Shree H. V. P. Mandal's

Degree College of Physical Education, Amravati.

(An Autonomous College)

FACULTY OF SCIENCE & TECHNOLOGY

(SCIENCE GROUP)

CURRICULUM SCHEME AND SYLLABUS

OF

BACHELOR OF COMPUTER APPLICATION

(Credit Based Semester Pattern)

Program Code: BCA2015

Introduced from the Session 2015-2016

Programme Structure for BCA

1. **Programme Name in Complete**: Bachelor of Computer Application

2. **Programme Name in Short**: BCA

3. **Nature of the Programme (Certificate / Diploma/ UG Degree / PG Diploma / PG Degree):** UG Degree

4. **Objective:** The Programme Educational Objectives of BCA programme are:
   1. To impart the students, latest comprehensive and skill based knowledge with equal emphasis on theory and practice in the field of information technology.
   2. To provide students with sound academic base from which an advanced career in Computer Application can be developed.
   3. To prepare students with conceptual grounding in computer usage as well as its practical business in order to craft the students as a versatile computer professional who can provide service in almost all fields of computer application in industry, government, academia, research, entrepreneurial pursuit and consulting firms.
   4. To prepare students to undertake higher studies in computers and IT jobs.
   5. To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise.
   6. To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.

5. **Duration of the Programme** : Three Years; Full Time

6. **Examination Pattern (Annual/Semester):** Semester

7. **If Semester pattern then Number of Semesters:** Six Semester

8. **Marking Scheme (Percentage/Credit):** Credit

9. **Eligibility:** Students who passed 12th standard exam with mathematics OR passed three years diploma in electronics and computer engineering OR 10+2 level MCVC in electronics.

10. **Total working days:** Per Annual session : 200 days
    Per Semester: 100 days

11. **Teaching and Examination Scheme:** As prescribed in the curriculum design by the Subject Board and approved by Academic Board time to time.

12. Admission rules/conditions for every year/semester.

Sr. No.	Programme and Level	Type of Admission	Eligibility	Remark
1	BCA First Year Sem. I	Direct Admission	Students who passed 12th standard exam with mathematics OR passed three years diploma in electronics and computer engineering OR 10+2 level MCVC in electronics.	
2	BCA First Year Sem. II	Natural Growth	----	
3	BCA Second Year Sem. III	Natural Growth	Passed Minimum 50% of total passing heads of FYBCA Semester I and Semester II	
4	BCA Second Year Sem. IV	Natural Growth	----	
5	BCA Third Year Sem. V	Natural Growth	Clearly Passed in FYBCA and Passed Minimum 50% of total passing heads of SYBCA Semester III and Semester IV	
6	BCA Third Year Sem. VI	Natural Growth	----	

13. Programme Outcomes: The following Programme Outcomes are attained after completion of this UG programme:

PO1	Students will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise for working as an individual or in multidisciplinary teams with positive attitude.
PO2	Create awareness and attitude of concern about environmental problems.
PO3	Students can communicate efficiently to deliver their knowledge effectively.
PO4	Able to pursue advanced education in relevant subjects.

14. Programme Specific Outcomes (PSO): BCA programme has been designed to prepare graduates to attain the following programme specific outcomes:

PSO1	Students learn the computer usage as well as its practical knowledge in order to craft them as a versatile computer professional who can provide service in almost all fields of computer application in industry, entrepreneurial pursuit and consulting firms.
PSO2	Achieve ability to identify, analyze, formulate and develop computer applications by using appropriate modern computing tools and techniques.
PSO3	Students acquire latest comprehensive and skilled based knowledge with equal emphasis on theory & practical in the field of IT.

Curriculum Scheme of First Year B.C.A. Semester I

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/ Week)			CREDIT	EXAMINATION SCHEME										GRAND TOTAL
								THEORY				PRACTICAL						
				Th.	Pr.	Total / Week		Duration of Paper (Hrs)	Theory Exam	College Asses.	Total	Duration of Exam (Hrs)	Pract.	Viva Voce	College Asses.	Total		
1	15BCA101	CFOS	COMPUTER FUNDAMENTAL AND OPERATING SYSTEM	6		6	4	3	60	15	75	3					
2	15BCA102	PMC	PROGRAMMING METHODOLOGY USING C	6		6	4	3	60	15	75	3					
3	15BCA103	DT	DIGITAL TECHNIQUES	6		6	4	3	60	15	75	3					
4	15BCA104	FSBDP	FILE SYSTEM AND BUSINESS DATA PROCESSING	6		6	4	3	60	15	75	3					
5	15BCA105	DCN	DATA COMMUNICATION NETWORK	6		6	4	3	60	15	75	3					
6	15BCA106	CS-I	COMMUNICATION SKILLS – I	6		6	4	3	60	15	75	3					
7	15BCA107	LAB-I	Lab-I (C Language)		6	6	3	3					20	10	20	50	
8	15BCA108	LAB-II	Lab-II (DT)		6	6	3	3					20	10	20	50	
			TOTAL	36	12	48	30				450					100	550

Curriculum Scheme of First Year B.C.A. Semester II

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/ Week)			CREDIT	EXAMINATION SCHEME										GRAND TOTAL
								THEORY				PRACTICAL						
				Th.	Pr.	Total / Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS					
									Theory Exam	College Asses.	Total		Pract.	Viva Voce	College Asses.	Total		
1	15BCA109	AC	ADVANCED C	6		6	4	3	60	15	75	3						
2	15BCA110	DMS	DISCRETE MATHEMATICAL STRUCTURES	6		6	4	3	60	15	75	3						
3	15BCA111	RDBMS	RELATIONAL DBMS	6		6	4	3	60	15	75	3						
4	15BCA112	SAD/MIS	SYSTEM ANALYSIS & DESIGN AND MIS	6		6	4	3	60	15	75	3						
5	15BCA113	µP	MICROPROCESSOR	6		6	4	3	60	15	75	3						
6	15BCA114	CS-II	COMMUNICATION SKILLS– II	6		6	4	3	60	15	75	3						
7	15BCA115	LAB-III	Lab-III (Adv. C + µP)		6	6	3	3					20	10	20	50		
8	15BCA116	LAB-IV	Lab-IV (SQL Server)		6	6	3	3					20	10	20	50		
			TOTAL	36	12	48	30				450					100	550

Curriculum Scheme of Second Year B.C.A. Semester III

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/ Week)			CREDIT	EXAMINATION SCHEME										GRAND TOTAL
								THEORY				PRACTICAL						
				Th.	Pr.	Total / Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS					
									Theory Exam	College Asses.	Total		Pract.	Viva Voce	College Asses.	Total		
1	15BCA201	DS	Data Structure	6		6	4	3	60	15	75	3						
2	15BCA202	OOP using C++	Object Oriented Programming using C++	6		6	4	3	60	15	75	3						
3	15BCA203	WT	WEB TECHNOLOGY	6		6	4	3	60	15	75	3						
4	15BCA204	SET	SOFTWARE ENGINEERING & TESTING	6		6	4	3	60	15	75	3						
5	15BCA205	OS	Operating System	6		6	4	3	60	15	75	3						
6	15BCA206	EVS	Environment Science	3		3	2	3	--	50	50	3						
7	15BCA207	LAB-I	Lab-I (DS & OPP using C++)		9	9	4	3					20	10	20	50		
8	15BCA208	LAB-II	Lab-II (WT)		6	6	3	3					20	10	20	50		
			TOTAL	33	15	48	29				425					100	525

Curriculum Scheme of Second Year B.C.A. Semester IV

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/ Week)			CREDIT	EXAMINATION SCHEME										
								THEORY				PRACTICAL						GRAND TOTAL
				Th.	Pr.	Total / Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS					
									Theory Exam	College Asses.	Total		Pract.	Viva Voce	College Asses.	Total		
1	15BCA209	VB.NET	VISUAL BASIC.NET	6		6	4	3	60	15	75	3						
2	15BCA210	NS	NETWORK SECURITY	6		6	4	3	60	15	75	3						
3	15BCA211	NM	NUMERICAL METHODS	6		6	4	3	60	15	75	3						
4	15BCA212	JAVA	JAVA PROGRAMMING	6		6	4	3	60	15	75	3						
5	15BCA213	BSA	BUSINESS SYSTEM & APPLICATION	6		6	4	3	60	15	75	3						
6	15BCA214	DMng	DISASTER MANAGEMENT	3		3	2	3	--	50	50	3						
7	15BCA215	LAB-III	Lab-III (VB.NET)		9	9	4	3					20	10	20	50		
8	15BCA216	LAB-IV	Lab-IV (NM & JAVA)		6	6	3	3					20	10	20	50		
			TOTAL	33	15	48	29				425					100	525

Curriculum Scheme of Third Year B.C.A. Semester V

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/ Week)			CREDIT	EXAMINATION SCHEME										GRAND TOTAL
								THEORY					PRACTICAL					
				Th.	Pr.	Total / Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS				
									Theory Exam	College Asses.	Total		Pract.	Viva Voce	College Asses.	Total	
1	15BCA301	AJAVA	Adv. JAVA	6		6	4	3	60	15	75	3					
2	15BCA302	LINUX	LINUX & Shell Prog.	6		6	4	3	60	15	75	3					
3	15BCA303	.NET	ASP.NET USING C#.NET	6		6	4	3	60	15	75	3					
4	15BCA304	ADBMS	ADBMS	6		6	4	3	60	15	75	3					
5	15BCA305	SEM	SEMINAR		6	6	3								50	50	
6	15BCA306	LAB-I	Lab-I (Adv. JAVA)		6	6	3	3					20	10	20	50	
7	15BCA307	LAB-II	Lab-II (LINUX)		6	6	3	3					20	10	20	50	
8	15BCA308	LAB-III	Lab-III (ASP.NET& C#)		6	6	3	3					20	10	20	50	
			TOTAL	24	24	48	28				300					200	500

Curriculum Scheme of Second Year B.C.A. Semester VI

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/ Week)			CREDIT	EXAMINATION SCHEME										GRAND TOTAL
								THEORY					PRACTICAL					
				Th.	Pr.	Total / Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS					
									Theory Exam	College Asses.	Total		Pract.	Viva Voce	College Asses.	Total		
1	15BCA301	AJAVA	Adv. JAVA	6		6	4	3	60	15	75	3						
2	15BCA302	LINUX	LINUX & Shell Prog.	6		6	4	3	60	15	75	3						
3	15BCA303	.NET	ASP.NET USING C#.NET	6		6	4	3	60	15	75	3						
4	15BCA304	ADBMS	ADBMS	6		6	4	3	60	15	75	3						
5	15BCA305	SEM	SEMINAR		6	6	3								50	50		
6	15BCA306	LAB-I	Lab-I (Adv. JAVA)		6	6	3	3					20	10	20	50		
7	15BCA307	LAB-II	Lab-II (LINUX)		6	6	3	3					20	10	20	50		
8	15BCA308	LAB-III	Lab-III (ASP.NET& C#)		6	6	3	3					20	10	20	50		
			TOTAL	24	24	48	28				300					200	500	

Syllabus of First Year B.C.A. Semester I

Subject Code	15BCA101
Subject Name	Computer Fundamental and Operating System
Short Name	CFOS
Total Lectures	88
Total Credits	4
Prerequisites :	
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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.

Units	Contents	Total Lectures
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.	18
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.	18
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.	18
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.	17
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.	17
	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 Outcomes:
1. Gain knowledge of fundamental of computer and its memory.
2. Ability to use various input/output and secondary storage devices.
3. Gain knowledge about various types of software, translator programs and OS.
4. Able to use various DOS commands.
5. Acquire logic which helps to use and create applications in windows.

Subject Code	15BCA102
Subject Name	Programming Methodology using C
Short Name	PMC
Total Lectures	88
Total Credits	4

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.

Objectives:
- To build the basic skills of programming.
- To acquire the importance of C programming using various methodologies.

Units	Contents	Total Lectures
I	**Programming Concept :** Algorithm, Flowchart, Programming languages, Assembler, Interpreter, Compiler. **Programming Process:** Program design, coding, compilation, execution, testing, debugging, documentation, structured programming, Features and approaches.	18
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.	18
III	**Operators and Expressions in C :** Arithmatic, 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()	18
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.	17
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.	17
	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 Outcome:
1. Students get the complete knowledge of C language.
2. Students are able to develop logic which will help them to create programs, applications in C.
3. By learning the basic programming construct they can easily switch over to any other language in future.
4. Students get better opportunity in software industry.
5. Students can design, develop and test programs in C programming language to solve problems related to collecting, processing and storing data.
6. Better understanding and the ability to follow professional programming practices to align with industry expectations.

Subject Code	15BCA103
Subject Name	Digital Technique
Short Name	DT
Total Lectures	88
Total Credits	4

Prerequisites:
- Understanding of computer hardware circuit.
- Understanding of machine language.

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.

Units	Contents	Total Lectures
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.	18
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	17
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	17
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	18
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.	18
	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 Outcomes:
1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. To understand and examine the structure of various number systems and its application in digital design.
3. The ability to understand, analyze and design various combinational and sequential circuits.
4. Ability to identify basic requirements for a design application and propose a cost effective solution.
5. The ability to identify and prevent various hazards and timing problems in a digital design.

Subject Code	15BCA104
Subject Name	**File System and Business Data Processing**
Short Name	**FSBDP**
Total Lectures	**88**
Total Credits	**4**

Prerequisite:
• Knowledge about Small scale Database like MS-ACCESS

Objectives:
• To expose the students about File Structure and Organization.
• To understand how to use Business Data Processing works.
• To expose the students to the concepts of business data processing with Databases.

