



JECRC<sup>TM</sup>  
UNIVERSITY  
BUILD YOUR WORLD

**School of Engineering  
Scheme  
BCA  
(Bachelor of Computer Applications)**

**Academic Programme  
Batch 2018-21**

**Total Credits for the Batch 2018-21 = 168 Credits**

- 1. Minimum Credits required = 155 Credits**
- 2. Total Relaxation = 13 Credits**
- 3. No relaxation in Core and Foundation subjects**
- 4. Students must choose at least one subject of 3 credits of type ID in II year**
- 5. Students have option to opt out/drop courses of maximum 6 credits of type S. (Not more than 3 credits from one semester).**
- 6. Students have option to opt out/drop courses of maximum 4 credits of type SEC in IV and V Semester with respective combination of type S. (Not more than 2 credits from one semester).**
- 7. Theory exams duration will be of 03 hours and Practical exams will be of 02 hours.**
- 8. Internal Assessment will be of 50 marks and End Term Assessment will be of 50 marks.**

I	II	III	IV	V	VI	Total	Minimum Credit Points
28	28	28	28	28	28	168	155

#### Subject Description as per Type

Type ↓	Semester →	I Semester	II Semester	III Semester	IV Semester	V Semester	VI Semester	Total
Foundation (F)		6	3	3	-	-	-	12
Core (C)		10	17	14	10	13	28	92
Specialization (S)		-	-	-	6	6	-	12
Interdisciplinary (ID)		-	-	3	3	-	-	6
SEC		12	8	8	9	9	-	46
Total		28	28	28	28	28	28	168

## Semester – I

<b>Course Code</b>	<b>Course Name</b>	<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credit s</b>	<b>Type</b>
BCA101A	Fundamentals of Computer Systems	3	0	0	3	F
BCA102A	Programming Fundamentals using C-I	3	1	0	4	CORE
BCA103A	System Analysis and Design	3	0	0	3	CORE
BCA104A	Digital Electronics	3	0	0	3	CORE
BCA105A	Communication Skills	3	0	0	3	F
BCA106A	Office Automation Tools Lab	0	0	2	2	SEC
BCA107A	Programming Fundamentals using C-I Lab	0	0	2	2	SEC
BCA108A	Communication Skills Lab	0	0	2	2	SEC
BCA109A	Internet Lab	0	0	2	2	SEC
BCA110A	Digital Electronics Lab	0	0	2	2	SEC
BCA111A	Seminar	0	0	2	2	SEC
	<b>Total</b>	<b>15</b>	<b>1</b>	<b>12</b>	<b>28</b>	

- ❖ F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses
- ❖ L- Lecture, T- Tutorial, P- Practical

## **Semester – II**

<b>Course Code</b>	<b>Course Name</b>	<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>	<b>Type</b>
BCA112A	Environmental Studies	3	0	0	3	F
BCA113A	Operating System	3	0	0	3	CORE
BCA114A	Database Management System	3	1	0	4	CORE
BCA115A	Computer Architecture	3	1	0	4	CORE
BCA116A	Programming Fundamentals using C-II	3	1	0	4	CORE
BCA117A	HTML Programming	2	0	0	2	CORE
BCA118A	Database Management System Lab	0	0	2	2	SEC
BCA119A	Programming Fundamentals using C-II Lab	0	0	2	2	SEC
BCA120A	HTML Lab	0	0	2	2	SEC
BCA121A	UNIX and Shell Programming Lab	0	0	2	2	SEC
	<b>Total</b>	<b>17</b>	<b>3</b>	<b>8</b>	<b>28</b>	

❖ F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance

**Courses**

❖ L- Lecture, T- Tutorial, P- Practical

## **Semester – III**

<b>Course Code</b>	<b>Course Name</b>	<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>	<b>Type</b>
BCA122A	Principles and Practices of Management	3	0	0	3	ID
BCA123A	Programming in PHP	3	0	0	3	CORE
BCA124A	Basic Mathematics	3	0	0	3	F
BCA125A	Data Structures and Algorithms using C	3	1	0	4	CORE
BCA126A	Programming Fundamentals using C++	3	1	0	4	CORE
BCA127A	Software Engineering	3	0	0	3	CORE
BCA128A	PHP Lab	0	0	2	2	SEC
BCA129A	Data Structure and Algorithm using C Lab	0	0	2	2	SEC
BCA130A	Programming Fundamentals using C++ Lab	0	0	2	2	SEC
BCA131A	Software Testing Lab	0	0	2	2	SEC

	<b>Total</b>	<b>18</b>	<b>2</b>	<b>8</b>	<b>28</b>	
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- ❖ F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses
- ❖ L- Lecture, T- Tutorial, P- Practical

## **Semester – IV**

<b>Course Code</b>	<b>Course Name</b>	<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credit s</b>	<b>Type</b>
BCA132A	Introduction to Accounting and Economics	3	0	0	3	ID
BCA133A	Programming in Java	3	1	0	4	CORE
BCA134A	Programming in Python	3	0	0	3	S
BCA135A	Computer Network	3	0	0	3	S
	Elective – I	3	0	0	3	CORE
	Elective – II	3	0	0	3	CORE
BCA136A	Programming in Java Lab	0	0	2	2	SEC
BCA137A	Programming in Python Lab	0	0	2	2	SEC

BCA138A	Introduction to PL/SQL Lab	0	0	2	2	SEC
BCA139A	Minor Project	0	0	3	3	SEC
	<b>Total</b>	<b>18</b>	<b>1</b>	<b>9</b>	<b>28</b>	

- ❖ F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses
- ❖ L- Lecture, T- Tutorial, P- Practical

## Semester – V

Course Code	Course Name	L (Hr.)	T (Hr.)	P (Hr.)	Credits	Type
BCA140A	Data Analytics using R	3	0	0	3	S
BCA141A	Android Applications Development	3	0	0	3	S
BCA142A	Information Security and Cyber Law	3	1	0	4	CORE
BCA143A	Advance Java	3	0	0	3	CORE
	Elective – III	3	0	0	3	CORE
	Elective – IV	3	0	0	3	CORE
BCA144A	Data Analytics using R Lab	0	0	2	2	SEC

BCA145A	Android Applications Development Lab	0	0	2	2	SEC
BCA146A	Advance Java Lab	0	0	2	2	SEC
BCA147A	Minor Project	0	0	3	3	SEC
	<b>Total</b>	<b>18</b>	<b>1</b>	<b>9</b>	<b>28</b>	

- ❖ F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses
- ❖ L- Lecture, T- Tutorial, P- Practical

## Semester – VI

Course Code	Course Name	L (Hr.)	P (Hr.)	Credits	Type
BCA165A	Industrial Training/Internship/Project Presentation	0	28	28	CORE

## List of courses for Electives

Course Code	Course Name
BCA148A	Computer Graphics
BCA149A	Complier Design
BCA150A	MIS (Management Information System)
BCA151A	Theory of Computation

BCA152A	Web Technologies
BCA153A	Artificial Intelligence and Expert System
BCA154A	Data Mining
BCA155A	Data Warehousing
BCA156A	Mongo Database
BCA157A	Soft Computing
BCA158A	Parallel Computing
BCA159A	Mobile Computing
BCA160A	Image Processing
BCA161A	Big Data Analytics
BCA162A	Organization Behavior
BCA163A	Introduction to Cloud Computing
BCA164A	Introduction to Sales Force

**Note:**

1. Students have to select different courses from the given list for each elective.
2. Minimum Batch size is 20 for any Elective.

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)**

A master of the Computer Science Program should:

#### **PEO- I**

To excel in problem solving and programming skills in the various computing fields of IT industries.

**PEO- II**

To develop the ability to plan, analyze, design, code, test, implement & maintain a software product for real time system

**PEO- III**

To promote students capability to set up their own enterprise in various sectors of Computer applications

**PEO- IV**

To experience the students in finding solutions and developing system based applications for real time problems in various domains involving technical, managerial, economical & social constraints

**PEO- V**

Students will be provided with an educational foundation that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.

**PROGRAMME OBJECTIVES**

Understand and Apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.

1. Identify, analyze the computing requirements of a problem and Solve them using computing principles.
2. Design and Evaluate a computer based system, components and process to meet

the specific needs of applications.

3. Use current techniques and tools necessary for complex computing practices.
4. Use suitable architecture or platform on design and implementation with respect to performance.
5. Develop and integrate effectively system based components into user environment.
6. Understand and commit to Cyber regulations and responsibilities in Professional computing practices.
7. Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
8. Apply the understanding of management principles with computing knowledge to manage the projects in multidisciplinary environments.
9. Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
10. Understand societal, environmental, health, legal, ethical issues within local and global contexts and the consequential responsibilities relevant to professional practice.
11. Function effectively in a team environment to accomplish a common goal.
12. Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
13. Use knowledge to analyze, interpret the data and synthesis the information to derive valid conclusions using research methods.
14. Expertise in developing application with required domain knowledge.

### **PROGRAM OUTCOME (PO's)**

BCA programme has been designed to prepare graduates for attaining the following program outcomes:

PO1: Engineering knowledge: Apply the knowledge of mathematics, engineering fundamentals, and an engineering specialization to the solution of complex engineering

problems.

PO2: Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: To identify and sharpen their IT/ programming skills.

PO7: Develop practical skills to provide solutions to industry, society and business.

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: The ability and the mindset to continuously update and innovate.

PO12: Analyze and apply latest technologies to solve problems in the areas of computer applications.

## **Semester I**

**Course Name: Fundamentals of Computer Systems**

**Course Code: BCA101A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To be able to learn the major components of a computer system
2. To know the Student to learn different types of input and output devices, memories in computer.
3. To enhance the practical knowledge of the students related to Operating system, Computer Software and Boolean algebra.
4. To demonstrate the concept of Logic gates, Simplification of Boolean Expressions Using K-Map and Internet.
5. To know the Characteristics, Generations of computers, Classification of Computers and basic functionality of computers.

### **Syllabus**

#### **Unit I**

**Introduction to Computers & Number Systems:** Introduction of Computers, Characteristics, Generations of computers, Classification of Computers, Basic Computer Organization, Applications of Computers, Binary Number System, Working with Binary Numbers, Octal Number System, Hexadecimal Number System, BCD Code ,Other Codes.

#### **Unit II**

**Input-Output devices & Computer Memory:** Input Devices, Output Devices, Soft Copy Devices, Hard Copy Devices, Memory Type: Memory Hierarchy, Processor Registers, Cache Memory, Primary Memory, Secondary Storage Devices, Magnetic Tapes, Floppy Disks, Hard Disks, Optical Drives, USB Flash Drives , Memory Cards, Mass Storage Devices

### **Unit III**

**Computer Software & Operating Systems:** Computer Software: Introduction to Computer Software, Classification , System Software, Application Software , Acquiring Computer Software, Productivity Software, Graphics Software, Database management software .

Operating Systems: Basic Definitions, History, Characteristics, Properties, Classifications, Functions of OS, Popular Operating Systems, mobile operating System.

### **Unit IV**

**Boolean Algebra and Logic Gates:** Boolean Algebra ,Venn Diagrams ,Truth Tables ,Basic Laws of Boolean Algebra, Representations of Boolean Functions, Logic Gates, Logic Diagrams and Boolean Expressions ,Universal Gates, Simplification of Boolean Expressions Using K-Map.

### **Unit V**

**Computer Networks and Internet:** Computer Networks: Introduction to Computer Networks, Connecting Media, Network Topologies, Types of Network, Networking Devices, Wireless Networks, Data Transmission Mode, Open System Interconnection Model, TCP/IP Model, Internet, Internet Protocol Address., DNS, URL.

The Internet & Emerging Computer Technologies: History, Internet Services, Internet Glossary, Types of Internet Connections, Internet Security, Distributed Networking, Peer-to-peer Computing, Grid Computing, Cloud Computing, Utility Computing, Wireless Network, Bluetooth, Artificial Intelligence

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understand what is computer system and Basic information related to computer.

CO2: Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components

CO3: Understand the difference between an operating system and an application program, and what each is used for in a computer

CO4: Understand the fundamentals of Logic gates and circuit design

CO5: Understand basics of World Wide Web and new Internet technologies.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcom e	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01				H						H		H
C02			H			H	M					
C03		H										
C04							H	H				
C05	H				M						L	

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Reema Theraja , "Fundamentals of Computers", Oxford University Press, 2014

**Reference Books**

1. Madan, S. , "Fundamentals of Computers and Information System", Scholar Tech Press, 2012
2. Mohan, P., "Fundamentals of Computers", Himalaya publishing House, 2010
3. Murthy, C. S., "Fundamentals of Computers", Himalaya Publishing House, 2010
4. Tiwari, H. N., & Jain, H. C., "Fundamentals of Computer and Information System", International Book House Pvt. Ltd., 2012

**Course Name: Programming Fundamentals using C-I**

**Course Code: BCA102A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	1	0	4

**Course Objectives:**

1. To provide exposure to problem solving through programming.
2. To enhance the ability to solve the problem through various constructs of C such as decision control and looping statements.
3. To demonstrate the concept of Accessing Array Elements, Storing Values in Arrays and length of an Array.
4. To evaluate the concept of data types and variable.
5. To explore major concepts of computer science and the process of computer programming, including programming, procedural and data abstraction and program modularity.

**Syllabus**

**Unit I**

**Introduction to Programming and C:** Introduction to Computer Software, Classification of Computer Software, Programming Languages, Generation of Programming Languages

**C Programming Language:** Introduction, Structure of C Program, Files Used in C Program,

## **Unit II**

**Data types and Variables:** Compiling and Executing C Programs, Keywords, Identifiers , Data Types, Variables, Constants, Input/output Statement in C, Operators in C, Type Conversion and Typecasting, Structure of C Program, Operators: Arithmetic operators, relational and logical operators.

## **Unit III**

**Decision Control and Looping Statements:** Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, break and continue Statements, goto Statement, Building a Robust C Program, Flow Chart Designing

## **Unit IV**

**Array:** Declaration of Arrays, Accessing Array Elements, Storing Values in Arrays, Length of an Array, Array Operations, Multidimensional Arrays, Two-Dimensional Arrays, and Operations on Two-dimensional Arrays.

## **Unit V**

**String:** Introduction, Suppressing Input, String Operations, String and Character Functions, String Array.

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Students will learn the concept of character set identifiers and keywords, data type, variable names, declaration statements and basic structure of C program.

CO2: Student will classify the String Operations, String and Character Functions.

CO3: Students will apply the concept of Arithmetic operators, relational and logical operators, type, conversion, Standard input and output, formatted output and input.

CO4: Students will contrast C programs based on Flow of Control and program Structures.

CO5: Students will learn the concept of Accessing Array Elements, Storing Values in Arrays, and length of an Array.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcom e	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1				H						H		H
CO2			H			H	M					
CO3		H										
CO4							H	H				
CO5	H				M						L	

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Reema Theraja , "Programming in C", Second Edition , Oxford University Press, 2016

**Reference Books**

1. Yeshwant kanetkar, Let us C, Fifteenth Edition, BPB Publication 2016.
2. Reema Thareja, "Introduction to C Programming", First Edition, Oxford University

press, 2012.

3. Byron S Gottfriend, "Programming with C", Second Edition, Mc Graw Hill, 2007.
4. Herbert Schildt, Turbo C: The Complete Reference, Fourth edition, Mc Graw-Hill, 2017.

**Course Name: System Analysis and Design**

**Course Code: BCA103A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To provide an understanding and application of system analysis and design processes centered on the systems development life cycle.
2. To extend the core topics include project management and cost-benefit analysis; information systems planning and project identification and selection.
3. To emphasizes interpersonal skill development with clients, users, team members, and others associated with development, operation, and maintenance of systems.
4. To learn the Information system components, Types on information systems, System development life cycles, the systems analyst.
5. To make a study of Systems planning, Object oriented analysis and design.

## **Syllabus**

### **Unit I**

**System Concepts and Information Systems Environment:** The System Concept: Definition, Characteristics of Systems, Elements of a System, Open and Closed System, Formal and Informal Information Systems, Computer based Information Systems, Management Information System, Decision Support System, General Business Knowledge, and Interpersonal Communicational System.

### **Unit II**

**System Development Life Cycle:** Recognition of needs, Impetus for System Change, Feasibility Study, Analysis, Design, Implementation, Post implementation and Maintenance. Role of the Systems Analyst, The Analyst/User Interface, Behavioral issues.

### **Unit III**

**Systems Planning and Initial Investigation:** Strategies for Determining Information Requirement, Problem Definition & Project initiation, Background Analysis, Fact Analysis, Review of Written Documents, Onsite Observations, Interviews and Questionnaires, Fact Analysis, Performance Analysis, Efficiency Analysis, Service Analysis.

### **Unit IV**

**Information Gathering:** need, Information about the firms, Information gathering tools, Interviewing, Arranging the Interview, Guides to a Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives

### **Unit V**

**Tools of Structured Analysis:** The Dataflow Diagram (DFD), Data Dictionary, Decision Trees and Structured English. Feasibility Study: System performance, Economic Feasibility, Technical Feasibility, Behavioral Feasibility, Steps in Feasibility Analysis.

**Input/Output and Forms Design:** Input Design, CRT Screen Design, Output Design, and Requirements of form Design. H/W / S/W Selection, Make V/s Buy decision and Maintenance, Documentation: Importance, Types of documentation, Security and disaster planning and management.

**Course Outcomes:**

**Upon successful completion of this subject students should be able to:**

CO1: Students are able to describe the concept of Information System Analysis and development life cycle.

CO2: Explain the purpose of Information Requirement Analysis, Data modeling with logical entity relationship diagrams, Feasibility study and cost estimation.

CO3: Understand System Designing & Implementation of object oriented analysis and design.

CO4: Solve Managerial Issues in Software Projects using CASE tools.

CO5: Analysis and design models using object modeling techniques and object oriented database.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11
CO1		H	M		H						
CO2	H					M					
CO3							M	H			H
CO4		H		H							
CO5	M				M				M		

H = Highly Related; M = Medium; L = Low

### **Text Books**

1. Howryskiewycz , "Systems Analysis and Design", PHI Publications

### **Reference Books**

1. Analysis and Design of Information Systems, Senn, TMH
2. System Analysis and Design Methods, Whitten, Bentley.
3. Shelly Cashman Series , "System Analysis & Design" , 4<sup>th</sup> Ed., Thomson Press
4. Analysis and Design of Information Systems, Rajaraman,PHI

**Course Name: Digital Electronics**

**Course Code: BCA104A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
3	0	0	3

### **Course Objective:**

1. To introduce the concept a comprehensive introduction to digital logic design leading to the ability to understand number system representations.
2. To know binary codes, binary arithmetic and Boolean algebra, its axioms and theorems, and its relevance to digital logic design.

3. To know about synchronous sequential logic and Asynchronous sequential logic.
4. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
5. To prepare students to perform the analysis and design of various digital electronic circuits.

## Syllabus

### Unit I

**Binary Systems:** Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

### Unit II

**Boolean Algebra and Logic Gates:** Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operating, Digital Logic Operations, Digital Logic Gates, Integrated Circuits.

### Unit III

**Simplification of Boolean Functions:** Karnaugh map and Quine-Mccluskey methods, SOP, POS simplification, NAND and NOR implementations Don't - Care Conditions, Exclusive - OR Function.

### Unit IV

**Combinational Logic Design:** Combinational Circuits, Analysis Procedure, Design Procedure, Adder: Half adder, Full adder, Serial adder, Parallel adder & Carry look-ahead adder, Subtractors : Half subtractor & Fullsubtractor, Decoders, Encoders, Multiplexers.

## **Unit V**

**Synchronous Sequential Logic:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure. Registers and Circuits: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters.

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Know how digital logic design is used to represent computer systems and recall the use of digital IC's, Transistor.

CO2: Illustrate the concept of SOP, POS simplification and NAND, NOR implementations.

CO3: Know concepts of Boolean algebra, its theorems, and its relevance to digital logic design.

CO4: Demonstrate the concept of Boolean functions, multiplexer trees and de-multiplexer.

CO5: Understand the concept of sequential logic and design procedures.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcom e</b>	<b>Program Outcome</b>

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P01 0	P01 1	P01 2
C01			H				M		M			
C02		H						M				
C03					H	M						
C04				H				M				
C05	M								M		L	

H = Highly Related; M = Medium; L = Low

### Text Books

1. M Morris Mano, " Digital Design" , 3rd Edition, 2006, PHI

### Reference Books

1. Bignell& Donovan Digital Electronics, 4th Edition, 2007, Thomson Learning.
2. R. P Jain, Modern Digital Electronics, Second Edition, TMH
3. L K Maheswari and M M S Anand, "Laboratory Manual for Introductory Electronic Experiments", New Age, 2010.
4. S Poornachandra Rao and B Sasikala, "Handbook of Experiments in Electronics and Communication Engineering",Vikas publishers, 2003.

