



Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore-641043, Tamil Nadu, India

B.Sc. Computer Science

Programme Specific Outcomes:

1. Acquire adequate knowledge in core areas.
2. Possess skill sets in programming.
3. Exhibit a range of transferable skills for employment.
4. Groom themselves to be future technocrats.
5. Imbibe societal responsibilities.

Scheme of Instruction and Examinations

(For Students admitted from 2018-2019 and onwards)

Part	Course Code	Name of the Course / Component	Hours of Instructions/ Course/ Week		Scheme of Examination				
			Theory	Practical	Duration of exam	CIA	CE	Total	Credits
First Semester									
I	18BLT001/ 18BLA001/ 18CLF001	Tamil/Hindi/French - I ,yf;fpak; I - ,yf;fzk;> ,yf;fpatuyhW Prose, One Act Play, Grammar and Translation Communicative French –I	5	-	3	50	50	100	4
II	18BLE001	English Language for Communication-I	5	-	3	50	50	100	4
III		Core Courses							
	18BCSC01	Digital Computer Fundamentals	4	-	3	50	50	100	3
	18BCSC02	Data Structures and Algorithms	4	-	3	50	50	100	3
	18BCSC03	Programming in C	3	-	3	50	50	100	3
	18BCSC04	Computing Laboratory - I C	-	4	3	50	50	100	2
		Discipline Specific Elective (DSE) Course							
	18BCSI01	DSE – I Essential Mathematics for Computer Science (Computer Science)	4	-	3	50	50	100	3
IV		Games	-	1	-	-	-	-	-

Second Semester

I	18BLT002/ 18BLA002/ 18CLF002	Tamil/Hindi/French – II ,yf;fpak; II - ,yf;fzk;> ,yf;fpatuyhW Poetry, Letter Writing and Technical Terms Communicative French-II	5	-	3	50	50	100	4
II	18BLE002	English Language forCommunication-II	5	-	3	50	50	100	4
III		Core Courses	-						
	18BCSC05	Computer Architecture	4	-	3	50	50	100	3
	18BCSC06	Internet and E - commerce	4	-	3	50	50	100	3
	18BCSC07	Programming in C++	3	-	3	50	50	100	3
	18BCSC08	Computing Laboratory – II C++	-	4	3	50	50	100	2
		Discipline Specific Elective (DSE) Course							
	18BCSI02	DSE – II Programming Interactivity (Computer Science)	4	-	3	50	50	100	3
IV		Games	-	1		-	-	-	-

Third Semester

III		Core Courses							
	18BCSC09	Operating Systems	4	-	3	50	50	100	3
	18BCSC10	Computer Networks	4	-	3	50	50	100	3
	18BCSC11	Computer Graphics and Multimedia Systems	4	-	3	50	50	100	3
	18BCSC12	Programming in Java	3	-	3	50	50	100	3
	18BCSC13	Computing Laboratory - III Java	-	4	3	50	50	100	2
	18BCSC14	Computing Laboratory - IV Graphics and Multimedia	-	4	3	50	50	100	2
		Discipline Specific Elective (DSE) Course							
	18BCSI03	DSE – III Statistical methods (Computer Science)	5	2	3	50	50	100	5

Fourth Semester

III		Core Courses							
	18BCSC15	Cyber Security	4	-	3	50	50	100	3
	18BCSC16	Microprocessors and Microcontrollers	4	-	3	50	50	100	3
	18BCSC17	Relational Database Management Systems	4	-	3	50	50	100	3
	18BCSC18	Programming in Python	3	-	3	50	50	100	3
	18BCSC19	Computing Laboratory - V Python	-	4	3	50	50	100	2
	18BCSC20	Computing Laboratory - VI RDBMS	-	4	3	50	50	100	2
		Discipline Specific Elective (DSE) Course							
	18BCSI04	DSE– IV Optimization Techniques (Computer Science)	5	2	3	50	50	100	5

Fifth Semester

III	Core Courses								
	18BCSC21	Fundamentals of Data Science	5	-	3	50	50	100	4
	18BCSC22	Cloud Computing	5	-	3	50	50	100	3
	18BCSC23	Software Engineering	5	-	3	50	50	100	3
	18BCSC24	Computing Laboratory - VII PHP and MySQL	2	4	3	50	50	100	3
	18BCSC25	Computing Laboratory – VIII R Programming	2	4	3	50	50	100	3
	18BCSC26	Technical Communication (Self - Study)	1	-	3	100	-	100	4
	18BCSC27	Computer Science (Computer Based Test)	-	-	-	-	100	100	2
		Generic Elective(GE) Course	2	-	-	100	-	100	2

Sixth Semester

III	Core Courses									
	18BCSC28	Artificial Intelligence	5	-	3	50	50	100	4	
	18BCSC29	Introduction to IoT	4	-	3	50	50	100	3	
	18BCSC30	Client Server Computing	4	-	3	50	50	100	3	
	18BCSC31	Computing Laboratory - IX Web Technologies	2	4	3	50	50	100	3	
	18BCSC32	Computing Laboratory - X Android Programming	2	4	3	50	50	100	3	
	18BCSC33	Project	-	5	-	50	50	100	5	
			Total Credits						128	