Units	Contents	Total Lectures
I	**File Structure and Organization:** Introduction, Logical and Physical Files, Basic File Operations, File Organization, Types of file organization, Over View of Indexes. File Operations: Sorting, Searching and Merging.	18
II	**File Organization:** Sequential, Direct or relative Access, Index Sequential File. Hash files, Relative Files, Multi Key files, Concept of Master & Transaction files, Algorithms for searching and sorting of files, File merging & retrieval of information.	18
III	**Index implementation:** Storage Organization, Distributed files, File system evaluation, File Security issues & implementation, Future of file systems. **Data and File Structures:** Introduction, advantages & uses.	18
IV	**Data processing fundamentals:** Data Information input, processing and output. Data Concepts: Fields, Record, Files. Introduction, Development of data Processing, Data & information, Data Processing systems, Schematic diagram of information system.MIS and its characteristics	17
V	Steps and Elements of Data Processing. **LEVELS OF DATA PROCESSING:**-Manual, Mechanical, Electronic. **TYPES OF DATA PROCESSING:**-Batch, online, offline, Real-time, Multiprogramming, multiprocessing, Time Sharing, Interactive computing or Interactive processing, Transaction processing, Application area.	17
	Text Books: 1. Mary E.S.Loomis- Data Management & File Structures (Second Edition) Prentice-Hall of India Pvt. Ltd. 2. Seymour Lipschutz and Martin M. Lipschutz -Data Processing(Schaum Out Line Series) Second Edition McGraw Hill Book 3. S. Jaiswal- Fundamental of Electronic data processing First Edition 1995 Galgotia Publications Pvt.Ltd.	
	References: 1. Pradeep K.Sinha & Priti Sinha-Computer Fundamentals (sixth Edition) BPB Publication. 2. R.Jayprakash Reddy-Business data processing and Computer Applications APH 3. Cordon B. Davis-Computer Data Processing(Second Edition) (McGrawHill book) 4. C.S. French- Data Processing & Information Technology BPB publication 5. James Bradely -Files & Data Base Techniques (McGrawHill Publications)	

Course Outcomes:
1. Students get complete knowledge of file structure and its operations.
2. They get proper knowledge of file system, file organization.
3. Better understanding and get ability to Implementation of algorithm on operation of file.
4. Ability to get knowledge about Distributed file System.
5. They aware with file security issues and implementation.
6. Also they get knowledge about Management information system.
7. Also they get proper knowledge of data processing, levels and types of data processing.

Subject Code	15BCA105
Subject Name	**Data Communication Network**
Short Name	DCN
Total Lectures	88
Total Credits	4

Prerequisites :
- Basic Knowledge of Computer fundamentals is required.

Objectives:
- To acquire the basic knowledge about Data Communication Networks, network types, devices and various media.
- To acquire the knowledge about various modulation types and switching techniques.
- To understand the various levels of OSI model and about Internet history and its application.

Units	Contents	Total Hrs.
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.	18
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	18
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	18
IV	PBX (Private Branch Exchange) **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.	17
V	**Network Protocols:** OSI Model, X.25 Protocol, Transmission Control Protocol/Internet Protocol (TCP/IP), Ethernet, Token Ring, Datagram . Broadband ISDN, Fascimile(FAX)	17
	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 Outcomes:
1. Describe the components and infrastructure that form the basis for most computer network.
2. Students get complete knowledge of computer network.
3. Describe the technical aspects of data communication on the internet.
4. Propose network designs based on case studies in college or other institutes.

Subject Code	15BCA106
Subject Name	Communication Skill-I
Short Name	CS-I
Total Lectures	88
Total Credits	4

Prerequisites:
- Students should have the basic knowledge of English language.
- They should know the competencies of English.

Objectives:
- To make the student competent in English language.
- To polish the reading and writing skills. To aim at enhancing the communication skill to face the requirements in future employability.
- The Communicative English course aims at training the would-be graduates in various levels of communication in English speech skills, oral skills and other related skills.

Sr. No.	Contents	Total Hrs.
1	**Grammar and Preposition** – 04 1.1 Articles and Preposition -04 1.2 Appropriate forms of verbs -02 1.3 Synonyms and Antonyms -04 1.4 Error Detection -02	18
2	**Language Proficiency** -12 2.1 Types of Sentences -02 2.2 Clauses -03 2.3 Do as directed -07	18
3	**Forms of Written Communication** -12 3.1 Job Application Letter -06 3.2 Preparing Curriculum Vitae or Resume -06	18
4	**Creative Writing** -12 4.1 Drafting Memorandum, E-mail -06 4.2 Composing Notices, Invitations, Telegrams -06	17
5	**Business Communication**-12 5.1: Introduction to Business Communication -04 5.2: Communication in Organizations -04 5.3: Email Communication, Non-verbal Communication-04	17
	Text Books: 1. Mac Millans, English Grammar 2. M. Raman, S. Sharma, Technical communication: Principles and practice, first edition, Oxford University Press(2004).	
	References: 1. Z.N.Patil, B.S.Valke, English for Practical Purposes. 2. M.A.Pink, S.E.Thomas ,English Grammar Composition and Effective Business Communication, S.Chand.	

Course Outcomes:
1. Able to reach out to a wider audience.
2. Skill in developing a scientific approach in writing e-mail, speech-communication, effective presentation techniques, and writing technical and business reports.
3. Enable to take up all writing tasks with ease and confidence.

Subject Code	15BCA107
Subject Name	Lab-I: C Language
Short Name	Lab-I
Total Teaching	88
Total Credits	4

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

Subject Code	15BCA108
Subject Name	Lab-II : DT
Short Name	Lab-II
Total Teaching	88
Total Credits	4

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

Syllabus of First Year B.C.A. Semester II

Subject Code	15BCA109
Subject Name	Advanced C
Short Name	AC
Total Lectures	88
Total Credits	4

Prerequisites :
- The student should have the basic knowledge of mathematics and computations.
- This subject should have the basic skills of C programming.

Objectives:
- To develop the advanced skills of programming.
- To learn the advance concepts of programming like structure, string handling, file handling & graphics.

Units	Contents	Total Lectures
I	**Functions in C:** Definition, Function Prototype, Function Calling, call by value, call by pointers, return values & their types, Functions with Arrays, Pointer to functions, Recursion Function	17
II	**Structure & Union:** Definition of Structure, Declaration & Initialization of Structure, Array of Structure, Pointer to Structure, Self Referential Structure. **Union**: Definition of Union, Declaration & Initialization, Comparison of Union with Structure.	18
III	**String Handling:** Definition of String, Declaration & Initialization of String variables, Array of Pointers to Strings, String Handling functions: gets(), strcpy(), strcat(), strlen(), strcmp(), strcpy(), strlwr(), strupr(), strrev(), strset().	18
IV	**File Handling in C:** Introduction to Streams and Files in C, defining & opening a file, closing a file, different file opening modes, Operations on file by using: fof(), fscanf(), fprintf(), getw(), putw(), fgetc(), fputc(), fgets(), fputs(), fread(), fwrite(), feof(), ferror().	18
V	**Graphics in C:** Introduction , Drawing Objects in C-Line, Circle, Rectangle, Ellipse, Changing Foreground & Background, Filling Objects by Colors.	17
	Text Books: 1. E. Balagurusamy, Programming in ANSI C, Second Edition, Tata McGraw- Hill Publication, New Delhi, 1992. 2. Yeshwant Kanetkar, Let Us C, Third Edition, BPB Publication Limited, New Delhi, 1999. 3. Yeshwant Kanetkar, Graphics Under C, Third Edition, BPB Publication Limited, New Delhi, 2008.	
	References: 1. Byron Gottfried, Programming with C, Second Edition,McGraw- Hill Publication, New Delhi, 1996. 2. D. Ravichandran, Programming with C, First Edition,New Age Inetrnational Publication Limited, New Delhi, 2006. 3. Sudhir Dawra, Mastering Graphics Programming in C, First Edition,Firewall Media- Laxmi Publications Private Limited, New Delhi, 2004. 4. H.M.Deitel, P.J.Deitel, C How to Program, Seventh Edition, 2011, Pearson Publication Limited, New Delhi, 2011.	

Course Outcome:
1. Students get the knowledge of some advance concepts of C language.
2. Students are able to develop graphics programming, strings and files.
3. Students are able to develop logic which will help them to create programs, applications in C.
4. Students get better opportunity in software industry.
5. Students can design, develop and test programs in C programming language to solve problems related to collecting, processing and storing data.
6. Better understanding and the ability to follow professional programming practices to align with industry expectations.

Subject Code	15BCA110
Subject Name	**Discrete Mathematical Structures**
Short Name	**DMS**
Total Teaching periods	**88**
Total Credits	**4**

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

Objectives :
- To be able to explain and apply basic methods of discrete mathematics in computer science.
- To use methods in subsequent courses in design and analysis of algorithms, in software engineering.

Units	Contents	Total Hrs.
I	**Set Theory:** Basic concepts, Types of sets, Operations on set, Examples, Principle of Inclusion–Exclusion. **Combinatorics:** Permutation and Combination, Pigeonhole principle.	18
II	**Relations:** Definition, Types of Relation, Operations on Relation, Composition of Relation, Properties. Functions: Representation of Function, Types of Function, Composition, Inverse of Function.	18
III	**Generating Functions:** Ordinary and Exponential Generating function, Ferrer's Diagram, Conjugate or Dual of Ferrer's diagram, Probability Generating Functions.	18
IV	**Recurrence Relations:** Linear Recurrence Relation, Homogenous solution, Particular Solution, Total solution. Lattice: Definition and properties.	17
V	**Graph Theory:** Introduction to Graph, Types, Matrix Representation of graph: Adjacency and Incidence Matrix. **Trees:** Properties of Trees, Rooted and Binary tree.	17
	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, 4th edition,San Francisco, Dellen (Macmillan), (1987).	
	References: 1. C. L. Liu ,Elements of Discrete Mathematics, 2nd edition, Tata McGraw-Hill,(2006). 2. K.D.Joshi, Foundations of Discrete Mathematics,2nd edition, New Age International Publishers, (2007). 3. Medelson, Boolean Algebra and Switching circuits, Tata McGraw Hill Publication Co-Ltd,4/12 Asaf Ali Road, New Delhi.	

Course Outcomes:
1. Analyze the statements presented in DNF and determine their validity.
2. Apply sets, relation and digraphs to solve the problems.
3. Understand the basic concepts of graph theory and some related theoretical problems.
4. Examine the validity of arguments by using propositional and predicate calculus.

Subject Code	15BCA111
Subject Name	Relational DBMS
Short Name	RDBMS
Total Lectures	88
Total Credits	4

Prerequisites :
- The student should have the basic knowledge of database management system.
- The student should be able to use database management system.

Objectives:
- To develop Problem Solving abilities using relational database management system
- To learn basic principles of relational database management system
- To develop skills for project development & frame work activity using relational database management system.

Units	Contents	Total Lectures
I	**Basic Concept:** Traditional File based System, Database Management system, Roles in database environment, Architecture of DBMS, Components of DBMS, Advantages and Disadvantages, DBA and its role, Database Languages. **Database Models:** Relational, Hierarchical, Network with its Advantages and Disadvantages.	18
II	**Relational Model :** Relation, Domain & Attributes, Keys, Relational Algebra and Calculus, Entity Relationship model, E-R diagram, Functional dependency **Normalization:** Introduction, 1NF, 2NF, 3NF, BCNF.	18
III	**SQL:** Introduction, Basic Structure of SQL Query, Components of SQL, Data types, Operators. **DDL Commands :** CREATE,ALTER,DROP, DESCRIBE,TRUNCATE **DML Commands :**SELECT, INSERT, DELETE,UPDATE ORDER By Clause, Group By Clause, Having Clause, View and Operation on View.	18
IV	**Functions: Numeric Function:** ABS, MOD, FLOOR, CEIL,TRUNC,SQRT,SIGN,COS, LOG, EXP, LEAST, GREATEST. **Group Function:** AVG, MAX, MIN, SUM, COUNT. **Character Function:** LENGTH, LOWER, UPPER, INITCAP, INSTR, SUSSTR, LPAD, RPAD, LTRIM, RTRIM, DECODE, SOUNDEX. **Conversion Function :** To-Number, To-Char.	17
V	**PL/SQL:** Introduction, Features, Block structure, Constants and Variables, data types, Control structure. **Programming Cursor:** Implicit Cursor, Explicit Cursor, their attributes, declaring, opening, fetching cursor.	17
	Text Books : 1. C.J. Date, an Introduction to Database Systems, Addison-Wesley Publishing Company, (8th Edition),1981. 2. Mujumdar & Bhattacharya, Database Management Systems, Published by Tata McGraw-Hill Education Pvt. Ltd., 2004 3. IVAN BAYROSS, Sql,PL/SqL the Programming Language Of Oracle, BPB Publications,2010 4. Ivon Bayross, Database Concepts and Systems for Students. Published by Shroff Publishers & amp. dstributors Pvt. Ltd. 2009. 5. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database system concepts, Fifth Edition, McGrawHill Publication. 6. Thomas, Connolly, Carolyn Begg, Database systems, A practical approach to Design, Implementation and management –Fourth Edition, Pearson Education.	
	References : 1. Ramakrishnan, Gehrke, Database management systems Third Edition, McGrawHill Publicaion. 2. RamezElmastri, Shamkant B. Navathe, Fundamentals of Database systems Fifth edition, Pearson Education. 3. Kevin Loney, George Koch, Oracle 9i.The complete Reference, Forth Edition, McGrawHill Publication.Fifth edition, Pearson Education.	

Course Outcomes:
1. Students get the thorough knowledge of Database and Relational Database Management

system.
2. Students are able to develop logic which will help them to create applications in RDBMS.
3. By learning the basic programming construct they can easily switch over to other RDBMS in future.
4. Students get better opportunity in software industry as Database Administrator.
5. Students can design, develop and test programs in RDBMS to solve problems related to collecting, processing and storing data.