**Course Name: Communication Skills**

**Course code: BCA105A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To understand the basic concepts of three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
2. To have a deep insight into the techniques for delivering effective presentations.
3. To have a deep insight for winning job interviews and actively participating in various forms of group communication.
4. To apply the critical and creative thinking abilities necessary for effective communication in today's business world.
5. To summarize the better writing skills by briefing the learners to the dynamics of effective writing.

### **Syllabus**

#### **Unit I**

##### **Essentials of Grammar**

1. Parts of Speech
2. Articles
3. Question Tags
4. Conditional Sentences
5. Modal Verbs

#### **Unit II**

##### **Applied Grammar**

1. Tenses
2. Passive Voice
3. Indirect Speech
4. Relative Clauses

## **Unit III**

### **Composition**

Dialogue Writing

Paragraph Writing

Precise Writing

Report, its importance and Report Writing

## **Unit IV**

### **Poems**

1. The Character of A Happy Life: Sir Henry Wotton
2. No Men are Foreign: James Kirkup
3. If : Rudyard Kipling

## **Unit V**

### **Short Stories**

1. How Much Land Does a Man Need?: Leo Tolstoy
2. The Last Leaf: O. Henry

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understand the communication processes and practices in academic and professional contexts.

CO2: Able to understand the concept and basics of communication and essentials of grammar.

CO3: Students are able to work with jumble words and grammar.

CO4: Enhance the knowledge of composition; produce written academic and professional documents.

CO5: Have the capability to apply an ability to properly carry out the purpose and significance of the channels of Communication and improve writing skills for stories and poems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01	M	H									M	
C02					M							H
C03								H	M			
C04								H		M		
C05	H								H			

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Sanjay Kumar & Pushp Lata , "Communication Skills ", Second Edition, Oxford University Press.

**Reference Books**

1. English for Engineers: Made Easy, AedaAbidi&RituChaudhary, Cengage Learning, (New Delhi)
2. A Practical Course for Developing Writing Skills in English, J.K. Gangal, PHI Learning Pvt. Ltd., New Delhi.
3. Intermediate Grammar, Usage and Composition, Tickoo, A. E. Subramaniam& P. R.Subramaniam, Orient Longman (New Delhi)
4. The Written Word , Vandana R. Singh, Oxford University Press (New Delhi)R.T.U., Kota Scheme and

**Course Name: Office Automation Tools Lab**

**Course Code: BCA106A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**List of Sample Programs**

Elaborate these topics in with the help of following tools ie. open office/MS office/Libre office

**1. Introduction**

- 1.1. Concept of Windows, Icon, Menu
- 1.2. Desktop
- 1.3. Creating Folders and Shortcuts
- 1.4. Finding Files & Folders
- 1.5. Creating, Copying, Moving and Deleting files
- 1.6. Windows Explorer

**2. Word Processing Package**

- 2.1. Typing, Editing, Proofing & reviewing
- 2.2. Formatting text & Paragraph
- 2.3. Automatics Formatting and Styles
- 2.4. Working with Tables

2.5. Graphics and Sound

2.6. Mail Merge

### **3. Spreadsheet package**

3.1. Concept of worksheet

3.2. Working & Editing in Workbooks

3.3. Creating Formats & Links

3.4. Protecting and Hiding data

3.5. Built in Functions (Mathematical, Statistical, String & Date)

3.6. Formatting a Worksheet & Creating graphics objects

3.7. Creating Charts (Graphics), Formatting and analyzing data

3.8. Sharing & Importing Data

3.9. Printing

### **4. Presentation Package**

4.1. Creating and Editing Slides

4.2. Creating and Editing objects in the slide

4.3. Animation

4.4. Creating and Running Slide Show

4.5. Templates

### **5. Internet**

5.1. Concepts

5.2. Working

5.3. Mailing & surfing tools

**Course Name: Programming Fundamentals using C-I Lab**

**Course Code: BCA107A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**List of Sample Programs**

1. Write a program to demonstrate the use of printf Statement to print values of variables of different data types.
2. Write a program to calculate the area of a triangle using Hero's formula.
3. Write a program to calculate the distance between two points.
4. Write a program to perform addition, Subtraction Division, Integer Division, Multiplication and modulo Division on two Integer numbers.
5. Write a program to subtract two long Integers.
6. Write a program to illustrate the use of Unary prefix increment and decrement operators.
7. Write a program to find the largest of three numbers using Ternary operators.

8. Write a program to show use of Bitwise operators.
9. Write a program to demonstrate the use of Assignment Operators
10. Write a program to Swap 2 numbers using a temporary variable.
11. Write a program to Swap 2 numbers without using a temporary variable.
12. Write a program to convert degrees fahrenheit into Degrees Celsius.
13. Write a program to convert a floating point number into the corresponding integer.
14. Write a program to convert an Integer into the Corresponding floating point number.
15. Write a program to determine whether a person is eligible to vote or not.
16. Write a program to determine the character entered by the user.
17. Write a program to find whether the given number is even or odd.
18. Write a program to find whether the given year is a leap year or not.
19. Write a program to test whether a number entered is positive , negative or equal to zero.
20. Write a program to input three numbers and then find largest of them using && operator.
21. Write a program to calculate the roots of a quadratic equation.
22. Write a program to demonstrate the use of switch statement without a break.
23. Write a program that accepts a number from 1 to 10. Print whether the number is even or odd using a switch case construct.
24. Write a program to print the following pattern

\*\*\*\*\*

\*\*\*\*\*

\*\*\*\*\*

\*\*\*\*\*

25. Write a program to print the following pattern

A

AB

ABC

ABCD

ABCDE

26. Write a program to print the Fibonacci series using recursion.

27. Write a program to read and display n numbers using an array.

28. Write a program to print the position of the smallest of a number using arrays.

29. Write a program to enter n number of digits. Form a number using these digits.

30. Write a program to transpose a 3X3 matrix.

31. Write a program to read and display a 3X3 matrix.

32. Write a program to print the elements of a 2D array.

33. Write a program to display a string using printf () .

34. Write a program to find the length of a string.

35. Write a program to convert characters of a string into lower case.

**Course Name: Communication Skills Lab**

**Course Code: BCA108A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

### **Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Sample Programs**

#### **Building Advanced Vocabulary**

1. Word Formation
2. Affixes
3. Words often Mis-spelt and Mis- Pronounced
4. Words often Confused
5. Homonyms and Homophones
6. One Word for Many.
7. Synonyms and Antonyms.
8. Jumbled Sentences
9. Practice Exercise of Linking Words (Conjunctions) on software
10. Practice Exercise of Tenses on soft ware
11. Practice Exercise of passive voice on software
12. Dialogue conversation Practice on software

**Course Name: Internet Lab**

**Course Code: BCA109A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

### **Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Sample Programs**

1. Basic exposure to World Wide Web and internet.
2. Implementing properties and settings of internet browsers.
3. Exposure to internet browsing through Mozilla, Firefox opera etc.
4. Implementing the use of online transactions, exposure to online shopping and e-commerce site.
5. Exposure to different types of search engines.
6. Implementing the search options in various search engines like google, bing, alta vista etc.
7. Implementing the settings of Proxy server, firewall settings, security features etc
8. Exposure to social media.
9. Creating an account on Facebook
10. Exploring the features and creating an account on LinkedIn.
11. Creating account and exploring the features of Twitter, pin interest, Tumblr etc.

### **Course Code: BCA110A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

#### **Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

#### **List of Sample Programs**

1. To study and verify the truth table of logic gates.
2. Design and implementation of Adder and Subtractor using logic gates.
3. Design and implementation of BCD to excess-3 code converter using logic gates.
4. Design and implementation of Binary to gray code converter using logic gates.
5. Design and implementation of 4 bit binary Adder/ subtractor using IC 7483
6. Design and implementation of 4 bit binary BCD adder using IC 7483
7. Design and implementation of 2 bit Magnitude Comparator using logic gates.
8. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
9. Design and implementation of multiplexer using logic gates, IC74150 and IC74154.
10. Design and implementation of De-multiplexer using logic gates, IC74150 and IC74154
11. Design and implementation of encoder using logic gates, IC7445 and IC74147
12. Design and implementation of decoder using logic gates, IC7445 and IC74147
13. Construction and verification of 4 bit ripple counter.
14. Design and implementation of 3-bit synchronous up/down counter.
15. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops

**Course Name: Seminar**

**Course Code: BCA111A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

**Course Objective:**

The students will present a seminar on a technical topic in front of class and faculty. The evaluation will be done on individual performance followed by submission of a written report on Seminar Topic.

## **SEMESTER II**

**Course Name: Environmental Studies**

**Course Code: BCA112A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives**

1. To define and use correctly the common terms of environmental science.
2. To explain what makes up the environment, how it functions, and how humans are part of it.
3. To apply the concepts and principles of environmental science to propose solutions to specific environmental problems.
4. To analysis environmental writings and predictions and their impact on subsequent developments in human relationship with the environment.
5. To evaluate the adequacy of conclusions about environmental phenomena.

### **Syllabus**

#### **Unit I**

**Introduction and Natural Resources:** Multidisciplinary nature and public awareness, Renewable and nonrenewal resources and associated problems, Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources, Conservation of natural resources and human role.

#### **Unit II**

**Ecosystems:** Concept, Structure and function, Producers composers and decomposers, Energy flow, Ecological succession, Food chains webs and ecological pyramids,

Characteristics structures and functions of ecosystems such as Forest, Grassland, Desert, Aquatic ecosystems.

### **Unit III**

**Biodiversity and Conservation:** Definition, Genetic, Species, and Ecosystem diversity, Bio-geographical classification of India, Value of biodiversity at global, national, local levels, India as a mega diversity nation, Hot spots of biodiversity, Threats to biodiversity, Endangered and endemic species of India, In-situ and ex-situ conservation of biodiversity.

### **Unit IV**

**Environmental Pollution:** Definition, Causes, effects and control of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards, human role in prevention of pollution, Solid waste management, Disaster management, floods, earthquake, cyclone and landslides.

### **Unit V**

**Social issues and Environment:** Unsustainable to sustainable development, Urban problems related to energy, Water conservation and watershed management, Resettlement and re-habitation, Ethics, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents, holocaust, Waste land reclamation, Consumerism and waste products, Environment protection act, Wildlife protection act, Forest conservation act, Environmental issues in legislation, population explosion and family welfare program, Environment and human health, HIV, Women and child welfare, Role of information technology in environment and human health.

### **Course Outcomes:**

**Upon successful completion of this subject students should be able to:**

CO1: Understand fundamental physical and biological principles that govern natural

processes.

CO2: Understand fundamental concepts from the social sciences and the humanities underlying environmental thought and governance.

CO3: Integrate and apply perspectives from across the natural sciences, social sciences, and the humanities in the context of complex environmental problems.

CO4: Apply the concepts and principles of environmental science to propose solutions to specific environmental problems.

CO5: Able to understand social and environmental issues.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcom e	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01				H						H		H
C02			H			H	M					
C03		H										
C04							H	H				
C05	H				M						L	

H = Highly Related; M = Medium; L = Low

#### **Text Book**

1. Rajgopalan , "Environmental Studies From Crisis to Cure" , (3e), Oxford University Press.

#### **Reference Book**

1. Agarwal, K.C., Environmental Biology, Nidi Publication Ltd., Bikaner, 2001.
2. BharuchaErach, Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmadabad, 2002.
3. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
4. Cunningham, W.P., et al., Environmental Encyclopedia, Jaico Publishing House, Mumbai, 2003.

**Course Name: Operating System**

**Course Code: BCA113A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To understand the services provided by and the design of an operating system.
2. To be able to understand the structure and organization of the file system.
3. To understand a process and processes synchronized and scheduled.
4. To be able to understand different approaches to memory management.
5. To understand the data structures and algorithms used to implement an OS.

**Syllabus**

**Unit I**

**Introduction:** Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, distributed systems, Different computing environments.

Operating System Organization: Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

## **Unit II**

**Process Management:** Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multithreading models, Non-pre-emptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

## **Unit III**

**Memory Management:** Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

## **Unit IV**

**File and I/O Management:** Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

## **Unit V**

**Protection and Security:** Policy mechanism, Program, Security problem, user authentication, program and system threats, Cryptography. Case study of UNIX operating system

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understand what are an operating system and the role it plays.

CO2: Understand the structure of operating systems, applications, and the relationship between them.

CO3: Have some knowledge of the services provided by operating systems. Also have some exposure to some details of major OS concepts.

CO4: Students should be able to use system calls for managing processes, memory and

the file system.

CO5: Students are able to apply scheduling algorithms and authentication.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1		H							M			
CO2				H								
CO3			H				M				M	
CO4			M									H
CO5		M			H					H		

H = Highly Related; M = Medium; L = Low

**Text Book**

- 1.A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8<sup>th</sup> edition, John Wiley Publications ,2008.

**Reference Books**

1. G. Nutt, Operating Systems: A Modern Perspective, 2<sup>nd</sup> edition Pearson Education ,1997.
2. A.S. Tanenbaum, Modern Operating Systems, 3<sup>rd</sup> edition, Pearson Education ,2007.
3. W. Stallings, Operating Systems, Internals & Design Principles, 5<sup>th</sup> edition, Prentice Hall of India, 2008.
4. "Operating Systems: Internals and Design Principles" by William Stallings

**Course Name: Database Management System**

**Course Code: BCA114A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	1	0	4

**Course Objectives:**

1. To enhance the fundamentals knowledge of data models and to conceptualize and depict a database system using ER diagram.
2. To develop programs and queries based on SQL and relational database,

and do fundamental Operations of Relational Algebra & their Implementation.

3. To be able to know the fundamental concepts of transaction processing management.
4. To justify the concept of concurrency control techniques and recovery procedure.
5. To have an introductory knowledge about the Storage and Query processing Techniques.

## Syllabus

### Unit I

**Basic Concepts:** Purpose of database systems-Components of DBMS – DBMS Architecture and Data Independence- Data modeling, Entity Relationship Model, Relational, Network, Hierarchical and object oriented models, Data Modeling using the Entity Relationship Model.

### Unit II

**Structure of relational databases:** Relational Constraints, Domain Constraints, Key Constraints Referential Integrity Constraints, Relational Algebra, Fundamental Operations of Relational Algebra & their Implementation, Data definition with SQL, insert, delete and update statements in SQL – views – data manipulation with SQL.

### Unit III

**Query Processing:** Methods for Joining Tables –Nested Loop Join Merge Join, Hybrid Join, Multiple table Join, Transforming Nested Queries to Joins, Object Relational SQL, Procedural SQL, Introduction to Embedded SQL.

### Unit III

**Database Design:** Integrity Constraints – Domain Constraints- Referential integrity – Functional Dependency- Normalization using Functional Dependencies, Normal forms based on primary keys- general definitions of Second and Third Normal Forms. Boyce Codd Normal Form- Multivalued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form.

## **Unit IV**

**Transaction Management:** Transaction Concept, ACID Properties, Transaction State, Implementation of ACID properties, Schedules.

## **Unit V**

**Concurrency Control:** Need of concurrency control, Concurrency control techniques, Lock based protocols, binary lock, share and exclusive lock, two phase locking protocol. Introduction to recovery.

**Course Outcomes:**

**Upon successful completion of this subject students should be able to:**

CO1: Recall the basic concept of DBMS and models of DBMS.

CO2: To know the fundamental concepts of transaction processing management.

CO3: To develop programs and queries based on SQL and relational database, and do fundamental Operations of Relational Algebra & their Implementation.

CO4: Contrast the concept of functional dependency, Norm forms, constraints and integrity

CO5: Able to understand the concept of concurrency control techniques and recovery.

## **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01	H		M						M			M
C02		H			H							
C03			M	H				M				
C04						M					M	H
C05	M						H					

H = Highly Related; M = Medium; L = Low

### Text Book

1. Fundamentals of Database System Elmasri and Navathe (4rd Edition), Pearson Education Asia (2008)

### Reference Books

1. An Introduction to Database Systems - C.J.Date (7th Edition) Pearson Education Asia (2006)
2. A.Silberschatz, H. Korth and S. Sudarshan, *Database System Concepts*, 5th Edition, McGraw Hill, 2010.
3. R. Ramakrishnan, J. Gehrke, *Database Management Systems*, 3<sup>rd</sup> edition, McGraw Hill International Edition, 2007.
4. Database System Concepts - Henry F Korth, Abraham Silbershatz, McGraw Hill 2nd edition. (2005)

**Course Name: Computer Architecture**

**Course Code: BCA115A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	1	0	4

### **Course Objectives:-**

1. To provide information about digital computer technology and computer system performance.
2. To describe concepts of instruction-set architecture.
3. To clear concepts of central processing unit and describes the structure of arithmetic/logic units.
4. To have a systematic understanding of the basic structure and operation of a digital computer.
5. To discuss in detail the operation of the arithmetic Unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.

### **Syllabus**

#### **Unit I**

**Background And Motivation:** Combinational Digital Circuits, Signals, Logic Operators, and Gates, Boolean Functions and Expressions, Designing Gate Networks, Useful Combinational Parts, Programmable Combinational Parts, Timing and Circuit Considerations

**Digital Circuits with Memory:** Latches, Flip-Flops, and Registers, Finite-State Machines, Designing Sequential Circuits

#### **Unit II**

**Computer System Technology & Performance:** From Components to Applications, Computer Systems and Their Parts, Generations of Progress, Processor and Memory Technologies, Peripherals, I/O, and Communications, Software Systems and Applications

Computer Performance: Cost, Performance, and Cost/Performance, Defining Computer Performance, Performance Measurement vs. Modeling Reporting Computer Performance, The Quest for Higher Performance

### **Unit III**

**Instruction-Set Architecture:** Instructions and Addressing: Abstract View of Hardware, Instruction Formats, Simple Arithmetic and Logic Instructions, Load and Store Instructions, Jump and Branch Instructions, Addressing Modes.

Procedures and Data: Simple Procedure Calls, Using the Stack for Data Storage, Parameters and Results, Data Types, Arrays and Pointers, Additional Instructions

### **Unit IV**

**Arithmetic/Logic Unit:** Number Representation: Positional Number Systems, Digit Sets and Encodings, Number-Radix Conversion, Signed Integers, Fixed-Point Numbers, Floating-Point Numbers.

Adders and Simple ALUs: Simple Adders, Carry Propagation Networks, Counting and Instrumentation, Design of Fast Adders, Logic and Shift Operations.

Multipliers and Dividers: Shift-Add Multiplication, Hardware Multipliers, Programmed Multiplication, Shift-Subtract Division, Hardware Dividers, Programmed Division.

### **Unit V**

**Memory System Design:** Main Memory Concepts: Memory Structure and SRAM, DRAM and Refresh Cycles, Hitting the Memory Wall, Pipelined and Interleaved Memory, Nonvolatile Memory, Need for a Memory Hierarchy.

Cache Memory Organization: The Need for a Cache, Direct-Mapped Cache, Set-Associative Cache, Cache and main Memory, improving Cache Performance.

### **Course Outcomes (COs):-**

**On successful completion of this course, the learner will be able to**

CO1: Students are able to understand concept of combination and digital circuits.

CO2: Able to understand Computer systems and Computer Performance.

CO3: To describe Instruction set Architecture, Simple Procedure Calls.

CO4: Able to understand ALU functioning and Architecture, Multipliers and Dividers.

CO5: Enhance the knowledge of Memory system design, cache memory organization and interleaved memory.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1				H					M			
CO2		M		M						M		
CO3	M				M		L					M
CO4			L					M				
CO5	H				L				M			

H = Highly Related; M = Medium; L = Low

**Text Book:**

1. Behrooz Parhami, "Computer Architecture", Fifth Edition, Oxford University Press, 2014

**Reference Books :**

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky, Naraig Manjikian, "Computer Organization and Embedded Systems", (6e), McGraw Hill Publication, 2012

2. D. A. Patterson and J. L. Hennessy, "Computer Organization and Design - The Hardware/Software Interface", (5e), Morgan Kaufmann, 2011
3. Mohammed Rafiquzzaman and Rajan Chandra, "Modern Computer Architecture", Galgotia Publications Pvt. Ltd. 2008.
4. William Stallings, "Computer Organization and Architecture Designing for Performance", (8e), PHI, 2009.

**Course Name: Programming Fundamentals using C-II**

**Course Code: BCA116A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	1	0	4

### **Course Objectives:**

1. To provide exposure to problem solving through programming.
2. To enhance the ability to solve the problem through various constructs of C such as decision control and looping statements.
3. To demonstrate the concept of functions, arrays, strings, pointers, structure and union.
4. To evaluate the concept of file management and pre-processor directives.
5. To explore major concepts of computer science and the process of computer programming, including programming, procedural and data abstraction and program modularity.

### **Syllabus**

#### **Unit I**

**Recap of basics using C:** Data types, variables, Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, break and continue Statements, Array, and String.