Semester	Subject Code	Name of the Course/ Component	Hours of Instruction/Course/ Week		Credit/Course	Total Credits
Part IV Components						
A. Ability Enhancement Courses						
1. Ability Enhancement Compulsory Courses(AECC)						
2	17BAES01	Environmental Studies (Foundation Course)	4		Remarks	4
5	17BSCS01	Communication Skills	3		Remarks	2
6	17BSSS01	Soft Skills	3		Remarks	2
II. Skill Enhancement Courses (SEC)						
3		Value Added Course (from a basket of choices offered)	40 hrs. Duration		Remarks	2
4		Co-curricular Courses Add on Certificate/ Quantitative Aptitude/ Certificate Courses- Gandhian Studies / Women's Studies/ Ambedkar Studies/ Verbal and Non – Verbal /Reasoning/General Awareness/others as per list	Varied duration		Remarks	2
B. Extra – Curricular Course						
1-6	15BXNC01-06 15BXNS01-06 17BXSP01-06	NCC/ NSS/ Sports (representing the Institute)	-	-	Remarks	6
Total Credits						18

*For the first four semesters there will be a minimum of two core courses/semester

**Project/Training/Internship: minimum 15 days (4 credits)- Maximum 30 days (6 credits)

The above may be within the regular working hours or during the vacation of the I year and II year

Total Credits to earn the Degree

1. Part I, II & III Components : 128

2. Part IV Components : 18

Total **146 Credits**

Courses offered to other Departments

- Generic Elective Course - 18BCS001 Computer Fundamentals and office Automation
- Value Added Course - 18BCSV01 Desktop Publishing

Digital Computer Fundamentals

Semester I
18BCSC01

Hours of Instruction / Week: 4
No. of Credits: 3

Objectives:

1. To introduce number systems and codes used in digital systems and basic postulates of Boolean algebra.
2. To apply Boolean algebra and other techniques to express and simplify logical expressions.
3. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits and also the concepts of memories.

Unit 1 Numeric Systems and Codes

12

Number Systems- Binary, Octal, Hexadecimal Conversions. Complements – r's and (r-1)'s complements. Binary Codes– Weighted and non-weighted codes, Excess-3, Gray codes, ASCII, EBCDIC, BCD codes, Error detection and Error correction codes.

Unit 2 Boolean Algebra and Logic Gates

Fundamentals - Basic Laws, De Morgan's Theorems, Digital Logic Gates, Universal Gates. Expression simplification– Truth table, SOP, POS, Karnaugh map, Don't care conditions.

12

Unit 3 Combinational Circuits

Binary Adder - Half Adder, Full Adder, Binary Parallel Adder. Binary subtractor - Half Subtractor, Full Subtractor, Parallel binary adder/subtractor. Code converters - Multiplexers, Demultiplexers, Encoders, Decoders.

12

Unit 4 Sequential Circuits

Flip-flops -RS, D, JK, T, Master/Slave. Registers - Shift Register, Counters, Asynchronous and Synchronous Counters, Binary counter, up/down counter, BCD counter.

12

Unit 5 Memory Concepts

Basics – Characteristics of semiconductor memories, RAM, ROM, static and dynamic RAM. Memory Types –PROM, EPROM, EEPROM, Magnetic Core Memories - Floppy Disks, Hard Disks and Optical Storage. 12

Total Hours: 60

Course Outcomes:

1. Acquire knowledge on the Binary logic, the use of number system and data representation.
2. Understanding Boolean algebra and its significance in digital computer operations.
3. Familiarity to design efficient combinational and sequential logic circuits.
4. Comprehend the various types of memory and their applications.
5. Master the basic hardware of a digital computer and its workings.

Text Books:

1. *Thomas C. Bartee, (2008), Digital computer fundamentals*, Tata McGraw Hill, Sixth Edition.
2. *Malvino and Leach, (2010), Digital compiler Principles and Applications*, Tata McGrawHill, Sixth Edition.
3. *Tokheim, (2006), Digital Principles*, Schaum's outline series, Tata McGraw Hill, Third Edition.

Reference Books:

1. *A.P.Malvino, (2006), Digital Computer electronics*, Tata McGraw Hill, Third Edition.
2. *A.P. Godse, D.A. Godse, (2008), Digital computer fundamentals*, Technical Publications, Pune.
3. *Jefferson G.Boyce, (2006), Digital computer fundamentals*, Prentice Hall.

E-learning Resources:

1. <https://www.thesisscientist.com/docs/Study%20Notes/95c4e1fb-c9a8-4717-b60d-dc423a6e491f>
2. www-wjp.cs.uni-saarland.de/lehre/vorlesung/info2/.../Computer_Structure.pdf
3. <https://www.thesisscientist.com/docs/Study%20Notes/95c4e1fb-c9a8-4717-b60d-dc423a6e491f>

Data Structures and Algorithms

Semester I
18BCSC02

Hours of Instruction / Week: 4
No. of Credits: 3

Objectives:

1. To understand the different methods of data organization like linear and non-linear forms.
2. To learn different sorting and searching techniques.
3. To develop a clear understanding of the various file organizations and storage management.