Subject Code	15BCA112
Subject Name	**System Analysis and Design & Management Information System**
Short Name	**SAD & MIS**
Total Lectures	**88**
Total Credits	**4**

Prerequisites:
- Knowledge about Small scale Database like MS-ACCESS

Objectives:
- To develop Problem Solving abilities using computers.
- To teach basic principles of development.
- To develop skills for project development & frame work activity.

Units	Contents	Total Lectures
I	**System development life cycle: -** Goals, system, computer base business system, personal traits of analyst, System life cycle, working with technology, Preliminary System Analysis, Goals and Review, fact finding and reviews, working with peoples.	18
II	**Detailed analysis:** review and assignment, feasibility study. **Modeling tools for system analyst:** Goals, role of data in business, modeling with DFD, DFD's With CASE. **Structural methodology:** Need relevant CASE technology, other specification Tools.	18
III	**Prototyping System analysis:** 3Gls, 4Gls, object oriented analysis. **System design:** guidelines for output design, formatting and designing report, data entry process, input design and data collection, file design, database design. **Software design:** program definition, module design.	18
IV	**Overview of implementation**: Scheduling and assigning a task, testing and training, system maintenance, management issue, System Testing and Quality assurance.	17
V	**MIS Introduction:** System Implementation, MIS frame work, importance concepts, management, information system Definition, Nature & Scope: Characteristics, function, structure Decision making. **MIS:** Types, level, utility Management of Information System: Implementation, Planning, organization & development, user training, testing.	17
	Text Books: 1.D.P. Goyal, " Management information systems", Macmillan India Ltd. System Analysis & Design by Igon-H-PHI 2.Robert G. Murdick & Joel E. Ross & James R. Claggett, "Information Systems for Modern Management" PHI. 3.J. Kanter, "Management/Information Systems", PHI.	
	Reference Books: 1.Bentley,"System Analysis and Design", TMH 2.A. Ziya Aktas, "Structured Analysis & Design of Information System", PHI. 3. V. Rajaraman, "Analysis & Design of Information Systems", PHI.	

Course Outcomes:
1. Gather data to analyze and specify the requirement of a system
2. Design system components and environments
3. Ability to demonstrate an understanding of and apply various models and techniques that provide a basis for the SDLC.
4. Ability to learned different categories of software requirements.
5. Demonstrate an ability to use the techniques and tools
6. Learned about the importance of project management including cost estimation.

Subject Code	15BCA113
Subject Name	Microprocessor
Short Name	µp
Total Lectures	88
Total Credits	4

Prerequisite:
- Interaction with hardware by using assembly language.
- Understanding execution under hardware.
- Understanding of assembler.

Objectives:
- To expose the students about microprocessor used in computer system.
- To understand how microprocessor works inside computer system.
- To expose the students to the concepts of assembly language programming.

Units	Contents	Total Lectures
I	**Introduction of Microprocessor:** Evolution of Microprocessor, Internal block diagram of 8086 Microprocessor, Software Model or Programming Model or register organization of 8086, Flag register of 8086.	18
II	**Addressing modes and instruction Set:** Data Transfer instruction, Arithmetic instruction, Logical instruction, Bit Manipulation instruction.	18
III	**Assembler directives and Programming:** Program transfer and flag manipulation instruction, Assembler Directives, Program based on above instructions, Search for big number, small number, occurrences of given number.	18
IV	**8086 Hardware Specification:** Pin configuration, Function of each pin, interrupts: hardware and software interrupts, interrupt vector table, interrupt processing	17
V	**Introduction to advance Microprocessor and microcontroller :** Important feature of Pentium Microprocessor (Functional Block Diagram not expected),Super scalar pipeline architecture, Cache memory, concept of RISC and CISC processor **Microcontroller:** The important features of 8051 microcontroller, advantages of microcontroller over microprocessor.RAM organization of 8051 microcontroller, application of microcontroller.	17
	Text Books: 1. B .Ram: Fundamental of Microprocessor and Microcomputer 6th edition:Dhanpatrai Publication(2006) 2. Atul P.Godse /Mrs.Deepali A.Godse-Microprocessor and Interfacing 1st edition :Techinal publication pune (2009) 3. James L.Antonakos,The Pentium Microprocessor 1st edition:Prentice hall(1997)	
	References: 1. Barry B. Brey: The Intel Microprocessors 6[Th] edition:Prentice hall(2007) 2. Douglus V Hall: Microprocessor and Interfacing 2nd edition :Glencoe(1992) 3. K.M.Bhurchundi and A.K.Ray:Advanced Microprocessors & Peripherals 3rd edition:Tata Mcgraw hill(2013)	

Course Outcomes:
1. Explain the architecture, pin configuration of microprocessor 8086/microcontroller and Interfacing ICs.
2. Identify various addressing modes of microprocessor8086/microcontroller
3. Perform various microprocessor/microcontroller based programs.
4. Apply the concepts of 8086 programming like interfacing, interrupts, stacks & subroutines.
5. Demonstrate programming proficiency using the various addressing modes and data transfer instructions of the microprocessor/microcontroller.
6. Solve basic binary math operations using the microprocessor/microcontroller.

Subject Code	15BCA114
Subject Name	Communication Skill -II
Short Name	CS-II
Total Lectures	88
Total Credits	4

Prerequisites:
- Students should have the basic knowledge of English language.
- They should know the competencies of English.

Objectives:
- To make the student competent in English language.
- To polish the reading and writing skills.
- To aim at enhancing the communication skill to face the requirements in future employability.
- The Communicative English course aims at training the would-be graduates in various levels of communication in English speech skills, oral skills and other related skills.

Sr. No.	Contents	Total
1	**Comprehension Skill** -12 1.1 Generating Ideas with quick response -06 1.2 Attempting Precise -06	18
2	**Command Over Language** -12 2.1 Using other forms of verbs. -03 2.2 Voice -02 2.3 Do as Directed -07	18
3	**Written Communication Skills**-12 Course Content: 3.1. Notices-03 3.2. Agendas-03 3.3. Minutes-03 3.4. Fax Messages-03	18
4	**Drafting Language** -12 4.1 Business Letter -06 4.2 Drafting Reports -06	17
5	**General Awareness** -12 5.1 Short Notes -07 (Audio-visual aids, Interview, Barriers of Communication, Verbal/Non Verbal Communication) 5.2 Personal Response in 100 words -05 (Pollution, Current Affairs, Education)	17
	Text Books : 1. Mac Millans, English Grammar 2. M. Raman, S. Sharma, Technical communication: Principles and practice, first edition, Oxford University Press(2004).	
	References : 1. Z.N.Patil, B.S.Valke, English for Practical Purposes. 2. M.A.Pink, S.E.Thomas ,English Grammar Composition and Effective Business Communication , S.Chand.	

Course Outcomes:
1. Skills in speaking in official and formal situations and in writing letters, notices, fax messages and reports.
2. Enable to face the challenges in communication primarily in a technical milieu as communicating formal and technical messages.
3. Focus on enhancing competence and confidence in making use of the English language.

Subject Code	15BCA115	
Subject Name	Lab-I : Advanced C	
Short Name	Lab-I	
Total Lectures	88	
Total Credits	4	
Sr. No.	Contents	Total Lectures
1	Write a program for swapping of two integer numbers using third by using concept of Function Prototype.	5
2	Write a program to calculate Factorial of n number by using Recursion Function.	6
3	Write a program to sort an array of integers by using Functions.	6
4	Write a program to demonstrate the concept of passing Array to a Function.	6
5	Write a program to read the information for one person from keyboard and print the same on the screen by using Structure.	5
6	Write a program to demonstrate the concept of Self Referential Structure.	6
7	Write a program for Union containing your own personal information.	6
8	Write a program for printing sequence of characters on screen by using 'for' loop.	6
9	Write a program for concatenation of two strings.	6
10	Write a program for comparison of two strings.	6
11	Write a program to sort a list of names in alphabetical order.	6
12	Write a program to display an entered string in reverse order.	6
13	Write a program to read data from one file and write into another by using file handling.	6
14	Write a program for drawing a circle inside rectangle.	6
15	Write a program for drawing two straight parallel lines.	6

Subject Code	15BCA115	
Subject Name	Lab-I : µP	
Short Name	Lab-I	
Total Teaching	88	
Total Credits	4	
Sr. No.	Contents	Total Lectures
1	Write an assembly language program for addition of two 8 bit numbers.	6
2	Write an assembly language program for addition of two 16 bit numbers	6
3	Write an assembly language program for subtraction of two 8 bit numbers	6
4	Write an assembly language program for subtraction of two 16 bit numbers.	6
5	Write an assembly language program for multiplication of two numbers	6
6	Write an assembly language program for signed multiplication of two numbers	6
7	Write an assembly language program for division of 16 bit number by 8 bit number	6
8	Write an assembly language program for signed division of 16 bit number by 8 bit number	6
9	Write an assembly language program for find factorial of given number	6
10	Write an assembly language program for find sum of all numbers form array of 8 bit numbers	6
11	Write an assembly language program for sum of all even numbers form array of 8 bit numbers	6
12	Write an assembly language program for sum of all odd numbers form array of 8 bit numbers	6
13	Write an assembly language program for search big (largest) number form array of 8 bit numbers	6
14	Write an assembly language program for search small (smallest) number form array of 8 bit numbers	6
15	Write an assembly language program for search given number form array of 8 bit numbers	4

Subject Code	15BCA116
Subject Name	Lab-II : SQL SERVER
Short Name	Lab-II
Total Teaching	88
Total Credits	4

Sr. No.	Contents	Total
1.	Practical based on basic DDL commands	
2.	Practical based on basic DML commands	
3.	Practical based on Clauses[ORDER BY,GROUP BY,HAVING]	
4.	Practical based on Operators	
5.	Practical based on Views and Operations on Views	
6.	Practical based on Numeric functions	
7.	Practical based on Group functions	
8.	Practical based on Character functions	
9.	Practical based on Conversion functions	
10.	Write a program to display simple message in PL/SQL	
11.	Write a program greatest among two numbers in PL/SQL	
12.	Write a program to read a given number is even or odd in PL/SQL	
13.	Write a program for addition of two numbers in PL/SQL	
14.	Write a program for calculating simple interest in PL/SQL	
15.	Write a program to find area and circumference of circle in PL/SQL	

Syllabus of Second Year B.C.A. Semester III

Subject Code	15BCA201
Subject Name	DATA STRUCTURES
Short Name	DS
Total Lectures	88
Total Credits	4

Prerequisites:
- Basic knowledge of C programming must be known.

Objectives:
- To extend programming ability using an object oriented language.
- To analyze the algorithms to determine time and space complexity.
- To build and manipulate linear and non-linear data structure, including Stack, Array, Linked list, Queues, Tree and Graphs.
- To be able to Sort, Search and merge data.
- To be able to choose the appropriate data structure to use in solving typical computer science problem.

Units	Contents	Total Lectures
I	**Introduction**: Data structure & their types, primitive Operations, Algorithms & Algorithms Notation, Time-Space Complexity. **Arrays :** Linear array and its Representation in memory, Primitive Operation on Linear Array, traversing linear arrays, inserting & deleting operations, Bubble sort, Linear search and Binary search algorithms.	18
II	**Linked List:** Linked lists and their representation in memory, Primitive Operation on Linked list, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion operations on linked lists. Header linked lists, Two-way linked lists & its memory representation.	18
III	**Stack:** Definition, sequential and Linked representation in Memory. Primitive Operation on Stack, Arithmetic expressions, Polish notation: Infix, Postfix & Prefix operations using stack. **Recursion:** Recursion definitions & Their type, recursion for Tower of Hanoi.	18
IV	**Queues:** Definition, Primitive Operation on Queues, Array Representation of Queues, linked lists representation of a queue. De-queue. Circular Queue, priority queue. **Trees:** Definition, Tree terminology, Binary Trees & their memory representation using Arrays & Linked list, Traversing Binary Trees.	17
V	**Graph:** Definition, Graph terminology, sequential and Linked representation of Graph. **Sorting:** Selection sort, Insertion sorts. Merging &Merge sort, Radix sorts, Quick Sort, Hashing & Type of Hashing Function.	17
	Text Books : 1. Seymour Lipschutz, Data Structures, Tata McGraw Hill Education Private Limited, NEW DELHI. 2. S. B. Kishor, Data Structures, Das Ganu Publications, Nagpur, 2nd Edition (2007) 3. G. S. Baluja, Data Structures through C (A Practical Approach), GAGAN KAPUR FOR Dhanpat Rai & Co. (P) Ltd. New Delhi, 4th Edition.	
	References : 1. Langsam, Augenstein And Tenenbaum, Data Structures using C & C ++, PHI. 2. Tremblay and Sorenson, An Introduction to Data Structures With Applications. 3. Horowoitz & Sahani, Fundamentals of Data Structure, 2nd Edition.	

Course Outcomes :

1. Ability to implement linear and non-linear data structures like stacks, queues, linked list etc. when required in an application.
2. Able to choose appropriate data structure and algorithms for simple programs or program parts.
3. Able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
4. Efficiently evaluate algorithms and data structures in terms of time and memory complexity of basic operations.
5. Apply data structure concepts in various domains like DBMS, compiler construction etc.

Subject Code	15BCA202
Subject Name	**Object Oriented Programming using C++**
Short Name	**OOP using C++**
Total Lectures	**88**
Total Credits	**4**

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.

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.

