introduction**: Data Mining Functionalities, Applications, data categories, data scale Data Mining Issues, scale measurement, Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization, Data Mining Versus Knowledge Discovery in Data Bases, Social Implications of Data Mining	12
	Mapping of CO : CO1	
II	**Data visualization techniques:** Graphics and visualization, Summarization vs visualization, Graphics, Line chart, bar chart, Histogram, Time charts, pie charts, radar charts, bubble charts, multi-variable diagram**,** hierarchical charts, visualization in data mining, probability and its notations, different ways to express probability.	12
	Mapping of CO : CO2	
III	**Data Warehousing :** Goals of data ware housing, advantages, data warehouse vs data base, operational data stores, data marts, distributed data ware house, indexing, **Online Analytical processing :**OLAP, OLAP VS OLTP , Advantages of OLAP, OLAP operations, OLAP operations, Operational Database Systems and Data Warehouses (OLTP Vs OLAP), OLAP vs statistical database, Decision tree, Advantages of decision tree.	12
	Mapping of CO : CO3	
IV	**Classification and Prediction**: Issues in classification,, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation. **Cluster Analysis:** meaning of cluster, Geometric interpretation, Cluster Display, Data preparation**,** Partitioning Methods, Hierarchical Methods, Density-Based Methods, Applications, Clustering High-Dimensional Data. Software for clustering.	12
	Mapping of CO : CO4	
V	**Web mining:** Web pages, web sites, search engine, implementing web mining, page rank algorithm, web query mining, image mining, applications, **Text mining**: Document, text statistics vs text mining, data for text mining, rectification, Text processing, goal of text mining, text classification, applications**.** Trends in Data Mining.	12
	Mapping of CO : CO5	

	Text Books: **1.** RajanChattamvelli -Data mining methods: second edition narosa publishing house publication. **2.**J.Han, M.Kamber-Data Mining: Concepts and Techniques",2nd Edition, Morgan Kaufmann Publisher. **3.** ArunK.Pujari-Data Mining Techniques, 2nd Edition, Universities Press. **4.** David Hand, Heikki Manila, PadhraicSymth "Principles of Data Mining"PHI Publication **5.** Margaret H. Dunham- Data Mining: Introductory and Advanced Topics Pearson Education	
	References: 1. Charu C. Agarwal, Data Mining Textbook, Springer Publication. 2. BhavaniThuraisingham, Data Mining Technologies, Techniques, Tools & Trends 3. PANG-NING TAN, Vipin Kumar, Michael Steinbach "Introduction to Data Mining" 4. Hongbo Du, Data Mining Techniques & Applications, Cengage Learning.	

Program Code: BCA2022	Course Type: Discipline Specific Elective Theory
Course Code: 22BCA403	Course Name: Software Engineering
Credits: 4	Mapping of Programme Outcome(PO) and Programme Specific Outcome (PSO): PO1, PSO1

Course Objectives:

- To use Design and coding principles for project development.
- Learn the basic principles of Software Engineering.
- To develop skill to generate high quality software.

Prerequisites:

- Basic knowledge in Computer software and related terms along with object oriented concepts.

Course outcomes (CO):

The Student Will

CO1. Identify relevant software process model for problem.
CO2. Use SRS for relevant problem.
CO3. Apply specified notations for software data flow diagram.
CO4. Prepare testing plan for software model.
CO5. To estimate size of the software product by the given method.

Units	Contents	Total Hrs:60
I	**Software development process:** Software engineering as layered approach, characteristics, Definition, management, and software development frame work, product, process component. **Software life cycle model**: Waterfall, prototyping, spiral incremental, RAD, V model.	12
	Mapping of CO : CO1	
II	**Software requirement engineering**: Introduction, Types of requirements, requirement engineering process, feasibility study, requirement analysis: Structured, object oriented modeling, other approaches. **Requirements Specification**: characteristics of SRS, structure, need.	12
	Mapping of CO : CO2	
III	**Software design**: Principles of software design,concept, data design architectural design, component level design, user interface design, object oriented design, **Design notation**: flowchart, DFD, structure chart, Decision table. **Software coding**: Feature, programming practices: top down, bottom up, structured, information hiding, coding methodology	12
	Mapping of CO : CO3	
IV	**Software Testing fundamentals**: Error, fault and failure, test cases and test criteria, **Software testing**: basic, strategies, v mode. **Level of software testing**: unit, integration, system acceptance. **Testing Technique**: white box, black box and gray box testing and their comparison.	12
	Mapping of CO : CO4	
V	**Software metrics:** measurements**,** Classifications,**Software quality**: Concept, SQA group. **Quality management**: process and product quality, quality assurance and standard, quality planning & quality control. **Software Maintenance**: Basic, type, software maintenance life cycle.**Basic of cost estimation**: Basics, cost estimation process, Estimation models, COCOMO and COCOMO II model of cost estimation.	12
	Mapping of CO : CO5	
	Text Books : 1. Rohitkhurana," Software Engineering Principles and practice", Second edition , Vikas publishing house Pvt. Ltd, 2010 2. Sommerville Pearson, "Software Engineering", Eight Edition, Pearson Education, 2007 3. PankajJalote, "An integrated approach to Software Engineering", Third Edition, Narosa Publishing House, 2005	
	References: 1. Roger S. Pressman ,"Software Engineering : A Practitioner Approach", Seventh edition, McGrawHill, 2010 2. Richard Fairley ,"Software Engineering Concept", Tata McGrawHill Edition 2008 3. Hans van Vliet, "Software Engineering: Principles and Practice", 3rd edition, John Wiley & Sons, 2008	