Unit 1 Introduction

Overview of Algorithms- analyzing Algorithms, time and space comparisons, Notations- Big Oh, Omega and Theta- Primitive Data structures, Arrays- ADT for arrays, Ordered list, operations ,representation of arrays. **12**

Unit 2 Linear Data Structures

Stacks and Queues - operations on queues and stacks, evaluation of expression, postfix to infix conversions, application- recursion. Linked list- operations, applications of Queues and linked lists. String processing, indexing and storage. **12**

Unit 3 Non-linear Data Structures

Trees - basic concepts, Binary tree traversals, representation..Threaded binary trees- representation, traversal. Graphs-basic concepts, representation, search techniques, Applications of graphs and trees. **12**

Unit 4 Sorting and Searching

Insertion Sort, Bubble Sort, Quick Sort, Heap Sort, Search- Sequential, Binary Search. **12**

Unit 5 File Structures and Dynamic Storage Management

File Organizations - Sequential, Index sequential, Direct file organization and access methods. Hashing- Hash Tables and hash functions. **12**

Total Hours: 60

Course Outcomes:

1. Analyzing the complexity of algorithms.
2. Applying linear and non- linear data structures to simple applications.

3. Application of appropriate sorting, searching and indexing techniques where required.
4. Ability to choose the appropriate file structures and access methods in real time applications.
5. Formulate new solutions for programming problems.

Text Books:

1. *Sahni Horowitz, Anderson Freed (2008), Fundamentals of Data Structure in C*, University Press, Second Edition.
2. *Lipschutz, Pai (2010), Schaum's Outline Series Data Structures*, Tata Mcgraw Hill.

Reference Books:

1. *Jean Paul Tremblay and Paul Anderson, (2005), An introduction to Data Structures with Applications*, McGraw Hill, Second Edition.

E-learning Resources:

1. <https://www.w3schools>
2. <https://www.programiz.com/dsa>
3. <https://nptel.ac.in/courses/106102064/1>

Objectives:

1. To understand the design of algorithms and method of programming
2. To make the student understand the logical structure of a computer program and to write programs using C language.
3. To develop skills in writing programs in C for different applications.

Unit 1 Introduction to Programming

9

Introduction - Computer Hardware, Data, Computer Software, History, Classification of computers- Algorithm - Concept, Algorithm representation, Sub algorithms. Evolution of Programming languages, Building a program, Program execution, categories of languages- Steps in Computer Programming, Programming techniques, Logic representation-pseudo code

Unit 2 Introduction to C and Control Statements

9

Desirable Program Characteristics, Data types, Constants, Variables and Arrays, Declarations, Expressions Statements, Symbolic Constants, Operators and Expressions, Data Input and Output. Preparing and Running A Complete C Program, Branching, looping, The Switch Statement, The break Statement, The continue Statement, The comma Statement, The go to Statement.

Unit 3 Functions, Storage Classes and Arrays

9

A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion. Storage Classes, Automatic Variables, External (Global) Variables, Static Variables. Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Arrays and Strings.

Unit 4 Structures, Unions and Pointers

9

Defining a Structure, Processing a Structure, User-defined Data Types (Typedef), Structure and Pointers, Passing Structures to Functions, Self-referential Structures, Unions. Pointer Declarations, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to Other Functions

Files, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data Files, Concept of Binary Files.

Total Hours: 45

Course Outcomes:

1. Obtain knowledge to Design an algorithm and draw flowcharts
2. Attain knowledge about the fundamentals of programming.
3. Trained skill to solve problems through programming environment for simple applications.
4. Understand the use of Arrays, functions, pointers, structures and unions.
5. Gain knowledge about the basics of file handling mechanism.

Text Books:

1. *Behrouz A. Forouzan, (2017), Foundations of computer science*, Thomson Course Technology, Fourth Edition.
2. *E.Balagurusamy (2011), Programming in ANSI C*, Tata McGraw Hill Publishing Company Ltd., Fifth Edition.

Reference Books:

1. *YashwantP.Kanetkar, (2010), Let us C*, BPB Publications, Sixth Edition.
2. *Rajaraman V, (2015), Fundamental of Computers*, Prentice Hall of India, New Delhi, 6th edition.
3. *Binu.A (2010), Problem Solving and Computer Programming Using C*, University Science Press, Laxmi Publications.
4. *Horowitz Ellis Sahni Sartaj & Anderson- Susan (2008), Fundamentals Of Data Structures In C(Pul)*, 2, Reprint, Orient Black Swan.