Units	Contents	Total Lectures
I	**OOP:** Features of OOP, basic Concepts of OOP, advantages and applications of OOP, Introduction to C++, structure of C++ program, tokens, keywords, identifiers, basic data types & user defined data types, Constants, variables, declaration of variables and initialization.	17
II	**Operators:** Scope resolution operator, member dereferencing operator, Type conversion, implicit & explicit conversions. **Control structures:** if, switch, do..while, while, for statements. **Functions:** Function prototype, Function calling and returning, their types, inline functions, default arguments, constant arguments, function overloading.	17
III	**Classes and Objects:** class specification, creating objects, accessing class members, defining member functions, Nesting of member function, friend functions, passing objects as arguments, Returning objects from functions. **Constructors:** Defining constructor, parameterized constructor, multiple constructors in a class, constructor with default argument, copy constructor, destructor.	18
IV	**Arrays and pointers:** Arrays as class member data, 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:** Derived and base class, Types of Inheritance, visibility mode.	18
V	**Virtual Functions and Polymorphism:** Introductions, pointers to derived class, definition of virtual functions, pure virtual functions, Rules for Virtual functions, **Files and streams:** Hierarchy of file stream classes, opening and closing of files, files modes, file I/O with stream class.	18
	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.	

Course Outcomes :
1. Able to implement the OOP concepts like class, objects, Inheritance, Polymorphism, Constructor, Destructor, Polymorphism, Virtual Function, etc.
2. Programming logic is developed which will help them to create efficient programs & applications providing the students better opportunity in software industry.
3. Ability to follow professional programming, practices to align with Industry Expectations.

Subject Code	15BCA203
Subject Name	WEB Technology
Short Name	WT
Total Lectures	88
Total Credits	4

Prerequisites :
- Basic knowledge in HTML tags & skill of creating web pages should be known.
- Knowledge of basic Computer hardware & software is also necessary.

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.

Units	Contents	Total Lectures
I	Web basics, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, World Wide Web Consortium (W3C) **HTML5**: Features, Editing, First HTML5 Example, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, meta Elements.	18
II	**HTML5 Elements**: **Form input type element**: Colors, date, time, e-mail addresses, numbers, range, search, telephone numbers, URLs, **Datalist Elements**. **Page-Structure Elements**: header, nav, figure, figcaption, article, summary, details, section, aside, meter, footer. **Audio and Video elements. Canvas element:** rectangle.	18
III	**Introduction to scripting**: Java Script basics, operators, data types, popup boxes. Control structures: if, If-else, Switch. Looping structures: for, do-while, while. **Java Script functions**: built in functions, Defining and invoking parameter functions. **JavaScript objects**: Math, String, Date, Number, Boolean	18
IV	**XML**: Introduction, Features, Syntax, Tags, Elements, Attributes, Tree Structure and namespaces. **DTD**: Internal, External. **XML Schemas**: Definition types. **CSS**: Introduction, basic properties, **Selectors**: universal, type, id, class. Inline Styles Embedded Style Sheets, External Style Sheets. Element Positioning and Dimensions.	17
V	**jQuery**: Introduction , importance, jQuery Installation, jQuery Syntax, jQuery Selectors, jQuery Event Methods, jQuery Effects **AngularJS**: OVERVIEW, Features, advantages, disadvantages, simple application, Directives, Expressions: numbers, String, Object, and Array.	17
	Text Books : 7. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet & World Wide Web: How to program", Fifth Edition Pearson ISBN 978-0-13-215100-9 8. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, McGraw-Hill, ISBN: 978-0-07-174170-5 9. Kogent Learning Solutions Inc, HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and jQuery, Dreamtech Press, New Delhi, 2011 10. 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, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2009 3. Jonathan Chaffer, Karl Swedberg, "Learning jQuery" 4. Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson Education, New Delhi, 2009	

Course Outcomes :
1. Ability to develop a dynamic website by the use of JavaScript, HTML5 & Cascading Styles sheets.
2. Students will be able to write a well formed / valid XML document and Schema.
3. Able to use scripting languages and web services to transfer data and add interactive components to web pages.

4. Ability to combine multiple web technologies (JavaScript, JQuery and AngulerJS, etc.) to create advanced web components.
5. Able to incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.

Subject Code	**15BCA204**
Subject Name	**SOFTWARE ENGINEERING AND TESTING**
Short Name	**SET**
Total Lectures	**88**
Total Credits	**4**

Prerequisites :
- Basic knowledge in System development life cycle should be known.
- Knowledge of basic Computer software and related terms are also necessary.
- Programming constructs along with object oriented concepts must be known.

Objectives:
- To provide an insight into the process of software development.
- To understand and practice the various fields such as analysis, design, development, testing of software engineering.
- To develop skill to construct software of high quality with high reliability.
- To apply metrics and testing technique to evaluate the software.

Units	Contents	Total Lectures
I	**Software**: Definition, characteristic, myths. **Software engineering**: Definition, layer, management, and phases in software engineering software process, project, product, process component and frame work. **Software life cycle model**: Waterfall, prototyping, spiral incremental, RAD, V model.	18
II	**Software requirement**: Introduction, Types, requirement analysis: Structured, object oriented modeling, other approaches. **SRS**: Characteristic. **Basic of cost estimation**: Estimation of resources, software product cost factor COCOMO model of cost estimation.	18
III	**Software design**: Basic, data design architectural design, component level design, user interface design, object oriented design, software design notation: flowchart, DFD, structure chart. **Software coding**: Feature, programming practices: top down, bottom up, structured, information hiding.	18
IV	**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.	17
V	**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.	17
	Text Books : 1. Rohit khurana," Software Engineering Principles and practice", Second edition , Vikas publishing house Pvt. Ltd, 2010 2. Sommerville Pearson, "Software Engineering", Eight Edition, Pearson Education, 2007 3. Pankaj Jalote, "An integrated approach to Software Engineering", Third Edition, Narosa Publishing House, 2005	
	References : 5. Roger S. Pressman ,"Software Engineering : A Practitioner Approach", Seventh edition, McGrawHill, 2010 6. Richard Fairley ,"Software Engineering Concept", Tata McGrawHill Edition 2008 7. Hans van Vliet, "Software Engineering: Principles and Practice", 3rd edition, John Wiley & Sons, 2008.	

Course Outcomes :
1. Achieve basic knowledge of software engineering principles, including models and their

applications in the different phases of software development.
2. Ability to analyze a problem, understand its requirements and use the techniques and tools necessary for software engineering practice.
3. Ability to do project management and its cost estimation.
4. Ability to do software testing using appropriate technique.
5. Ability to manage software quality and do software maintenance.

Subject Code	15BCA205
Subject Name	Operating System
Short Name	OS
Total Lectures	88
Total Credits	4

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

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 various types of operating system & their management and techniques.

Units	Contents	Total Lectures
I	**Operating system:** Introduction, Components, Characteristics and Services. **Process concept**: Definition, process state, process state transition, operation on process, inter-process communication, process scheduling.	18
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.	18
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.	18
IV	**Device Management:** I/O Hardware, application I/O interface, kernel I/O sub system, Disk scheduling & management, swap-space management.	17
V	**Study of Unix Operating system:** Features, History, Architecture, process management, scheduling, memory management, file systems, security.	17
	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, (2015). 5. Sumitabh Das, Unix concepts and Application, Fourth Edition, Tata McGraw-Hill Education, (2010).	
	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 Co., (1985). 4. M. Milankovic, Operating systems, McGraw-Hill. 5. A. S. Tananbum, Operating systems, Pearson Education.	

Course Outcomes:
1. Ability to use various OS and its file systems with ease.
2. Ability to understand CPU scheduling algorithms used in OS.
3. Able to understand the management of deadlock, memory, virtual memory and device.
4. Ability to install UNIX/LINUX, etc. operating systems.

Subject Code	15BCA206
Subject Name	Environmental Science
Short Name	EVS
Total Lectures	40
Total Credits	2

Prerequisites:
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Objectives:
- To create awareness about environmental problems among the students.
- To impart basic knowledge about the environment and its applied problems.
- To develop an attitude of concern for the environment.
- Motivating students to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.

Units	Contents	Total Lectures
I	**The multidisciplinary nature of environmental studies:** Definition, Scope and importance, Need for public awareness. **Human population and the environment:** Population Explosion, Human Rights, Value Education, Environment and Human Health, Women and Child Welfare Programme.	09
II	**Social Issues and The Environment:** From unsustainable development to sustainable development, Water conservation- Rain water harvesting, Watershed management, Global Warming, Acid-rain, Environment Protection Act, Air (Prevention and Control of pollution), Act, Wildlife protection Act.	09
III	**Natural Resources:** Renewable and non-renewable resources, Forest resources, Water resources, Mineral resources, Food resources, Land resources, Role of an individual in conservation of natural resources.	06
IV	**Ecosystem, Biodiversity and its conservation:** Ecosystem- Concept of ecosystem, Structure and functions of ecosystem, Food-chain, Ecological pyramids, Structure and functions of ecosystem- Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem, **Biodiversity:** Introduction- Definition, Genetic, Species and Ecosystem diversity, Values of biodiversity, Hot-spots of biodiversity, threats to biodiversity, Conservation of biodiversity: In-situ and Ex-situ conservation.	10
V	**Environmental Pollution:** Causes, effects and control measures of- Air pollution, Soil pollution, Water pollution, Noise pollution, Thermal pollution, Solid waste management.	06
	Text Books 1. Prof. K. Gawai, Environmental studies, Sanskar publications. 2. R. Rajgopalan, Environmental studies, Oxford uni. press, New Delhi, 2005.	
	References : 1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner. 2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R) 3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB) 4. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p 5. De A.K., Environmental Chemistry, Wiley Eastern Ltd	

Course Outcomes:
1. Students will gain knowledge of Ecosystem, Biodiversity and Environmental Pollution.
2. Ability to understand Causes, effects and control measures of Pollution.
3. Achieve awareness about Water conservation- Rain water harvesting, Watershed management, Global Warming, Acid-rain, Environment Protection Act, Wildlife protection Act.

Subject Code	15BCA207
Subject Name	Lab-I: DS & OOP using C++
Short Name	Lab-I
Total Lectures	130
Total Credits	4

Sr. No.	Contents	Total Lectures
	Data Structures Practical List:	
1	WAP to Insert element in an array at the given location.	3
2	WAP to Delete an element from array at the given location.	3
3	WAP to Sort the element of an array using bubble sort technique.	3
4	WAP to Search an element using linear search technique.	3
5	WAP to Search element from an array by using binary search technique.	3
6	WAP to Traverse an element from link list.	3
7	WAP to Insert node at beginning of link list.	3
8	WAP to Delete node at beginning of link list.	3
9	WAP to Insert node at specific location of link list.	3
10	WAP to Calculate factorial of given number by using iteration method.	3
11	WAP to Calculate factorial of given number by using recursion method.	3
12	WAP to Calculate Fibonacci series of given number by using recursion method.	3
13	WAP to perform basic operation (PUSH, POP) of stack using array.	3
14	WAP to Calculate factorial of given number by using recursion method.	3
15	WAP to Obtain tower of Hanoi problem.	3
16	WAP to Perform the insertion operation of queue by using array.	4
17	WAP to Perform the deletion operation of queue sort by using array.	4
18	WAP to Sort element of an element of an array by using insertion sort technique.	4
19	WAP to Sort element of an element of an array by using selection sort technique.	4
20	WAP to Merge element of two arrays into a single array by using merging technique.	4
	OOP using C++ Practical list:	
1	Practical based on structure of C++ Program.	2
2	Practical based on use of operators.	3
3	Practical based on use of Type conversion.	3
4	Practical based on use of class and objects.	3
5	Practical based on use of control structures- if-else.	3
6	Practical based on use of control structures nested if.	3
7	Practical based on use of control structures- switch statement.	3
8	Practical based on use of looping structures- for loop.	6
9	Practical based on use of looping structures do-while.	3
10	Practical based on use of looping structures while.	3
11	Practical based on use of function.	6
12	Practical based on use of inline function.	3
13	Practical based on inheritance.	3
14	Practical based on function overloading.	3
15	Practical based on operator overloading	3
16	Practical based on constructor	3
17	Practical based on parameterized constructor.	3
18	Practical based on copy constructor	3
19	Practical based on virtual function.	3
20	Practical based on file handling	3

Subject Code	15BCA208
Subject Name	Lab-II : (Web Technology)
Short Name	Lab-II
Total Lectures	90
Total Credits	3

Sr. No.	Contents	Total Lectures
1	Create a webpage in HTML5 using <img> tag with its attributes.	3
2	Create a webpage in HTML5 for strength of BCA using <table> tag	3
3	Create a webpage in HTML5 using <form> tag with new input type.	3
4	Create a webpage in HTML5 for strength of BCA using <a> tag	3
5	Create a webpage in HTML5 with audio and video Elements	3
6	Write a program for inline CSS	3
7	Write a program for internal style sheet	3
8	Write a program for external style sheet	3
9	WAP for simple Javascript using if-else conditional statements.	3
10	WAP for simple Javascript using for looping statements.	3
11	WAP in Javascript to check whether the given number is even or odd.	3
12	Write a program in XML for showing student information.	3
13	Write a program in simple AJAX	3
14	Write a program to use of jQuery	3
15	Write a program to demonstrate AngularJS.	3

Syllabus of Second Year B.C.A. Semester IV

Subject Code	15BCA209
Subject Name	VISUAL BASIC. NET
Short Name	VB.NET
Total Lectures	88
Total Credits	4

Prerequisites:
- Basic knowledge of programming logic must be known.

Objectives:
- Extend programming ability using VB.Net
- Ability to learn and developed GUI based and Event Driven programming.
- Build and manipulate Database programming using VB.net
- Learn basic controls of Visual Studio IDE.

