BACHELOR OF COMPUTER APPLICATIONS (BCA)

PROPOSED SYLLABUS BATCH 2019

SEMESTER-I

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	COMPUTER FUNDAMENTALS	CORE-1	06	04	02(P)	
BCA	PROGRAMMING IN C LANGUAGE	CORE-2	06	04	02(P)	
BCA	MATHEMATICS IN COMPUTING	CORE-3	06	04	02(T)	
BCA	ENGLISH COMMUNICATION SKILLS	ABILITY ENHANCEMENT COURSE	02	02	-	
BCA	ENVIRONMENTAL SCIENCE	ABILITY ENHANCEMENT COURSE	02	02	-	
TOTAL				22		

SEMESTER-II

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	OBJECT ORIENTED PROGRAMMING USING C++	CORE-1	06	04	02(P)	
BCA	DIGITAL ELECTRONICS	CORE-2	06	04	02(P/T)	
BCA	DISCRETE STRUCTURES	CORE-3	06	04	02(T)	
BCA	ENGLISH COMMUNICATION SKILLS	ABILITY ENHANCEMENT COURSE	02	02	-	
BCA	ENVIRONMENTAL SCIENCE	ABILITY ENHANCEMENT COURSE	02	02	-	
TOTAL				22		

SEMESTER III

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	DATA STRUCTURES USING C	CORE-1	06	04	02(P)	
BCA	WEB TECHNOLOGIES	CORE-2	06	04	02(P)	
BCA	DATA COMMUNICATIONS	CORE-3	06	04	02(T)	
BCA	MULTIMEDIA DESIGN(offered by the department) students can opt SEC for the sem offered by other departments	SKILL ENHANCEMENT COURSE	04	04	-	
TOTAL				22		

SEMESTER- IV

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	OPERATING SYSTEMS	CORE-1	06	04	02(P)	
BCA	DATABASE MANAGEMENT SYSTEMS	CORE-2	06	04	02(P)	
BCA	COMPUTER ORGANIZATION	CORE-3	06	04	02(P)	
BCA	FUNDAMENTALS OF COMPUTER NETWORKS(BCA students not to opt for this course) students can opt SEC for the sem offered by other departments	SKILL ENHANCEMENT COURSE	04	04	-	
TOTAL				22		

SEMESTER-V

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	SOFTWARE ENGINEERING	DSE-1	06	04	02(P)	
BCA	JAVA PROGRAMMING	DSE-2	06	04	02(P/T)	
BCA	VISUAL PROGRAMMING USING .NET	DSE-3	06	04	02(P)	
BCA	ADVANCED WEB PROGRAMMING	DSE-4	06	04	02(P/T)	
BCA	NUMERICAL TECHNIQUES	DSE-5	06	04	02(P/T)	
BCA	INTRODUCTION TO ALGORITHMS	DSE-6	06	04	02(P/T)	
Student can choose 3 DSE Courses from the above list						
BCA	PC ASSEMBLY MAINTAINENCE AND UPGRADATION(offered by the department) students can opt SEC for the sem offered by other departments	SKILL ENHANCEMENT COURSE	04	04	-	
TOTAL			22			

SEMESTER-VI

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial/ Industrial Visit	
BCA	• SOFTWARE PROJECT IDENTIFICATION(synopsis and presentation) • SOFTWARE PROJECT DEVELOPMENT • SOFTWARE PROJECT REPORT	DSE-1	01 04 01	-	-	
BCA	COMPUTER NETWORKS	DSE-2	06	04	02(P)	
BCA	COMPUTER GRAPHICS	DSE-3	06	04	02(P/T)	
BCA	ARTIFICIAL INTELLIGENCE	DSE-4	06	04	02(P/T)	
BCA	CLOUD COMPUTING	DSE-5	06	04	02(P/T)	
Student has to choose DSE-1(compulsory) and any two from DES-2 to DSE-5 Courses from the above list						
BCA	ANDROID PROGRAMMING(offered by the department) students can opt SEC for the SEM offered by other departments	SKILL ENHANCEMENT COURSE	04	04	-	
TOTAL			22			

BCA Batch-2019

SEMESTER-I

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	COMPUTER FUNDAMENTALS	CORE-1	06	04	02(P)	
BCA	PROGRAMMING IN C LANGUAGE	CORE-2	06	04	02(P)	
BCA	MATHEMATICS IN COMPUTING	CORE-3	06	04	02(T)	
BCA	ENGLISH COMMUNICATION SKILLS	ABILITY ENHANCEMENT COURSE	02	02	-	
BCA	ENVIRONMENTAL SCIENCE	ABILITY ENHANCEMENT COURSE	02	02	-	
TOTAL			22			

BCA 1st Semester-2019

Computer Fundamentals   **Credits:**06

UNIT-I

Data, Information, Introduction to Computers and Applications, Block Diagram of a Computer, Functions of the Different Units - Input unit, Output unit, Memory unit, CPU (ALU+CU), Commonly used Terms: Hardware, Software, Firmware, Units of Measurement of Storage, Generation of Computers. Input& Output Devices - Input Devices

UNIT-II

Memories - Memory hierarchy, Registers, Types of Registers, Cache Memory , Primary Memory - RAM, How data is stored in a RAM, DRAM and SRAM, ROM, ROM BIOS/ Firmware, Types of ROM, Secondary Memories, Hard disk, how data is stored in a hard disk, concept of tracks, sectors, cylinders, formatting of hard disk (low level formatting and high level formatting), Electronic (Flash Disk). Operating Systems, Booting sequence, File and Command Processor File, Definition of File, File Naming, Booting from Floppy and HDD, Warm and Cold Reboot. Windows Basics

UNIT-III

Introduction to DOS Types of Dos Commands, Internal and External , Introduction of Autoexec.bat, Versions of Dos Commands, Directory Commands, Copy, X- Copy, Del, Rename, Attrib, Backup, Restore, Find Sys, Filter Commands, General Commands, Types, Data, Time , Prompt, Format, CHKDSK, DISK COPY, LABEL, VOL, DISKCOMP, COMP, RECOVER, Redirecting Commands Input and Output.