E-learning Resource:

1. www.tutorialspoint.com/cprogramming/cprogramming_tutorial.pdf

Computing Laboratory - I C

Semester I
18BCSC04

Hours of Instruction / Week: 4
No. of Credits: 2

Objectives:

1. To develop , compile and debug programs using C Language
2. To articulate and implement algorithms in C
3. To efficiently solve computing problems in real world

List of Programs:

1. Program using control statements.
2. Program using Looping statements
3. Program using select case statements.
4. Program using single dimensional arrays.
5. Program using two-dimensional arrays.
6. Program using strings.
7. Program using functions.
8. Program using call by value.
9. Program using call by reference.
10. Program using nested function.
11. Program using function and arrays.
12. Program using recursive functions.
13. Program using enumerated data types.
14. Program using structures.
15. Program using structure and functions.
16. Program using pointers.
17. Program using array of pointers.
18. Program using pointers to function
19. Program using command line arguments.
20. Program using files.

Total Hours: 60

Note: Minimum of 20 Programs to be completed with at least one from each topic.

Course Outcomes:

1. Design and develop programs that demonstrate effective use of C features.
2. Trace and execute the programs written in C language.

3. Develop programs using the basic elements like decision and control statements, Arrays and Strings.
4. Gain knowledge to know about the code reusability with the help of user defined functions and pointers.
5. Apply programming constructs to develop simple applications using files.

DSE – I Essential Mathematics for Computer Science

Semester I
18BCSI01

Hours of Instruction/Week: 4

No of Credits: 3

Objectives:

1. To enable the students to gain knowledge about basic concepts of Sets Theory and Matrices.
2. To make the students learn interpolation methods.
3. To train the students in solving system of equations.

Unit 1 Matrices and determinants**12**

Matrices, Determinants of a square matrix, properties of Determinants, inverse of a Matrix and its properties, method of finding Inverse of a Matrix, Verification of Cayley- Hamilton theorem.

Unit 2 Set Theory**12**

Definition, Specifying Sets, types of set, Basic set Operations, Venn diagram, laws of algebra of sets with proof. Relations, types of Relations, composition of Relations, Matrices of Relation. Functions, Range of Functions, types of Functions, Simple problems.

Unit 3 Finite Differences**12**

Operators , difference tables, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae.

Unit 4 Linear Equation**12**

Introduction to Linear Equation, Solution of simultaneous linear algebraic equations using Gauss-Elimination method and Gauss - seidal method of Iteration.

Unit 5 Numerical Integration**12**

Introduction to Numerical Integration ,Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ rule and Simpson's $3/8^{\text{th}}$ rule and simple problems.

Total Hours: 60**Course Outcomes:**

1. Work with Matrices and construct coefficient Matrix.
2. Formulate problems in sets and apply set operations.
3. Construct numerical solutions of nonlinear equations.
4. Formulate numerical interpolation and approximation of functions
5. Apply numerical integration using various rules.

Text Books:

1. *P.Radha Muthu and T.Santha (2011), Mathematics for Computer Science and Applications*, Kalaikathir Achchagam, Coimbatore, India.
2. *Goel and Mittal (2012), Numerical Analysis in Engineering*, Pragati Prakashan, Merut.

Reference Books:

1. *M.K.Venkatraman(2009), Engineering and Mathematics, Vol II, National Pub Company.*
2. *S.S.Sastry(2011), Introductory Methods of Numerical Analysis, Prentice Hall of India, New Delhi.*

E-learning Resources:

1. <http://cec.nic.in/E-Content/Pages/Result.aspx?p=Paper16&s=MATH&Name=Mathematics&PaperName=Numerical%20Analysis>.
2. <http://nptel.ac.in/downloads/108108079/>

Computer Architecture

Semester II
18BCSC05

Hours of Instruction/Week: 4
No. of Credits: 3

Objectives:

1. To understand the representations for different data types and information transmission.
2. To study the operations of Arithmetic Logic Unit and hierarchical memory system including cache memory and virtual memory.
3. To know the different ways of communicating with I/O devices and standard I/O interfaces.

Unit 1 Data Representation and Micro operations

Data types – Number systems, Complements, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes. Micro operations - Register Transfer Language, Bus and Memory Transfers, Arithmetic, Logic and Shift micro operations. 12

Unit 2 Central Processing Unit

Components – General Register Organization, Stack Organization. Instruction Formats – Three, Two, One and Zero address instructions. Addressing Modes – Direct, indirect, immediate, relative, indexed, auto increment, auto decrement, stack addressing. Instruction types - Data Transfer and Manipulation, Program control, Reduced Instruction Set Computers (RISC). 12

Unit 3 Arithmetic and Control Unit

Arithmetic – Addition, subtraction, multiplication and division with signed magnitude and 2's complement numbers. Micro programmed control– Control memory, Address sequencing. 12

Unit 4 Input-Output Organization

Peripheral devices - Input-output Interface – Isolated and memory-mapped I/O. Modes of Data Transfer- Asynchronous Data transfer, Programmed I/O, Interrupt, Direct Memory Access. 12

Unit 5 Memory Organization

Basic concepts–Hierarchy, Main Memory, Auxiliary Memory. High speed memories - Associative Memory, Cache Memory, Virtual Memory, memory mapping. 12

Total Hours: 60

Course Outcomes:

1. Conscious of the representation of different data types and information handling in computers.
2. Responsive on various addressing modes and instruction formats

3. Realize the functional units of processor as Arithmetic and Logical operations and control functions.
4. Appreciate the insight of memory storage and operation details related to input/output.
5. Apprehend knowledge in storage and retrieval techniques of different high speed memories.