Units	Contents	Total Lectures
I	**Introduction to .NET**, 4.0.NET Framework features & architecture. Introduction to Visual Studio2010, Event Driven Programming, VB.NET Development Environment, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The VB.NET Language - data types, variables, variables declarations, Scope of a variable, type casting, constants, operators and expressions.	18
II	Conditional statements, loop statements. Arrays, types of array, Exception Handling, Sub procedure, Functions, Passing arguments, Optional Argument, Returning value from function. Msgbox & Inputbox, String manipulation, mathematical function, Date function	18
III	**Object Oriented Programming:** Concepts of classes & objects, field, Properties, methods and events, Creating a class, Constructors and Destructors, Inheritance, Access modifiers, Overloading & Overriding, Polymorphism.	18
IV	**Working with Forms:** Loading, showing and hiding forms, controlling one form within another. GUI Programming with Windows Form: Method, properties, events and working of basic controls-Textbox, Label, Button, Listbox, Combobox, Checkbox, PictureBox, Image Control, RadioButton, Panel, Timer. Menu, Built-in Dialog Boxes.	17
V	**Data Access with ADO.NET:** What are Databases, Accessing Data with the Server Explorer, Architecture of Ado.net, Data provider Ado.net objects: Connection, Command, DataReader. Data Controls: Grid View, DetailView, Repeater, DataList	17
	Text Books : 1. Steven Holzner, Visual Basic.NET Programming Black Book PARAGLYPH PRESS Dreamtech Publications. 2. Visual Basic 2010 Programming Black Book, PLATINUM Edition, Dreamtech Press, KOGENT Learning Solution Inc. 3. Shirish Chavan, Visual Basic.NET PEARSON Education. 4. Michal Halvorsons, MICROSOFT VISUAL BASIC.NET STEP BY STEP, Prentice-Hall of India Private Limited, New Delhi	
	References : 1. Alisstair McMonnies, Object Oriented Programming in Visual Basic.NET, Pearson Education 2. Hamilton J.P., OOP with Visual Basic.NET, O'Reilly Media Inc. 3. Francesco Balena, Programming Microsoft Visual Basic.NET, Microsoft Press.	

Course Outcomes :
1. Able to build application using event driven programming skills and GUI tools of .net framework.
2. Able to use object-oriented features with console applications.
3. Able to create dynamic application using ADO.NET.

Subject Code	15BCA210
Subject Name	Network Security
Short Name	NS
Total Teaching Hrs.	88
Total credits	4

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

Objectives:
- To be able to explain and implement basic security techniques.
- To use methods in cyber crime and networking purposes.

Units	Contents	Total Lectures
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.	17
II	**Block Ciphers and Data encryption standard**: Block cipher principles, Data Encryption standard, AES Evaluation criteria of AES, The AES cipher.	18
III	**Finite Fields:** Groups, Rings and Fields, Modular Arithmetic, Euclidean Algorithm. **Introduction to Number theory:** Prime numbers, Formats and Euler's theorem, Testing for primarily.	17
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.	18
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.	18
	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)	

Course Outcomes :
1. Able to identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks.
2. Able to understand encryption and analyze the various encryption algorithms.
3. Able to apply modern algebra and number theory.
4. Capability to understand cryptographic algorithms and its vulnerabilities.
5. Ability to understand the techniques and algorithms used for message authentication like MAC, Digital Signatures and Hash functions.
6. Students are familiarized with network security designs using available secure solutions.

Subject Code	15BCA211
Subject Name	Numerical Methods
Short Name	NM
Total Lectures	88
Total Credits	4

Prerequisites:
• Basic knowledge of mathematics.

Objectives:
• To teach the concept of Numerical analysis.
• To teach the various applications of numerical methods on computer.

Units	Contents	Total Lectures
I	**Introduction:** A simple mathematical model, algorithm design. Approximation and round-off errors, truncation errors, Numerical error, Modeling error, Inherent error, Blunders, Absolute and relative error.	17
II	**Root of equations**: Introduction of methods used to find roots of Non-linear equations, Polynomial equation, transcendental equation, Bisection method, False Position method, Newton-Raphson method, Secant method.	18
III	**Interpolation**: Concept and definition of interpolation, Construction of Forward and Backward difference table, Newton- Gregory formula of Forward and Backward interpolation, Lagrange interpolation, inverse interpolation.	18
IV	**Curve Fitting**: Introduction of Regression, definition, Least – square regression: Linear regression. **Solutions to ODE (Ordinary Differential Equations):** Introduction to ODE, various methods to solve ODE: Euler's method, Runge-kutta method.	17
V	**Linear Algebraic Equation**: a**) Gauss elimination**: Solving small number of equations Naïve gauss elimination, pitfalls of elimination method. **Numerical Integration:** Introduction to numerical integration, General Quadrature formula for Equidistant ordinates, various numerical methods for solving numerical integration: Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8rd rule.	18
	Text Books : 1. S.R. Patil, M.D. Bhagat, A.D. Mankar, "Numerical Methods", Nirali Prakashan, Sep.-2007. 2. S.C. Chapra, R.P. Canale, "Numerical Methods for Engineers", Tata Mc-Graw Hill Pvt. Ltd., New Delhi, 5th Edition,2006, ISBN-13: 978-0-07-063416-9 . 3. S.S. Shastri, "Introductory methods of Numerical Analysis", Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition, Jan.1997, ISBN:81-203-0611-2.	
	Reference Books : 1. E. Balguruswamy, "Numerical Methods", Tata Mc-Graw Hill Pvt. Ltd., New Delhi, 1999, ISBN-13: 978-0-07-463311-3. 2. V. Rajaram, "Computer oriented numerical methods", Prentice Hall of India Pvt. Ltd., New Delhi, 3rd Edition, 1997,ISBN:81-203-0786-0. 3. M.K. Jain, S.R.K. Iyengar, R. K. Jain, "Numerical Methods for Scientific & Engineering computations", Wiley Eastern Ltd., New Age International Publications Ltd., 3rd Edition, ISBN : 81-224-0540-1.	

Course Outcomes:
1. Ability to implement a numerical method in any modern computer language.
2. Capable of performing error analysis for a given numerical method.
3. Able to solve linear system of equation using appropriate numerical method.
4. Ability to solve algebraic and transcendental equation using appropriate numerical method.

Subject Code	15BCA212
Subject Name	JAVA PROGRAMMING
Short Name	JP
Total Teaching Hrs.	88
Total credits	4

Prerequisites :
Students should be familiar with Object Oriented Programming.
Basic concepts related to programming are required.

Objectives:
To be able to explain and implement basic Programming techniques.
To use methods & concepts for programming purposes.

Units	Contents	Total Lectures
I	**Introduction to JAVA:** Introduction, Features, Java Virtual Machine(JVM), Java Development Kit(JDK),Data Types, Keywords, Operators & Expressions, Control Structures(if, if-else,switch statement),Looping Structures(for,while, do-while,continue,break statement).	18
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.	18
III	**Interface & Packages:** Introduction to Interface, Defining & Implementing Interface, Defining Packages, Importing Packages, API Packages. **Access Specifiers:** public, private & protected.	17
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.	17
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, Handling Mouse & Keyboard events through Applet.	18
	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.	

Course Outcome :
1. Students programming logic is developed which will help them to create programs & applications.
3. Able to implement class, objects, Interface, Packages, Exception Handling, Multithreaded Programming, Applet, Event Handling, etc.
4. Students get better opportunity in software industry.
5. Better understanding & the ability to follow professional programming, practices to align with Industry Expectations.

Subject Code	15BCA213
Subject Name	**BUSINESS SYSTEM AND APPLICATION**
Short Name	**BSA**
Total Lectures	**88**
Total Credits	**4**

Prerequisites:
• Basic knowledge of Business and Management.

Objectives:
• To learn the concept of Business System.
• To acquire the knowledge of Principles of Management.
• To understand the financial and marketing functions.

Units	Contents	Total Lectures
I	**Introduction:** Nature of business, Characteristics of business, objectives, components of business, Industry, Commerce, environment of business system, business system and its sub-systems, Business and economical systems, **Forms of legal ownership**: Sole proprietorship business, Partnership organization, Social responsibilities of business.	18
II	**Company Management:** Structure of company management, shareholders, board of directors, chief executives, managing directors, patterns and problems of company management, company meetings & resolutions, company office - its organization and management, basic functions of the Office.	17
III	**Principles of Management:** Nature and Importance of Management, Administration and Management, Functions of Management, Decision Making, Coordination, need of coordination, Planning, process of planning, elements of planning, Organization, organization structure, types of organization.	18
IV	**Personnel functions:** Personnel management, definition, role of personnel manager, job evaluation, merit rating. Industrial relations, Trade Unionism, employee remunerations, systems of wage payments, incentives & wage policies.	17
V	**Financial functions:** Financial planning, need of finance, financial planning, sources of finance, methods for raising finance, shares, debentures, **Marketing functions:** Marketing & its function, selling or distributions of goods, advertising and promotion.	18
	Text Books: 1. M. C. Shukla, Business Organization & Management, S. Chand & Company. 2. Neeru Vasishth, Taxman's Business Organization and Management. 3. Johan Strydom, Oxford's Principles of Business Management, 2nd Edition	
	References: 1. P. Gopalkrishnan, Materials Management, PHI. 2. Reddy & Gulshan, Business Organization & Management, S. Chand & Company. 3. R. C. Appleby, Modern Business Administration, 6/e, Macmillan.	

Course Outcomes:
1. Achieve an understanding of Management Information Systems.
2. Ability to analyze and synthesize business information needs of the organization.
3. Ability to support the decision-making by providing the strategic information.
4. Compare and evaluate alternative business application environments that enable business systems.

Subject Code	15BCA214
Subject Name	DISASTER MANAGEMENT
Short Name	DMng
Total Lectures	40
Total Credits	2

Prerequisites :
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Objectives:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR).
- To enhance awareness of institutional processes in the country 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 Lectures
I	**Introduction to Disasters:** Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)	04
II	**Disasters:** Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.) Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change.	06
III	**Approaches to Disaster Risk reduction:** Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.	10
IV	**Inter-relationship between Disasters and Development:** Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources	10
V	**Disaster Risk Management in India Hazard and Vulnerability profile of India Components of Disaster Relief:** Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programs and legislation).	10
	Text Books: 1. Gupta Anil K, Sreeja S. Nair. 2011 Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi. 2. KapurAnu 2010: Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi.	
	References: 1. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000 2. Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008 3. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge. 4. Coppola P Damon, 2007. Introduction to International Disaster Management, 5. Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines. 6. Cuny, F. 1983. Development and Disasters, Oxford University Press. 7. Document on World Summit on Sustainable Development 2002. 8. Govt. of India: Disaster Management Act 2005, Government of India, New Delhi.	

Course Outcomes:
1. Acuire an understanding of vulnerabilities and to work on reducing disaster risks and to build a culture of safety.
2. Ability to understand Causes, effects and control measures of Disaster Management.

Note: There will be a Project Work (Field Work, Case Studies) for this subject. The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Project must be conceived creatively based on the geographic location and hazard profile of the region where the college is located.

Subject Code	15BCA215
Subject Name	Lab-III (VB.NET)
Short Name	Lab-III
Total Lectures	130
Total Credits	4

Sr. No.	Contents	Total Lectures
1	Write a VB.NET program to determine whether an input number is an even number.	3
2	Write VB.Net to Find Greatest of Three Number	3
3	Write VB.Net for Conditional if else.	3
4	Write VB.Net for Select Case	3
5	Write VB.Net for Print Factorial	3
6	Write VB.Net for Print Prime Number	3
7	Write VB.Net to Generate Fibonacci Series	3
8	Write VB.Net to Swap Two Numbers using 2 Variables.	3
9	Write VB.Net to Print * like * * * * * * * * * * * * * * *	3
10	Write VB.Net code to print the following pattern: 1 12 123 1234 12345	3
11	Write VB.Net code to print the following pattern: I I N I N D I N D I I N D I A	3
12	Write VB.Net code to print the following pattern: 1 23 456 78910	3
13	Write VB.Net program to demonstrate constructor.	4
14	Write VB.Net program to demonstrate constructor overloading.	4

15	Write VB.Net program to demonstrate passing argument by val.	4
16	Write VB.Net program to demonstrate passing argument by ref.	4
17	Write VB.Net program to demonstrate arrays.	4
18	Write VB.Net program to demonstrate built in dialog boxes.	4
19	Write VB.Net program to demonstrate timer control.	5
20	Write VB.Net program to demonstrate check box.	5
21	Write VB.Net program to demonstrate radio button.	6
22	Write VB.Net program to demonstrate repeater data controls.	6
23	Write VB.Net program to demonstrate data grid control	6
24	Write VB.Net program to demonstrate panels.	6
25	Write VB.Net program to demonstrate string manipulation functions.	6
26	Write VB.Net to demonstrate classes and objects.	6
27	Write VB.Net to demonstrate method overloading	6
28	Write VB.Net to create menu editor	6
29	Write VB.Net for Ado.Net connection objects.	6
30	Write VB.Net for Ado.Net command objects.	6

Subject Code	15BCA216
Subject Name	Lab-IV (JAVA)
Short Name	Lab-IV
Total Lectures	90
Total Credits	3

Sr. No.	Contents	Total Lectures
	Perform any 8 from JAVA Practical list:	
1	WAP in java for demonstrating switch statement.	4
2	WAP in java for demonstrating while loop.	4
3	WAP in java for demonstrating for loop.	4
4	WAP in java for demonstrating do while loop.	4
5	WAP in java to demonstrate the use of Casting Operation.	4
6	WAP in java to demonstrate the use of Multiple inheritance using	4
7	interfaces.	4
8	WAP in java to demonstrate the use of method overriding.	4
9	WAP in java for sorting given list of strings using String class methods.	4
10	WAP in java to demonstrate the use of Packages.	4
11	WAP in java to demonstrate the use of simple try – catch.	4
12	WAP for demonstrating multithreading concept.	4
13	Create an applet for drawing symbol of Olympics.	5
14	Create an applet for drawing a human face.	5
15	Create an applet for drawing Polygons	4
16	Create an applet for displaying numerical values	4
17	Create an applet for drawing Lines and Rectangle	4
18		4
	Perform any 8 from Numerical Methods Practical list:	
1	Write a c - program for Bisection method.	3
2	Write a c - program for False Position method.	3
3	Write a c - program for Newton–Raphson method.	3
4	Write a c - program for Secant method.	3
5	Write a c - program for Newton- Gregory Forward Interpolation.	3
6	Write a c - program for Newton- Gregory Backward Interpolation.	3
7	Write a c - program for Lagrange's Interpolation.	3
8	Write a c - program for Inverse Interpolation.	3
9	Write a c - program for Linear Regression.	3
10	Write a c - program for Gauss Elimination method.	3
11	Write a c - program for Numerical Integration using Trapezoidal rule.	3
12	Write a c - program for Numerical Integration using Simpson's 1/3rd rule.	3
13	Write a c - program for Numerical Integration using Simpson's 3/8th rule.	3
14	Write a c - program to solve ODE using Euler's method.	3
15	Write a c - program to solve ODE using Runge-Kutta method.	3

Syllabus of Third Year B.C.A. Semester V (CBS)

Subject Code	15BCA301
Subject Name	Advanced Java
Short Name	AJAVA
Total Lectures	88
Total Credits	4

Prerequisites:
- Basic concepts of Object Oriented Programming.
- Basic knowledge of C, C++ & Core Java Programming.