UNIT-IV

MS office Package: Basics of Word Processing using MS Word. Introduction to MS Excel: Worksheet Workbook, Workspace Basic, using different formulas, Power Point: Launching PowerPoint and choosing a Theme, Adding Slides, changing Layouts and exploring the Outline, Exploring PowerPoint's Views.

Reference Books:

- Computer today, Donald H. Sanders, McGraw Hill Publishing Company.
- Microcomputers Software and Applications, Dennis P. Curtin and Leslie R. Portel, PHI.
- Data Processing: An Introduction, Donald P. Spencer and Charles R. Merril Pub. And Co.
- Computers and Their Applications, Larry Joel Goldestein, PHI.
- Mudassir Makhdoomi, BOOK BANK OF COMPUTER FUNDAMENTALS & E-COMMERCE, Mewar University Press

BCA 1ˢᵗ Semester-2019

Programming in C Language   **Credits:** 06

UNIT-I

Problem Solving Techniques, Steps for Problem Solving, Using Computer as a Problem Solving Tool, Design of Algorithms, Definition, Features of Algorithms, Flowcharts, Basic Symbols used in Flowcharting. Translators – Interpreters, Compilers and Assemblers.

C Language Fundamentals: Character Set, Identifiers and keywords, Rules for Forming Identifiers, Keywords, Data Types and Storage, Data Type Quantifiers, Variables, Declaring Variables, Initializing Variables, Constants, Types of Constants, Assignment Statements, Arithmetic Operators, Relational Operators, Logical Operators, Comma and Conditional Operators, Type Cast Operator, Size of Operators, C Shorthand, Priority of Operators

UNIT-II

Decision Control Statement, if Statement, if else, nested if, switch statement, Loop Control Statements - while loop, do while loop, for loop, nested loops, goto statement, break statement, continue statement. Introduction to pointers, Functions – Call be Value and Call by reference. Recursion.

UNIT-III

Arrays: Array declaration, Size Specification, Array Initialization, Initialization of Array elements in declaration, Character Array Initialization, Subscript, Processing of Arrays, Multi-Dimensional Arrays, Multi-Dimensional Array Declaration, Initialization of Two Dimensional Arrays, Strings, Pointers, Dynamic Memory allocation

UNIT-IV

Structures and Unions Declaration of Structures, Accessing the Members of a Structure, Initializing Structures, Structures as Function Arguments, Structures and Arrays. PreProcessor Directives, Introduction to Files

Reference Books:
- The C programming Language., Pearson Ecl – Dennis Ritchie
- Let us C-Yashwant Kanetkar.
- Structured programming approach using C-Forouzah & Ceilberg Thomson learning publication.
- How to solve it by computer, RG Dromey, PHI

BCA Batch-2019

SEMESTER-II

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	OBJECT ORIENTED PROGRAMMING USING C++	CORE-1	06	04	02(P)	
BCA	DIGITAL ELECTRONICS	CORE-2	06	04	02(T)	
BCA	DISCRETE STRUCTURES	CORE-3	06	04	02(T)	
BCA	ENGLISH COMMUNICATION SKILLS	ABILITY ENHANCEMENT COURSE	02	02	-	
BCA	ENVIRONMENTAL SCIENCE	ABILITY ENHANCEMENT COURSE	02	02	-	
TOTAL				22		

BCA 2ⁿᵈSemester-2019

Object Oriented Programming using C++   **Credits:** 06

UNIT-I

Introduction to the Object Oriented Languages: Concepts of Classes and Objects, Data Abstraction, Encapsulation, Reusability, polymorphism. Elements of the Programming Language (C++): Control Statements, Input/Output Functions, Pointers, structures, Classes and Objects, Scope resolution operator, Class members.

UNIT-II

Constructor: parameterized &un-parameterized constructors, copy constructor. Destructor, Friend Functions. Inline functions: Explicit & Implicit Inline Functions. Overloading: Function overloading and Operator Overloading (Overloading unary & binary operators).

UNIT-III

Inheritance: Single and Multiple Inheritance, Concepts of Derived & Base classes, Access specifier under Inheritance. Concepts of Ambiguity in Multiple inheritance.

UNIT-IV

Polymorphism: Early binding & Late binding. Virtual Functions & Abstract classes. Streams: I/O Streams and File Streams, I/O Manipulators

Reference Books:

- James Rumbaugh, "Object Oriented Models and Design" Pearson Education Harrington. "C & Object Oriented Paradigm" John Viley& sons Publication.
- Ali Brhrani "Object Oriented Systems Development" McGraw – Hill 1999.
- Lafore Robert, "Object Oriented programming in C++", Galgotia Publications.
- Balagurusamy, E, "Object Oriented with C++", Tata McGraw-Hill.
- D.Ravichandran, "Programming with C++",McGraw-Hill Publication

Digital Electronics   **Credits:** 06

UNIT-I

Digital Logic, **Data and number representation**: Binary numbers, Octal numbers, Hexadecimal numbers, conversion of numbers form one system to the other, binary-complement representation, 2's complement representation, BCD,ASCII, Excess-3 code, Gray code, Binary arithmetic.

UNIT-II

Boolean algebra: Introduction, Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Boolean Functions.