Text Books:

1. *M. Morris Mano (2007), Computer System Architecture*, Prentice Hall of India, Third Edition.
2. *Carl Hamacher, Zvonbo Vranesic, SaftwatZaby, (2011), Computer Organization*, Tata McGraw Hill Publications, Fifth Edition.
3. *John P. Hayes, (2012), Computer Architecture and Organization*, Tata McGraw Hill Publications, Third Edition.

Reference Books:

1. *John L. Hennessy, David A. Patterson, (2019), Computer Architecture - A Quantitative Approach*, Morgan Kaufmaan Publishers, Sixth Edition.
2. *John Y. Hsu, (2017), Computer Architecture Software Aspects, Coding and Hardware*, CRC Press.
3. *Gerard Blanchet, Betrand Dupouy, (2013), Computer Architecture*, Wiley.

E-learning Resources:

1. <https://www.ece.uic.edu/~dutt/courses/ece366/lect-notes.html>
2. <https://www.vidyarthiplus.com/vp/thread-19014.html#.Wq7bo7i-ldh>
3. www.svecw.edu.in/Docs%5CITIIBTechIISemLecCOA.pdf
4. <http://www.rejinpaul.com/2014/06/cs6303-computer-architecture-syllabus-notes-question-papers-cs6303ca-cse-it-3rd-sem-regulation-2013.html>

Internet and E-Commerce

Semester II

18BCSC06

Objectives:

Hours of Instruction / Week: 4

No. of Credits: 3

1. To learn the basics of Internet and e-commerce.
2. To give the basics of Internet File Transfer Operations.
3. To understand e-Marketing-payment and Security.

Unit 1 Emergence of the Internet

Commercial use of the Internet, Growth of the Internet, Emergence of the worldwide Web, Advantages and Disadvantages of E-Commerce, E-business models based on the Relationship of transaction parties-B2C,B2B,C2C,C2B. E-business models based on the Relationship of transaction types-Brokerage Model, Aggregator Model. **12**

Unit 2 Enabling Technologies of World Wide Web

Internet Client-Server Applications-Telnet, File Transfer protocol. Uniform Resource Locators, Transmission Control Protocol, broadband technologies. **12**

Unit 3 E-Marketing

Traditional Marketing, Online Marketing, E-advertising, Internet Marketing Trends, Target Markets, E-branding, Marketing Strategies. **12**

Unit 4 E-Security

Information System Security, Security on the Internet, E-business Risk Management Issues, Information Security environment in India. **12**

Unit 5 E-Payment systems

Digital Token-based E-Payment systems, Properties of E-cash, Cheque Payment Systems on the Internet, Risk and E-Payment systems. **12**

Total Hours: 60

Course Outcomes:

1. Stay up to date with latest marketing trends.
2. Enable to send and receive the various types of online payments.
3. Enable efficient affiliate marketing.
4. Enable to use social media to promote business.

5. Enable customer retention.

Text Book:

1. ***P.T. Joseph (2015). E-commerce- an Indian perspective***, PHI learning private Limited, Fifth Edition, New Delhi.

Reference Books:

1. ***C. S. V Murthy (2017), E-Commerce (Concepts ,Models, Strategies)***, Himalaya Publishing House, First Edition.
2. ***Elias. M. Awad (2007), Electronic Commerce from vision to fulfillment***, Eastern Economy Edition, PHI Publications, Third Edition.
3. ***S.Jaiswal (2010). Doing Business on the Internet E-Commerce (Electronic Communication for Business)***,Galgotia Publications, New Delhi,5thEdition,.

E-learning Resources:

1. <https://www.smartworld.com/notes/e-commerce-notes-pdf-ec/>
2. <https://www.lynda.com/Ecommerce-training-tutorials/1311-0.html>.

Programming in C++

Semester: II
18BCSC07

Hours of instruction/week: 3
No. of credits: 3

Objectives:

1. To understand the concepts of Object Oriented Programming.
2. Emphasize on Objects, Polymorphism and Inheritance.
3. Problem solving with object oriented approach.

Unit 1 Principles of Object Oriented Programming 9

Basic Concepts of Object Oriented Programming, Benefits of OOP, Applications of OOP. Introduction to C++ - Tokens, Keywords, Identifiers, Constants, Data types, Operators, Manipulators, Expressions and their Types, Control Structures: if, switch, do-while, while and for statement.

Unit 2 Functions in C++ 9

Function Prototyping, Parameters Passing in Functions, Inline Functions, Function Overloading. Classes and Objects – Specifying a Class, Defining Member Functions, Static Data Members, Static Member Functions, Arrays of objects, Objects as Function Arguments, Friendly Functions, Returning Objects.

Unit 3 Constructors and Destructors 9

Constructors Parameterized Constructors, Copy Constructor, Destructors. Operator Overloading -Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Rules for Overloading Operators.