Objectives:
- To introduce the concepts and working of JDBC, AWT, RMI & Servlets.
- To learn JSP Programming.
- To learn and understand advanced concepts of Java Programming.

Units	Contents	Total Lectures
I	**JDBC:** JDBC concept, Related classes, JDBC Architecture, JDBC API, Types of JDBC Drivers, Steps to create JDBC Application, Java SQL packages, Inserting & Updating Records.	18
II	**AWT :** AWT concept, AWT components, Containers, Frames & Panels, Event Delegation Model, Event source & Handler, Event categories, Listeners & Interfaces, RMI concept, Architecture, Stubs & Skeleton, RMI classes & Interfaces, Writing simple RMI application.	18
III	**Servlets:** Servlet concept, Servlet Life cycle, Servlet Development Kit, Servlet API, Handling http Requests & Response, Using Cookies, Session Tracking.	17
IV	**Introduction to JSP:** Simple JSP concepts, Request-time expressions, Advanced JSPs: Scripts. conditionals, loops,Try-Catch.	17
V	**JFC & Swings:** Introduction to JFC, Features, Overview of Swing, Components & Containers, Swing Packages, Exploring Swing Components, Generating Swing Application.	18
	Text Books: 1. Herbert Schildt, Complete Reference Java2, Fifth Edition, Tata MacGraw Hill Publications, 2008 2. Dietel & Dietel , Java How to Program, Pearson Education 3. D.R. Collaway, Inside Servlets, Pearson Education 4. Phillip Hanna Osborne , Complete Reference JSP, McGraw-Hill	
	References: 1. Steven Holzner, Java2 Programming Black Book, DreamTech Press 2. Larne Pekowasky, Java Server Pages, Pearson Education (LPE) 3. SubhramanyamAllamaraju, Cedric Buest. Professional Java Server Programming, Apress publications 4. KanikaLakhani , Advance Java, Katson Publications	

Course Outcomes:
1. Able to develop Graphical user Interface applications and Web based applications in Java by importing applet, AWT and SWING packages.
2. Capable of developing Web based applications using Servlets and JSP to have an interactive application such as Client Server Architecture.
3. Ability to develop Web based applications by JDBC to have an interactive application with database connectivity.
4. Able to develop remote method invocation for communication between remote systems.

Subject Code	15BCA302
Subject Name	**LINUX AND SHELL PROGRAMMING**
Short Name	**LINUX**
Total Lectures	**88**
Total Credits	**4**

Prerequisites :
- Basic knowledge of operating system and its Functions.
- Basic Knowledge of programming in C.

Objectives:
- To learn the architecture & commands in LINUX.
- To be able to write Shell scripts to perform the given task.
- To learn the VI Editor.

Units	Contents	Total Lectures
I	**LINUX:**An introduction, The LINUX Architecture, Feature of Linux, System Origination, Linux file System, Reasons for its popularity, different flavors of Linux (e.g. Red hat, Fedora, Ubuntu), login & logout. **Linux Command:** Command format, **Directory oriented commands:** ls, Wild card Character, mkdir, rmdir, cd, psd, find, du, df. **File oriented commands:** cat, cp, rm, mv, wc, nl, file, cmp, comm.	18
II	**File Access permission:**chmod,chown,chgrp,dd,expand,nl,tac,tail,head **Process oriented Commands:**ps, **Background oriented commands:** kill, nohup, at, batch. **Communication oriented commands:** write, mail, wall. **General purpose commands:**data, who, who am I, man, cal, lpr, tee, script, tput, split, expr, bc.	17
III	**Pipes and Filters**: Introduction, pipe, Redirection. **Filters:** sort, grep, unia, more, pr, cut, paste, tr, sed, gawk.**VI Editor:** Introduction, starting vi, vi modes, insert command, delete commands, replace command, cursor movement command, search command, Yanking commands, Redo command, undo command, screen command, exmode commands.	18
IV	**Shell Programming:** Introduction, Shell script, command Grouping, shell variable, echo, expert, conditional parameters substitution, Escape mechanisms. **Positional parameters:** shift, set, read, exit, shell meta characters, control statement, if statement, test statement, test command, case statement, iterative statement, while loop, until loop, break, continue, infinite loops, shell functions, sleep, basename	18
V	**The C Shell:** Introduction, login files, setting variable, array, path setting, Aliases, history, input computation, shell scripts, special characters, control constructs, if statement, switch statement, loop ,while loop, foreach statement, repeat statement.	17
	Text Books : 3. B. Mohamed Ibrahim, "LINUX a practical Approach", Firewall media . 4. Mark G. Sobell, "A practical Guide to LINUX command, Editor and Shell Programming", Pearson, Third Edition. 5. E Balagurusamy, "Programming in C: A Primer" 3e, Tata McGraw Hill, 2010.	
	References : 8. Richard K. Blum,"Linuxfo Dummies", 8th edition,9780470116494 9. SumitabhaDas,"Unix concepts and Applications", Fourth Edition, TMH 2006, 10. Yashwantkanitkar,"Unix shell programming", First Edition, BPB Publisher,2010. 11. Behroz A. Fourzan,"Unix and Shell programming", First Edition, Cengage Learning India,2003.	

Course Outcomes :
1. Able to identify and use Linux utilities to create and manage file processing operations.
2. Ability to use Linux environment, organize directory structures in Linux/Unix.
3. Able to develop shell scripts to perform more complex tasks.
4. Use Linux pipes and redirection for complex tasks.
5. Make use of filter, filter options, filter parameters

Subject Code	**15BCA303**
Subject Name	**ASP.NET USING C#.NET**
Short Name	**.NET**
Total Lectures	**88**
Total Credits	**4**

Prerequisites :
- Basic knowledge in web programming & skill of creating web pages.
- Knowledge of HTML and other scripting languages.
- Knowledge of basic dot net technologies.
- Knowledge of dot net framework is desirable.

Objectives:
- To learn the object oriented aspects of C#.
- To learn the technologies of the .NET framework.
- To learn (ASP.NET) for web based applications.

Units	Contents	Total Lectures
I	**INTRODUCTION TO C#**: Features, Compilation and Executions, Variables, Data Types, Operators, Flow Controls in C#: selection (if-else, switch), iteration (for, while, do-while), jump statements (go-to, break, continue).Arrays, Strings.	17
II	**OBJECT ORIENTED ASPECTS OF C#**: classes, objects, encapsulation, polymorphism and inheritance. **ADVANCED C#:** Interfaces, namespaces, structures, Exception handling.	18
III	**INTRODUCTION TO ASP.NET**: features, structure of ASP.NET web application, file types in ASP.NET, ASP.NET page and application life cycle, ASP.NET coding models: single page and code behind page models, ASP.NET web page syntax, Directives.	18
IV	**STANDARD WEB SERVER CONTROLS**: Button, TextBox, Label, CheckBox, RadioButton, Hyperlink, ListBox, DropDownList, Image, Calendar control and Panel Control. **VALIDATION CONTROLS**: RequiredFieldValidator, RangeValidator, CompareValidator, RegularExpressionValidator, CustomValidator, ValidationSummary	18
V	**INTRODUCTION TO ADO.NET:** Architecture, Data provider in ADO.NET,Connected and disconnected data access, Data Sets, Data Reader. **OVERVIEW OF DATA CONTROLS FOR WEB APPLICATIONS:** GridView, DataList, DetailsView, Repeater.	17
	Text Books : 1. Kogent Learning Solutions Inc, "C# 2010 Programming Covers .NET 4.0 Black Book",Dreamtech Press, 978-9350040317. 2. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012. 3. Matthew MacDonald, "Beginning ASP.NET 4 in C# 2010", 978-1-4302-2609-6. 4. E Balagurusamy,"Programming in C#: A Primer" 3e, Tata McGraw Hill, 2010. 5. Andrew Troelsen, "Pro C# 2010 and the .NET 4 Platform, 5e, A Press, 2010.	
	References : 1. G. Andrew Duthrie, "Microsoft ASP.NET Step by Step" (Microsoft Press; edition (23 January 2002)). 978-0735612877 2. Anne Boehm and Ged Mead,"ADO.NET 4 Database Programming with C# 2010" Published March 2011, ISBN 978-1-890774-63-9 3. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O'Reilly, 2010. **Reference Sites:** 1. www.w3schools.com 2. www.tutorialspoint.com	
Course Outcomes:		

4. Able to build application using event driven programming skills and GUI tools of .net framework.
5. Able to use object-oriented features in web applications and do various validations.
6. Able to create dynamic application using ADO.NET.

Subject Code	15BCA304
Subject Name	ADBMS
Short Name	ADBMS
Total Lectures	88
Total Credits	4

Prerequisites:
- Basic concepts of Database system.
- Basics knowledge of Database management system.

Objectives:
- To introduce the concept and working of DBMS,RDBMS,ORDBMS,OODBMS
- To learn and understand basic concepts of Data Mining, Data Warehousing.

Units	Contents	Total Lectures
I	**Introduction:** Review of Database Concepts. File Organization Concepts. **Normalization**. Physical Database Design and Tuning, Index Selection, overview of database Tuning, Choices in Tuning the Conceptual schema, Choices in Tuning queries and views, DBMS benchmarking.	18
II	**Concurrency Control Transactions:** schedules, Serialization, Lock based concurrency control, Lock Management, Specialized locking Techniques. **Crash Recovery:** Introduction to Crash Recovery, Log, Check pointing, Recovery from system crash.	18
III	**Parallel and distributed databases:** Architecture for Parallel databases, parallel query. Evaluation and optimization. **Introduction to distributed databases:** Architecture, Fragmentation and Replication. Catalog Management, Distributed Query processing, Distributed transaction management.	18
IV	**Object database systems:** Objects, Indentity, Inheritance, Database Design for an ORDBMS, Storage and access methods, Query processing and Optimization. Comparing RDBMS with OODBMS and ORDBMS.	17
V	**Data Warehousing:** Introduction, DSS and OLTP, Metadata Management in Data Warehouse. Related data structures, OLAP and Data Warehouse environment. **Data Mining:** Introduction and Application areas.	17
	Text Books: 1. Raghu Ramkrishna, Database Management systems, McGraw-Hill International Editions. 2. C.G. Date, Introduction to Database systems. 3. Silberschatz, Korth, Sudarshan, Database System Concepts, MacMillan. 4. Anil Kahate, Introduction to DBMS, Pearson Edition. 5. George Marakas, Modern Data Warehousing, Mining and Visualization, Pearson Edition. 6. *J.Han, M.Kamber, Data Mining: Concepts and Techniques,2ndEdition, Morgan Kaufmann Publisher.*	
	References: 1. Charu C. Agarwal, Data Mining Textbook, Springer Publication. 2. Connolly, Database systems, Pearson. 3. *Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education* 4. *Arun K. Pujari, Data Mining Techniques, 2nd Edition, Universities Press.*	

Course Outcomes:
1. Apply normalization process to construct the database.
2. Able to implement Concurrency and recovery strategies of DBMS.
3. Able to understand ER concepts and ER mapping to relational model.
4. Gain knowledge about parallel, distributed database systems and ORDBMS model.
5. Capable to deal with advance technologies like Data warehousing and data mining by learning its basic concepts

Subject Code	**15BCA305**
Subject Name	**SEMINAR**
Short Name	**SEM**
Total Lectures	**90**
Total Credits	**3**

Prerequisites
-

Course Objectives
• To learn new topics by self learning.
• To study and review the research papers, magazines, etc.
• To develop communication, interpersonal and presenting skills.

Synopsis format:
1. Abstract
2. Introduction
3. Technology focus
4. Future scope
5. Conclusion
6. References

Seminar Report Format:
1. Abstract
2. Introduction
3. Technology Focus
4. Applications
5. Future Scope
6. Conclusion
7. References

Rules:
1. Topic should be based on recent technology.
2. Topic should be research oriented.
3. The topic may be out of the scope of syllabus.
4. Synopsis should submit the synopsis in the given format for approval by the department.
5. Synopsis should not exceed more than 2 pages, it should cover the summery of whole topic in brief.
6. Minimum 10-12 slides presentation should be prepared for seminar.
7. Seminar report should be duly signed by seminar guide.
8. It will be responsibility of guide and students to communicate about selection/rejection/preparation of the topic to each other.
9. Synopsis should be submitted within tipe span specified by Seminar In-charge.
10. Synopsis should be hand written.