## **Unit II**

**Functions:** Function Declaration/Function Prototype, Definitions, Function call, Return Statement, Parameter passing, Scope of Variables, Storage classes, Recursive functions

## **Unit III**

**Pointers:** Computer's Memory, Introduction to Pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Generic Pointers, Passing Arguments, Pointers and Arrays, Pointers and Strings, Array of Pointers, Function Pointers, Array of Function Pointers, Pointers to Pointers

## **Unit IV**

**Structure & Union:** Structure Declarations, Typedef keyword, initialization, Accessing members, nested structure, Array of Structure, Structure with functions , Self-referential Structures, Union, Structure vs Union

## **Unit V**

**Files and Preprocessor Directives:** Files: Introduction to Files, Using Files in C , Writing to files, Read data, EOF, Error handling , Command line Arguments, Functions for Selecting a Record Randomly, Renaming the File, Temporary File.

Preprocessor Directives: Introduction, Types, #define, #include, #undef, #line, Pragma Directives, Conditional Directives, The Defined Operator, #error Directive, Predefined Macro Names.

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Students will learn the concept of character set identifiers and keywords, data type, variable names, declaration statements and basic structure of C program and Flow of Control and program Structures.

CO2: Student will classify the File handling, preprocessor directives and predefined macro names.

CO3: Students will apply the concept of Arithmetic operators, relational and logical

operators, type, conversion, Standard input and output, formatted output and input.

CO4: Students will contrast C programs based on Structures Union and Files.

CO5: Students will learn the concept of Arrays, Pointers, Null Pointers, and Generic Pointers

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcom e	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1				H						H		H
CO2			H			H	M					
CO3		H										
CO4							H	H				
CO5	H				M						L	

H = Highly Related; M = Medium; L = Low

#### **Text Book**

1. Reema Theraja , "Programming in C", Second Edition , Oxford University Press, 2016

#### **Reference Books**

1. Yeshwant kanetkar, Let us C, Fifteenth Edition, BPB Publication 2016.
2. Reema Thareja, "Introduction to C Programming", First Edition, Oxford University press, 2012.
3. Byron S Gottfriend, "Programming with C", Second Edition, Mc Graw Hill, 2007.
4. Herbert Schildt, Turbo C: The Complete Reference, Fourth edition, Mc Graw-Hill, 2017.

**Course Name: HTML Programming**

**Course Code: BCA117A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
2	0	0	2

**Course Objectives:**

1. To summarize the structure of HTML, XHTML and tags.
2. To demonstrate core HTML attributes id, class, style, title, core language, core events, Headings, Paragraphs and Breaks etc.
3. To visualize the basic concept of Images Preliminaries, Tables and layout of tables.
4. To recognize the elements of HTML, frameset, multimedia and video.
5. To introduce basics concept of CSS, Adding Style to a document, CSS and HTML Elements

## **Syllabus**

### **Unit I**

Introduction to HTML and XHTML- HTML Structure, Document types, Tag- HTML, Head, Title, Body, Elements and Characters, The Rules of HTML, XHTML: The rules enforced. Web Development Overview: Need for Careful Web Development, Basics Web Process Model, the Site Plan, Design, Phase Dissected, Testing.

### **Unit II**

Core Elements: Document Structure Redux, Core HTML Attributes- id, class, style, title, core language, core events, Headings, Paragraphs and Breaks, Division and Centering, Quotations, Preformatted Text. Creating Lists in HTML- Ordered lists, Unordered List, definite List. Horizontal Rules, Other block Level Elements- Address, Text Level Elements, Inserting and Deleted Text, Character Entities. Comments, Linking and Addressing- Linking Basics, UML, Linking in HTML, Anchor Attributes, Images and Anchors.

### **Unit III**

Images- Images Preliminaries, HTML Images Basics, Images as Buttons, Text, Color and Backgrounds- HTML Approach to Visual Design, Fonts, Colors in HTML, Color Attributes for Body, Background Images, Tables and Layout- Introduction to tables : the rowspan and colspan attributes, Table for Layout: cellpadding and cellspacing, cell alignment, colored tables and cells, background images in tables

### **Unit IV**

Frames: Overview of Frames, Simple Frame Example, The use of <noframes> Frame Targeting, Frame Layouts, Floating Frames.

Multimedia: Audio- Digital Sound Basics, Audio file formats and compression, Downloading and playing audio, MP3, Audio Inclusion Basics.

Vedio: Vedio Inclusion Basics, QuickTime, Streaming Vedio Choices.

Unit V

## CSS1: Style Sheet Basics, Adding Style to a document, CSS and HTML Elements, Selectors

## CSS1 Properties: Font, Text, List, Color and Background, box, Display.

CSS2: CSS2 Selectors, CSS Properties- Positioning and Sizing of Regions, z-index, Content Overflow Properties, Max and Min Height and Width, Clipping Regions, CSS2 Text and font Improvements, CSS2 Text and Font Improvements, CSS2 List Changes, Display Properties Changes.

## **Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Apply a structured approach to identifying needs, interests, and functionality of a website.

CO2: Demonstrate core HTML attributes id, class, style, title, core language, core events, Headings, Paragraphs and Breaks etc.

CO3: Visualize the basic concept of Images Preliminaries, Tables and layout of tables, accessible HTML code.

CO4: Write well-structured, easily maintained, standards-compliant CSS code to present HTML pages.

## C05: Recognize the elements of HTML, frameset, multimedia and video.

## **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>C02</b>				H								
<b>C03</b>					M				M			
<b>C04</b>		H				M					H	
<b>C05</b>	M			L				M				

H = Highly Related; M = Medium; L = Low

#### **Text Book:**

1. The Complete Reference HTML and XHTML by Thomas A. Powell, McGraw Hill, Forth Edition, 2007

#### **Reference Books:**

1. Beginning HTML, XHTML, CSS, and JavaScript, John Duckett, Wiley India, Forth Edition, 2008
2. HTML, XHTML, and CSS Bible, Steven M. Schafer, Wiley India, Fifth Edition, 2012
3. "HTML5: Designing Rich Internet Applications" by Matthew David
4. "HTML and CSS: Design and Build Websites" by Jon Duckett

**Course Name: Database Management System Lab**

**Course Code: BCA118A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

#### **Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Sample Programs**

1. Create and use the following database scheme to answer the given queries.

#### **EMPLOYEE Scheme**

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

#### **EMPLOYEE State**

Eno	Ename	Job_type	Manager	Hire_date	Dno	Commission	Salary
765	Martin	Sales_man	198	1981-04-22	30	1400.00	
				1250.00			
756	Jones	Manager	783	1981-04-02	20	0.00	2300.00
752	Ward	Sales_man	769	1981-02-22	30	500.00	1300.00
749	Allan	Sales_man	769	1981-02-20	30	300.00	2000.00
736	Smith	Clerk	790	1980-12-17	20	0.00	1000.00
793	Miller	Clerk	788	1982-01-23	4	0.00	1300.00
792	Ford	Analyst	756	1981-12-03	20	0.00	2600.00
790	James	Clerk	769	1981-12-03	30	0.00	
				950.00			
787	Adams	Clerk	778	1983-01-12	20	0.00	1150.00
784	Turner	Sales_man	769	1981-09-08	30	0.00	
				1450.00			

783	King	President	NULL	1981-11-17	10	0.00	2950.00
788	Scott	Analyst	756	1982-12-09	20	0.00	2850.00
778	Clark	Manager	783	1981-06-09	10	0.00	2900.00
769	Blake	Manager	783	1981-05-01	30	0.00	2870.00

### **DEPARTMENT Scheme**

Field	Type	NULL KEY DEFAULT		
Dno	Integer	No	PRI	NULL
Dname	Varchar(50)	Yes		NULL
Location	Varchar(50)	Yes		New Delhi

### **DEPARTMENT State**

Dno	Dname	Location
10	Accounting	New York
20	Research	Dallas
30	Sales	Chicago
40	Operation	Boston
50	Marketing	New Delhi

### **Query List**

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE\_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than \$2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is

not in the range of \$1500 and \$2850.

8. Query to display Employee Name and Department No. Of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don't have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission. Sort the data in descending order of Salary and Commission.
12. Query to display Name of all the employees where the third letter of their name is 'A'.
13. Query to display Name of all employees either have two 'R's or have two 'A's in their name and are either in Dept No = 30 or their Manager's Employee No = 7788.
14. Query to display Name, Salary and Commission for all employees whose Commission Amount is greater than their Salary increased by 5%.
15. Query to display the Current Date.
16. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
17. Query to display Name and calculate the number of months between today and the date each employee was hired.
18. Query to display the following for each employee:-  

<E-Name> earns < Salary> monthly but wants < 3 \* Current Salary >.  
Label the Column as Dream Salary.
19. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with 'J', 'A' and 'M'.
20. Query to display Name, Hire Date and Day of the week on which the employee started.
21. Query to display Name, Department Name and Department No for all the employees.
22. Query to display Unique Listing of all Jobs that are in Department # 30.
23. Query to display Name, Dept Name of all employees who have an 'A' in their

name.

24. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
25. Query to display Name and Employee no. Along with their Manager's Name and the Manager's employee no; along with the Employees' Name who do not have a Manager.
26. Query to display Name, Dept No. And Salary of any employee whose department No. And salary matches both the department no. And the salary of any employee who earns a commission.
27. Query to display Name and Salaries represented by asterisks, where each asterisk (\*) signifies \$100.
28. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
29. Query to display the number of employees performing the same Job type functions.
30. Query to display the no. Of managers without listing their names.
31. Query to display the Department Name, Location Name, No. Of Employees and the average salary for all employees in that department.
32. Query to display Name and Hire Date for all employees in the same dept. As Blake.
33. Query to display the Employee No. And Name for all employees who earn more than the average salary.

**Course Name: Programming Fundamentals using C-II Lab**

**Course Code: BCA119A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**List of Sample Programs**

1. Write a program to demonstrate the use of printf Statement to print values of variables of different data types.
2. Write a program to calculate the area of a triangle using Hero's formula.
3. Write a program to calculate the distance between two points.
4. Write a program to perform addition, Subtraction Division, Integer Division, Multiplication and modulo Division on two Integer numbers.
5. Write a program to subtract two long Integers.
6. Write a program to illustrate the use of Unary prefix increment and decrement operators.

7. Write a program to find the largest of three numbers using Ternary operators.
8. Write a program to show use of Bitwise operators.
9. Write a program to demonstrate the use of Assignment Operators
10. Write a program to Swap 2 numbers using a temporary variable.
11. Write a program to Swap 2 numbers without using a temporary variable.
12. Write a program to convert degrees fahrenheit into Degrees Celsius.
13. Write a program to convert a floating point number into the corresponding integer.
14. Write a program to convert an Integer into the Corresponding floating point number.
15. Write a program to determine whether a person is eligible to vote or not.
16. Write a program to determine the character entered by the user.
17. Write a program to find whether the given number is even or odd.
18. Write a program to find whether the given year is a leap year or not.
19. Write a program to test whether a number entered is positive , negative or equal to zero.
20. Write a program to input three numbers and then find largest of them using && operator.
21. Write a program to calculate the roots of a quadratic equation.
22. Write a program to demonstrate the use of switch statement without a break.
23. Write a program to determine whether an entered character is a vowel or not.
24. Write a program to enter a number from 1 to 7 and display the corresponding day of the week using switch case statement.

25. Write a program that accepts a number from 1 to 10. Print whether the number is even or odd using a switch case construct.

26. Write a program to print the following pattern

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\*\*\*\*\*

\*\*\*\*\*

\*\*\*\*\*

27. Write a program to print the following pattern

A

AB

ABC

ABCD

ABCDE

28. Write a function to swap the value of two variables.

29. Write a program to calculate area of a circle using function.

30. Write a program to print the Fibonacci series using recursion.

31. Write a program to read and display n numbers using an array.

32. Write a program to print the position of the smallest of a number using arrays.

33. Write a program to enter n number of digits. Form a number using these digits.

34. Write a program to transpose a 3X3 matrix.

35. Write a program to read and display a 3X3 matrix.

36. Write a program to enter n number of digits. Form a number using these digits.

37. Write a program to implement linear search.

38. Write a program to implement Binary search.

39. Write a program to print the elements of a 2D array.
40. Write a program to display a string using printf () .
41. Write a program to find the length of a string.
42. Write a program to convert characters of a string into lower case.
43. Write a program to print Hello worlds using pointers.
44. Write a program to calculate area of circle.
45. Write a program to display the sum and average of numbers from m to n.
46. Write a program to calculate area of a Triangle.
47. Write a program using structures to find the largest of three numbers.
48. Write a program to read a file character by character, and display it simultaneously on the screen.
49. Write a program to count the number of characters and number of lines in a file.
50. Write a program to copy one file into another .copy one character at a time.

**Course Name: HTML Lab**

**Course Code: BCA120A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**List of Sample Programs**

1. Create a Web Page using HTML To Display "Welcome to the World of HTML" using basic HTML tags.
2. Create a Web Page using HTML using Headings, Paragraphs and Breaks HTML Tags.
3. Write a program to design a Bio-Data.
4. Write a program in html to create a webpage with four frames (Picture, table, list, and hyperlink)
5. Write a program to create a Ordered List in HTML
6. Write a program to create a Unordered List in HTML
7. Write a program to create a Defined List in HTML
8. Write a program in html to create a webpage to show different hobbies.
9. Write a program in html to Implementation Of Table Tag
10. Write a program in html to create a webpage with four frames (Picture, table, list,

and hyperlink).

11. Write a program in html to create a webpage to show the block level elements and text level elements.
12. Write a program in html to create a webpage to show various confectionary items using ordered list and unordered list.
13. Write a program in html to create a webpage to show different hobbies.
14. Write a program in html to show India map.
15. Write a program in html to create a web page using style sheet.
16. Write a program in html to create a web page to show registration naukri.com.
17. Write a program in html to show books in inventory in different tables by using rowspan and colspan.
18. Create a Web Page in HTML to show Admission form in some university.
19. A Web Page in HTML to show all the Text, Color, Background and Font Elements.
20. Write a Program to Create a Nested List.
21. Write a program to create menu using HTML and CSS
22. Design of the cart page and the registration page required for online book store.

**Course Name: UNIX and Shell Programming Lab**

**Course Code: BCA121A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**List of Sample Programs**

1. Demonstrate how to use the following Bourne Shell commands: cat, grep, ls, more, ps, chmod, finger, ftp, etc.
2. Use the following Bourne Shell constructs: test, if then, if then else, if then elif, for, while, until, and case.
3. Copy, move, and delete files and directories.
4. Write moderately complex Shell scripts.
5. Make a Shell script executable.
6. Create a ".profile" script to customize the user environment.
7. Execute programs written in C under UNIX environment
8. Learn tracing mechanisms (for debugging), user variables, Bourne Shell variables, read-only variables, positional parameters, reading input to a Bourne Shell script,

command substitution, comments, and exporting variables. In addition, test on numeric values, test on file type, and test on character strings are covered.

9. Use advanced features of File Transfer Protocol (FTP)
10. Compile source code into object and executable modules.

## **Semester III**

**Course Name: Principles and Practices of Management**

**Course Code: BCA122A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To discuss, understand, and present management principles, processes and procedures in consideration of their effort on individual actions.
2. To participate, summarize and lead class discussions case problems
3. To be able to understand the concept of environment and environment relationship.
4. To knowledge and understanding of the Principles of Management
5. To enable the students to manage valuable insight into the workings of business and other organizations.

### **Syllabus**

#### **Unit I**

**Introduction:** Concepts of management, The management process and function, Types and roles of managers, Managerial levels and skills, Emerging challenges for management.

Management Theories: Scientific management school, Administrative management, Behavioral School, Management science school, Systems approach, Contingency approach.

## **Unit II**

**Environmental Context:** Concept of environment, External environment and internal environment, Organization- environment relationships, Managerial ethics, Social responsibility, Planning and Decision Making: Planning an overview, Importance of planning, Purpose and functions of organizational goals, Types of planning, Concept of strategic planning, Situational analysis, Managerial decision making: nature of decision making, styles and conditions of decision making, group decision making, tools for planning and decision making

## **Unit III**

**Organizational Design and Structure:** Meaning, Principles and approaches to organizing, job design, Departmentation, Nature and types of organization design, Situational influence on organizational design, informal organization, Authority, power and responsibility, Delegation and decentralization of authority, Emerging concepts in organizing

## **Unit IV**

**Motivation:** the motivational process, the need-hierarchy and motivation-hygiene theories, Motivation through employee participation

**Communication and Team Work:** Concept, nature, and forms of organizational communication, Informal communication, Interpersonal communication, barriers to communication, Groups and teams: concept and characteristics, Interpersonal and inter-group conflicts, Managing conflicts

## **Unit V**

**Control and Quality Management:** Elements of control, Nature and types of control, Managing control in organization, Information for effective control, MIS and DSS, TQM,

Factors effecting quality. Deming management

International Management: Globalization – concept, nature and forms. Methods of globalization, changing international management scenario. Multinational companies – meaning and types, effects and benefits

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Introduction to relation between management and behavior.

CO2: Define management, quality management, and project management in respect of planning & Decision making.

CO3: Identify relevant issues in human resource management with leadership qualities.

CO4: Understands the theories and practices of Communication and team work in management.

CO5: Describe International Management with Quality control concepts.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	H							L				H
CO2		M				H	M					
CO3				H						H		
CO4							H					
CO5	H				M						L	

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. Stoner J.A. and Freeman R.E, "Management", VI Edition , Prentice hall India

### **Reference Books**

1. Parkinson C.N., Rustomji M.K. and Sapre S.A, "Great Ideas in Management".
2. S.K. Mandal , "Management: Principles and Practice"
3. Lallan Prasad, S S Gulshan,"Management Principles and Practices".
4. "Great Ideas in Management" by Parkinson C N and Rustomji M K and Sapre S A

**Course Name: Programming in PHP**

**Course Code: BCA123A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
3	0	0	3

### **Course Objectives:**

1. To demonstrate the basics of the PHP and MYSQL, PHP configuration in IIS & Apache Web Server and features of PHP.
2. To understand how PHP, HTML and MYSQL work together to produce dynamic pages.
3. To apply specific PHP variables, data types, syntax and conditional statements.

4. To be able to apply control statements and database connectivity.
5. To make use of string functions and array functions.

## **Syllabus**

### **Unit I**

Introduction to PHP, Installation of PHP and MySQL, PHP configuration in IIS & Apache Web Server and features of PHP, Writing PHP, How PHP code is parsed, Embedding PHP and HTML Executing PHP and viewing in Browser.

### **Unit II**

Data types, Operators, PHP variables: static and global variables, Comments in PHP, Control Structures, Condition statements, If...Else, Switch, ? operator, Loops, While, Break Statement Continue. Do...While, For, For each, Exit, Die, Return

### **Unit III**

Arrays in PHP, Working With Data, FORM element, INPUT elements, Validating the user input, Passing variables between pages, Passing variables through GET, Passing variables through POST, Passing variables through REQUEST, Working With Data, Built-in functions.

### **Unit IV**

String Functions: chr, ord, strtolower, strtoupper, strlen, ltrim, rtrim, substr, strcmp, strcasecmp, strpos, strrpos, strstr, striistr, str\_replace, strrev, echo, print, Math Functions: abs, ceil, floor, round, fmod, min, max, pow, sqrt, rand.

### **Unit V**

Array Functions: count, list, in\_array, current, next, previous, end, each, sort, rsort, assort, array\_merge, array\_reverse User Defined Functions. Sessions and cookies, Concept of Session Starting session, Modifying session variables, registering and deleting session

variable Concept of Cookies.

**Course Outcomes:**

**Upon successful completion of this subject students should be able to:**

CO1: Demonstrate the basics of the PHP and MYSQL, PHP configuration in IIS & Apache Web Server and features of PHP.

CO2: Examine how web pages are developed using PHP array, form and input elements.

CO3: Apply specific PHP variables, data types, syntax and conditional statements.

CO4: Understand the basics of array functions and user defined functions.

CO5: Understand the basics of string functions like chr, ord, strtolower, strtoupper, strlen.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	H							L				H
CO2		M				H	M					
CO3				H						H		
CO4							H					
CO5	H				M						L	

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Core PHP Programming, Leon Atkinson Pearson publishers, 2nd Edition, ISBN-13: 978-0130893987.

## **Reference Books**

1. PHP Cookbook by David Sklar and Adam Trachtenberg, O'Reilly Media, Inc., ISBN: 978-1-449-36375-8.
2. The Complete Reference PHP, SteverHolzner McGraw Hill, Edition: 1 ISBN: 9780070223622.
3. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book" by Kogent Learning Solutions Inc.
4. "Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP ( 4th Revised Edition ) CD-ROM Included" by Ivan Batross

**Course Name: Basic Mathematics**

**Course Code: BCA124A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
3	0	0	3

## **Course Objectives:**

1. To be able to learn the concept of basic mathematics terms for competition exams.
2. To learn the basic operations like addition, subtraction, multiplication and division.
3. To demonstrate the concept of number system and binary numbers.
4. To be able to work with Time and Work, solve problem Based on Ages, Profit and Loss, Simple Interest, Compound Interest.
5. To be able to classify the basic reasoning concepts.