Program Code: BCA2022	**Course Type: Discipline Specific Elective Theory**
Course Code: 22BCA403	**Course Name: Multimedia and Animation**
Credits: 4	**Mapping of Programme Outcome(PO) and Programme Specific Outcome(PSO):** PO1, PSO1

Course Objectives: In this course, the student will learn About:

- Study the concept of multimedia.
- Multimedia software
- Hyper media and Hyper text, Audio file formats
- Production Tips
- Animation

Prerequisites:

- Students should be familiar with using a computer.
- Students should be familiar with Multimedia software and Animation tools.

Course outcomes (CO): The students will

CO1: Become critical thinkers and creative producers of multiple modes of media, including audio, video and animation.

CO2: Use performance theory and skills to create and enhance animation.

Units	Contents	Total Hrs:60
I	**Introduction to Multimedia:** Definition of Multimedia, CD-ROM and the multimedia highway, Uses of Multimedia, Hardware components, CD-ROMs and Multimedia applications, Hardware & Software requirements.	12
	Mapping of CO :CO1	
II	**Multimedia Software:** Basic tools, painting and drawing tools, OCR software, Sound editing programs, Animation devices. Linking multimedia objects, office suites, word processor, spreadsheets presentation tools, Types of Authoring tools card and page based, icon based and time based authoring tools, object oriented tools.	12
	Mapping of CO :CO1	
III	**Production Building Blocks:** Test-using test in Multimedia, Computers and Text, Font editing and Design tools, Hyper media and Hyper text, Sounds-multimedia system sounds MIDI verses Digital Audio, Audio file formats, Working with sound in Windows, Adding sound.	12
	Mapping of CO :CO1	
IV	**Production Tips:** Image-creation, making still images, images colors, Image, File format, Animation-principles of animation, making workable animations Video, using video, Broadcast video, Standard, Integrating Computer and TVs, shooting and editing Video, using Recording formats, Video tips, Video Compression.	12
	Mapping of CO :CO1	
V	**Animation:** Introduction, Types of animation, Animation tools- hardware and software, Tweening, Morphing and its parts, animation Application.	12
	Mapping of CO :CO2	
	Text Books: 1. Multimedia Making It Work (TMH) 1997 : Tay Vaughan 2. Multimedia Power Tooks, 2 Edition : Peter Jerram and M. (RandomHouse Electronic Publishing) Gosney 3. Computer Graphics, Hearn &Baker,PHI	
	References: 1. Siamon J. Gibb And Dianysios c. Tsichritzis, "Multimedia Programming",AddisonWesely, 1995. 2. Johan Villamil, Casanova AndLeonyFernanadez, Eliar, "Multimedia Graphics", PHI, 1998 3. Malay K. Pakhira, Computer Graphics, Multimedia and Animation, 2 nd Edition, PHI Publication.	

Course Code	**22BCA405**
Course Name	**Lab-V:JAVA**
Course Category	**Core Course Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr.No.	**Contents**	**Total Hrs. 30**
1	Program for displaying a Simple Message.	1
2	Program for Printing given Numbers. 1 2 2 3 3 3 4 4 4 4 5 5 5 5 5	1
3	Program for Printing Floyd's Triangle. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	1
4	Program for Printing Multiplication table using do-while statement. 1 2 3 4 5 2 4 6 8 10 3 6 9 12 15 4 8 12 16 20 5 10 15 20 25	1
5	Program for demonstrating an application with two classes.	1
6	Program for demonstrating concept of Method Overloading.	1
7	Program for demonstrating concept of Constructor Overloading.	1
8	Program for demonstrating concept of Inheritance.	1
9	Program for demonstrating concept of Method Overriding.	1
10	Program for demonstrating the use of Packages.	2
11	Program for demonstrating concept of try-catch.	2
12	Program for demonstrating concept of Multithreading.	2
13	Write an Applet Program for drawing Lines & Rectangle.	2
14	Write an Applet Program for drawing Polygon.	2
15	Write an Applet Program for drawing Square Inside Circle.	1
16	Write an Applet Program for drawing Circle Inside Square.	2
17	Write an Applet Program for drawing an Olympic Symbol.	2
18	Write an Applet Program for displaying Human Smiling Face.	2
19	Write an Applet Program for displaying Ice Cream Cone.	2
20	Write an Applet Program for displaying Numeric Values.	2