Logic gates: NOT, OR, AND, Universal NAND and NOR gates, Universal building blocks (NOT, OR, AND) Digital Circuit simplification, Karnaugh maps, Four-variable K-Map, Don't care conditions.

UNIT-III

Combinational Logic: Adders (half & full), Subtractor (half & full), Multiplexers and de-multiplexers, Decoders, BCD-to-decimal decoder, Encoders, Parity Checkers.

Sequential Logic: Latches, Flip-flops, Types of flip-flops, Master-Slave flip-flop.

UNIT-IV

Memories: ROM, RAM, EPROM, EEPROM, Volatile and non-volatile memories, Static and dynamic RAM.

Registers: Introduction, Shift Registers. **Counters:** Asynchronous counter, Synchronous counter, Binary Counter, Ripple counters, Up/down counters.

REFERENCE Books:
- Moris Mano, "Digital Logic and Computer Design", PHI Publications, 2002.
- R.L.Tokheim, "Digital Electronics, Principles and Applications", Tata McGraw Hill, 1999.
- W.Gothman, "Digital electronics", PHI.
- S. Salivahanan & S. Arivyhgan. "Digital circuits and design", Vikas Publication, 2001.
- Malvino Leach, "Digital Principles and Application", TMH, 1999.

BCA Batch-2019

SEMESTER III

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	**Practical/ Tutorial**	
BCA	**DATA STRUCTURES USING C**	**CORE-1**	**06**	**04**	**02(P)**	
BCA	**WEB TECHNOLOGIES**	**CORE-2**	**06**	**04**	**02(P)**	
BCA	**DATA COMMUNICATIONS**	**CORE-3**	**06**	**04**	**02(T)**	
BCA	**MULTIMEDIA DESIGN**(offered by the department) students can opt SEC for the sem offered by other departments	**SKILL ENHANCEMENT COURSE**	**04**	**04**	**-**	
TOTAL				**22**		

BCA 3rdSemester-2019

Data Structures using C   **Credits:**06

UNIT-I

Data Structure Basics: Basic Terminology, Linear and Non-Linear Data Structures,Linear Arrays and Implementation:Traversing, Inserting and Deleting.

Sorting and Searching: Linear Search and Binary Search, **Sorting Algorithms:**Selection Sort,Bubble Sort, Insertion Sort, Quick Sort and Merge Sort.

UNIT-II

Pointers: Declaring and initializing pointers, pointer arithmetic, Dynamic Memory Allocations in C, **Linked Lists and their implementations:** Traversing, Inserting and Deleting operations in Linked Lists (Singly,Doubly and Circular),Applications of Linked lists.

UNIT-III

Stacks: Introduction to Stacks,Static vs. Dynamic implementation of Stack,**Stack operations:** Create, Push, Pop and Peep,**Applications of Stack:** Polish Notations, Postfix, Infix and Prefix Expressions.

Queues: Linear Queues and their representation in memory, Staticvs.Dynamic implementation of Linear Queues, **Queue operations:** Create, enqueue and dequeue, Doubly ended queue, Circular Queue,Applications of Queue.

UNIT-IV

Introduction to Trees: Tree terminology, Binary Tree and their representation in memory, Dynamic Implementation of binary tree: Traversing Binary Tree, Binary Search tree, Application of Trees.

Introduction to Graphs: Graph terminology, Types of Graphs, **Graph Implementation**: Static and Dynamic,Application of Graphs.

Reference Books:
- Balaguruswamy, Programming in ANSI C, Tata McGraw Hill.
- Trebley and Sorenson, An Introduction to Data Structure with Application, McGraw Hill, Kongakusha 1976.
- Horowitz and Sahni, Data Structures, Sbcs Publication, 1980.

Department of Computer Applications
The Islamia College of Science & Commerce, Srinagar- J&K
(UGC- Autonomous)

BCA 3ʳᵈSemester-2019

Web Technologies   **Credits:** 06

UNIT-I

Introduction to internet and its applications, Client-Server architecture,World Wide Web and its evolution,**Internet Terminologies**: Web Browsers,Web server,Uniform Resource Locator (URL), Domain Name Server, Private and Public IP's,Search engines, Web Publishing, Web Hosting.

UNIT-II

HTML: Concept of Hypertext Markup language, Structure of HTML page,**Basic Tags:**Formatting, Images, Hyperlinks, Character entities, HTML Tables, HTML Lists,Frames in HTML, Div and Span tags,**Form tags:** Input tags, Buttons, Radio buttons, Check boxes, Select box, **HTML 5 tags**: Spin box, slider, Date picker,email, color, number, tel, url.

UNIT-III

Introduction to CSS: Concept of CSS, CSS syntax,Attaching styles with HTML pages, Inline styles, embedded styles, external styles, Selector types, CSS Properties, Box Model, Display positioning, CSS floats,Pseudo-classes and Pseudo-elements, Basic 2D transformations.

UNIT-IV

Java Script: Introduction to Client-Side scripting, variables, Operators, Decision and Looping structures, Arrays, Functions, Timers, Closures (Nested functions), Strings functions, Regular expressions, Document Object Model, Finding elements in the DOM, Modifying DOM elements, **Event Handling:** Events, Defining Event Handlers, Client-side validation using Java Script.

Reference Books:
- Beginning HTML, XHTML, CSS, and JavaScript by Jon Duckett, Wiley Publishing, Inc.
- HTML5 and CSS3 All-in-One For Dummies by Andy Harris, John Wiley & Sons, Inc.,
- HTML5 Step by Step by Faithe Wempen, O'Reilly Media, Inc.
- THE BOOK OF CSS3: A Developer's Guide to the Future of Web Design by Peter Gasston,
- JavaScript Absolute Beginner's Guide by Kirupa Chinnathambi, Pearson Education

BCA 3rdSemester-2019

DataCommunications   **Credits:** 06
UNIT-I

Introduction to Data communications, Data representations, **Data flow:**Simplex, Half-Duplex, Full-Duplex,**Transmission modes:** Parallel and Serial transmission,**Data and Signals:** Analog and Digital data, Analog and digital signals, **Periodic analog signals:** Sine wave, phase, wavelength, time and frequency, bandwidth, **Digital signals:** bitrate, bitlength.