## **Syllabus**

### **Unit I**

**Basic Operations:** Addition, Addition and subtraction in a single row, Multiplication, multiply by different numbers, Divisibility, Divisibility by different number, Squaring, Cube, HCF & LCM, HCF and LCM of decimal numbers and fractions, Fractions, Decimal Fractions,

### **Unit II**

Elementary Algebra, Surds, Number System, Binary System, Permutation & Combination, Probability, Ratio and Proportion, Partnership, Percentage, Calculation oriented basic Percentage Problems, Average, and Problem Based on Ages, Profit and Loss, Simple Interest, Compound Interest, Allegation

### **Unit III**

Time and Work, Work and Wages, Pipes and Cisterns, Time and Distance, Problems on Average/Relative speeds, Boats, Trains, Trains, Streams, Series, Data Sufficiency, Data Analysis, Problems on Bar/Line Graphs, Pie Charts, Tables.

### **Unit IV**

**Reasoning Classification:** Number, Letter, GK and Meaningful Words, Analogy, Coding

Decoding: Coding by Analogy, Coding and decoding by letter shifting & Coding Letters of a Word, Puzzle: Number based puzzles; Puzzle Quant based questions like on age, speed and distance or Seating arrangement questions.

## **Unit V**

Blood Relations: Family Tree or General Blood Relation Problems, Missing Number: missing number from the given matrix or diagram, Series: Number & Alphabet series, Non Verbal Reasoning: Complete the pattern, Assemble Image, Mirror Image, Hidden Image, Counting Figures.

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to**

CO1: Learn the basic operations like addition, subtraction, multiplication and division.

CO2: Able to work with Time and Work, solve problem Based on Ages, Profit and Loss, Simple Interest, Compound Interest.

CO3: Demonstrate the concept of number system and binary numbers.

CO4: Able to classify the basic reasoning concepts.

CO5: Determine the concept of blood relations, number series, Non Verbal Reasoning.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1		H							M			
CO2						M				H		
CO3				H				M				
CO4						M					H	

C05	H				M								L
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H = Highly Related; M = Medium; L = Low

### **Text Book**

1. Magical Book on Quicker Maths by M. Tyra.
2. Verbal Reasoning and non verbal by M. Tyra

### **Reference Books**

1. Quantitative Aptitude by R.S. Agarwal.
2. A Modern Approach to Verbal & Non – Verbal Reasoning by R.S. Agarwal.
3. Fast track objective arithmetic by Rajesh Verma.

**Course Name: Data Structures and Algorithms using C**

**Course Code: BCA125A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	1	0	4

**Course Objectives:**

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques.
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To understand about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.
5. To impart the basic concepts of algorithms implementation in optimized time .

**Syllabus**

**Unit I**

**Introduction to Data Structures and Algorithms:** Elementary Data Structure Organization, Classification of Data Structures, Operation of Data Structures, Operations on Data Structures ,Abstract Data Type ,Algorithms, Different Approaches to, Designing an Algorithm, Control Structures Used in Algorithms, Time and Space Complexity, Omega Notation ( $\Omega$ ), Theta Notation ( $\Theta$ ) ,Other Useful Notations.

**UNIT 2: Array and Linked List**

Declaration of Arrays, Accessing the Elements of an Array, Storing Values in Array, operations, Passing Array to functions, Pointers and Arrays, Arrays of Pointers, Two-dimensional Arrays, Operations on , Passing Two-dimensional Arrays to Functions, Pointers and Two-dimensional Arrays, Sparse Matrices .

Linked list Basic Terminologies, Memory Allocation and De-allocation for a Linked List, Singly Linked Lists, Circular Linked Lists, Doubly Linked Lists, Circular Doubly Linked

Lists, Header Linked Lists, Multi-linked Lists, Applications of Linked Lists.

### **UNIT 3: Stacks and Queues**

**Stack:** Array Representation of Stack, Operations on Stack, linked Representation of Stacks, Operations on a Linked Stack, Multiple Stacks, Applications of Stack,

**Queues:** Introduction to Queues, Array Representation of Queues ,Linked Representation of Queues, Types of Queues , Applications of Queues

### **UNIT 4 : Trees and BST**

Trees: Types of trees , Creating a Binary Tree from a General Tree, Traversing a Binary Tree, Huffman's Tree

Binary Search Trees: BST Operations, Threaded Binary Trees, AVL Trees, Red-Black Trees, Splay Trees

### **UNIT 5: Graph, Searching & Sorting**

Basic Terminologies, Directed Graphs, Representations of Graphs, Graph Traversals Algorithms, Topological Sorting, Shortest-Path Algorithms.

**Searching & Sorting:** Introduction to searching, Linear and Binary Search, Interpolation Search, jump search, Sorting Types, Bubble, Insertion, Selection , Merge Sort, Radix Sort Shell Sort, Quick Sort, Heap Sort.

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: Ability to analyse algorithms and a algorithm correctness.

CO2: Ability to implement various techniques of link list.

CO3: Ability to describe stack, queue with linked list operation.

CO4: Ability to have knowledge of tree and graphs concepts.

CO5: Ability to summarize searching and sorting techniques

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01		H							M			
C02						M				H		
C03				H				M				
C04						M					H	
C05	H				M							L

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Reema Thereja,, "Data Structure using C" , Second Edition , Oxford University Press, 2014

**Reference Books**

1. R. G. Dromey, "How to Solve it by Computer", Second Edition, Prentice-Hall of India, 2002.
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, 2002.
3. ISRD Group, "Data Structures using C", Fifth Edition Tata McGraw Hill, 2007
4. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode" Third Edition Prentice-Hall of India, 2004.

**Course Name: Programming Fundamentals using C++**

**Course Code: BCA126A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	1	0	4

**Course Objectives:**

1. To explain the difference between object oriented programming and procedural programming and features of object oriented programming.
2. To be able to create programs using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
3. To be able to build C++ classes using appropriate encapsulation, objects and functions.
4. To be able to apply operator overloading in different form.
5. To be able to understand the working of files.

**Syllabus**

**Unit I**

**Introduction to Object Oriented Programming:** Generation of Programming, Programming Paradigms, Features of Object Oriented Programming , Introduction to C++, History of C++, Structure, First Program, Compiling and Executing C++, Using Comments, Tokens, Character Set, Keywords, Identifiers, Data Types, Variables, Constants, Input and Output Statements, Operators in C++, Operator Precedence and Associability, Decision Control and Looping, Statements, Functions, Arrays, Strings, Pointers, Structure, Union, and Enumerated Data Types

## **Unit II**

**Classes and Objects:** Introduction , Class, Creating Objects, Accessing Object Members, Nested Member Functions, Making a Member Function Inline, Memory Allocation for Class and Objects, Array of Objects, DMA, Objects as Function Arguments, Returning Objects, this pointer, Constant Parameters and Members, Pointers Within a Class , Empty Classes, Friend Classes, Constructor, Types of Constructors, Constructor with Arguments, Constructor Overloading, Destructors

## **Unit III**

**Operator Overloading and Type Conversions:** Scope of Operator Overloading, Syntax, Not Overloading Operators, Implementing Operator, Overloading Unary Operators, Overloading Binary Operators, Overloading Special Operators, Type Conversions

## **Unit IV**

**Inheritance:** Defining Derived Classes, Access Specifies, Inheritance, Types of Inheritance, Single Inheritance, Constructors and Destructors in Derived Class, Constructor in Multi-Level, Multi-Level Inheritance, Constructor in Multi-Level Inheritance, Multiple Inheritance, Hierarchical Inheritance, Multi-path Inheritance.

## **Unit V**

**File Handling:** Streams in C++, Classes for File Stream, Opening and Closing of Files, Detecting the End-of-File, Files Modes, File pointer.

### **Course Outcomes:**

**Upon successful completion of this subject students should be able to:**

- CO1: Understand the features of C++ supporting object oriented programming
- CO2: Be able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
- CO3: Be able to apply operator overloading in different form.

CO4: Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism

CO5: Able to understand the working with files like opening and closing of files.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcom e	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1		L	H				M		M			
CO2		H			L			M				L
CO3	H				H	M			L			
CO4			H	H			L	M				
CO5		L							H		M	

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Reema Thereja, "Object Oriented Programming with C++", First Edition, Oxford University Press ,2015

**Reference Books**

1. Object Oriented Programming with C++, Sourav sahay, Oxford University, Sept 2012.

2. Let Us C: Bala Guruswamy, TATA McGraw Hill.
3. Richard F. Gilberg, Behrouz A. Forouzan, "Data structures, A Pseudocode Approach with C", (2e), Cengage Learning India Pvt.Ltd, India, 2009.
4. Robert Kruc & Bruce Lening, "Data structures & Program Design in C", (2e), Pearson, 2007.

**Course Name: Software Engineering**

**Course Code: BCA127A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives**

1. To provide a comprehensive overview of Software Engineering
2. To understand the full software development life cycle, including a thorough coverage of methods, tools, principles, and guidelines.
3. To understand software metrics, real-time software design, quality assurance, reliability, risk management, cost and schedule estimation, sizing, planning, test and integration process, technical management and human
4. To be able to work with software metrics (attributes) to measure properties of the software product as a means to evaluate and control the development process.
5. To understand the concept of planning and managing the software development.

### **Syllabus**

## **Unit I**

**Software Engineering Introduction:** Motivation, Definition of Software Engineering, Characteristics of Software, Problems Confronted by Software Engineering, The Software Engineering Response, Challenges with the Response, Grand Challenge. Evolution of Software Engineering: Motivation, History, Evolutionary Trends, Programming to Software Engineering.

## **Unit II**

**Planning and Managing Software Development:** Software Development Methodologies: A Method to the Madness, Software Development Life Cycle Algorithm, Process, and Methodology, Different Development Philosophies, People and Processes Software Estimation: Science and Art of Software Estimation, Importance of Estimation in Software Development, Estimating Size, Estimating Effort, Estimating Time, Estimation and Experience, COCOMO

Metrics in Software Development: Need for Measurement, Metrics Go beyond Mere Measuring, Metrics, Management, and Beyond, Brief Review of Software Metrics, Function point, LOC.

## **Unit III**

**Software Making:** Software Architecture: Architectural Views of Software, Views and Definitions of Software Architecture, Need for Architecture in Large-Scale Software Systems, How Architecture Differs from Design, Architectural Patterns, Future of Software Architecture,

## **Unit IV**

**Languages of Software Development:** Incremental Approach to Learn Languages, Programming Languages, Modeling Languages, Specification Languages  
**Software Development across Workflows and Phases:** Dimensionality of Software Development Phases and Workflows in Perspective, Model for Software Development

## **Unit V**

## **Testing, Maintaining:** Software Testing, Reliability, and Quality: Some Testing Terms, Some Testing Tenets, Testing Philosophies, Different Types of Testing, Inspections, Walkthroughs, and Reviews, Case Study

## **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

## C01: Understanding of Basics of Software Engineering & Development.

CO2: Understanding of Different-2 models, Software Matrices and Estimation.

CO3: Understanding of Software Development across Workflows and Phases, languages & Architecture.

## CO4: Understanding of different -3 testing strategies and tools.

## C05: Be exposed to World Wide Web and Enterprise Software Development.

## **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. Software Engineering Fundamentals, Oxford, Ali Behforooz and Frederick Hudson, October 2012.

### **Reference Books**

1. Pressman, R.S., "Software engineering" A Practitioner's Approach", Third Edition, Jalote, P., "An Integrated Approach to Software Engineering". Narosa 1991.
2. Jalote P., "An Integrated approach to Software Engineering", Narosa,1991.
3. Ghezzi Carlo and Others "Fundamentals of Software Engineering" PHI
4. Fairley R., "Software Engineering Concepts", Tata McGraw Hill, 1997.

**Course Name: PHP Lab**

**Course Code: BCA128A**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

### **Course Objectives**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Sample Programs**

1. WAP to reverse the string without using any predefined function
2. WAP to check the season of the year according to given month using control statement (Switch statement)
  - a. spring month 3,4,5

- b. summer month 6,7,8
  - c. autumn month 9,10,11
  - d. winter month 12,1,2
3. WAP to create an array for employee names and associate another array of employee's salary and print these values using for each loop.
  4. WAP that will accept an array of integers as input and output an array where for each item in the source array, the new array will perform the following operations:-
    - a. for even numbers divide by 2
    - b. for odd number multiply by 3
  5. WAP to make sure a value has been supplied for a form element. For example, you want to make sure a text box hasn't been left blank.
  6. WAP to know whether an email address a user has provided is valid.
  7. WAP in php to show the values in the input fields after the user hits the submit button
  8. WAP create a form with one text field and submit button to find string in lower case, uppercase, sub string, position of a string and trimmed string
  9. WAP to find whether a given string is subset of another given string or not
  10. WAP to find square and square root of a randomly generated number
  11. WAP to merge 2 associative array sort that array in :-
    - a. ascending order
    - b. descending order
    - c. in key sorted form
  12. WAP to generate captcha code
  13. WAP to create session, provide it name and id and display their values and finally delete the session.
  14. WAP to in which you want to set a cookie so that your website can recognize subsequent requests from the same web browser.
  15. WAP to in which you want to read the value of a cookie that you've previously set.
  16. WAP in which You want direct access to the body of a request, not just the parsed data that PHP puts in \$\_POST for you. For example, you want to handle an XML document that's been posted as part of a web services request.

17. WAP to shows how to use validate().
18. WAP to Call ob\_start() at the top of your page and ob\_end\_flush() at the bottom. You can then intermix commands that generate output and commands that send headers.
19. WAP to send compressed content to browsers that support automatic decompression.
20. WAP to use the same HTML page to emit a form and then process the data entered into it. In other words, you're trying to avoid a proliferation of pages that each handle different steps in a transaction.
21. WAP in which you have data that can be easily represented as key/value pairs, want to store it safely, and have very fast lookups based on those keys.
22. WAP in which you want access to a SQL database to store or retrieve information. Without a database, dynamic websites aren't very dynamic.
23. WAP in which you want to retrieve some data from your database.
24. WAP in which you want a concise way to execute a query and retrieve the data it returns.
25. WAP in which you want to know how many rows a SELECT query returned, or you want to know how many rows an INSERT, UPDATE, or DELETE query changed.
26. WAP in which you need to make text or binary data safe for queries

**Course Name: Data Structure and Algorithm using C Lab**

**Course Code: BCA129A**

L (Hr.)	T/P (Hr.)	Pr (Hr.)	Credits
0	0	2	2

#### **Course Objectives**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

#### **List of Sample Programs**

1. Write a menu driven program to implement the following sparse matrices using one-

dimensional array:

- i) Diagonal Matrix
- ii) Lower Triangular Matrix
- iii) Upper Triangular Matrix
- iv) Symmetric Matrix

2. Write a program to compute  $b^r$  using recursion where b represent base and r represents power.
3. Write a program to reverse a user entered string using recursion.
4. Write a program to perform the following Queue operations using Circular Array implementation (Use Templates):
  - i) Enqueue
  - ii) Dequeue
5. Write a program to add two large integers using stack.
6. Write a program to evaluate postfix expression using stack.
7. Write a program to implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
8. Write a program to perform the following Stack operations using linked list.
  - i) Push
  - ii) Pop
  - iii) Clear
9. Write a program to create and perform the following operations on Queues using linked list:
  - i) Enqueue
  - ii) Dequeue
10. Write a program to implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
11. Write a program to implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
12. Write a program to add two polynomials using linked list representation.

13. Write a menu driven program to implement the insertion operations in an ordered linked list.
14. Write a menu driven program to implement the deletion operations in an ordered linked list.
15. Write a menu driven program to implement the merging operations in an ordered linked list.
16. Write a Program to reverse elements of a Stack using an additional Stack.
17. Write a Program to reverse elements of a Stack using an additional Queue.
18. Write a Program to implement the insertion operation in a Binary Search Tree.
19. Write a Program to implement the deletion by coping or by merging operation in a Binary Search Tree.
20. Write a Program to implement the Search a number in BST operation in a Binary Search Tree.
21. Write a Program to implement the count leaf nodes of the tree operation in a Binary Search Tree.
22. Write a menu driven program to implement the Selection sorting algorithms.
23. Write a menu driven program to implement the Insertion sorting algorithms.
24. Write a menu driven program to implement the Binary Search algorithms.
25. Write a menu driven program to implement the Bubble sorting algorithms.

**Course Name: Programming Fundamentals using C++ Lab**

**Course Code: BCA130A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

## **Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

## **List of Sample Programs**

1. Write a program to read and print values of variables of different data types.
2. Write a program to calculate the distance between two points.
3. Write a program to perform addition, subtraction, multiplication and division on 2 integer numbers.
4. Write a program to find largest of two numbers using ternary operator.
5. Write a program to print the ASCII value of a corrector.
6. Write a program to swap 2 numbers using a temporary variable.
7. Write a program that displays the size of every data type.
8. Write a program to convert an integer into the corresponding floating point number.
9. Write a program to enter any character. If the entered character is in lower case, convert it into upper case. If it is a lower case character, then convert it into upper case.
10. Write a program to find whether a given year is leap year or not.
11. Write a program to print 20 horizontal asterisks (\*)
12. Write a program to display the largest of 10 numbers using ternary operator.
13. Write a program to print the following pattern:  
A  
AB  
ABC  
ABCD  
ABCDE
14. Write a program to print the following pattern:

12321

1234321

15. Write a program to classify a given number as prime or composite.
16. Write a program using for loop to calculate the average of first n natural numbers.
17. Write a program to enter a decimal number. Calculate and display the binary equivalent of this number.
18. Write a program to sum the series:  $1/1+2^2/2+3^3/3+\dots$ .
19. Write a program to generate calendar of a month given the start day and the number of days in that month.
20. Write a program to calculate the area of a circle using functions.
21. Write a program to calculate the volume of a cuboid using default arguments.
22. Write a program to add two values of different data types using static polymorphism.
23. Write a program to calculate GCD using recursive function.
24. Write a program to calculate  $\exp(x,y)$  using recursive functions.
25. Write a program to read and display n random numbers using an array.
26. Write a program to interchange the largest and the smallest number in the array.
27. Write a program to find the second largest number using an array of n numbers.
28. Write a program to merge 2 unsorted arrays.
29. Write a program to implement linear search in any given array.
30. Write a program to transpose a  $3 \times 3$  matrix.
31. Write a program to read and display a  $2 \times 2 \times 2$  array.
32. Write a program to concatenate 2 strings.
33. Write a program to compare 2 strings.
34. Write a program to insert a string in the main text.
35. Write a program to sort names of students.
36. Write a program to enter a text that contains multiple lines. Display the n lines of text starting from m<sup>th</sup> line.
37. Write a program to add 2 integers using pointer.
38. Write a program to add 2 vectors (Arrays).

39. Write a program to copy a given string into a new string. Memory for the new string must be allocated dynamically.
40. Write a program to read, display, add and subtract 2 complex numbers.
41. Write a program to read and display information of a student using structure within a structure.
42. Write a program to read and display information of all the students in the class.
43. Write a program using pointer to structure to initialize the members in the structure.
44. Write a program to illustrate the use of arrays within structure.
45. Write a program to display the name of the colors using enumerated types.
46. Write a program to enter a rational number, simplify and display it.
47. Write a program to demonstrate the concept function overloading in the member functions of a class.
48. Write a program that adds 2 complex numbers. The object must be passed through preference and the result must be passed by value.
49. Write a program to display the list of students according to their marks.
50. Write a program to find mean of 2 numbers belonging to two different classes using friend function.

## **Course Code: BCA131A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	2

### **Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Experiment**

1. Draw Data flow diagram and Entity relationship diagram (e.g. Airline reservation system or others with suitable example)
2. Draw use case diagram (e.g. Library management system or others).
3. Draw sequence diagram (e.g. Banking management system or others)
4. Draw state chart diagram (e.g. Hospital management system or others).
5. Draw Activity diagram (e.g. ATM system or others).
6. Write programs in „C“ Language to demonstrate the working of the following constructs: i) do...while ii) while....do iii) if...else iv) switch v) for
8. A program written in „C“ language for Matrix Multiplication fails introspect the causes for its failure and write down the possible reasons for its failure.
9. Take any system (e.g. ATM system or other) and study its system specifications and report the various bugs.
10. Write the test cases for any known application (e.g. Banking application or others applications).
11. Create a test plan document for any application (e.g. Library Management System)
12. Study of any testing tool (e.g. Win runner)
13. Study of any web testing tool (e.g. Selenium)
14. Study of any bug tracking tool (e.g. Bugzilla, bugbit)

15. Study of any test management tool (e.g. Test Director)

## Semester IV

**Course Name: Introduction to Accounting and Economics**

**Course Code: BCA132A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To be acquainted with about the important concepts and characteristics of accounting.
2. To study the application of accounting in the general business environment.
3. To prepare the estimate for various business activities such as purchase, sale, production and cash budgets.
4. To provide a comprehensive treatment of accounting principles, technique and practices.
5. To get the students acquainted with fundamental concepts and processes of accounting so that they are able to appreciate the nature of item presented in the annual accounts of an organization.