Formatting Rules:
a. Paper size A4.
b. Margins all side 1 inch.
c. Line Spacing for final report 1.5
d. Font : Times New Roman
e. Size :
    i. 12 for Normal body of text in the seminar report
    ii. 14 for title and headings in the seminar report
    iii. 9 for footnote and style italic

Course Outcome:
1. Ability to learn a new technology and formulate the contents for self learning.
2. Able to present the new topic and defend the questions raised.
3. Gain self confidence and stage daring.

Subject Code	15BCA306
Subject Name	Lab-I : Advanced Java
Short Name	Lab-I
Total Teaching Hrs.	90
Total Credits	3

Sr. No.	Contents	Total Hrs.
1	To Study Creation of JDBC Connection.	3
2	Write a program for JDBC prepare statement.	5
3	Write a program for JDBC prepare statement with Result Set.	5
4	Write a program to execute SQL function using Callable statement.	5
5	To Study different AWT Components.	3
6	Write a program to create a Frame by using AWT.	5
7	Write a program to demonstrate the use of AWT Listener.	5
8	Write a program to write simple RMI application.	5
9	To Study Compilation & Deployment of Servlet.	3
10	Write a program to create Servlet which prints Simple message.	5
11	Write a program to create a Registration form in Servlet.	5
12	Write a program to create Servlet for Student details.	5
13	To Study steps to Create & Run an JSP page.	3
14	Write a program for JSP to display Date.	5
15	Write a program for JSP to connect to Ms-SQL Database & retrieve records.	5
16	Write a program for JSP to demonstrate Try-Catch.	5
17	To Study hierarchy of Java Swing classes.	3
18	Write a program for Swing to create JFrame, JButton & Methodcall inside Java Constructor.	5
19	Write a program for Swing to demonstrate the use of Inheritance.	5
20	Write a program for Swing to add any Label in your application.	5

Subject Code	15BCA307
Subject Name	Lab-II(LINUX)
Short Name	Lab-II
Total Lectures	90
Total Credits	3

Sr. No.	Contents	Total Hrs.
1	Case study of Linux architecture and features.	3
2	Familiarization of Linux commands: Directory oriented commands	3
3	Use of Wild card characters.	3
4	Familiarization of Linux commands: file oriented commands	3
5	Familiarization of Linux commands: file access permission commands	3
6	Familiarization of Linux commands: Process/ Background processing	3
7	commands.	3
8	Familiarization of Linux commands: communication oriented commands.	3
9	Familiarization of Linux commands: general purpose commands.	3
10	Program on Use of pipes	3
11	Program on Use of filters	3
12	Use of Vi editor inserts commands.	3
13	Use of Vi editor deletes commands.	3
14	Use of Vi editor search commands.	3
15	Program in C using arithmetic and logical operators.	3
16	Program in C to display "DCPE HVPM" N times using looping structures.	3
17	PROGRAMS for Simple Shell like display name of college, student etc.	3
18	PROGRAMS for Simple Shell using control structures.	3
19	PROGRAMS for Simple Shell using looping structure while.	3
20	PROGRAMS for Simple Shell using looping structure until.	3
21	PROGRAMS for Simple Shell using looping structure for.	6
22	PROGRAMS for C Shell script using if-else statement.	3
23	PROGRAMS for C Shell script using switch statement.	6
24	PROGRAMS for C Shell script using while loop statement.	6
25	PROGRAMS for C Shell script using for each statement.	6
26	PROGRAMS for C Shell script using repeat statement.	3

Subject Code	15BCA308
Subject Name	LAB-III(ASP.NET & C#)
Short Name	LABIII
Total Lectures	90
Total Credits	3

Sr. No.	Contents	Total Hrs.
1	Write Program in C# to print "Hello C#"	2
2	Write Program in C# to Swap Two numbers.	2
3	Write Program in C# to find greatest number among three numbers.	2
4	Write Program in C# to implement Switch Statement	2
5	Write Program in C# to calculate factorial of number using Do While loop	2
6	Write Program in C# to print pyramid using For Loop	2
7	Write Program in C# to find the number prime or not.	2
8	Write Program in C# to Demonstrate function.	3
9	Write Program in C# to Sort an Array.	3
10	Write Program in C# to demonstrate the concept of Class and Object.	4
11	Write Program in C# to demonstrate Access specifier.	3
12	Write Program in C# to demonstrate the concept of Constructor and Destructor.	4
13	Write Program in C# to demonstrate concept of inheritance.	4
14	Write Program in C# to demonstrate method Overloading.	3
15	Create Web Application using ASP.NET to show "Hello Word".	3
16	Create Web Application using ASP.NET to show calculator.	4
17	Create Web Application using ASP.NET to Create the registration Form.	5
18	Create Web Application using ASP.NET to demonstrate following validation controls Required Field Validator, Range Validator, and Compare Validator.	6
19	Create Web Application using ASP.NET to demonstrate Check Boxes and Radio Buttons.	5
20	Create Web Application using ASP.NET to demonstrate List Controls.	4
21	Create Web Application using ASP.NET to demonstrate Image Control.	4
22	Create Web Application using ASP.NET to demonstrate Grid view Control.	5
23	Create Web Application using ASP.NET to demonstrate repeater Control.	6
24	Create Web Application using ASP.NET to demonstrate how to Retrieve and display data.	6
25	Create Web Application using ASP.NET to demonstrate DATA controls.	4

Syllabus of Third Year B.C.A. Semester VI (CBS)

Subject Code	15BCA309

Subject Name	Mobile Computing
Short Name	MC
Total Lectures	88
Total Credits	4

Prerequisites:
• Basic concepts of Communication system & Networking.

Objectives:
• To introduce concept and working of mobile communication system.
• To learn &understand basic concepts of Mobile computing.

Units	Contents	Total Lectures
I	**Introduction:** Applications, Short History, Market for Mobile Communication, Simplified Reference Model. **Wireless Transmission:** Frequencies for Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System.	18
II	**Medium Access Control:** Motivation for Specialized MAC, **Introduction to :**SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA. **Introduction to Telecommunication Systems:** GSM, DECT, TETRA, UMTS and IMT-2000.	18
III	**Satellite & Broadcast Systems**: History, Applications, GEO, LEO, MEO, Routing, Localization, Handover. **Broadcast Systems**: Overview, Cyclical Repetition of Data, Digital Audio & Video Broadcasting, Convergence of Broadcasting and Mobile Communications.	18
IV	**Wireless LAN:** Infrared Versus Radio Transmission, Infrastructure and Adhoc Network, IEEE 802.11, HIPERLAN, Bluetooth. **Mobile Network Layer:** Mobile IP, DHCP, Mobile Adhoc Networks.	17
V	**Mobile Transport Layer:** Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks. **Support For Mobility:** File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML, WAP2.0	17
	Text Books: 1. Jochen Schiller- Mobile Communication, 2nd Edition (Pearson Education) 2. Raj Kamal- Mobile Computing, 2nd Edition (Oxford University Press) 3. GordanStuber- Principles of Mobile Communication, 3rd Edition (SpringerPublication) 4. Mazliza Othman- Principles of Mobile Computing & Communication, 2nd Edition (Auerbach Publications)	
	References: 1. Jerry D. Gibson- Mobile Communications Handbook, 3rd Edition (CRC PressPublication) 2. Tony Wakefield, David Bowler- Introduction to Mobile Communications, 2nd Edition (Auerbach Publications) 3. Yoshihiko Akaiwa- Introduction to Digital Mobile Communication, 2nd Edition 4. (Wiley Series Publication) 5. Gottapu SasibhushanaRao- Cellular Mobile Communications, 3rd Edition (Pearson Education)	

Course Outcomes:
1. Able to understand the basic concepts and principles in mobile computing and Telecommunication Systems
2. Able to identify the important issues of developing mobile computing systems and applications
3. Gain good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support;
4. Ability to understand the concept of Wireless Transmission, Satellite Transmission and broadcasting
5. Capable of organizing the functionalities and components of mobile computing systems into different layers.

Subject Code	15BCA310
Subject Name	PHP/MySQL
Short Name	PHP/MySQL
Total Lectures	88

Total Credits	4

Prerequisites:
- Basic knowledge of HTML, javascript, CSS, XML etc.
- Basic Knowledge of relational database system, query building and query processing.

Objectives:
- To develop the basic skills of web programming.
- To provide knowledge to create dynamic web page.
- To improve the skills for fast development of web application.
- To provide knowledge about database and communication between database & web application

Units	Contents	Total Hrs.
I	**Introduction:** Linux, Apache Web Server, Mysql, PHP and open source, Overview of PHP capabilities, PHP HTML embedding tags and syntax, simple script examples, PHP variables, operators, data types. Flow control or control structure and loops.	18
II	**Array and Functions:** Introduction to functions, declaring functions, function scope, passing arguments to function, using include files and require statements, predefined PHP functions and mailing functions.	18
III	**Object oriented concepts:** Introduction, basic class definition, visibility, constructors and destructors, static keywords, class constants, inheritance. File system and system functions.	18
IV	**Database operations**: Operations with PHP, connecting to MySql or any other database with PHP, selecting a database, building and sending query, retrieving and inserting data, PHP Mysql functions.	17
V	**Processing of HTML and PHP:** Adding PHP to HTML or processing HTML form using GET, POST, SESSION, COOKIE variables, Http and File uploads, Exception and Error handling, Debugging.	17
	Text Books : 4. Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, Beginning PHP, Apache,MySQL Web development, Wrox Publication. 5. Jason Gerner, Elizabeth Naramore, Morgan L. owens, Matt warden, Professional LAMP: Linux, apache, MySqland PHP5 Web development, Wrox Publication. 6. Tim Converse, Joyce Park, PHP5 and Mysql Bible , Wiley publication	
	References : 1. Lynn Beighley, Michael Morrison,Head first PHP and Mysql,Second Edition, Oreilly publication. 2. Luke Weling, Laura Thomas, PHP and MYSQL Web Development, Pearson Education.	

Course Outcomes:
1. Able to write PHP scripts to handle HTML forms.
2. Able to create PHP programs that use various PHP library functions, and that manipulate files and directories.
3. Capable to analyze and solve various database tasks using the PHP language.
4. Ability to analyze the concepts of GET, POST, SESSION and COOKIE by writing PHP programs.
5. Able to analyze and solve common Web application tasks by writing PHP programs.

Subject Code	15BCA311
Subject Name	Computer Graphics Multimedia & Animation
Short Name	CGMA

Total Lectures	88
Total Credits	4

Prerequisites :
● Basic knowledge about computer system, its components and functions.

Objectives:
● To acquire the basic knowledge about Computer Graphics.
● To learn the basic knowledge about various algorithms of Computer Graphics
● To understand the various types of multimedia & animation and compression techniques.

Units	Contents	Total Lectures
I	**Introduction to Computer Graphics:** Introduction, history, characteristics, advantages & disadvantages, application, components. Adapters ,Coordinates representation, software standards, **Input devices**: keyboard, mouse, trackball, space ball, joysticks, image scanner, touch panel, light pen, and voice system, **File format**: GIF, JPEG, PNG, TIFF, MPEG	18
II	**Graphics Preemptive** **Display devices**: CRT, Raster Scan Display, Random Scan Display, Flat Panel Display, LCD. Virtual reality system, Raster Scan System, Random Scan System. **Output Primitives** : Points & line, DDA algorithm, Bresenham's line algorithm, circle generation algorithm, **Attribute**: line, curve, text, area-fill	18
III	**Transformation and Clipping** **Transformation** : Introduction, translation, scaling, rotation, composite transformation, matrix representation, homogeneous coordinates, The Viewing Pipeline, Viewing Coordinate Reference Frame **Clipping:** point, Cohen-Sutherland Line Clipping, curve, text, exterior.	18
IV	**Multimedia and Compression** **Multimedia:** Introduction, overview, multimedia & hypermedia, advantages, disadvantages, application, software tools: music, Sequencing & notation, digital audio. **Compression:** introduction, need, types, evaluating & visibility, simple compression techniques, transform coding techniques.	17
V	**Animation:** Introduction, history, design of animation sequences, application, advantages, disadvantages, traditional animation, computer animation, tweening, morphing, case study on flash.	17
	Text Books : 1. Hearn d and Baker M. P, "Computer graphics-c version", 2nd edition Pearson Education. 2. Rajiv Chopda ," Computer graphics " revised edition S. Chand 3. ze-Nilan li, Mark S. Derw "Fundamental of multimedia"	
	References: 1. Siamon J. Gibb And Dianysios c. Tsichritzis, "Multimedia Programming",AddisonWesely, 1995. 2. Johan Villamil, Casanova And LeonyFernanadez, Eliar, "Multimedia Graphics", PHI, 1998 3. Malay K. Pakhira, Computer Graphics, Multimedia and Animation, 2ndEdition, PHI Publication.	

Course Outcomes:
1. Able to recognize and evaluate critical and aesthetic issues within computer graphics and the multimedia media.
2. Student gets acquainted with the basic principles of 2D and 3D computer graphics.
3. Able to implement vector and raster based graphic algorithms.
4. Able to use graphical programming interfaces.

Subject Code	15BCA312
Subject Name	Artificial Intelligence

Short Name	AI
Total Lectures	88
Total Credits	4

Prerequisites:
- Basic Knowledge of logic &reasoning.

Objectives:
- To learn &understand the Concepts of Artificial Intelligence & Expert System.
- To Study & understand role of knowledge in AI & its representation.
- To understand Applications of AI.