UNIT-II

Transmission impairments: Attenuation, Distortion, Noise, **Date rate limits:** Nyquist bitrate, Shannon's capacity, **Data transmission performance concepts:** Bandwidth, Throughput, Latency (delay), jitter, **Digital to Digital Conversions:**Introduction to Line coding, Line code Schemes (Unipolar and Polar).

UNIT-III

Analog to Digital Conversion: Introduction toPulse Code Modulation concepts: sampling, quantization, Delta Modulation.
Digital to Analog Conversion: Introduction toAmplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying.

UNIT-IV

Analog to Analog Conversion: Introduction to Amplitude Modulation and Frequency Modulation.
Transmission media: Guided transmission media: Twisted-Pair, Co-axial Cable, Optical Fiber.
Unguided transmission media: Radio Waves, Microwave and Infrared Waves.

Reference Books

- B. A. Forouzan: Data Communications and Networking, Fifth edition, McGraw Hill Education, 2013.
- Wayne Tomasi: Introduction to Data Communications and Networking, Pearson Education.
- William Stallings: Data & Network Communications**,** PHI

BCA Batch-2019

SEMESTER- IV

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial	
BCA	**OPERATING SYSTEMS**	**CORE-1**	**06**	**04**	**02(P)**	
BCA	**DATABASE MANAGEMENT SYSTEMS**	**CORE-2**	**06**	**04**	**02(P)**	
BCA	**COMPUTER ORGANIZATION**	**CORE-3**	**06**	**04**	**02(P)**	
BCA	**FUNDAMENTALS OF COMPUTER NETWORKS(BCA students not to opt for this course)** students can opt SEC for the sem offered by other departments	**SKILL ENHANCEMENT COURSE**	**04**	**04**	**-**	
TOTAL			**22**			

BCA 4ᵗʰSemester-2019

Operating Systems
Credits:06

UNIT-I

Overview of an Operating System,Functions of operating system, **Basic concepts of Process Management:**Process, Process states, Process control block,**Process scheduling concepts:** Schedulers, Scheduling criteria, Process scheduling algorithms: FCFS, SJF, Priority, Round-Robin.

Inter-process Communication concepts: Process Synchronization, Race conditions, Critical section problem.

UNIT-II

Introduction to Process Synchronization tools: Mutual exclusion with busy wait, Semaphores, Monitors, Message passing.

Introduction to Deadlocks: Concept of Deadlock, Deadlock Prevention,Deadlock avoidance with Dijkstra's Banker's Algorithm for single instance of resource, Deadlock Detection using Resource Allocation graphs, Deadlock Recovery.

UNIT-III

Introduction to Memory Management: Concept of Memory Management, Contiguous vs. Non-contiguous Memory allocation, Paging, page table structure, demand paging, Segmentation, virtual memory, Page replacement algorithms.

Introduction to Device Management (I/O): Devices andtheir characteristics, device drivers,device handling, disk scheduling algorithms.

UNIT-IV

Introduction to File Management: File concept, typesand structures, directory structure, file access methods and file security.

Introduction to Linux: Features of Linux operating system, **Syntax and Implementation of various Linux commands:** File and Directory commands, communication commands, I/O and Redirection commands, process manipulation commands, Introduction to Vi editor.

Reference Books:
- Dietel, H.M. "An introduction to operating System" Addison Wesley, Publishing Company, 1984.
- Milenkovic. M. "An Operating System – Concepts & Design". McGraw Hill International Education Computer Science Series 1992.
- Peterson. J.L. Abharam Silberschatz. "Operating System Concepts". Addison Wesley Publishing Company1989.
- Tananbum, A.S. "Modern Operating System", Prentice Hall Of India, New Delhi, 1995.
- Karnetkar, "Unix Shell Programming", BPB
- Sumitabha das,"Unix by sumitabha das",Tata Macgraw Hills.

BCA 4ᵗʰSemester-2019

Database Management Systems   **Credits:**06

UNIT-I

Database & Database Users: Concepts, Characteristics of Database, Database System Vs File System. Introduction to DBMS, Advantages, Disadvantages of DBMS, Database Users. **Database System Concepts & Architecture:** Data Models, Schemas and Instances, DBMS Architecture & Data Independence.

UNIT-II

Data Modeling using ER-Approach: Concepts, ER-Notations, Entities, Attributes, Relationships Keys concepts.

Relational Data Model: Concepts, Relational model Constraints (Entity Integrity, Referential Integrity, Key Constraints, Domain Constraints), CODD'S Rules, Relational Algebra (Fundamental Operations).

UNIT-III

Relational Database Design & Normalization: Functional dependencies, Normalization of relational database, **Normal Forms:**1NF, 2NF, 3NF and BCNF, lossless join property, Dependency preservation property.

UNIT-IV

Introduction to SQL – (a relational database language): Concepts, Characteristics of SQL, Advantages of SQL, **Data definition in SQL**, Specifying Constraints in SQL, **Data manipulation in SQL**, Views & Queries, Create users, Grant and revoke object privileges. **Data Control Language:** Rollback, Commit.