### **Syllabus**

#### **Unit I**

**Accounting Concept:** Basic of Accounting, Meaning and nature of accounting, Scope of financial accounting, Interrelationship of Accounting with other disciplines, Branches of Accounting, Accounting concepts and convention, Indian Accounting Standards

#### **Unit II**

**Journal, Ledger and Trial Balance:** Journal: Meaning of Journal, Advantages, and Subdivision. Ledger: Meaning, subdivision, Mechanics of Posting, balancing of Ledger

accounts. Trial Balance: Objectives, Defects of trial balance, Errors disclosed by trial balance, preparation and locating errors.

### **Unit III**

**Cash Book and Subsidiary books of Accounting:** Kinds of cashbook, Purchase daybook, Sales daybook, Bills receivable book, Bills payable book.

### **Unit IV**

**Depreciation:** Causes of Depreciation, Meaning of Depreciation Accounting, Method of Recording depreciation, Methods of Providing Depreciation.

### **Unit V**

**The Scope and Method of Economics, the Economic Problem:** Scarcity & Choice, The Price Mechanism, And Demand & Supply Equilibrium: The Concept of Elasticity and its Applications. The Production Process: Output decisions – Revenues Costs and Profit Maximization. Laws of returns & Returns to Scale: Economics and Diseconomies of scale.

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Get the Knowledge about the important concepts and characteristics of accounting.

CO2: Able to understand the budget preparation and control of a company.

CO3: Be prepared of fiscal policies of the organization.

CO4: Learn about Inventory Systems, Methods of Valuation of Inventories.

CO5: Learn about Cash Journal, Petty Cash Book, Purchase Journal, Purchase Return, Sales Journal and Sales Return Journal.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcom</b>	<b>Program Outcome</b>

e	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01		H										
C02			H						M			
C03					H							M
C04	M						H					
C05		H			M					L		

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. Maheshwari, S.N. and Maheshwari, S. K., (2009) An Introduction to Accountancy, Eighth Edition, Vikas Publishing House.

### **Reference Books**

1. Ahuja H.L., "Business Economics", S.Chand & Co., New Delhi, 20012.
2. Financial Accounting: A Managerial Perspective" by Narayanaswamy
3. Tulsian, P.C., (2009) Financial Accountancy, 2nd edition, Pearson Education.
4. Ferfuson P.R., Rothchild, R and Fergusen G.J."Business Economics" Mac-millan, Hampshire, 1993.

**Course Name: Programming in Java**

**Course Code: BCA133A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
3	1	0	4

**Course Objectives:**

1. To be able to understand the concept of programming paradigms, basic concept of object oriented programming and features of java.
2. To demonstrate the concept of data types, literals and basic structure of java programming.
3. To enhance the practical knowledge of decision making statements and control statements.
4. To be able to use variety technologies of Java and work with different platforms.
5. To examine the life cycle of applets and packages.

**Syllabus**

**Unit I**

**Introduction to OOPS:** Paradigms of Programming Languages – Basic concepts of Object Oriented Programming – Differences between Procedure, Oriented Programming and Object Oriented , History of Java features – Java Environment, JDK ,API.

**Introduction to Java:** Types of java program, Creating and Executing a Java program, Java Tokens: Keywords, Character set, Identifiers, Literals, Separator, Java Virtual Machine (JVM) – Command Line Arguments, Comments in Java program.

## **Unit II**

**Control Structures, Arrays, and Vectors:** Elements, Constants, Variables, Data types, Scope of variables, Type casting – Operators: Special operators, Expressions, Evaluation of Expressions.

**Decision making and Branching:** Simple if statement, if – else statement, nesting if – else, else if Ladder – switch statement – **Decision making and looping:** While loop, do - While loop for loop, break, loop continue Statement.

## **Unit III**

**Array, Strings:** Arrays: One Dimensional Array – Creating an array, Array processing, Multidimensional Array, Vectors ArrayList, Advantages of Array List over Array Wrapper classes. Strings: String Array, String Methods, String Buffer Class.

## **Unit IV**

**Classes and Inheritance:** Class and objects: Defining a class, Methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of Methods, this keyword – Command line input.

Inheritance: introduction and its definition, Final variables and methods, Final classes, Final methods, Abstract methods and classes.

## **Unit V**

**Packages, Applets and Awt Controls:** Packages: Java API Packages System Packages, Naming Conventions, Creating & Accessing a Package, Adding Class to a Package Hiding.

Classes Applets: Introduction, Applet Life Cycle, Creating & Executing an Applet, Applet

tags in HTML, Parameter tag aligning the display, Graphics Class: Drawing and filling lines, Rectangles, Polygon, Circles, Arcs, Line Graphs, Drawing Bar charts.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understanding the concept of programming paradigms, basic concept of object oriented programming and features of java.

CO2: Enhance the practical knowledge of decision making statements and control statements.

CO3: Examine the life cycle of applets and packages and use the exception handling mechanism for handle the errors.

CO4: Illustrate the concept of Inheritance, Constructor, operator overloading and graphics in java.

CO5: Evaluate the concept of array, string, function, class and object.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	H		M			L				M		
CO2		H										M
CO3			H								M	
CO4					M			H				
CO5	H			M					M			

H = Highly Related; M = Medium; L = Low

### **Text Books**

1. Programming in Java, Sachin Malhotra, Oxford University, November 2013
2. Java One step ahead, Seth and Juneja, Oxford University, May 2017.

### **Reference Books**

1. Programming with Java A Primer, E. Balaguruswamy Tata McGraw Hill Companies
2. R. Nageswara Rao, "Core Java: An Integrated Approach", First Edition, DT Editorial Services, 2016.
3. Herbert Schildt, "The Complete Reference", Ninth Edition, McGraw Hill, 2014.
4. Cay S. Horstmann," Core Java", Ninth Edition, Prentice Hall,2012.

**Course Name: Programming in Python**

**Course Code: BCA134A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
3	0	0	3

### **Course Objectives:**

1. To lineup the basics of python programming, Features, history, data types and

- variables.
2. To be able to solve real-world problems through python programming.
  3. To be able to understand problem solving approaches, programming languages, object oriented programming.
  4. To construct of Python language such as control statements, functions, strings, files, data structures.
  5. To apply the concept of Classes and objects, functions and array in python.

## Syllabus

### Unit I

**Basics Of Python Programming:** Features of Python ,History of Python ,The Future of Python ,Writing and Executing First Python Program, Literal Constants , Numbers , Strings, Variables and Identifiers , Data Types , Input Operation, Comments , Reserved Words , Indentation.

### Unit II

Operators and Expressions, Expressions in Python, Operations on Strings , Concatenation, Multiplication (or String Repetition), Other Data Types, Tuples , Lists , Dictionary, Type Conversion .

### Unit III

**Decision Control, Function and Modules:** Introduction to Decision Control Statements, Selection/Conditional Branching Statements, Basic Loop Structures/ Iterative Statements, while loop, Nested Loops, The break Statement, The continue Statement, The pass Statement, The else Statement used with Loops.

### Unit IV

**Function:** Function Definition, Function Call, Variable Scope and Lifetime, return statement, Lambda Functions or Anonymous Functions , Documentation Strings, Recursive Functions.

### UNIT V

**File Handling** File : File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions Renaming and Deleting Files, Directory Methods

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Outline the basics of python programming, Features, history, data types and variables.

CO2: Understanding of Python especially Decision control, function and modules.

CO3: Understanding of the file handling and Data Structure.

CO4: Be exposed to object oriented concepts in Python programming, decision controls and function.

CO5: Understand the concept of file, opening, closing, reading and writing files.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	H								M			
CO2	H		M									M
CO3				M						M		
CO4							H					
CO5		M			M			H				

H = Highly Related; M = Medium; L = Low

## **Text Book**

1. Python Programming, Oxford, ReemaThareja, June 2017

## **Reference Books**

1. "Programming Python" by Mark Lutz and O'Reilly Media
2. "Python Testing Cookbook" by Greg L Turnquist
3. "Head First Programming" by Paul Barry and David Griffiths
4. "Python Crash Course: A Hands-On, Project-Based Introduction to Programming" by Eric Matthes.

**Course Name: Computer Network**

**Course Code: BCA135A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To be familiar with the terminology and concepts of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks.
2. To enhance the practical knowledge of protocols used in different layers.
3. To be familiar with physical layer based on telephone lines.
4. To be able to understand Error Detection, Error Correction, Flow Control.
5. To be able to understand the concept of Connection Oriented, Connectionless and routing algorithms.

**Syllabus**

**Unit I**

**Introduction To Computer Networks:** Definition: Network, The Need of Resources Sharing , Concept of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks , Connection-Oriented Networks: X.25 and Frame Relay, Network Categories, Network Components & Connection, Layers and Services.

**Unit II**

**The Physical Layer:** The Duties of Physical Layer, Infrared and Millimeter Waves, The ISM Bands, The Optical Light and Free Space Optics, Wired Physical Layer, Physical Layer Based on Telephone Line, 802.2, The LLC Layer

**Unit III**

**The Data Link Layer &The Medium Access Sublayer:** Introduction, Duties, The Error, Types of Errors, Redundancy, Error is Not Always Handled at the Data Link Layer, Error Detection, Error Correction, Flow Control, Protocols, The Sender and Receiver Concept, Timers and the Time Out Event, The Sending and Receiving Windows, The Sequence and Acknowledgment Numbers, Re-transmission, Duplicate Frames, Go Back N, Selective Repeat, Wired MAC Layer

## **Unit IV**

**The Network Layer:** Connection-Oriented Forwarding using Virtual Circuits, Connectionless Forwarding using Datagrams , Connection-Oriented vs. Connectionless Forwarding, Forwarding Examples, Routing Algorithms, Hierarchical Routing , Broadcast Routing, Multicast Routing, Congestion.

## **Unit 5**

**Transport Layer And Application Layer:** Connection Management at the Transport Layer, Congestion Control, Comparison with Data Link Layer, Client-Server Communication, A Sample-Client Server Program, Efficient Management of Dynamic Connections, Domain Name System, The World Wide Web and HTTP, The Email System, File Transfer Protocol

### **Course Outcomes (Cos):**

**Upon successful completion of this subject students will able**

CO1: To be familiar with the terminology and concepts of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks.

CO2: Describe, analyze and compare Physical Layer based on telephone lines.

CO3: Describe, analyze and compare a number of data link, network, and transport layer protocols, Error Detection, Error Correction and Flow Control.

CO4: Able to understand the concept of Connection Oriented, Connectionless and routing algorithms.

CO5: Enhance the practical knowledge of protocols used in different layers.

## **Text Book**

1. Computer Network, Bhushan Trivedi, Oxford University, May 2011.

## **Reference Books**

1. Data Communication and network, Bhushan Trivedi, Oxford University, Feb 2016.
2. Behrouz A. Forouzan, Data Communication and Networking, Fifth Edition, McGraw Hill, 2013
3. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2014
4. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson, 2011

**Course Name: Programming in Java Lab**

**Course Code: BCA136A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**List of Sample Programs**

1. To write a java program to find the area of rectangle
2. To write a java program to print the individual digits of a 3 digit number.
3. Write a java program to read two integers and print the larger number followed by the words “is larger” If the numbers are equal print the message “These numbers are equal”.
4. To write a java program to read an integer and find whether the number is odd or even
5. To write a java program find the biggest of three integers.
6. Write a program to display a simple message.
7. Write a program to add two numbers.
8. Write a program to arithmetic operations.

9. Write a program to area of the circle.
10. Write a program to check odd or even.
11. Write a program to find Greatest among three numbers.
12. Write a program to find greatest number using nested if.
13. Write a program to sum and average of five marks.
14. Write a program to describe functionality of Arithmetic operations using switch.
15. Write a program to write names of 10 natural numbers.
16. Write a program to sum of 'n' natural numbers.
17. Write a program to find Factorial of a number.
18. Write a program to sum of 'n' numbers.
19. Write a program to sum of two numbers using class and object.
20. Write a program to prepare mark sheet of a student.
21. Write a program to find area of rectangle using constructor.
22. Write a program to find area of room.
23. To write a java program to find the sum of digits of a given number
24. To write a java program to find the first 15 terms of Fibonacci sequence.
25. To write a java program to print the Armstrong numbers.
26. To write a java program to find the largest and smallest number in an array.
27. Write a program to arithmetic operations using static members.
28. Write a program to print greatest value using nesting of methods.
29. To write a java program that creates a string object and initializes it with

your name and performs the following operations

30. To find the length of the string object using appropriate String method.
31. To find whether the character 'a' is present in the string. If yes find the number of times 'a' appear in the name and the location where it appears
32. To write a java program to create a StringBuffer object and illustrate how to append characters and to display the capacity and length of the string buffer
33. To write a java program to create a StringBuffer object and illustrate how to insert characters at the beginning
34. To write a java program to Create a StringBuffer object and illustrate the operations of the append () and reverse () methods.
35. To write a java program to display total marks of 5 students using student class. Given the following attributes: Regno(int), Name(string), Marks in subjects(Integer Array), Total (int).
36. To write a program in java with a class Rectangle with the data fields width, length, area and colour. The length, width and area are of double type and colour is of string type.The methods are get\_length(), get\_width(), get\_colour() and find\_area().
37. Create two objects of Rectangle and compare their area and colour. If the area and colour both are the same for the objects then display "Matching Rectangles", otherwise display "Non-matching Rectangle".
38. Write a java program to create a Player class and inherit three classes Cricket\_Player, Football\_Palyer and Hockey\_Player.
39. Write a program to find area and volume of a room using inheritance .
40. Write a program to describe Method overriding
41. To write a java program to show how a class implements two interfaces.
42. To write a java program to show that the variables in an interface are implicitly static and final and methods are automatically public
43. To write a java program to create a package for Book details giving Book name, Author name, price and year of publishing.
44. To write a java applet program to change the color of a rectangle using

scroll bars to change the value of red, green and blue

45. To write an applet program for creating a simple calculator to perform Addition, subtraction, Multiplication and Division using Button, Label and TextField component.
46. To write a java program to catch more than two exception
47. To write a java program to create our exception subclass that throws exception if the sum of two integers is greater than 99.
48. To write a java program for generating two threads, one for generating even number and one for generating odd number.

**Course Name: Programming in Python Lab**

**Course Code: BCA137A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed

theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Experiment**

1. Write a program to display data of different types using variables and literals constants.
2. Write a program to reassign values to a variable.
3. Write a program to read variables from the user.
4. Write a program to exhibit indentation errors.
5. Write a program to enter a number and display its hex and octal equivalent and its square root.
6. Write a program to read and print values of variables of different data types.
7. Write a program to calculate area of triangle using Heron's formula.
8. Write a program to calculate the distance between two points.
9. Write a program to perform addition, subtraction, division and multiplication on two floating point numbers.
10. Write a program to perform addition, subtraction, division and multiplication on two integer point numbers.
11. Write a program to calculate average of two numbers. Print their deviation.
12. Write a program to calculate the total amount of money in the piggy bank given the coins of Rs 10, 5, 2, 1.
13. Write a program to convert degrees Fahrenheit into degrees Celsius.
14. Write a program to count all the prime and composite numbers entered by the user.
15. Write a program to find the greatest number from 3 numbers.
16. Write a program to take input from the user and then check whether it is a number or a character.
17. Write a program to separate two values printed on the same line using a tab.
18. Write a program to calculate the sum and average of first 10 numbers.
19. Write a program to find whether the given number is an Amstrong number or not.
20. Write a program to enter a number and then calculate the sum of its digits.

21. Write a program to enter a binary number and convert it into decimal number.
22. Write a program to calculate GCD of 2 numbers.
23. Write a program to print the reverse of a number.
24. Write a program to print the multiplication table of n, where n is entered by the user.
25. Write a program using for loop to calculate the average of first n natural numbers.
26. Write a program using for loop to calculate factorial of a number.
27. Write a program to classified a given number as prime or composite.
28. Write a program to sum the series--  $1+1/2+.....+1/n$ .
29. Write a program using while loop to read the numbers until -1 is encountered.  
Also count the numbers of prime numbers and composite numbers entered by the user.
30. Write a program to demonstrate the continue statement.
31. Write a program to write a function that displays a string repeatedly.
32. Write a program to demonstrate the mismatch between function parameters and arguments.
33. Write a program to demonstrate the use global statement.
34. Write a program to demonstrate name clash of local and global variable.
35. Write a program to demonstrate access of variables in inner and outer functions.
36. Write a program to demonstrate flow of control after the return statement.
37. Write a program to write another function which returns an integer to the caller.
38. Write a program that adds two numbers using the syntax of lambda functions.
39. Write a program to use a lambda function with an ordinary function.
40. Write a program to add two numbers using lambda function.

**Course Name: Introduction to PL/SQL Lab**

**Course Code: BCA138A**

L (Hr.)	T/P (Hr.)	Pr (Hr.)	Credits

0	0	2	2
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## Course Objectives

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

## List of Sample Programs

1. Create a relational database that contains the following tables and insert 10 records into these tables. Solved the Following SQL Queries:

student (**sid**, sname, sex, age, year, gpa)

dept (**dname**, numphds)

prof (**pname**, dname)

course (**dname, cno, cname**)

major (**dname, sid**)

section (**dname, cno, sectno, pname**)

enroll (**sid, dname, cno, sectno, grade**)

- i. Print the names of professors who work in departments that have fewer than 50 PhD students.
- ii. Print the names of the students with the lowest GPA.
- iii. For each Computer Sciences class, print the class number, section number, and the average gpa of the students enrolled in the class.
- iv. Print the names and section numbers of all classes with more than six students enrolled in them.
- v. Print the name(s) and sid(s) of the student(s) enrolled in the most classes.
- vi. Print the names of departments that have one or more majors who are under 18 years old.

vii. Print the names and majors of students who are taking one of the College Geometry courses.

viii. For those departments that have no major taking a College Geometry course print the department name and the number of PhD students in the department.

ix. Print the names of students who are taking both a Computer Sciences course and a Mathematics course.

x. Print the age difference between the oldest and the youngest Computer sciences major.

xi. For each department that has one or more majors with a GPA under 1.0, print the name of the department and the average GPA of its majors.

xii. Print the ids, names and GPAs of the students who are currently taking **all** the Civil Engineering courses.

2. Create the 3 structured record data type named as address\_type(street, city, state, pin\_code), person\_type(firstname, lastname, DOB) and business\_type(title, company). Create 2 tables based on person\_type and business\_type. Create one more table which is referred by first two tables. ( Reference type)

3. Write a program to enter a number and find the factorial of the number.

4. Write a code to create a type with an array of number 10.

5. Write a PL/SQL code to take the input from the user for 3 subjects and calculate total marks and percentage.

6. Write a program to create a function for add two numbers and call it by passing the values as an argument.

7. Write a program to enter two number and find greater number using function

8. Write a program to create a PL/SQL function for count the number of records in any existing table.

9. Write a PL/SQL code to create a table using the already created array type and insert 5 records.

10. Write a PL/SQL code to enter two numbers and perform the arithmetic operations. (Addition, Subtraction, Multiplication, Division).

**Course Name: Minor Project**

**Course Code: BCA139A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	3	3

**Course Objectives:**

The purpose of minor project is to enhance the practical knowledge based on prescribed languages which are introduced in this program. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

## **Semester V**

**Course Name: Data Analytics using R**

**Course Code: BCA140A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To explain the key differences between the tasks of classification, clustering, regression, and dimensionality reduction
2. To identify the key differences between supervised and unsupervised learning paradigms
3. To explain how noisy observations affect the result of data mining methods.
4. To deal with missing data and Manipulate strings in R
5. To understand basic regular expressions in R and base R graphics

### **Syllabus**

#### **Unit I**

**Introduction to R:** Basics of R, R-Environment Setup, Installation of R, Rstudio, Installing and Configuring, RStudio in Windows, Installing and Configuring, RStudio in Linux, Programming with R, Basic Data Types, Vectors, Matrices, Arrays.

**Factors and data Frames:** Factor Levels, Data Frame, Creating a Data Frame, Sub setting of Data Frames, Extending Data Frames, Sorting Data Frames

#### **Unit II**

**List:** Creating a List, Creating a Named List, Lists Operations , Conditionals and Control Flow, Relational Operators, Relational Operators and Vectors, Logical Operators, AND Operator, OR Operator, NOT Operator, Logical Operators and Vectors, Conditional

## Statements

### Unit III

**Iterative Programming:** While Loop, For Loop, Looping Over List, Loops for Vectors, Loops for Matrices, Loops for Data Frames, Loops for Lists, Functions in R.