Units	Contents	Total Lectures
I	**Overview of AI**: Introduction, Importance of AI, AI and related fields, **knowledge concepts:** Introduction, Definition and Importance of knowledge**,** knowledge based system, representation of knowledge, knowledge organization, Knowledge Manipulation	18
II	**Introduction to LISP:** Syntax and Numeric function, Basic List manipulation function in LISP, Function predicates and conditional, Input, Output and Local variables. **Formalized symbolic Logics:** syntax & semantics for propositional logic, inference rule, principle of resolution, representation using rules,	18
III	**Dealing with Inconsistencies and Uncertainties:** Truth Maintenance System, Default Reasoning and the closed world assumption, Predicate completion and circumscription. **Object Oriented Representation:** Introduction, Objects, Classes, Messages and Method, Object oriented languages and system.	17
IV	**Search & Control strategies:** Introduction, Preliminary Concept, Uniformed or blind search, informed search **Matching techniques**: Introduction, structures used in matching, Measures for matching **Knowledge organization & management:** Introduction, Indexing and Retrieval Techniques, Integrating knowledge in memory.	17
V	**Natural Language Processing**: Introduction, Overview of Linguistics, Levels of Knowledge used in Language Understanding, **Grammar and Languages**: Chomsky Hierarchy of Generative Grammar, Structural representation, Transformational Grammar, **Parsing Techniques:** Top-down and Bottom up parsing, Deterministic and Nondeterministic parser. Semantic analysis and representation structure.	18
	Text Books: 1. Dan W. Patterson, Introduction to AI and Expert Systems, PHI. 2. V S Janakiraman, K Sarukesi, P Gopalakrishnan, Foundation of Artificial Intelligence and Expert System, MACMILLION. 3. P.H. Winston ,"Artificial Intelligence", Addision-Wesley Publication.	
	References: 1. Rajiv Chopra, AI a Practical Approach, S. Chand 2. Nils J. Nilsson , Principles of AI 3. E. Rich, K. K. Knight, "Artificial Intelligence", TMH	

Course Outcomes:
1. Gain Knowledge of AI and expert system.
2. Know the concept List Processing, Knowledge representation.
3. Applications of AI for designing the expert system.

Subject Code	15BCA312
Subject Name	Image processing
Short Name	IP
Total Lectures	88
Total Credits	4

Prerequisites :
- Basic knowledge in Computer Graphics should be known.
- Knowledge of basic Image and related terms are also necessary.

Objectives:
- To study the image fundamental and mathematical transform for image processing
- To study basic image processing operations.
- To study image processing technique.
- To understand image analysis algorithm.

Units	Contents	Total Lectures
I	**Image fundamentals** :Introduction, image representation, steps in image processing, elements of digital image Processing, Image file format, Basic relationship between pixels (Neighbor of pixel, Connectivity, labeling) Basic transformation (Scaling, Translation, Rotation)	18
II	**Image transformation and Enhancement** "Fourier transformation, discrete Fourier transformation & Fast Fourier transformation, Walsh transformation and Hadamard transformation, Spatial domain method, frequency methods, Spatial filtering (Smooth & Shaping), Color image processing.	18
III	**Image Restoration**: Introduction, Degradation model, algebraic approach to restoration, minimum mean square error restoration, least square error restoration.	18
IV	**Compression**: Need for data compression, Image compress model, error file compression: Huffman coding, run length coding, lossless predictive coding, Lossy compression: Lossy predictive coding, transformation coding.	17
V	**Segmentation**: Introduction to image segmentation: point, line, edge, Local processing, Global processing via Hough Transformation, graph theoretic technique, **Thresholding:** foundation role region oriented segmentation.	17
	Text Books : 1. Rafael C. Gonzalez, "Digital Image Processing" Addison Wesley Publication 0-201-435772 2. B. Chanda& D. DuttaMajumder, "Digital image processing & analysis" 2nd Edition Eastezn Economy Edition, PHI 2011-978-81-203-43252 3. Anil k. Jain "Fundamental of Digital Image Processing" Eastern Economy Edition, PHI-2010-978-81-203-0929-6	
	References : 1. S. Sridhar "Digital Image Processing" Oxford University press, 2011. 2. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis and Machine vision", CL Engineering Publication.	

Course Outcomes:
1. Knowledge of the Image enhancement techniques, Image restoration procedures and compression procedures.
2. Knowledge of image segmentation and compression techniques.

Subject Code	15BCA312

Subject Name	Data Mining
Short Name	DM
Total Lectures	88
Total Credits	4

Prerequisites:
- Basics knowledge of Data and its preprocessing.
- Basic concepts of database management systems.

Objectives:
- To introduce concept and working of Data & its associated operations.
- To understand basic concepts of Mining Patterns, Cluster Analysis & Graph Mining.

Units	Contents	Total Lectures
I	**Introduction**: Data Mining Functionalities, Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.	18
II	**Mining Frequent Patterns, Associations and Correlations:** Basic concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.	18
III	**Classification and Prediction**: Issues, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation. Prediction: Linear Regression, Nonlinear Regression, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor.	18
IV	**Cluster Analysis:** Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data. Mining Time-Series Data, Mining Sequence Patterns in Biological Data.	17
V	**Graph Mining, Social Network Analysis and Multirelational Data Mining:** Mining Object, Spatial, Multimedia, Text and Web Data, Data Mining Applications, Trends in Data Mining.	17
	Text Books: 1. *J.Han, M.Kamber-Data Mining: Concepts and Techniques",2nd Edition, Morgan Kaufmann Publisher.* 2. *Arun K.Pujari-Data Mining Techniques, 2nd Edition, Universities Press.* 3. *David Hand, Heikki Manila, Padhraic Symth "Principles of Data Mining"PHI Publication* 4. *Margaret H. Dunham- Data Mining: Introductory and Advanced Topics Pearson Education*	
	References: 1. Charu C. Agarwal, Data Mining Textbook, Springer Publication. 2. Bhavani Thuraisingham, 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.	

Course Outcomes:
1. Ability to understand the concepts of data mining.
2. Able to use data pre-processing techniques to build data mining applications.
3. Able to analyze transaction databases for association rules.
4. Able to use classification methods and prediction techniques on transaction databases.
5. Ability to use various clustering techniques for categorizing data.

Subject Code	15BCA313
Subject Name	PROJECT
Short Name	PRJ
Total Lectures	90
Total Credits	3

Prerequisites
- Preliminary knowledge of research methodology.
- Knowledge about Computer technology and application domain in which seminar will be developed.
- Good knowledge of subject domain.

Objectives
- To give the students hands on experience of real life system development life cycle involving deadlines and team work.
- To make the students apply the Computer technologies learnt during the program.
- To provide the experience in analyzing, designing, implementation and evaluating information systems by following proper documentation process.

Rules for Project Work :
A student will be examined in the course "Project Work" as given below:
1. Project work may be done individually or in groups. However if project is done in groups, each student must be given a responsibility for a distinct task and care should be taken to see the progress of individual.
2. Students should take guidance from a guide and prepare a Project Report on "Project Work" in 3 copies to be submitted to the Head of the Department. A soft copy of project report along with source-code and data should also be submitted.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs, experimental setup and methodology.
4. The project report will be duly accessed by the guide of the project and marks will be communicated by the Head of the Department to the Examination Department.
5. The project report should be prepared in a format prescribed by the College, which also specifies the contents and methods of presentation.

General Instruction Regarding Preparation of Project Report :
TYPING :
(a) The typing shall be standard 12 pts in double spacing using only
(b) Margins must be Left 1.5 inches Right 1 inches Top 1 inches Bottom 1 inches
(c) Paper A4 size Paper

COPIES :
Two hard-bind copies (As per format displayed herewith) One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR COVER PAGE :
PROJECT REPORT
ON
NAME OF THE PROJECT
BY
NAME OF STUDENT

GUIDED BY
NAME OF THE GUIDE

PROGRAMME NAME & CLASS

Department of Science
Degree College of Physical Eucation
Shree H. V. P. Mandal, Amravati.

ACADEMIC SESSION

Report format for Software Development Projects:

1 Blank Page at beginning
Title Page
Certificate from Guide
Acknowledgement
Index with printed Page Numbers

CHAPTER 1 : INTRODUCTION
1.1 Existing System and Need for System
1.2 Proposed System
1.3 Scope of Work
1.4 Operating Environment – Hardware and Software

CHAPTER 3 : ANALYSIS & DESIGN
3.1 User Requirements
3.2 Software Requirements
3.3 System Flow
3.4 Module Flow
3.5 Module Document
3.6 Input Document
3.7 Computational Method Document (If methods are used)
3.8 Output Document
3.9 Data Flow Diagram (DFD)
3.10 Functional Decomposition Diagram (FDD)
3.11 Entity Relationship Diagram (ERD)
3.12 Data Dictionary
3.13 Table Design
3.14 Menu Tree
3.15 Menu Screens
3.16 Input Screens
3.17 Report Formats

CHAPTER 4: IMPLEMENTATION & RESULTS
4.1 Input Forms with Data
4.2 Output Reports with Data
4.3 Sample Code

CHAPTER 5: CONCLUSION AND FUTURE SCOPE
5.1 Drawbacks and Limitations
5.2 Conclusion
5.3 Proposed Enhancements
REFERENCES
1 Blank Page at the end.

Course Outcomes
1. Learn proper project documentation.
2. Ability to implement the commercial or research project.
3. Ability to commissioning of the developed software.
4. Presentation and marketing skills for the developed application.

Subject Code	15BCA314

Subject Name	LAB-IV(Mobile computing)	
Short Name	LAB-IV	
Total Lectures	**90**	
Total Credits	**3**	
Sr. No.	Contents	Total Hrs.
1	Program to implement user interface using layout	3
2	Program to perform simple mathematical operation.	3
3	Program to implement Calculator.	3
4	Program to implement Conversion of Celsius to Fahrenheit.	3
5	Program to implement multiple widgets.	3
6	Program to implement use of button.	3
7	Write a program to implement use of list view.	3
8	Write a program to implement use of spinner	3
9	Write a program to implement use of dialog box	3
10	Write a program to implement use of control structures IF.	3
11	Write a program to implement use of dialog box for using lists	3
12	Write a program to implement use of control structures SWITCH	3
13	Write a program to implement use of LOOPING structures FOR.	3
14	Write a program to implement use of LOOPING structures with nesting.	3
15	Write a program to implement use of LOOPING structures while.	3
16	Write a program to implement use of LOOPING structures for tabular manipulation.	3
17	Case study of simplified reference model of mobile computing.	3
18	Case study of cellular system.	3
19	Case study of data communication system.	3
20	Case study of satellite system.	3
21	Case study of different types of handovers.	3
22	Case study of Digital Audio Broadcasting and Digital Video Broadcasting	3
23	Case study of wireless LAN.	3
24	Case study of Wireless application protocol.	3
25	Case study of mobile network layer.	3
26	Case study of mobile transport layer.	3
27	Case study of WAN.	3
28	Case study of Ethernet.	3
29	Case study of ISDN.	3
30	Case study of Telecommunication systems.	3

Subject Code	15BCA315	
Subject Name	**Lab-V(PHP/MySQL)**	
Short Name	**LAB-V**	
Total Lectures	**90**	
Total Credits	**3**	
Sr. No.	**Contents**	**Total Hrs.**
1	Write a PHP script to calculate profit and Loss using simple if-else.	3
2	Write a PHP script to check, given number is Even or Odd.	3
3	Write a PHP script to swap two numbers.	3
4	Write a PHP script to display Menu items and display message to user for selected value using switch case.	3
5	Write a PHP script to check greatest among 3 numbers using nested if-else statement.	3
6	Write a PHP script to check student grade if student is pass and display Grade using If-else Ladder	3
7	Write a PHP script to print 1 to 10 numbers using for loop.	3
8	Write a PHP script to print 10 to 1 number using do-while loop.	3
9	Write a PHP for script for Array Functions.	3
10	Write a PHP for script for user defined function mechanism.	3
11	Write a PHP script to demonstrate classes and objects.	6
12	Write a PHP script to Insert student personal information into database using class, object and MYSQL functions.	6
13	Write a PHP script to Display student personal information which is previously inserted into Database using MYSQL functions (use include statement for database file).	6
14	Write a PHP script to Update student personal information which is previously inserted into Database using MYSQL functions (uses require statement for database file).	6
15	Write a PHP script to upload image on the site.	6
16	Write a PHP script to display upload images on the web page.	6
17	Write a PHP script to demonstrate COOKIES variable.	6
18	Write a PHP script to demonstrate SESSION variable.	6
19	Write a PHP script to demonstrate GET and POST Method.	6
20	Write a PHP script to upload file.	6

Subject Code	15BCA316
Subject Name	Lab-VI: CGMA
Short Name	Lab-VI
Total Lectures	90
Total Credits	3

Sr. No.	Contents	Total Hrs.
1	Write a program in C to draw 2D line.	2
2	Write a program in C to draw 2D circle.	2
3	Write a program in C to draw 2D Rectangle.	2
4	Write a program in C to draw Triangle.	2
5	Write a program in C to draw Ellipse.	3
6	Write a program in C to draw 2D Arc.	3
7	Write a program in C to draw 2D polygon.	3
8	Write a program in C to draw a square in circle.	6
9	Write a program in C to draw Hut.	6
10	Write a program in C to draw nested circle using function.	4
11	Write a program in C to draw smiley face.	3
12	Write a program in C to count text height.	3
13	Write a program in C to draw to count text width.	3
14	Write a program in C to getdrivername.	3
15	Write a program in C for putpixel function.	3
16	Write a program in C for settextstyle.	4
17	Write a program in C for setbkcolor.	4
18	Write a program in C for fillellipse.	4
19	Write a program in C for fillpolygon.	4
20	Write a program in C for DDA algorithm.	4
21	Write a program in C for Bresenhams algorithm.	4
22	Write a program in C for 2D Translation.	6
23	Write a program in C for Scaling.	6
24	Write a program in C for Rotation.	6