Unit 4 Inheritance 9

Introduction, Defining Derived Classes, Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract class. Pointers – pointers to objects, this pointer, Virtual Functions and Polymorphism.

Unit 5 Files 9

Introduction, Classes for File Stream Operations, Opening and Closing a File, Detecting End-of-file, File pointers, Updating a File, Error Handling during File operations, Command line Arguments.

Course Outcomes:

1. Apply object oriented principles for problem solving
2. Design programs with classes and objects
3. Adopt polymorphism mechanism
4. Attain reusability through Inheritance
5. Explore the ease of C++ Programming

Text Book:

1. *E. Balagurusamy, (2017), Object-Oriented Programming with C++,* Tata McGraw Hill Education Private Ltd., New Delhi, Seventh edition.

Reference Books:

1. *D.Ravichandran (2017), Programming with C++,* Tata McGraw Hill Publications, Third Edition.
2. *K.R.Venugopal, (2013), Mastering C++,* McGraw Hill Education India Pvt. Ltd, Second edition.
3. *Ashok Kamthane, (2013), Programming in C++,* Pearson Education, Second edition.

E-learning Resources:

1. <http://cec.nic.in/e-content/Pages/default.aspx>
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C++&search_language=English
3. <http://nptel.ac.in/courses/106102066/>

Computing Laboratory - II C++

Semester: II

18BCSC08

Hours of instruction / week: 4

No. of credits: 2

Objectives:

1. Apply the concepts of OOP
2. Design programs with objects and polymorphism
3. Develop programs using Inline, Friend function and all types of Inheritance

List of Programs:

1. Program to explore all data types and operators
2. Program using Branching statements
3. Program using Looping statements
4. Program using arrays.
5. Program using Inline functions.
6. Program using the concept of classes and object
7. Program using Arrays of Objects
8. Program using Objects as function arguments
9. Program using Function that returns objects.
10. Program using Friend function.
11. Program using Constructors and Destructors.
12. Program using Function Overloading.
13. Program using Unary operator overloading
14. Program using Binary operator overloading
15. Program using Pointer to objects
16. Program using Single Inheritance.
17. Program using Multiple Inheritance.
18. Program using Multilevel Inheritance.
19. Program using Virtual function.
20. Program using I/O Files.

Total Hours : 60

Course Outcomes:

1. Develop application software
2. Achieve reusability through Inheritance
3. Utilize the salient features of C++
4. Handle and manage files
5. Apply OOP concepts wherever applicable

DSE – II Programming Interactivity

Semester II

18BCSI02

Objectives

Hours of Instruction / Week : 4

No. of Credits: 3

1. To learn the fundamentals of interactive programming.
2. To make a study on interaction with boards through IDE.

3. To understand how to manipulate sensed data.

Unit 1 Introducing Interaction Design 12

Programming for Interactivity - The Nature of Interaction, Messages and Interaction, Interfaces and Interaction, Languages of Interaction. Design and Interaction - Art and Interaction - Data Exchange and Exploration.

Unit 2 Processing Downloading 12

and Installing Processing. Exploring the Processing IDE. The Basics of a Processing Application. The Basics of Drawing with Processing. Capturing Simple User Interaction. Importing Libraries. Loading Things into Processing - Loading and Displaying Images, Displaying Videos in the Processing Environment, Using the Movie Class, Reading and Writing Files. Running and Debugging Applications. Exporting Processing Applications.

Unit 3 Arduino 12

Starting with Arduino. Installing the IDE. Touring Two Arduino Boards. Touring the Arduino IDE. The Basics of an Arduino Application. Features of the Arduino Language. How to Connect Things to Your Board. Hello World. Debugging Your Application. Importing Libraries. Running Your Code.

Unit 4 Movement and Location 12

Using Movement As and in Interaction. Using Software-Based Serial Ports. Understanding and Using GPS. Storing Data. Logging GPS Data to an Arduino - Using the Breadcrumbs Library, Implementing Hardware-Based Logging. Sending GPS Data. Determining Location by IP Address.

Unit 5 Spaces and Environments 12

Using Architecture and Space. Sensing Environmental Data. Using an XBee with Arduino - Creating a Simple Test, Configuring the XBee Module, Addressing in the XBee , XBee Library for Processing. Placing Objects in 2D. Using the X10 Protocol. Setting Up an RFID Sensor. Reading Heat and Humidity.

Course Outcomes: **Total Hours: 60**

1. Become familiar with the interactivity.
2. Understand the concepts of programming required for interactivity.
3. Master the basics of Arduino programming.
4. Able to understand how to sense environmental data.
5. Understand the concept of spatial and location based data manipulation.

Text Book:

1. *Joshua Noble (2009), Programming Interactivity - A Designer's Guide to Processing, Arduino, and open Frameworks*, O'Reilly Media, Inc.

Reference Books:

1. *Massimo Banzi (2014), Getting started with Arduino: The open source*, Shroff Publishers & Distributors.
2. *Erik Savasgard, (2015), Arduino 101 Beginners Guide: How to Get Started With Your Arduino*, Createspace Independent Pub.