### Unit IV

**Function in R:** Writing a Function in R, Nested Functions, Function Scoping, Function Environment, Function Scope, Default Values for Arguments, Returning Complex, Recursion, Loading an R Package, Methods of Loading, Mathematical Functions in R, Cumulative Sums and Products, Calculus in R, Input and Output Operations

### Unit V

**Apply Family in R , Charts & Graphs:** Apply Family : Using apply in R, Using lapply in R, Using sapply in R, Using tapply in R, Using mapply in R.

Charts & Graphs: Pie Chart, Bar Chart, Box Plot, Histogram, Line Graph, Scatter

### Course Outcomes (Cos):

**Upon successful completion of this subject students should be able to:**

CO1: Students will able to explain Basics of R programming.

CO2: Students will able to estimate the effects data interfaces.

CO3: Able to design data mining experiments using R and existing data mining tools.

CO4: Students will be able to programming with the help of functions.

CO5: Able explain the working of lists in R and will be able working with bar and charts.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	PO	P01	P01	P01

									9	0	1	2
C01			H					M				
C02		M		M					M			
C03	M				M		L				M	
C04			L					M				
C05	H				L				M			

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. Statistical Programming in R (Oxford) Srinivasa, Siddesh, Shetty and Sowmya, June 2017.

### **Reference Books**

1. Lawrence Leemis. Learning Base R. Lightning Source, 2016
2. Vikram Dayal. An Introduction to R for Quantitative Economics: Graphing, Simulating and Computing. Springer, 2015
3. Matthias Kohl. Introduction to statistical data analysis with R. bookboon.com, London, 2015.
4. Matthias Kohl. Introduction to statistical data analysis with R. bookboon.com, London, 2015.

**Course Name: Android Application Development**

**Course Code: BCA141A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To understand the Android application architecture, including the roles of the task stack, activities, and services.
2. To be able to build user interfaces with fragments, views, form widgets, text input, lists, tables, and more.
3. To be able to use advanced UI widgets for scrolling, tabbing, and layout control.
4. To be able to store application data on the mobile device, in internal or external storage locations.
5. To be able to support user-specific preferences using the Android Preferences API.

**Unit I**

**Introduction to Android:** Android Versions, Features of Android, Architecture of Android

Obtaining the Required Tools: Android Studio, Android SDK, Creating Android Virtual Devices (AVDs), Launching Your First Android Application.

## **Unit II**

Exploring the IDE, Using Code Completion, Debugging Your Application:- Setting Breakpoints, Navigating Paused Code, Publishing Your Application:- Generating a Signed APK

## **Unit III**

**Android User Interface**:- Understanding the Components of a Screen: Views and ViewGroups, LinearLayout (Horizontal) and LinearLayout (Vertical), RelativeLayout, ScrollView, Using Basic Views: TextView, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views, Using List Views to Display Long Lists: ListView, Using the Spinner View.

## **Unit IV**

**Activities, Fragments, and Intents**:- Understanding Activities: Applying Styles and Themes to an Activity, Hiding the Activity Title, Displaying a Dialog Window, Displaying a Progress Dialog, Linking Activities Using Intents: Open an Activity, Returning Results from an Intent, Fragments: Life Cycle of a Fragment, Adding Fragments Dynamically, Interactions Between Fragments, Understanding the Intent Object

## **Unit V**

Saving and Loading User Preferences: Accessing Preferences Using an Activity, Modifying, Programmatically Retrieving and Modifying the Preferences Values, Creating and Using Databases: Creating the DB Adapter Helper Class, Using the Database Programmatically

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Student can setup Android Environment, Well understanding of Android

Architecture.

CO2: Capable to customize IDE, can insert breakpoint and debugging, learn application deployment.

CO3: Learn to create different views of activity and manage layout for different activity.

CO4: Knowledge of Activity life cycle, and fragment. How intent will work for communication.

CO5: Can store Activity data on local device with database helper class.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01		L	H				M		M			
C02		H			L			M				L
C03	H				H	M			L			
C04			H	H			L	M				
C05		L							H		M	

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Beginning Android Programming with Android Studio

**Reference Books**

1. Android Application Development Cookbook.

2. Building Android application with HTML, CSS, and JavaScript 2<sup>nd</sup> Edition O'Reilly's Publication
3. Android 4.2 App Development Essentials
4. Android Application Development for Dummies

**Course Name: Information Security and Cyber Law**

**Course Code: BCA142A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
3	1	0	4

## **Course Objectives:**

1. To learn today's increasing network security threats and explain the need to implement a comprehensive security policy to mitigate the threats.
2. To provide extended security using authentication, Substitution Techniques, Transposition Techniques, Encryption and Decryption
3. To introduce security services for email and email protocols, Digital Certificates, Private Key Management, E-mail Security and Wireless Application Protocol (WAP) Security
4. To be able to understand awareness of Prohibited actions on Cyber, Cyber Squatting Banking/Credit card related crime E-commerce.
5. To gain the knowledge about Cyber Crime and Prohibited actions on Cyber.

## **Syllabus**

### **Unit I**

**Introduction to the Concepts of Security:** The need for security, Security Approaches, Principles of Security, Types of Attacks. **Cryptographic Techniques:** Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Key Range and Key Size, Possible Types of Attacks.

### **Unit II**

**Computer-based Symmetric Key Cryptographic Algorithms:** Algorithm Types and Modes, An overview of Symmetric Key Cryptography, DES, International Data Encryption, Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis.

### **Unit III**

**Computer-based Asymmetric Key Cryptography:** Brief History of Asymmetric Key Cryptography, An overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack

Algorithm, Some other Algorithms.

#### **Unit IV**

**Public Key Infrastructure:** Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards, XML, PKI and Security. Internet Security Protocols: Basic Concepts, Secure Socket Layer, SHTTP, Time Stamping Protocol E-mail Security, Wireless Application Protocol (WAP) Security.

#### **Unit V**

**Prohibited Actions on Cyber:** Pornography, IPR violations: software piracy, copyright infringement, trademarks violations, theft of computer source code, patent violations, Cyber Squatting Banking/Credit card Related crime E-commerce/ Investment Frauds.

#### **Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Demonstrate the threats in networks and security concepts, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption.

CO2: Apply authentication applications in different networks.

CO3: Understand security services for email, the RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together and Digital Signatures.

CO4: Know of Digital Certificates, Private Key Management, E-mail Security and Wireless Application Protocol (WAP) Security

CO5: Awareness of Prohibited actions on Cyber, Cyber Squatting Banking/Credit card related crime E-commerce.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcom	Program Outcome

e												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01				H						M		
C02		H										
C03							M					M
C04	M				H						M	
C05		H						M		L		

H = Highly Related; M = Medium; L = Low

### Text Book

1. William Stallings, –Cryptography and Network Security, Prentice Hall, New Delhi, 2006.

### Reference Books

1. Chalie Kaufman, Radia Perlman, Mike Speciner, –Network Security: Private Communication in a Public Network||, Pearson Education, New Delhi, 2004.
2. Neal Krawetz, –Introduction to Network Security||, Thomson Learning, Boston, 2007.
3. Bruce Schneier, –Applied Cryptography||, John Wiley & Sons, New York, 2004.
4. Frontiers of Electronic Commerce Kalakota and Whinstn Addition Wesley

**Course Name: Advance Java**

**Course Code: BCA143A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To be able to exhaustive coverage of advanced topics on Java from tools to enterprise Java
2. To provide ample application-based examples, with step-by-step explanations
3. To provide thorough understanding of each topic through extensive examples along with the program codes and screenshots
4. To provide relevant software installation and configuration information wherever necessary
5. To be able to work with comprises keywords, objective-type questions (with answers) and subjective-type questions for students at the end of all the chapters

**Syllabus**

**Unit I**

**Core Java Recap:** Introduction, Java Evolution and history, Classes and Objects, Functions & Interfaces, Inheritance, keywords: Static, Final, Super, Packages, Applets

**Unit II**

**Exception Handling, Multi-threading & Garbage Collection:** Limitations of Error handling – Advantages of Exception Handling Types of Errors – Basics of Exception Handling –

try blocks – throwing an exception – catching an exception – finally statement, tracing stack, custom exception classes.

Multi-threading : Introduction, Main Thread, Creating Thread, Interrupting Thread, Suspending and Resuming, Thread Priority, Synchronization & Deadlock, Inter-thread Communication Garbage Collection: Introduction, Size, Accessing GC from Java Program

### **Unit III**

**AWT:** AWT Class Hierarchy, Creating Container, Adding Components, Layout, AWT components, Event Handling, Dialog Boxes, Scrollbar, Menu.

### **Unit IV**

**Swings & Input/Output:** Swing Containment Hierarchy, Swing Components, Methods of Important Event Listener Interfaces Streams, Formatting, Data Streams, Object Stream, Reading/writing Arrays via Streams, Pipes, File I/O, Path, File

### **Unit V**

**JDBC:** JDBC Drivers, JDBC Architecture, JDBC Classes and Interfaces, Loading a Driver, Making a Connection, Execute SQL Statement, SQL Statements, Retrieving Result, Getting Database Information, Metadata

### **Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Revise object oriented features of java language and develop java applet programming using various techniques.

CO2: Handling exceptions and develop multi- threaded applications.

CO3: Develop applications using collection framework and concepts of generic programming.

CO4: Develop applications using Abstract Window Toolkit

CO5: Demonstrate the connectivity with SQL through JDBC and describe the JDBC architecture.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		H	H						M			
C02			M			L				M		
C03				H								M
C04	L							H				
C05		M			H					L		

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Second Edition, Oxford University Press , 2014.
2. Advance java programming, Oxford, Uttam Kumar Roy, April 2015.

## **Reference Books**

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming Language Ken Arnold Pearson
3. The complete reference JAVA2, Herbert schildt. TMH

**Course Name: Data Analytics using R Lab**

**Course Code: BCA144A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

## **Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

## **List of Experiment**

Following are the list of sample programs. Students have to perform accordingly.

1. Illustrate addition, multiplication and division between vectors.
2. Enumerate multiplication and division operations between matrices and

vectors in R console.

3. Write the command in R console to create a list containing a vector, a matrix and a list. Also give names to the elements in the list and display the list.
4. Write the command in R console to add a new element at the end of the list and display the same.
5. Write the command in R console to delete the fourth element from a list and display the resultant list.
6. Write the command in R console to update the third element of the list and display the resultant list.
7. Write the command in R console to create two lists, each containing 5 elements. Convert the list into vectors and perform addition on the two vectors. Display the resultant vector.
8. Write an R programme to print the values in vectors using the while loop.
9. Write an R programme to print the values in vectors using for loop.
10. Write an R programme to create four vectors namely patientid, age, diabetes and status. Put these four vectors into a Data frame patientdata and print the values using the for loop.
11. Write an R programme to print HELLO 10 times using for loop.
12. Write an R programme to print the Fibonacci series.
13. Write an R programme to print if the given number is ODD/EVEN.
14. Write an R programme to print the first 100 prime numbers.
15. Write an R programme to calculate the factorial of a number.
16. Write an R programme to calculate LCM of 2 numbers.
17. Write an R programme to calculate GCD of 2 numbers.
18. Write a programme to illustrate the use of local and global variable.
19. Write a programme to multiply two numbers using a function with a default value. Assume default value as NULL.
20. Demonstrate the creation of a complex number.
21. Add two complex numbers using the complex functions and test whether the sum of the complex numbers is complex or not.
22. Write a programme to calculate factorial of a number using recursive

computation.

23. Write a programme to sum n natural numbers.
24. Write a programme to find  $n^{\text{th}}$  Fibonacci number using recursive computation.
25. Write a programme to calculate the GCD of two numbers using recursive computation.
26. Write the commands in R console to find mean number of leaves for each day (data frame) using apply function.
27. Write the command in R console to specify the columns that needs to be excluded in the apply function.
28. Write the command in R console to change a value in the duckweed data frame.
29. Write the command in R console to determine the proportion of the total number of leaves counted on each day.
30. Write the command in R console to obtain mean using tapply function by considering a vector having 10 normal and 10 uniform variables. Assume that these vectors have three groups.

**Course Name: Android Application Development Lab**

**Course Code: BCA145A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed

theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Experiment**

Following are the list of sample programs. Students have to perform accordingly.

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi threading.
8. Develop a native application that uses GPS location information.
  
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock.

**Course Name: Advance Java Lab**

**Course Code: BCA146A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	2

**Course Objectives:**

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### **List of Experiment**

1. Write a program to sum and average of five marks.
2. Write a program to describe functionality of Arithmetic operations using switch.
3. Write a program to write names of 10 natural numbers.
4. Write a program to sum of 'n' natural numbers.
5. Write a program to find Factorial of a number.
6. Write a program to sum of 'n' numbers.
7. Write a program to sum of two numbers using class and object.
8. Write a program to prepare mark sheet of a student.
9. Write a program to find area of rectangle using constructor.
10. Write a program to find area of room.
11. To write a java program to find the sum of digits of a given number
12. To write a java program to find the first 15 terms of Fibonacci sequence.
13. To write a java program to print the Armstrong numbers.
14. Write a Java program that prints all real solutions to the quadratic equation  $ax^2+bx+c = 0$ . Read in a, b, c and use the quadratic formula. If the discriminant  $b^2 - 4ac$  is negative, display a message stating that there are no real solutions?
15. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence?
16. Write a Java program that prompts the user for an integer and then prints out all

the prime numbers up to that Integer?

17. Write a Java program that checks whether a given string is a palindrome or not.

Ex: MADAM is a palindrome?

18. Write a Java program that reads a line of integers and then displays each integer and the sum of all integers.

19. To write a java program to show how a class implements two interfaces.

20. To write a java program to show that the variables in an interface are implicitly static and final and methods are automatically public.

21. Write a program to implement multilevel inheritance and method overriding.

22. Write a program to illustrate class member access for packages and also implement interfaces.

23. To write a java applet program to change the color of a rectangle using scroll bars to change the value of red, green and blue

24. To write an applet program for creating a simple calculator to perform Addition, subtraction, Multiplication and Division using Button, Label and TextField component.

25. Write a program in Java to describe concepts of handling exceptions.

26. Write a program in Java to describe Exception Handling with all keywords

27. Write a program to describe the concept of Collection framework - an ArrayList.

28. Write a program to describe Java Generics using Map.

29. Write a program in Java in AWT to design login form.

30. Write a Java program to draw a rectangle using swing.

31. Write a Java swing program to print a wave form with output.

32. Write a Enable and Disable button in Java swing.

33. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations.

34. Write a program to update student information using jdbc connection.

35. Write a program to create an applet of a moving banner.

36. Develop static pages (using only HTML) of an online Book store.

**Course Name: Minor Project**

**Course Code: BCA147A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	3	3

**Course Objectives:**

The purpose of minor project is to enhance the practical knowledge based on prescribed languages which are introduced in this program. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

## List of Courses for Electives

**Course Name:** Computer Graphics

**Course Code:** BCA148A

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations.
2. To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.
3. To be enable for prepare students for activities involving in design, development and testing of modeling.
4. To make the students familiar with techniques of rendering, shading and animation.
5. To know about Modeling Transformations.

### **Syllabus**

#### **Unit I**

**Computer Graphics Basics and Object Representation:** Historical Development of the Field, Major Issues and Concerns in Computer Graphics, Preliminaries: Basics of Graphics System, CRT Displays, Graphics Pipeline: Stages of Rendering Process, Role of Graphics Libraries.

#### **Unit II**

**Modeling Transformations, Illumination, Lighting Models, and Intensity Representation:** Basic Transformations, Matrix Representation and Homogeneous Coordinate System, Composition of Transformations, Transformations in 3D ,Simple Lighting Model, Shading Models, Handling the Shadow Effect Intensity Representation.

### **Unit III**

**Color Models, Texture Synthesis, 3D Viewing and Clipping:** Physiology of Vision, Color Models, Texture Synthesis, 3D Viewing Transformation, Projection, Window-to-viewport Transformation, Clipping in 2D, 3D clipping.

### **Unit IV**

**Hidden Surface Removal and Rendring:** Types of Methods, Application of Coherence, Back Face Elimination, Depth (Z) Buffer Algorithm, A-Buffer Algorithm, Depth Sorting (Painter's) Algorithm, Warnock's Algorithm, Octree Methods, Scan Conversion of a Line Segment, DDA Algorithm, Bresenham's Algorithm. Circle Scan Conversion, Midpoint Algorithm, Fill Area Scan Conversion, Seed Fill Algorithm, Flood Fill Algorithm, Scan Line Polygon Fill Algorithm.

### **Unit V**

**Computer Animation , Multimedia and Hypermedia:** Generic Architecture, Input and Output of Graphics System, GPU and Shader Programming, Graphics Software and OpenGL, Traditional Animation Tech, Keyframing, Motion Capture, Physically based Methods and Procedural Techniques. Hypermedia, Multimedia Authoring, Components of Multimedia, Data Compression Standards

#### **Course Outcomes (COs):**

**On successful completion of this course students will be able to:**

CO1: Students will get the concepts of Graphics display devices, different types of graphics drawing algorithms.

CO2: Students will get the concepts of 2D and 3D Geometrical Transformations

CO3: Students will get the concepts of Color models and clipping.

CO4: Students will get the concepts of Hidden Line/surface elimination techniques

CO5: Student will get the concepts of creating animations and multimedia.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1		M				M				M		
CO2				M				M				
CO3					M						M	
CO4							H					
CO5	H	M				M			M			

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Computer Graphics, Oxford University, Bhattacharya, December 2015.

**Reference Books**

1. "Mathematical Elements of Computer Graphics" by Kogin Adams
2. "Computer Graphics" by John F Hughes
3. "Computer Graphics" by Desai and Apurva A
4. "Computer Graphics: A Programming Approach" by Steven Harrington

**Course Name: Compiler Design**

**Course Code: BCA149A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To understand, design and implement a lexical analyzer.
2. To understand, design and implement a parser.
3. To understand, design code generation schemes.
4. To understand optimization of codes and run time environment.
5. To understand various compiler writing tools.

**Syllabus**

**Unit I**

**Introduction to Compiler:** Theory of Computer Languages, Design of a Language, Evolution of Compilers, Stages of Compilation: Lexical Analysis, Syntactic Analysis, Semantic Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Symbol Table Management.

**Unit II**

**Lexical Analysis and Syntax Analysis:** Lexical Analysis: Alphabets and Tokens in Computer Languages, Representation of Tokens and Regular Expression, Token Recognition and Finite State Automata, Implementation, Error Recovery.

### **Unit III**

**Syntax Analysis:** Context-free Grammar and Structure of Language, Parser and its Types, Top down Parser, Bottom-up Parser, Parser Generator Tool (Yacc).

### **Unit IV**

**Code Optimization:** Need for Optimization, Objectives, Performance factors, Writing Optimized Code at User Level, Construction of Basic Blocks and Processing, Data-flow Analysis Using Flow Graph, Principal Sources of Optimization and Transformations, Alias, Procedural Optimization, Loops in Flow Graphs, Loop Optimization.

### **Unit V**

**Code Generations and Compiler Writing Tools:** Issues in Code Generation, Target Machine Architecture, Subsequent Use Information, Register Allocation, Directed Acyclic Graph Representation of Basic Blocks, Code Generation From Intermediate Code, Peephole Optimization, Code Scheduling, Lexical Tools.

### **Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to**

CO1: Learn the design and develop a comprehensive Compiler for a given language or an Introduction.

CO2: Analyze and able to design a compiler development with lexical and syntax analysis.

CO3: Describe all aspects of Run time storage with intermediate Code generation.

CO4: Implement various code optimization techniques.

CO5: Implement various optimization and code generation algorithms for the design of

a compiler.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcom e	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P0 9	P01	P01	P01
C01				H						M		
C02		H			L				M			
C03			H								M	
C04							H					
C05	H			L					M			

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Compiler Design, Oxford University, Muneeswaran, November 2012.

### **Reference Books**

1. "Compilers: Principles, Techniques and Tools" by Alfred V Aho and Ravi Sethi
2. "Engineering a Compiler" by Keith D Cooper and Linda Torczon
3. "Compiler Design in C" by Allen I Holob
4. "Elements of Compiler Design" by Meduna

**Course Name: Management Information System**

**Course Code: BCA150A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To get the knowledge about the important management concepts & their application, to have an insight of various functional departments in an organization.
2. To discuss the importance of security, privacy, and ethical issues as they relate to information systems.
3. To identify some of the strategies employed to lower costs and improve service.
4. To know about the designing and development of MIS

5. To know about Role of Decision Support System in MIS, Decision Support Models,

## Syllabus

### Unit I

**Introduction to Information System:** Information system, Classification of Information, Key aspects of Management, Definitions, roles and features of MIS, Structure of Management Information System, Benefits of Management Information System, Limitations of Management Information System.