Course Code	**22BCA406**
Course Name	**Lab-VI:Advanced Web Technology**
Course Category	**Core Course Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Sr.No.	Contents	Total Hrs. 30
1	Write Program in JavaScript for calling functions.	**1**
2	Write Program in JavaScript for function parameters.	**1**
3	Write Program in JavaScript for onclick events.	**1**
4	Write Program in JavaScript formouseover and mouseout event.	**1**
5	Write Program in JavaScript for Number object.	**1**
6	Write Program in JavaScript for.Date, Mathobject.	**1**
7	Write Program in JavaScript for exception handling.	**1**
8	Write Program in JavaScript for browser object model.	**1**
9	Write Program in JavaScript for Document Object Model.	**1**
10	Write Program in JavaScript for Classes Objects.	1
11	Write Program in JavaScript for Encapsulation.	**2**
12	Write Program in JavaScript for polymorphism.	**2**
13	Write Program in JavaScript for inheritance.	**2**
14	Write Program in jQuery for selectors.	**2**
15	Write Program in jQuery for display effects.	**2**
16	Write Program in jQuery for fading effects.	**2**
17	Write Program in JSON for display Student Information.	**2**
18	Write Program in Angularjs for DaraBinding.	**2**
19	Write Program in Angularjs for Directive.	**2**
20	Write Program in Angularjs for Controllers.	**2**

Course Code	**22BCA407**	
Course Name	**Lab-VII(PRACTICAL BASED ON ELE-V): Multimedia and Animation**	
Course Category	**Discipline Specific Elective**	
Total Teaching Hrs.	**30**	
Total Credits	**2**	
Units	**Contents**	**Total hrs:30**
1	**Write a case study on Hardware and its components.**	**2**
2	**Write a case study on Sound editing programs.**	**2**
3	**Write a case study on painting and drawing tools.**	**2**
4	**Write a case study on spreadsheets presentation tools.**	**2**
5	**Write a case study on Sound editing programs.**	**2**
6	**Write a case study on Audio file formats.**	**2**
7	**Write a case study on Working with sound in Windows.**	**2**
8	**Write a case study on Hyper media and Hyper text.**	**2**
9	**Write a case study on Font editing and Design tools.**	**2**
10	**Write a case study on, Animation-principles.**	**2**
11	**Write a case study on Broadcast video.**	**2**
12	**Write a case study on shooting and editing Video.**	**2**
13	**Write a case study on images colours and File format.**	**2**
14	**Write a case study on Types of animation.**	**2**
15	**Write a case study on Tweening and Morphing.**	**2**

Course Code	**22BCA407**
Course Name	**Lab-VII (PRACTICAL BASED ON ELE-V) : Data Mining**
Course Category	**Discipline Specific Elective Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Units	**Contents**	**Total Hrs. 30**
1	Write a case study on data categories.	2
2	Write a case study on Data Mining Issues.	2
3	Write a case study on Knowledge Discovery in Data Bases.	2
4	Write a case study on Line chart.	2
5	Write a case study on Histogram.	2
6	Write a case study on probability.	2
7	Write a case study on distributed data ware house.	2
8	Write a case study on indexing.	2
9	Write a case study on OLAP operations.	2
10	Write a case study on Bayesian Classification.	2
11	Write a case study on Partitioning Methods.	2
12	Write a case study on Density-Based Methods.	2
13	Write a case study on page rank algorithm.	2
14	Write a case study on image mining.	2
15	Write a case study on Trends in Data Mining.	2

Course Code	**22BCA407**
Course Name	**Lab-VII(PRACTICAL BASED ON ELE-V): Software Engineering**
Course Category	**Discipline Specific Elective Practical**
Total Teaching Hrs.	**30**
Total Credits	**2**

Units	**Contents**	**Total Hrs. 30**
1	Write a case study on software myths.	2
2	Write a case study on software development frame work.	2
3	Write a case study on prototyping.	2
4	Write a case study on RAD	2
5	Write a case study onfeasibility study.	2
6	Write a case study onobject oriented modelling.	2
7	Write a case study onSRS.	2
8	Write a case study on user interface design.	2
9	Write a case study on Decision table.	2
10	Write a case study on information hiding.	2
11	Write a case study on white box testing.	2
12	Write a case study on black box testing.	2
13	Write a case study on gray box testing.	2
14	Write a case study on COCOMO model.	2
15	Write a case study on software maintenance life cycle	2