Reference Books:
- Elmarsi, Navathe "Fundamentals of database Systems", 4th Ed., Pearson Education.
- Korth, Silbebschatz, Sudarshsn "Database System Concepts", 4th Ed., TMH.
- Leon "Database Management Systems", Vikas Pub.
- C.J. Date "An Introduction to Database Systems", Pearson education.
- Bipin C. Desai "An introduction to Database Systems", A.S. Ed., Golgotia pub.
- S.K. Singh, "Database Systems" , Pearson education
- Ivan Bayross,"SQL,PL/SQL the programming language of oracle",BPB publication.

BCA 4ᵗʰSemester-2019

Computer Organization   **Credits:**06

UNIT-I

Block diagram of Digital Computer, Functional components of a digital computer,CPU Clock, Bus, Bus structure,Von Neumann Architecture, Signed Integer Representations, Fixed-point representation, Floating point Representation (IEEE-754 representation), Signed Integer arithmetic,Floating-point arithmetic.

Organization of Processor: Registers, ALU and Control unit,Data path in a CPU,Single bus structure, Two bus structure, Three bus structure.

UNIT-II

Hardwired and Micro programmed control unit, Single accumulator organization, General register organization, Stack organization,Instruction cycle, Three-address, Two-address, One-address and Zero-address instructions, Instruction codes, Instruction format, Addressing modes.

UNIT-III

Memory Hierarchy, **Main memory:**Semiconductor memories, Memory cells - SRAM and DRAMcells, Organization of a memory unit,Memory Interleaving,**Cache memory:** Principle of Locality,Hit-miss ratio,Cache mapping techniques, Memory Management Unit,concept of Virtual Memory.

UNIT-IV

Peripheral Devices: I/O interface, Isolated and Memory-mapped I/O, Modes of Transfer, DMA (principle, modes of operations: Burst, cycle stealing), Basic concepts of an Interrupt, Types of Interrupts, I/O Controller, Synchronous and Asynchronous Data Transfer, Hand Shaking.

ReferenceBooks:

- WilliamStalling,"ComputerOrganization&Architecture",PearsonEducation
- Morris-Mano,"ComputerSystemArchitecture",Pearson Education
- Zaky&Hamacher,"ComputerOrganization",TMH
- B.Ram,"ComputerFundamentalArchitecture& Organization," NewAge.
- Tannenbaum,"StructureComputerOrganization,"Pearson Education.

BCA Batch-2019

SEMESTER-V

Course Code	Name of the Course	Paper Category	Credits	Credits Theory	Credits Practical/ Tutorial	Marks
BCA	**SOFTWARE ENGINEERING**	**DSE-1**	**06**	**04**	**02(P/T)**	
BCA	**JAVA PROGRAMMING**	**DSE-2**	**06**	**04**	**02(P)**	
BCA	**VISUAL PROGRAMMING USING .NET**	**DSE-3**	**06**	**04**	**02(P)**	
BCA	**ADVANCED WEB PROGRAMMING**	**DSE-4**	**06**	**04**	**02(P)**	
BCA	**NUMERICAL TECHNIQUES**	**DSE-5**	**06**	**04**	**02(P)**	
BCA	**INTRODUCTION TO ALGORITHMS**	**DSE-6**	**06**	**04**	**02(P/T)**	
Student can choose 3 DSE Courses from the above list						
BCA	**PC ASSEMBLY MAINTAINENCE AND UPGRADATION**(offered by the department) students can opt SEC for the sem offered by other departments	**SKILL ENHANCEMENT COURSE**	**04**	**04**	**-**	
TOTAL			**22**			

BCA 5thSemester-2019

Software Engineering   **Credits:** 06

UNIT-I (Software Process Models)

The Evolving role of Software, The changing Nature of Software,System-Definition and Concept, Elements of a System, Types of Systems–Open & Closed. Basic Principles of a Successful Systems, Users.**A generic view of process**: layered Technology, Process Framework, The Capability Maturity Model Integration (CMMI), Process Assessment,Product and Process, **Process Models:** The Waterfall Model, **Incremental Process Models**: Incremental Model, The RAD Model, **Evolutionary Process Models**: Prototyping, The Spiral Model, The Concurrent Development Model,

UNIT-II (Requirement Engineering)

Introduction to Requirements Engineering: Why, What and Where. **Requirements Types:** functional and non-functional requirements. Requirement Engineering Framework. Requirement Elicitation Process and Techniques. Requirement Analysis and Modelling, Requirements prioritization, verification, and validation.

UNIT-III (Design Engineering)

System Design: Data Flow Diagrams-Explanation, Features, Symbols-Solution of Different Cases, Concept of Decision Table & Decision Tree. Structured English-Sequential Structure, Decision Structure & Looping/Repetition Structure.
Basics of Design Engineering, Function oriented design, Design principles, coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology.

UNIT IV (Software testing and Quality Assurance)

Software Testing – Basics of Software Testing, Testing Terminology, Adequacy Criteria, Static vs. Dynamic Testing, Black Box vs. White Box Testing, Structural testing,
Software Quality Assurance (SQA) – Quality Concepts-McCall's Quality Factors-Concept- Different Stage.

Reference Books:

- Haryszkiewycz, T.T., "Introduction of System Analysis and Design". Prentice Hall of India, New Delhi.
- Rajaraman, V., "Analysis and Design of Information Systems". Prentice Hall of India, New Delhi.
- Senn, J.A.,"Analysis and Design of Information System". Tata McGrew Hill Book Company.
- Whiten, J.K., Bentley, L.D., V.M.,"Systems Analysis and Design Methods". Galgotia publications Pvt. Ltd.
- Kendall, "System Analysis and Design", Pearson Education.
- Pressmen, Roger-"Software Engineering-A Practitioner's Approach"

BCA 5th Semester-2019

Java Programming   **Credits:** 06

UNIT-I

History and Evolution of Java, Java and WWW, JVM, byte-code, Garbage Collection, simple java program, main method and command line arguments, Creating, Compiling and Executing a Java Program, Variables, Constants(Final), Keywords, Comments, Data Types, Literals, Type conversion and Casting, Operators, Conditional statements, Looping statements, Jump statements.