### Unit II

**MIS Development:** Overview of design of an information system, The role and tasks of systems analysts, Tools used by system analyst in designing Information system, MIS Requirement Analysis, MIS Requirement Specification, Feasibility Analysis & Report, MIS Development Models, MIS Design & Development Phase

### Unit III

**Decision Support System in MIS:** Managerial Decision Making, Types of Decisions, Definition and characteristics of DSS, Types of Decision Support Systems, Components of DSS, Role of Decision Support System in MIS, Decision Support Models, Risks of DSS in MIS,

### Unit IV

**Applications of Management Information Systems to E-Business:** Applications in Manufacturing Sector, Applications in Service Sector. Decision Support System and Knowledge Management, Enterprise Management Systems

### Unit V

**E-Business Enterprise:** A Digital Firm, Strategic Management of Business Performance,

Information Security Challenges in E-Enterprises, Information Technology: Impact on Society.

Infotech Infrastructure: Technology of Information Systems Unified Communication and Networks, Database and Client Server Architecture. Data Warehouse: Architecture to Implementation E-Business Technology

**Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Understand the basic concept of Management support system.

CO2: Know about the designing and development of MIS

CO3: To identify MIS Security Risks, Threats & Vulnerability and Assessing Risks.

CO4: To identify Database and Client Server Architecture. Data Warehouse: Architecture to implementation.

CO5: Know about Role of Decision Support System in MIS, Decision Support Models,

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1				H						M		
CO2		H										
CO3							M					M

C04	M				H						M	
C05		H						M		L		

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. Management Information Systems: Waman S Jawadekar, Tata McGraw-Hill

### **Reference Books -**

1. Management Information Systems S. Sadagopan, PHI learning PVT Ltd.
2. Management Information Systems, Davis, Tata McGraw-Hill
3. Decision Support and Expert Systems: Management Support Systems, Efraim Turban, Prentice Hall
4. Dr. C.B Gupta "Management concepts & practices" S.Chand& Sons, 2009.

**Course Name: Theory of Computation**

**Course Code: BCA151A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

## **Course Objectives:**

1. To introduce students to the mathematical foundations of computation including automata theory.
2. To be able to understand the concept of theory of formal languages and grammars and the notions of algorithm, decidability, complexity, and computability.
3. To enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.
4. To enhance the ability to understand the concept of Regular Expression Formalism.
5. To be able to describe formation of Turing machine by Grammars.

## **Syllabus**

### **Unit I**

**Introduction:** Basic Concepts, Sets, Relations, Graphs, Languages, Mathematical Induction, Finite State Machines FSM: Concept of Basic Machine, Finite State Machine, Finite Automata,

Deterministic Finite Automata, Non-deterministic Finite Automata, Equivalence of NFA and DFA, NFA with  $\epsilon$ -Transitions, Equivalence of NFA and NFA with  $\epsilon$ -Transitions, Equivalence of DFA and NFA with  $\epsilon$ -Transitions, DFA Minimization

### **Unit II**

**Regular Expression:** Formalism, Examples of Regular Expressions, Equivalence of Regular Expressions and Finite Automata, DFA to Regular Expression Conversion, Regular Sets and their Closure Properties, Pumping Lemma for Regular Languages, Decision Algorithms for Regular Sets, Applications of Regular Expressions and Finite Automata.

### **Unit III**

**Turing Machine:** Elements of a Turing Machine, Turing Machine Formalism,

Instantaneous Description, Transition Graph for Turing Machine, Complexity of a Turing Machine, Composite and Iterative Turing Machines, Universal Turing Machine, Multi-tape Turing Machine, Multi-stack Turing Machine, Multi-track Turing Machine.

#### **Unit IV**

**Grammar:** Constituents of Grammar, Formal Definition of Grammar, Grammar Notations, Derivation Process, Derivation Tree, Context-free Languages, Ambiguous Context-free Grammar, Simplification of Context-free Grammar, Normal Forms, Chomsky Hierarchy, Equivalence of Right-linear and Left-linear Grammars ,Equivalence of Regular Grammars and Finite Automata Pumping Lemma for Context-free Languages.

#### **Unit V**

**Automata:** Elements of a PDM, Pushdown Automata, Finite Automata vs PDAPDA Accepting CFLs, DPDA vs NPDA, Equivalence of CFG and PDA, Closure Properties of CFLs, Additional PDA Examples. Parsing, Bottom-up Parsing, Working of a Bottom-up Parser, Automatic Construction of Bottom-up Parser.

#### **Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to**

CO1: Students are able to understand basic terms TOC and FSM.

CO2: Students are able to understand Regular Expression and its fundamentals.

CO3: Students will be able to describe formation of Turing machine by Grammars.

CO4: Students will be able to understand the different-2 types of grammars

CO5: Students will be able to describe the PDA.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course	Program Outcome
--------	-----------------

Outcome												
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	H		H					H	M			
C02				H		H				L		
C03												M
C04				M				H				
C05		H					M		H		M	

H = Highly Related; M = Medium; L = Low

#### Text Book:

1. Vivek Kulkarni "Theory of Computation", Oxford University Press. 2013

#### Reference Books:

1. Peter Linz, "An Introduction to Formal Languages and Automata", (5e), Jones & Bartlett Learning, 2011.
2. John C Martin, "Introduction to Languages and the Theory of Computation", (3e), McGraw Hill, 2007.
3. J E Hopcroft, Rajeev Motwani & Jeffrey D Ullman, "Introduction to Automata Theory, Languages and Computation", (3e), Pearson Education, 2006.
4. K. L. P. Mishra, N. Chandrashekharan, "Theory of Computer Science", (3e), PHI publications, 2007.

**Course Name: Web Technologies**

**Course Code: BCA152A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To be able to develop a dynamic webpage by the use of java script and DHTML.
2. To be able to write a well formed / valid XML document.
3. To be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
4. To be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
5. To be able to write a server side java application called JSP to catch form data sent from client and store it on database.

**Syllabus**

**Unit I**

**Introduction to the Web and HTTP:** History of the Web, Protocols Governing the Web , Creating Websites for Individuals and Web Applications , Writing Web Projects, Identification of Objects , Web Team, Planning and Process Development , TCP/IP Protocol Suite, IP Addresses.

**Unit II**

**Hypertext Markup Language (HTML):** History of HTML and W3C, HTML and its Flavors, HTML Basics, Elements, Attributes, and Tags, HTML Elements, HTML Tags, Basic Tags, Headings , Advanced tags, Frames, Images, Meta Tag, Planning of Web Page, Model

and Structure for a Website, Designing Web Pages.

### **Unit III**

**Cascading Style Sheet (CSS) & XML:** Introduction, Advantages, Adding CSS, External Style Sheets, Embedded Style Sheets, Imported Style Sheets, Inline Style Sheets, Cascading Rule, Browser Compatibility, CSS and Page Layout, Anatomy of a Style Rule, Selectors, Grouping, Type Selectors ,Universal Selectors, Descendant Selectors ,Child Selectors, Attribute Selectors, class Selectors, ID selectors ,XML: Common Use , Role of XML, Basic Structure, Body, Elements, Attributes, Validation, Displaying XML, Namespace

### **Unit IV**

**Java Script:** Introduction, Variables, Literals , Operators, Control Structure, Conditional Statement , Arrays, Functions , Predefined Objects, The Location Object, History, Object Hierarchy, Accessing Objects, Event Handling , DOM, JavaScript and XML

### **Unit V**

**Servlet and JSP:** Introduction, Definitions, Server-side Java, Advantage over Applet,Servlet Architecture,Servlet Life Cycle,GenericServlet, HttpServlet,First Servlet,Passing.

JSP: JSP and HTTP, JSP Engines, JSP and Servlet, JSP Syntax, JSP Components

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Students are able to understand basic terms and protocols related to WWW.

CO2: Students are able to develop a dynamic webpage by the use of HTML/DHTML

CO3: Students will be able to write a well formed / valid XML document.

CO4: Students will be able to use java script for event handling etc.

CO5: Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01		L	H				M		M			
C02		H			L			M				L
C03	H				H	M			L			
C04			H	H			L	M				
C05		L							H		M	

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Web Technologies, Oxford University, Uttam Kumar Roy, November 2010

**Reference Books**

1. "Semantic Web Technologies: Trends and Research in Ontology-based Systems" by John Davies and Rudi Studer

2. "Semantic Web Technologies and Legal Scholarly Publishing (Law, Governance and Technology Series)" by Silvio Peroni
3. "Foundations of Semantic Web Technologies" by Pascal Hitzler and Markus Krotzsch
4. "Semantic Web Technologies for Intelligent Engineering Applications" by Stefan Biffl and Marta Sabou

**Course Name: Artificial Intelligence and Expert System**

**Course Code: BCA153A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To understand AI methodology and fundamentals; intelligent agents.
2. To understand search algorithms; game playing; supervised and unsupervised learning; decision tree learning.
3. To learn neural networks, nearest neighbor methods, dimensional reduction, clustering.
4. To understand kernel machines, support vector machines; uncertainty and probability theory.
5. To understand probabilistic reasoning in AI.

**Syllabus**

## **Unit I**

**History:** Artificial Intelligence: History and Applications, Intelligence, Communication, Learning, Artificial Intelligence, Progress of Artificial Intelligence, Modeling, Simulation, and AI, Intelligent Systems, Comparison of Various Intelligent Systems

## **Unit II**

**Knowledge Representation:** Reasoning, Issues, and Acquisition, Propositional Calculus, Predicate Calculus, Rule-based Knowledge Representation, Symbolic Reasoning Under Uncertainty, Basic Knowledge Representation Issues, Knowledge Acquisition

## **Unit III**

**Artificial Intelligence Problem-solving Languages:** PROLOG , Control Structures used in Rule-Based Systems , Search, Search Strategies Using Search Techniques , Implementation of Search, Construction and Debugging Methods for a Program, LISP, Problem-solving by LISP, Implementation of LISP , Comparison of LISP and PROLOG

## **Unit IV**

**Fuzzy Systems:** Foundation of Fuzzy Systems, Fuzzy Relations ,Arithmetic Operations of Fuzzy Numbers, Linguistic Descriptions and their Analytical Forms , De- fuzzification Methods, Fuzzy Logic in Control and Decision-making Applications,

## **Unit V**

**Expert Systems:** Features ,Characteristics, Architecture, Goals, Basic Activities, Advantages, Stages in the Development of an Expert System, Probability-based Expert Systems, Expert System Tools , Applications

### **Course Outcomes:**

**On successful completion of this course students will be able to:**

CO1: Knowledge of what constitutes "Artificial" Intelligence and History of Artificial Intelligence.

CO2: Explain Implementations Applications related to Artificial Intelligence.

CO3: Implement Expert system technologies and Fuzzy logic theory.

CO4: Ability to apply Artificial Intelligence with neural network and genetic algorithm.

CO5: Explain the Swarm Artificial Intelligence techniques.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1		M				M				M		
CO2				M				M				
CO3					M						M	
CO4							H					
CO5	H	M				M			M			

H = Highly Related; M = Medium; L = Low

**Text Book**

1. N. P. Padhy, "Artificial Intelligence and Intelligent Systems", 1 edition, Oxford University Press , 2005.

**Reference Books**

1. Stuart Russell and Peter Norvig,"Artificial Intelligence A Modern Approach", 3'rd Edition , Pearson Education, 2010.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", 3'rd Edition, Tata McGraw Hill Edition, 2008.

3. Saroj Kaushik, "Artificial Intelligence", (1e), Cengage Learning Publications, 2011.

Don W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Publication, 2006.

**Course Name: Data Mining**

**Course Code: BCA154A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To know about data mining techniques like KDD and DM.

2. To understand the basic concept of clustering, hierarchical and non-hierarchical techniques
3. To understand the use of K-MEDOID Algorithm, Partitioning Decision Tree.
4. To know the basic concept of data mining.
5. To provide the fundamental concepts of data warehousing technology.

## **Unit I**

**Introduction to Data mining:** Introduction, Architecture of a Data Mining System, The Knowledge Discovery Process , Integrating Data Mining with Data Warehouse, Related Areas of Data Mining , Data Mining Techniques

**Unit II Data Mining:** KDD vs. DM, DBMS vs. DM, DM Techniques, Issues and Challenges in DM, DM Applications. Association Rules: A Prior Algorithm, Generalized association rule.

**Unit III Data Warehousing:** Introduction, Definition, Multidimensional data transformation, OLAP operations, Warehouse schema.

**Unit IV Clustering:** Hierarchical and non-hierarchical techniques, K-MEDOID Algorithm, Partitioning Decision Trees: Decision tree induction, Tree pruning, and Extracting classification rules from decision trees.

**Unit V Introduction to Techniques for Data mining:** Neural Networks, Data mining using neural networks, Genetic algorithms, Web Mining.

## **Course Outcomes**

CO1: Students are able to understand the concepts of data mining and different techniques of data mining.

CO2: Understanding of various techniques to mine the data with the application area.

CO3: Able to utilize data warehouses and OLAP for data mining and knowledge discovery activities.

CO4: Able to determine an appropriate mining strategy and obtain knowledge of current

data mining applications.

CO5: Able to know about data warehousing schema.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	H					M						
CO2			M							M		
CO3											H	M
CO4					M			H				
CO5	H		M						L			

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Vikram Pudi , "Data Mining" , Third Edition, Oxford university Press

**Reference Books:**

1. Jiawei Han and Micheline Kamber, "Data Mining- Concepts and Techniques", (3e), Morgan Kaufmann Publishers, 2011
2. Paulraj Ponniah, "Data Warehousing", (2e), Wiley India Pvt. Ltd., 2010
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining. Pearson (2005), India.
4. Jiawei Han and MichelineKamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, 3rd edition

**Course Name: Data Warehousing**

## **Course Code: BCA155A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To know the basic concept of data mining.
2. To provide the fundamental concepts of data warehousing technology.
3. To be able to incorporate a step-by-step approach to designing and building a data warehouse.
4. To provide numerous review questions, multiple choice questions and other exercises at the end of each chapter.
5. To contain a running fictitious case-study to bring out practical aspects of building a data warehouse.

### **Syllabus**

#### **Unit I**

**Data Warehousing:** Introduction to Data Warehousing: Historical Background, Increasing Demand for Strategic Information, Data Warehouse Defined, Data Warehouse Users, Benefits of Data Warehousing, Concerns in Data Warehousing. Features of a Data Warehouse, Multidimensional data transformation, OLAP operations, Warehouse schema.

#### **Unit II**

**Architecture:** Architecture, Characteristics of Data Warehouse Architecture, Data Warehouse Architecture Goals, Data Warehouse Architecture, Data Warehouse and Data Mart, Building Data Marts and its issues, Building Data Marts, Other Data Mart Issues .

#### **Unit III**

**Planning and Project Management:** Project Management Principle, Data Warehouse

Readiness Assessment, Data Warehouse Project Team, Planning for the Data Warehouse, Data Warehouse Project Plan, Planning for the Data Warehouse Server, Capacity Planning, Selecting the Operating System, Selecting the Database Software.

## **Unit IV**

**Schema & Dimensional Modeling:** Schema: Dimensional Modeling, the Star Schema, the Snowflake Schema, Aggregate Tables, Fact Constellation Schema, the Strengths of Dimensional Modeling, Data Warehouse and the Data Model.

Dimensional Modeling: Characteristics of a Dimension Table, Characteristics of a Fact Table, T Types of Dimension Tables, Keys in the Data Warehouse (Star) Schema, Enhancing the Data Warehouse Performance, Technology Requirements.

## **Unit V**

**OLAP:** Need For OLAP, OLAP and Multidimensional Analysis, OLAP Functions, OLAP Applications, OLAP Models, OLAP Design Considerations, OLAP Tools and Products, Existing OLAP Tools, Data Design, Administration and Performance, OLAP Platforms.

### **Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to**

CO1: Describe the fundamental concepts, benefits and problem areas associated with data warehousing.

CO2: Describe the various architectures and main components of a data warehouse.

CO3: Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.

CO4: Understand various schemes and data models.

CO5: Compare and contrast OLAP and data mining as techniques for extracting knowledge from a data warehouse.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	H		H					H	M			
CO2				H		H				L		
CO3												M
CO4				M				H				
CO5		H					M		H		M	

H = Highly Related; M = Medium; L = Low

**Text Book:**

1. Vikram Pudi , "Data Mining" , Third Edition, Oxford university Press

**Reference Books:**

1. Jiawei Han and Micheline Kamber, "Data Mining- Concepts and Techniques", (3e), Morgan Kaufmann Publishers, 2011
2. Paulraj Ponniah, "Data Warehousing", (2e), Wiley India Pvt. Ltd., 2010
3. H. Witten and E. Frank, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann, 2000.
4. M.H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education 2006.

**Course Name: Mongo Database**

**Course Code: BCA156A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To understand the need and advantage of no SQL database.
2. To provide students the right skills and knowledge needed to develop and run Applications on mongoDB.
3. To be able to understand NoSQL database.
4. To perform session management using MongoDB.
5. To be able to perform Aggregation Queries.

**Syllabus**

**Unit I**

**MongoDB concepts** - Databases, collections, and documents. Downloading Installing and running MongoDB, Installing PHP Driver for MongoDB on various OS Platforms.

Define NoSQL, its characteristics and history, and the primary benefits for using NoSQL databases.

**Unit II**

**Application Development:** Inserting documents in MongoDB, Querying documents in collection, Doing advance queries in MongoDB, Updating documents MongoDB, Deleting

documents in MongoDB, Managing relationships between documents.

### **Unit III**

**Session Management:** Understanding HTTP sessions, Understanding PHP native session handling, Implementing session handling with MongoDB, Putting Session Manager, Building user authentication module, creating login, logout and user profile.

### **Unit IV**

**Aggregation Queries:** Generating Sample Data, Understanding MapReduce, Performing MapReduce in MongoDB and PHP, Aggregation using group(), Listing distinct values for field, counting documents with count(). Using MongoDB for web analytics.

### **Unit V**

**Handling files with GridFS:** What is Grid, Storing files in GridFS, Serving files from GridFS, Reading files in chunks

#### **Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to**

CO1: Students will be able to understand basic terms related to MongoDB.

CO2: Students will be able to know application areas of MongoDB and to write simple queries on MongoDB.

CO3: To perform session management using MongoDB.

CO4: Student will be able to perform Aggregation Queries.

CO5: Student will be able to design file handling application using MongoDB.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>
e	

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P00	P011	P012
C01	H		H					H	M			
C02				H		H				L		
C03												M
C04				M				H				
C05		H					M		H		M	

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. Kyle Banker, 2012, "MongoDB in Action", Manning Publications Co.

### **Reference Books**

1. MongoDB the definitive guide - O'Reilly Kristina Chodorow & Michal Dirolf
2. Rick Copeland, 2013, "MongoDB Applied Design Patterns", First Edition, O'Reilly Media Inc.
3. Gautam Rege, 2012, "Ruby and MongoDB Web Development Beginner's Guide", Packt Publishing Ltd
4. Mike Wilson, 2013, "Building Node Applications with MongoDB and Backbone", O'Reilly Media Inc.

**Course Name: Soft Computing**

**Course Code: BCA157A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To illustrative description of the inherent principles of soft computing, eliminating heavy mathematical treatment
2. To exclusive chapter on swarm intelligent systems
3. To extensive coverage of neural networks and fuzzy logic concepts
4. To understand basic concepts and working of generic algorithms.
5. To understand the concept of artificial neural network.

**Syllabus**

**Unit I**

**Introduction to soft computing, Need for soft computing, Artificial Intelligence, Artificial**

Neural Networks , Fuzzy Systems, Genetic Algorithm and Evolutionary Programming, Swarm Intelligent Systems.

## **Unit II**

**Artificial Neural Networks- I:** Introduction to Neural Networks, Biological Inspiration, Comparison between Brain and Computer, Biological Neural Networks to Artificial Neural Networks, Information Processing at the Neurons and Synapses, Classification of ANNs, Neural Network Architecture, Learning/Training, Training and Testing Modes.

## **Unit III**

**Artificial Neural Networks- II:** Backpropagation Neural Networks, Kohonen Neural Network, Learning Vector Quantization, Hamming Neural Network, Hopfield Neural Network, Bi-directional Associative Memory, ART Network, Boltzman Machine Neural Networks , Radial Basis Function Neural Networks.

## **Unit IV**

**Fuzzy Logic:** Fuzzy Logic Introduction, Human Learning Ability, Undecidability, Imprecision, and Uncertainty, Probability Theory vs Possibility Theory, Fuzzy sets and Classical sets, Fuzzy set operations, Fuzzy relations, Fuzzy compositions, Natural Language and Fuzzy Interpretations, Structure of Fuzzy Inference System

## **Unit V**

**Genetic Algorithm:** Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications

### **Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: To know about the basics of soft computing techniques and also their use in some real life situations.

CO2: To solve the problems using neural networks techniques.