E-learning Resource:

1. www.tutorialspoint.com/arduino/index.htm

Operating Systems

**Semester III
18BCSC09**

**Hours of Instruction / Week: 4
No. of Credits: 3**

Objectives:

1. Gain knowledge about the functionalities of operating system.
2. To understand the various resources managed by operating system.

3. Explore on case studies and security of operating systems.

Unit 1 Introduction to Operating Systems

Process concepts- Process state transition, process control block, operation on process, Interrupt processing. Parallel Processing- Mutual Exclusion, Critical Section, and Semaphores. **12**

Unit 2 Storage Management

Real storage - Storage organization, Storage management, Storage hierarchy, management strategies, Storage allocation, Storage protection. Virtual storage - blocking, paging, segmentation. **12**

Unit 3 Processor Management and Distributed Computing

Scheduling levels - Deadline Scheduling, First-In-First Out scheduling, Round Robin scheduling, Shortest job first scheduling, Shortest remaining time, highest response ratio next scheduling. Processor Interconnection schemes, Multiprocessor operating system organizations. **12**

Unit 4 Deadlock and File Management

Deadlock - conditions for deadlock, major areas of deadlock. File system- file system functions, file organization, database models. **12**

Unit 5 Operating systems Security & Case studies

Security - External, Operational, Surveillance, Amplification, Password protection, Auditing, Access Controls. Case studies - Linux Operating System, Mobile Operating System. **12**

Total Hours : 60

Course Outcomes:

1. Recall the concepts of file management.
2. Apply security aspects in appropriate situations.
3. Explore various other operating systems.
4. Apply knowledge gained through processor scheduling to other applications.
5. Analyze limitations of operating systems.

Text Books:

1. *H.M.Deitel, (2004), Operating Systems*, Pearson Publications, Second Edition.

Reference Books:

1. *Andrew S. Tanenbaum, (2014), Modern Operating Systems*, Pearson Prentice Hall of India, Fourth Edition.
2. *William Stallings, (2006), Operating Systems*, Prentice Hall of India, Fifth Edition.
3. *Abraham Silberschatz, Peter B. Galvin and Greg Gagne, (2012), Operating System Concepts*, John Wiley and Sons Inc., Ninth Edition.

E-learning Resources:

1. nptel.ac.in/courses/106108101
2. w3schools.in/operating-system-tutorial

Computer Networks

Semester III
18BCSC10

Hours of Instruction / Week: 4
No. of Credits: 3

Objectives:

1. To understand the concepts of Computer Networks.
2. To learn the functionalities of different layers in Network Architecture.
3. To know the applications of Computer Networks.

Unit 1 Introduction to Computer Networks and The Physical Layer

Layering and Protocols, Reference Models - OSI, TCP/IP, Comparison of OSI and TCP/IP. Theoretical basis for data communications - Guided Transmission Media - 12
Twisted Pairs, Coaxial Cable, Fiber Optics. Wireless Transmission - The Electromagnetic Spectrum, Radio transmission, Microwave Transmission.

Unit 2 The Data Link Layer

Design Issues - Services Provided to the Network Layer, Framing, Error Control, Flow Control. Error Detection and Correction- Error Correcting Codes, Error Detecting Codes. Elementary Data Link Protocols – Utopian Simplex Protocol, A Simplex Stop-and-Wait 12
Protocol for an Error-Free Channel, A Simplex Stop-and-Wait Protocol for a Noisy Channel. Sliding Window Protocols – A One-bit Sliding Window Protocol, A Protocol Using Go-Back-N, A Protocol Using Selective Repeat.

Unit 3 The Medium Access sub Layer

Channel Allocation Problem – Static and Dynamic Channel Allocation. Ethernet – 12
Classic Ethernet, MAC Sublayer Protocol, Ethernet Performance and types. Wireless LAN – The 802.11, Services. Bluetooth. RFID - Data Link Layer Switching and components.

Unit 4 The Network Layer

Design Issues, Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connection – Oriented and Connectionless Services 12
Comparison of Virtual-Circuit and Datagram Networks, Routing Algorithms - Shortest Path Algorithm - Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing. Addressing: The Network Layer in the Internet-IP Addresses, IPv4, IPv6.

Unit 5 The Transport Layer

Transport Services: Services provided to the upper layers, Elements of Transport Protocols, QoS; The Internet Transport Protocols –Introduction to UDP, Introduction to 12
TCP, TCP connection establishment, TCP connection release, TCP transmission policy, TCP congestion control. Real time applications in application layers.

Total Hours : 60

Course Outcomes:

1. Discuss the basic rudiments of networking concepts.
2. Analyze in detail and understood the basic idea of different protocol.
3. Analyze routing, packet switching and routing algorithms concepts.
4. Recognize the services of connectionless and connection oriented protocols.
5. Assess the internet domains and its services.

Text Books:

1. *Andrew S.Tanenbaum, (2011), Computer Networks*, Pearson Prentice Hall, Fifth Edition.