UNIT-II

Creating & Using Arrays, Referencing Arrays Dynamically, Multi-dimensional arrays, JavaStrings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality , Passing Strings To &From Methods , String Buffer Classes. Simple I/O using System.out and the Scanner class.

UNIT-III

Principles of Object-Oriented Programming, Defining & Using Classes, Objects, Controlling Access to Class Members, Constructors, Objects as parameters, Static variable and methods, Nested and inner classes, Inheritance: Single Level and Multilevel, Polymorphism, Method overloading, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Final method, Final Class, finalize method.

UNIT-IV

InterfacesandPackages,Extendinginterfacesandpackages,PackageandClassVisibility,UsingStandardJavaPackages(util,lang,io,net),WrapperClasses,Autoboxing/Unboxing.
Exception Handling in Java: Exception types, Using try catch and multiple catch, Creating user defined Exceptions, **File Handling in Java:** Streams, Byte-Stream Classes, Character- Stream Classes, File IO basics, **File operations:** Creating file, Reading file and Writing file.

ReferenceBooks

- Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
- James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley"The Java Language Specification, Java SE 8 Edition (Java Series)", Published by Addison Wesley, 2014.
- Java: The Complete Reference by Herbert Schildt
- Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
- Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9th Edition,Printice Hall.2012
- Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition,

BCA 5th Semester-2019

Visual Programming using .NET   **Credits:** 06

UNIT-I

Introduction to .NET: Introduction to .NET Framework, .NET Architecture, .NET class Library, Common Language Specification (CLS), Common Type System(CTS), Microsoft Intermediate Language(MSIL) and Meta data, Common Language Runtime (CLR),Managed Code, Garbage Collection, Assemblies, Private and public assemblies.

UNIT-II

Fundamentals of C# Language: Structure of C# program,Variables, Data Types, Operators, Arrays, Decision and Looping constructs.

Object-oriented Programming in C#: Creating and using Classes, objects,Inheritance,Visibility Modifiers.

UNIT-III

Introduction to ASP.NET: What is ASP.NET, Features of ASP.NET, Life cycle of ASP.NET page, ASP.NET Web Forms, Master Pages, **ASP.NET Server Controls:** HTML server controls, Web server controls, custom and user controls, Validation controls.

UNIT-IV

Introduction to ADO.NET:ADO.NET overview, ADO.NET Architecture, Using Database connections, Managing connection strings, **Executing commands:**ExecutingNonQuery(),ExecuteReader(),ExecuteScaler(), The Data Reader, Accessing data using Data Adapters and DataSets, Displaying data in DataGrid.

Reference Books:

- Visual C# 2010 Wrox Publications
- Asp.NET with C# Wrox Publications
- Professional C#, Wiley Publishing, Inc.Christian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson

BCA 5th Semester-2019

Advanced Web Programming   **Credits:**06

UNIT-I

Introduction to PHP: History of PHP, Installing PHP,Basic Syntax, PHP variables, constants, Data types in PHP, Expressions, scopes of a variable (local, global, static),PHP Operators,PHP operator Precedence and associativity.

PHP conditional statements and Loops: if else conditional statements (Nested IF and Else), Switch case, while, for and do While Loop,Jump Statements:Break, Continue and exit.

UNIT-II

Arrays: Creating index based and Associative array,Accessing array, Multidimensional arrays,some useful Library functions.

Handling HTML form with PHP: Capturing Form Data, GET and POST form methods,Retrieving form data with $_POST,$_GET and $_REQUEST arrays, Dealing with multi value fields.

Strings: Formatting, Joining,splitting, comparing strings, Introduction to Regular expressions.

UNIT-III

PHP Functions: Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function,   Function argument with call by value, call by reference,

Session Management: Session and session variables, creating and destroying sessions, Cookies, using cookies with sessions,

UNIT-IV

Introduction to DBMS and MySQL, Creating MySQL database, creating Database tables, Connecting MySQL database with PHP, Implementing Insert, Delete, update and select queries.

Reference Books:

- Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.
- Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.
- Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.
- Luke Welling, Laura Thompson, PHP and MySQL Web Development", 4th Edition, Addition Paperback, Addison-Wesley Professsional,2008.
- David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.

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Numerical Techniques   **Credits:** 06

UNIT-I

Floating point representation(IEEE representation) and Floating point arithmetic, Significant digits, Approximation and Errors: Types of errors, Round-off error, Truncation error, Accuracy and precision, Convergence and terminal conditions, Methods to find solution to Non-linear Equations: Bisection method, Secant method, Regula–Falsi, Newton–Raphson method.

UNIT-II

Methods to find solution to Non-Homogeneous Linear Equations: Direct Methods: Gauss elimination method (with row pivoting) and Gauss–Jordan method, Iterative methods: Jacobi and Gauss-Seidel methods.

UNIT-III

Numerical differentiation: Solving First Order derivatives and Second Order derivatives, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule.

UNIT-IV

Ordinary differential equation: Euler's method, Modified Euler's methods, Runge-Kutta second order & 4th order method.

Reference Books:
- Balaguruswamy , Numerical Methods,
- M.K. Jain, S.R.K. Iyengar and R.K. Jain,
- Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012) [3] Steven C Chapra,
- Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata Mc Graw Hill

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Introduction to Algorithms   **Credits:** 06

UNIT-I

Fundamentals of Algorithms: Introduction, Problem-solving aspects, Algorithm and its basic characteristics, **Algorithm analysis**: Time complexity and space complexity, units for measuring input size and running time, Best case, average case and worst case analysis, **Asymptotic Notations:**Big Oh,Theta, Omega, Small and small Omega notations.