CO3: To find the solution using different fuzzy logic techniques

CO4: To use the genetic algorithms for different modelling

CO5: To integrate the various soft computing techniques

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1				H						M		
CO2		H			L				M			
CO3			H								M	
CO4							H					
CO5	H			L					M			

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Soft Computing with MATLAB Programming, Oxford University, Padhy and Simon, May 2015.

**Reference Books**

1. "Soft Computing :Fundamentals And Applications" by Pratihar D K
2. "Soft Computing and Intelligent Systems Design: Theory, Tools and Applications" by Karray
3. "Soft Computing Applications and Intelligent Systems" by Shahrul Azman Noah

and Siti Norul Huda Sheikh Abdullah

4. "Soft Computing and Its Applications, Volume Two: Fuzzy Reasoning and Fuzzy Control: Volume 2" by Kumar S Ray

**Course Name: Parallel Computing**

**Course Code: BCA158A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To identify the scope for parallelism in a program.
2. To understand the various parallel programming models and the challenges involved in parallel programming.

3. To learn the basics of heterogeneous systems using CUDA and OpenCL.
4. To introduce the foundations of parallel computing, including parallel architectures, parallel programming methods and techniques.
5. To introduce parallel algorithm designs, and parallel performance analysis.

## Syllabus

### Unit I

**Introduction to Parallel Computing:** Motivating Parallelism, Scope of Parallel Computing, Organization and Contents of the Text, Parallel Programming Platforms, Implicit Parallelism: Trends in Microprocessor Architectures, Limitations of Memory System Performance.

### Unit II

**Principles of Parallel Algorithm Design:** Introduction, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models

### Unit III

**Basic Communication Operations:** One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, Circular Shift, Improving the Speed of Some Communication Operations

### Unit IV

**Analytical Modeling of Parallel Programs:** Sources of Overhead in Parallel Programs, Performance Metrics for Parallel Systems, The Effect of Granularity on Performance, Scalability of Parallel Systems, Minimum Execution Time and Minimum Cost-Optimal Execution Time, Asymptotic Analysis of Parallel Programs.

### Unit V

**Programming Shared Address Space Platform:** Thread Basics, The POSIX Thread API, Thread Basics: Creation and Termination, Synchronization Primitives in Pthreads,

Controlling Thread and Synchronization Attributes, Thread Cancellation.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Able to understand the concept of parallelism and Routing Mechanisms for Interconnection Networks.

CO2: Able to understand the parallel algorithm design techniques.

CO3: To design the Analytical Models of Parallel Programs.

CO4: To understand the concept of thread, POSIX and Pthreads.

CO5: To understand the basic communication operations

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	
C01		L	H				M		M				
C02		H			L			M				L	
C03	H				H	M			L				
C04			H	H			L	M					
C05		L							H		M		

H = Highly Related; M = Medium; L = Low

**Text Book**

1. Introduction to parallel Computing, Oxford University, Petersen and Arbenz, July 2008.

### **Reference Books**

1. "Computer Architecture and Parallel Processing" by Kai Hwang
2. "Computer Architecture and Parallel Processing" by Bharat Bhushan Agarwal and Sumit Prakash Tayal.
3. "Parallel Computers – Architecture and Programming" by Rajaraman V
4. "Advanced Computer Architecture for Parallel Processing (Mcgraw Hill Series in Electrical and Computer Engineering)" by Kai Hwang

**Course Name: Mobile Computing**

**Course Code: BCA159A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objectives:**

1. To understand the concept of mobile computing and mobile communication in equal measure 2G, 2.5G, 3G, 3G+, and 4G communication systems.
2. To know about mobile satellite communication networks, mobile IP, mobile TCP and digital audio-video broadcasting
3. To be able to understand the concept of mobile systems and devices, mobile operating systems used for application development, mobile databases,
4. To know about Client-server computing agents, application servers.
5. To know about security protocols, mobile Internet, and ad-hoc and sensor networks.

### **Syllabus**

#### **Unit I**

**Mobile Communication and Mobile Devices:** Mobile Computing introduction, Mobile Computing , Mobile Computing Architecture, Mobile Devices, Mobile System, Networks, Data Dissemination, Mobility Management, Security.

#### **Unit II**

**Cellular Networks and Frequency Reuse** Mobile Smartphones, Smart Mobiles, and Systems, Handheld Pocket Computers, Smart Systems, Limitations of Mobile Devices, Automotive Systems.

#### **Unit III**

**Wireless Medium Access Control, CDMA, 3G and 4G Communication:** Modulation, Multiplexing, Controlling the Medium Access, Spread Spectrum, FHSS, Coding Methods, CDMA,OFDM, High Speed Packet Access (HSPA) 3G Network, Long-term Evolution, WiMax Rel 1.0 IEEE 802.16e, Broadband Wireless Access, 4G Networks.

## **Unit IV**

**Mobile IP Network Layer and Mobile Transport Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation, Route Optimization, DHCP, VoIP, Ipsec. Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP.

## **Unit V**

**Mobile Ad-hoc and Wireless Sensor Networks:** Introduction to Mobile Ad-hoc Network, Fixed Infrastructure Architecture, MANET Infrastructure Architecture, MANET, Properties, Spectrum; Applications Routing and Routing Algorithms, Security in Ad-hoc Network, Wireless Sensor Networks, Data Dissemination, Sensor Network Applications, Distributed Network and Characteristics, TinyOS.

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Describe wireless and mobile communications systems and be able to choose an appropriate mobile system from a set of requirements.

CO2: To describe all layers, GSM and Architectures

CO3: To describe Interface a mobile computing system with CDMA, 3G and 4G communications.

CO4: To describe IP Network and layers.

CO5: To describe MANET and wireless sensor networks

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>

e	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1				H						M		
CO2		H			L			M				
CO3			H								M	
CO4							H					
CO5	H			L					M			

H = Highly Related; M = Medium; L = Low

### Text Book

1. Mobile Computing, Oxford University, Raj Kamal, December 2011.

### Reference Books

1. Mobile Communication 2nd edition by Jochen Schiller, Pearson education
2. Mobile Computing by Asoke Talukder, Roopa Yavagal (Tata McGraw Hill)
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober- "Principles of Mobile Computing"
4. Hazysztof Wesolowshi- "Mobile Communication Systems"

**Course Name: Image Processing**

**Course Code: BCA160A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To introduce students to the mathematical foundation of Image processing
2. To do detailed study of image processing Operations and Systems.
3. To learn students about Image transforms, Enhancement with algorithms of restoration and Compression.
4. To do detailed study about image segmentation.
5. To learn about Image Compression Model and Compression Algorithm.

**Syllabus**

**Unit I**

**Introduction to Image Processing :** Overview of Image Processing, Nature of Image Processing, Image Processing and Related Fields, Digital Image Representation Types of Images, Digital Image Processing Operations, Fundamental Steps in Image Processing, Image Processing Applications.

**Unit II**

**Digital Imaging Systems and Processing Operations:** Overview of Digital Imaging Systems, Physical Aspects of Image Acquisition, Biological Aspects of Image Acquisition, Review of Digital Cameras, Image Display Devices and Device Resolution, Digital Halftone Process , Image Storage and File Formats.

**Unit III**

**Image Restoration:** Introduction to Degradation, Types of Image Degradations, Point Spread Function and Modulation Transfer Function, Image Degradation Model, Noise Modelling, Image Restoration in Presence of Noise Only, Periodic Noise, and Band-pass and Band-reject Filtering, Image Restoration Techniques.

#### **Unit IV**

**Image Compression:** Image Compression Model, Compression Algorithm and its Types, Types of Redundancy, Lossless Compression Algorithms, Lossy Compression Algorithms, Image and Video Compression, Wavelet Transform and Multiresolution Analysis.

#### **Unit V**

**Image Segmentation and Colour Image Processing:** **Segmentation:** Introduction, Classification of Image Segmentation Algorithms, Detection of Discontinuities, Edge Detection, Hough Transforms and Shape Detection, Corner Detection, Principle of Thresholding, Principle of Region-growing, Active Contour Models, Validation of Segmentation Algorithms.

**Colour Image Processing:** Colour Image Storage and Processing, Colour Models, Colour Quantization, Pseudocolour Image Processing, Full Colour Processing.

#### **Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: Students are able to understand basic terms of Image Processing.

CO2: Students are able to understand Processing operations and its fundamentals.

CO3: Students will be able to describe the effect of transform operation on Digital Image .

CO4: Students will be able to understand the different-2 Image compressing algorithms.

CO5: Students will be able to describe segmentation and Color image processing.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1				H						M		
CO2		H			L				M			
CO3			H								M	
CO4							H					
CO5	H			L					M			

H = Highly Related; M = Medium; L = Low

**Text Book**

1. S. Sridhar , "Digital Image processing" , Oxford University Press, 2011

**Reference Books**

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing" (3e), Pearson Prentice Hall, 2008.
2. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image

- Processing Using MATLAB”, (2e), Tata McGraw Hill Publication, 2010.
3. Sonka, Hlavac, Boyle, “Digital Image Processing and Computer Vision”, CENGAGE Learning.
  4. “Digital Image Processing” by Rafael C Gonzalez and Richard E Woods.

**Course Name: Big Data Analysis**

**Course Code: BCA161A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

**Course Objectives:**

1. To know the fundamental concepts of big data and analytics.
2. To explore tools and practices for working with big data
3. To learn about stream computing.
4. To know about the research that requires the integration of large amounts of data.
5. To know about clustering and classification.

**Syllabus**

**Unit I**

**Introduction To Big Data:** Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating- The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of

Value -Understanding Big Data Storage – A General Overview of High-Performance Architecture - HDFS – Map Reduce and YARN – Map Reduce Programming Model

## **Unit II**

**Clustering and Classification:** Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases -Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons toChoose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree – TheGeneral Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees inR - Naïve Bayes - Bayes' Theorem - Naïve Bayes Classifier.

## **Unit III**

**Association and Recommendation System:** Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

## **Unit IV**

**Graph Memory:** Using Graph Analytics for Big Data: Graph Analytics - The Graph Model - Representation as Triples - Graphs and Network Organization - Choosing Graph Analytics - Graph Analytics Use Cases - Graph Analytics Algorithms and Solution Approaches - Technical Complexity of Analyzing Graphs- Features of a Graph Analytics Platform - Considerations: Dedicated Appliances for Graph.

## **Unit V**

**Stream Memory:** Introduction to Streams Concepts – Stream Data Model and Architecture -Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elementsin a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Realtime Analytics Platform(RTAP) applications - Case

Studies - Real Time Sentiment Analysis, Stock Market Predictions.

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: Identify the difference between structured, semi-structured and unstructured data.

CO2: summarize the challenges of big data and how to deal with the same.

CO3: Explain the significance of NoSQL databases.

CO4: Explain about Hadoop Ecosystem.

CO5: Identify the difference between Pig and Hive.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1		M				M				M		
CO2				M				M				
CO3					M						M	
CO4							H					
CO5	H	M				M			M			

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

### **Reference Book**

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with
2. Tom White, "Hadoop: The Definitive Guide", Second Edition, O'Reilly Yahoo Press.
3. Robert D. Schneider, "Hadoop for Dummies", Wiley.
4. VigneshPrajapati, "Big Data Analytics with R and Hadoop", Packt Publishing.

**Course Name: Organization Behavior**

**Course Code: BCA162A**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
3	0	0	3

### **Course Objectives:**

1. To discuss the development of the field of organizational behavior and explain the micro and macro approaches
2. To analyze and compare different models used to explain individual behavior related

- to motivation and rewards
3. To identify the processes used in developing communication and resolving conflicts
  4. To explain group dynamics and demonstrate skills required for working in groups (team building)
  5. To discuss the implementation of organizational change.

## **Syllabus**

### **Unit I**

**Organization behavior:** The Importance of Interpersonal Skills, Management Functions, Management Roles, Management Skills, Effective versus Successful Managerial Activities, Enter Organizational Behavior, Complementing Intuition with Systematic Study, Challenges and Opportunities for Organizational Behavior

### **Unit II**

**Diversity in organization:** Demographic Characteristics of the U.S. Workforce, Levels of Diversity, Discrimination, Biographical Characteristics, Ability: Intellectual Abilities, Physical Abilities 55, The Role of Disabilities, Implementing Diversity Management Strategies, Attracting, Selecting, Developing, and Retaining Diverse Employees, Effective Diversity Programs.

### **Unit III**

**Attitudes and job Satisfaction:** What Are the Main Components of Attitudes, Does Behavior Always Follow from Attitudes, What Are the Major Job Attitudes, Job Satisfaction, Measuring Job Satisfaction, How Satisfied Are People in Their Jobs, What Causes Job Satisfaction, The Impact of Satisfied and Dissatisfied Employees on the Workplace

### **Unit IV**

**Emotions and Moods:** The Basic Emotions, The Basic Moods: Positive and Negative Affect, The Function of Emotions, Sources of Emotions and Moods, Emotional Labor,

Affective Events Theory, Emotional Intelligence, The Case for EI, The Case Against EI, Emotion Regulation, OB Applications of Emotions and Moods.

## Unit V

**Perception and Decision Making:** Factors That Influence Perception, Making Judgments About Others, Attribution Theory, Common Shortcuts in Judging Others, Specific Applications of Shortcuts in Organizations, The Link Between Perception and Individual Decision Making, Decision Making in Organizations, The Rational Model, Bounded Rationality and Intuition, Common Biases and Errors in Decision Making, Influences on Decision Making: Individual Differences and Organizational Constraints, Ethics in Decision Making, Three Ethical Decision Criteria, Improving Creativity in Decision Making.

### Course Outcomes (COs):

**On successful completion of this course, the learner will be able to :**

CO1: To identify the various leadership styles and the role of leaders in a decision making process.

CO2: To explain organizational culture and describe its dimensions and to examine various organizational designs

CO3: Able to understand negative and positive emotions and moods.

CO4: Able to know the concept of Diversity in organization

CO5: Able to understand attitude and job satisfaction.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	PO 9	P01 0	P01 1	P01 2
CO1		M				M				M		

CO2				M					M				
CO3					M						M		
CO4							H						
CO5	H	M				M			M				

H = Highly Related; M = Medium; L = Low

### **Text Book**

1. "Organizational Behavior" Stephen P. Robbins –San Diego State University Timothy A. Judge –University of Notre Dame, 15<sup>th</sup> edition, Pearson.

### **Reference Books**

1. McShane, S.L. and Von Glinow, M.A., Organizational Behaviour, New Delhi, Tata McGrawHill Publishing company Ltd.
2. P. Jyothi, P. and Venkatesh, D.N., Human Resource Management, New Delhi, Oxford University Press.
3. Denhardt, R.B., Denhardt, J.V., and Aristigueta, M.P. (2009), Managing Human Behaviour in Public and Non-Profit Organizations, Second edition. California, Sage Publications.
4. Pynes, J.E. (2004). Human Resources Management for Public and Nonprofit Organizations, Second Edition. San Francisco, CA: Jossey- Bass Publishers.

**Course Name: Introduction to Cloud Computing**

**Course Code: BCA163A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
3	0	0	3

### **Course Objective:**

1. To provide students with the fundamentals, essentials of Cloud Computing and cloud models.
2. To be able to work with cloud services and to provide a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
3. To learn about the cloud environment, building software systems and components that scale to millions of users in modern internet.
4. To understand basic and advance services provided by the cloud and basic architecture on which cloud is based upon.
5. To enable students exploring some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

### **Syllabus**

#### **Unit I**

**Introduction:** Business and IT perspective, Cloud and virtualization, Cloud services requirements, cloud and dynamic infrastructure, cloud computing characteristics, cloud adoption.

**Cloud models:** Cloud characteristics, Measured Service, Cloud models, security in a public cloud, public verses private clouds, cloud infrastructure self service.

#### **Unit II**

**Cloud at a service:** Gamut of cloud solutions, principal technologies, cloud strategy, cloud design and implementation using SOA, Conceptual cloud model, cloud service demand.

### **Unit III**

**Cloud solutions:** Cloud ecosystem, cloud business process management, cloud service management, cloud stack, computing on demand, cloud sourcing.

### **Unit IV**

**Cloud management:** Resiliency, Provisioning, Asset management, cloud governance, high availability and disaster recovery, charging models, usage reporting, billing and metering.

### **Unit V**

**Cloud and SOA:** SOA journey to infrastructure, SOA and cloud, SOA defined, SOA defined, SOA and IAAS, SOA based cloud infrastructure steps, SOA business and IT services.

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: To provide students with the fundamentals, essentials of Cloud Computing and cloud models.

CO2: Students are able to work with cloud services and to provide a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

CO3: Understand about the cloud solutions, Cloud ecosystem, cloud business process management.

CO4: To learn about designing and implement cloud computing application and cloud management.

CO5: Demonstrate the SOA journey to infrastructure, SOA and cloud and IT services.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1		H				L					H	
CO2				H						M		
CO3	H								M			M
CO4				H								
CO5		M			H				M			

H = Highly Related; M = Medium; L = Low

**Text Books:**

1. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications

**Reference Books**

1. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach
2. RajkumarBuyya, James Broberg, Andrzej M. Goscinski,"Cloud Computing:Principles and Paradigms", Edition1, Wiley,2011
3. Barrie Sosinsky,"Cloud Computing Bible",Edition1, Wiley-India, 2010
4. Ronald L. Krutz, Russell Dean Vines,"Cloud Security:A Comprehensive Guide to Secure Cloud Computing", Edition 1 , Wiley- India,2010

**Course Name: Introduction to Sales Force**

**Course Code: BCA164A**

L (Hr.)	T/P (Hr.)	Pr (Hr.)	Credits
3	1	0	4

**Course Objective:**

1. To introduce cloud computing and sales force approaches.
2. To understand the concept and features of CRM, Data Migration Import Wizard and Data Loader.
3. To describe needs of APEX as a Programming Language, Various Statements and Operators.
4. To demonstrate class and visual force.
5. To be able to understand the concept of Trigger Context Variables, Validation and Automation, Components, Client Controller and Server Controller.

**Syllabus**

**Unit I**

**Introduction to Cloud Computing & Sales force:** On premise and Cloud approach, IaaS, PaaS and SaaS, Clouds, Versions, Editions & Environments, Product & Project Development

MVC Pattern and Multitenant Architecture: Configuration, Development, Testing and Admin, along with 15 steps of Salesfroce.com, MVC Diagram, Multi-Tenant Diagram Starting Designing Applications on Force.com: Basic Vocabulary, Registration, Navigation and Principles, Understanding the Same with Lightning, Relationships, All 6 Types, Validation, Page Layouts and Record Types

## **Unit II**

**CRM:** Campaign, Lead, Account, Contact and Opportunity, Campaign, Lead, Account, Contact and Opportunity, Product, Proc Book, Quote, Forecast, Order, Asset, Case, Solution, Activity, Task, Event, Calendar, PaaS features for CRM.

## **Unit III**

**Introduction to Programming:** Need of APEX as a Programming Language, Various Statements and Operators, 9 types of operators and 5 types of statements, System.debug, Comments, Indentation, Naming Conventions, OOP, Business Class , Test Class, Test Methods, Creating object, calling methods, executing a program, Constructor / Method / Operator Over Loading / this, Default , Parameterised .

## **Unit IV**

**Class and Visual Force:** Static and non-static members of a class, Class Summary, try catch, Collections list: Set, Map, Exception Handling, Assertions and Annotations: 6 types of Assertions and 3 Annotations, Database Statements: DML , MC inter relation, Database Statements : SOQL / SOSL, Visual Force - Types of Tags: 6 Types

## **Unit V**

**Custom List Controller:** Insert and fetch Records, Schedule Apex: Interface, Batch Apex: 50 K, 50 Million, Triggers: if and its types, Trigger Context Variables, Validation and Automation, Components, Client Controller, Server Controller

### **Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: Introduce cloud computing and sales force approaches.

CO2: Able to understand the concept and features of CRM, Data Migration Import Wizard and Data Loader.

CO3: Describe needs of APEX as a Programming Language, Various Statements and Operators.

CO4: To demonstrate class and visual force.

CO5: Able to understand the concept of Trigger Context Variables, Validation and Automation, Components, Client Controller and Server Controller.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1		H				L					H	
CO2				H						M		
CO3	H							M				M
CO4				H								
CO5		M			H				M			

H = Highly Related; M = Medium; L = Low

**Text Books:**

1. Wes Nolte , Jeff Douglas , "Salesforce Handbook" (3e), Lulu.com, 2011.

**Reference Books:**

1. David Taber, "Salesforce.com Secrets of Success: Best Practices for Growth and Profitability", 1 edition, Prentice Hall, 2009.
2. Tom Wong, Liz Kao & Matt Kaufman "Salesforce for Dummies", 4th Revised edition edition ,John Wiley & Sons, 2010
3. Visual force practices by Michael Floyd, Don Robins, Dan Appleman, et al.
4. Development with the Force.com Platform, Jason Ouellette