UNIT-II

Design and Analysis of Elementary Searching and Sorting techniques: Linear search, Bubble Sort, Selection sort and Insertion Sort.

Introduction to Divide and Conquer approach: General method, Binary search, Quick sort, Merge sort with time complexity analysis.

UNIT-III

Introduction to Greedy Method: General method, Knapsack problem, Job sequencing problem and optimal storage on tapes problem.

Introduction to Dynamic Programming approach

UNIT-IV

Tree Traversal Algorithms: Pre-order, Post-order and In-order Traversal and time complexity analysis.

Graph: Breadth First Search, Depth First Search and time complexity analysis.

References

- Horowitz, Sahni, Rajasekaran "Fundamentals of Computer Algorithms", Galgotia Publications
- Reference Books:
- Coremen, Leiserson, Rivest,Stein, "Introduction to Algorithms", 2nd edition, PHI.
- Michael T. Goodrich, Roberto Tamassia "Algorithm Design and Applications" , Wiley
- Aho, Hopcroft and Ullman, "The Design and Analysis of Computer Algorithms", Pearson.

BCA Batch-2019

SEMESTER-VI

Course Code	Name of the Course	Paper Category	Credits	Credits		Marks
				Theory	Practical/ Tutorial/ Industrial Visit	
BCA	PROJECT PROPOSAL (SYNOPSIS) SUBMISSION	DSE-1	01	-	-	
	SOFTWARE PROJECT DEVELOPMENT		02			
	PROJECT REPORT SUBMISSION		01			
	PROJECT PRESENTATION AND VIVA VOCE		02			
BCA	COMPUTER NETWORKS	DSE-2	06	04	02(P/T)	
BCA	COMPUTER GRAPHICS	DSE-3	06	04	02(P)	
BCA	ARTIFICIAL INTELLIGENCE	DSE-4	06	04	02(P/T)	
BCA	CLOUD COMPUTING	DSE-5	06	04	02(P/T)	
Student has to choose DSE-1(compulsory) and any two from DES-2 to DSE-5 Courses from the above list						
BCA	ANDROID PROGRAMMING (offered by the department) students can opt SEC for the SEM offered by other departments	SKILL ENHANCEMENT COURSE	04	04	-	
TOTAL			22			

BCA 6ᵗʰ Semester-2019

SOFTWARE PROJECT   **Credits:** 6

The project work constitutes a major component the Curricula of BCA (professional program) and it is to be completed within stipulated time. Software project work is mandatory for partial fulfillment of the degree in Bachelor in Computer Application's.

TYPE OF PROJECT

Majority of the students are expected to work on a real life project (Preferred).

The student can formulate a project problem alone or under the guidance of an assigned project guide. The student is expected to complete the project work within one semester as per the below guidelines:

Week 1-4

PROJECT PROPOSAL (SYNOPSIS) Submission   **Credits :01**

The project proposal should clearly state the project objectives with tools & technologies that are to be used/ implemented in the proposed project.

It is highly recommended for the purpose of collaboration, the students must use tools such as GitHub, GitlAB, BitBucket etc for collaboration and creation of repositories.

The project proposal should contain complete details in the following form:
1. Title of the Project
2. Introduction and Objectives of the Project
3. A complete structure which must include:
    o Software model (to be used),
    o Proposed Modular breakup i.e. Number of modules with brief description of the proposed modules.
4. Tools / Platform, Hardware and Software Requirement for the project with emphasis on minimum/recommended specifications.
5. Student effort breakup (in case of multiple student Groups).
6. Mention the Name and Address of the Industry or Client for which the project is being carried out.(In case the project is carried out outside campus)
7. Future scope and further enhancement of the project.

At the end of the proposed tenure for the submission of project synopsis the student (individually) has to submit Hard copy of synopsis with the above mentioned details. The students has to deliver a Presentation for the same as well.

SOFTWARE PROJECT DEVELOPMENT   **Credits:02**

WEEK 5

Analysis Phase

This should include SRS in proper structure based on Software Engineering concepts, E-R diagrams/Class diagrams/any related diagrams, Data flow diagrams/other similar diagrams, Data dictionary etc.

Hard Copy with presentation for Analysis phase is to be submitted by the student (individually)

Design Phase

Modularization details, Data integrity & constraints including database design, Procedural design, and User interface design,

Program code: Complete code (well indented)/Detailed, with suitable Comments & Description, using proper naming conventions.

The program code should always be developed in such a way that it includes complete error handling.

Hard Copy with presentation for Design phase is to be submitted by the student (individually)

WEEK 9-10

Testing:

Test case designs are to be included separately for Unit testing, Integration testing, System testing, Reports of the outcome of Unit testing, Integration testing, System testing are to be included separately. (Details of debugging and code improvement/optimization are to be included.)

Hard Copy with presentation for testing phase is to be submitted by the student (individually)

WEEK 11-12
Project Report Submission   **Credits: 01**

ITEMS TO BE INCLUDED IN THE PROJECT REPORT: The following items should be included in the Project Report:

1. **The project report must contain the following:**

- Introduction
- Objectives
- Tools/Environment Used
- Analysis Design
- Design Document
- Program Code
- Testing (Input and Output Screens
- Implementation of Security measures (if any) for the Software developed
- Limitations of the Project
- Future Scope of the Project
- Bibliography
- References

(Project Report preparation format document can be obtained from the Deptt)

Student who wishes to carry out project with an organization outside the campus must **seek prior permission for the same**. No project work outside campus without prior permission of the department shall be considered for evaluation.

Project Presentation & Viva voce   **Credits: 02**

After week 12 students will be asked to prepare a presentation of their software & at the end of semester a viva voce will be conducted for final evaluation.

Marks and Evaluation:

Sum of the scores obtained in the individual components of the project development will be the Total marks obtained by an individual student for the course.

Computer Networks   **Credits:**06

UNIT-I

Introduction to Computer Networks: Computer Network applications, Network Classification: LAN, MAN, WAN, LAN topologies.Overview of the OSI model & comparison with TCP/IP reference model.

UNIT-II

Networks Switching Techniques and Access mechanisms:

Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching;

Data Link Layer Functions and Protocol:

Error detection and error correction techniques; Data-link control- framing and flow control; error recovery protocols: stop and wait ARQ, go-back-n ARQ;

UNIT-III

Multiple Access Protocol and Networks

CSMA/CD protocols; Ethernet LANS; connectingLAN and back-bone networks- repeaters,hubs, switches, bridges, router and gateways;

Networks Layer Functions and Protocols

Introduction to Routing; **Routing algorithms:**Link state Routing algorithm, Distance vector algorithm,**Network layer protocol of Internet:** IP protocol, Classful IP addresses, Subnetting.

UNIT-IV

Transport Layer Functions and Protocols

TCP and UDP concepts, Transport services- error and flow control,Connection establishment and release- three wayhandshake;

Overview of Application layer protocol

Overview of DNS protocol; overview of WWW, FTP, TELNET, HTTP, STMP.

Reference Books:

- Andrew Tanenbaum, "Computer Networks", 4th Edition by Pearson.
- Douglas Comer, "Internetworking with TCP/IP, Volume 1", Pearson.
- W. Richard Stevens, "UNIX Network Programming", Pearson.
- Maufer, "IP Fundamentals", Pearson.
- Douglas Comer, "Client-Server Programming with TCP/IP, Volume 3", Pearson.

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Computer Graphics   **Credits:** 06

UNIT-I

Introduction to Computer Graphics. Applications of Computer Graphics. Graphic Display Devices: Refresh Cathode Ray Tubes, Raster-scan Displays, Random-Scan displays, Color CRT Monitors.

UNIT-II

Display Buffer, Concept of Double Buffering and Segmentation of Display Buffer. Use of Lookup tables, 2-D Graphics. Cartesian and Homogeneous Coordinate Systems. Line drawing algorithms (Bresenham's and DDA).Circle and Ellipse Drawing Algorithms.

UNIT-III

2-Dimensional Transformations. Composite Transformations. Concepts of Window and Viewport, Window to Viewport Transformations, Filling, Boundary and Flood-fill algorithms.

UNIT-IV

Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm), 3-D Graphics, Projections: perspective and parallel projection transformations, 3-Dimensional Transformations.

Reference Books:

- Hearn and Baker "Computer Graphics" 2nd Edition , Pearson Education.
- W.M.Newman and Sproull. "Principles of interactive Computer Graphics" ,TMH
- Steven Harrington." Computer Graphics a Programming Approach" McGraw Hill.
- Plastock and Kelley. "Schaums outline of theory and problems of computer Graphics"
- David F Frogers and J Alan Adams. "Procedural Elements of Computer Graphics" McGraw Hill
- David F Rogers and J Alan Adams. "Mathematical Elements of Computer Graphics" McGraw Hill
- James. D. Foley, A Van dam etal "Computer Graphics" Pearson.
- Sinha and Udai , "Computer graphics", TMH

BCA 6ᵗʰ Semester-2019

Artificial Intelligence   **Credits:** 06

UNIT-I

Introduction and historical perspective, AI Definition, the Turing Test, disciplines and applications, Agents and Environments, Typical Intelligent Agents.

UNIT-II

Problem solving Methods: Search Strategies- Uninformed Search Strategies, Informed Search Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems.

UNIT-III

Knowledge Representation: Propositional Logic, First Order Logic, Inference in First Order Logic, Prepositional Versus First Order Logic, Expert Systems, Forward chaining, backward chaining.

UNIT-IV

Artificial Neural Networks, Network Architectures and Learning Algorithms, Perceptron and its Limitations, Activation Functions.

Reference Books:

- S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 3ʳᵈ Edition, 2009
- Bratko, I., Prolog Programming for Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th edition, 2011.
- David L. Poole, Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
- M. Tim Jones, Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc; 1 edition, 2008

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Cloud Computing   **Credits:** 06

UNIT-I

Overview of Computing Paradigm, Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks.

UNIT-II

Grid and Cloud, Cloud Architecture(Layers), Service Models: Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud,

UNIT-III

Virtualization: Introduction to Virtualization and Virtual machine, Advantages and Drawbacks of Virtualization in Cloud computing, **Approaches in Virtualization:** Full virtualization, Para-virtualization and Hardware-assisted Virtualization, **Types of Virtualization:** OS virtualization, processor Virtualization, Memory virtualization, Storage virtualization, Network virtualization, Data virtualization, Application virtualization, Hypervisors and types of Hypervisors.

UNIT-IV

Cloud Service providers: Google App Engine, Amazon Web Services, Microsoft Azure, IBM Smart Cloud, Salesforce, and VMware. **Open-source support for cloud computing:** Open-source Tools for Iaas, Open-source tools for Paas, Open-source tools for Saas.

Reference Books

- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
- Essentials of Cloud Computing, K. Chandrasekaran, CRC Press
- Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
- Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
- Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley- India, 2010
- Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications , Adobe Reader ebooks available from eBooks.com,2010
- Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach ,McGraw Hills, 2010.
- Dimitris N. Chorafas, Cloud Computing Strategies ,CRC Press, 2010