Reference Books:

1. *Behrouz A. Forouzan (2007), Data Communications and Networking*, Tata McGraw Hill, Fourth Edition.
2. *Stanford H.Rouce, Marsha L. Schuh, (2008), Computer Networking*, Pearson Education.

E-learning Resources:

1. <http://nptel.ac.in/courses/106105081/>
2. <http://nptel.ac.in/courses/106106091/>
3. <http://nptel.ac.in/courses/106105080/>
4. <https://www.studytonight.com/computer-networks/>
5. <https://swayam.gov.in/courses/4066-computer-networks>

Computer Graphics and Multimedia Systems

Semester III
18BCSC11

Hours of Instruction / Week: 4
No. of Credits: 3

Objectives:

1. To know the basics of Graphics System Devices and their Functioning.
2. To Understand the Primitives and attributes of Graphics.
3. To understand the transformations, modeling techniques and interactive Graphics.
4. To introduce the multimedia technologies and components

Unit 1 Introduction to Computer Graphics and Graphics Systems and devices

Overview of graphics systems: Video display devices, Cathode Ray Tubes, Raster Scan displays, Random Scan displays, graphic monitors and workstations, Graphical user interface keyboards, mouse, joysticks, digitizers, image scanners, touch panels. **12**

Unit 2 Output Primitives and Attributes

Points and Lines, Line drawing algorithms-DDA algorithm, Bresenham's algorithm, circle generating algorithms, Pixel addressing, filled area primitives-Scan-line Polygon Fill Algorithm, Scan-Line fill of curved boundary, Boundary fill algorithm, Flood-fill algorithm fill area functions, cell array, character generation. Line attributes- Line type, line color, line width, Pen and brush options. Curve attributes, color and gray scale levels, area fill attributes, character attributes, anti aliasing techniques. **12**

Unit 3 2D Transformations and Viewing

Basic transformation, translation, rotation, scaling, matrix representation and homogeneous coordinates, composite transformations, other transformations, Viewing pipeline, viewing coordinate reference frame, window-to-viewport coordinate transformation, two-dimensional viewing functions, clipping operations, point clipping, line clipping-Cohen-Sutherland clipping, polygon clipping . **12**

Unit 4 3D Transformation

3D Concepts - Translation, Scaling and Rotations - Projections – Parallel Projection -Perspective Projection –Visible Surface Detection Methods - Polygon rendering methods. **12**

Unit 5 Multimedia Systems and Applications

Multimedia hardware and software -Components of multimedia –Text –Audio-Images and Graphics –Video and Animation, Multimedia Data base systems –Synchronization Issues –Presentation requirements –Applications –Video conferencing –Virtual reality – Interactive video –video on demand . **12**

Total Hours: 60

Course Outcomes:

At the end of the course, the student will be able to :

1. Identify the types of Graphics monitor, workstations, input devices and input techniques available to work with graphics.
2. Recognize the mathematical and heuristic algorithms behind the graphics object generation.
3. Familiarize the attributes of control the object shape and antialiasing techniques for the accurate display.
4. Comprehend the forms of 2D transformations, mapping process from world view to display and clipping process to select the visible portion, Construct the algorithms for 3D objects processing and familiarize 3D scene handling based on view plane direction.
5. Recall the multimedia technologies and components.

Text Books:

1. ***Donald Hearn & M. Pauline Baker, (2011), Computer Graphics –C Version***, Pearson Education, 2nd Edition.
2. ***Ashok Banerji & Ananda Mohan Ghosh, (2010), Multimedia Technologies***, Tata McGraw Hill.

Reference Books:

1. ***Tay Vaughan, (2008), “Multimedia: Making it Work”***, Tata McGraw Hill, 7thEdition.
2. ***Judith Jeffcoate, (2011), “Multimedia in Practice: Technology and Applications”***, Pearson Education.

E-learning Resources:

1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-837-computer-graphics-fall-2012/lecture-notes/>
2. https://www.tutorialspoint.com/computer_graphics/computer_graphics_tutorial.pdf

Programming in Java

Semester III
18BCSC12

Hours of Instruction / Week: 3
No. of Credits: 3

Objectives:

1. To gain knowledge of object-oriented paradigm in the Java programming language.
2. To emphasize on event -driven programming methods.
3. Highlight the special and unique features of java programming.

Unit 1 Java Fundamentals

Introduction - Simple java program - Java program structure - Java tokens - Java statements - implementing a java program - Java virtual machine - Command line arguments: Constants, Variables and Data types - Scope of variables –Operators, Control statements, break and continue. **9**

Unit 2 Class and Methods

Classes, Objects and Methods, Creating Objects - Accessing Class members - Constructors - Methods, Method overloading, Arrays, Strings, String Buffer Class, Vectors, Wrapper Classes. **9**

Unit 3 Inheritance

Types of Inheritance, Method Overriding, Final Variables and Methods, Final classes, Finaliz Method, Abstract Method, Visibility control. **9**

Unit 4 Interfaces and Packages

Interfaces - Extending interface, implementing interface, accessing interface variable, Packages - Creating and accessing package, package hierarchy, import statement, access modifiers, Hiding Class. **9**

Unit 5 Exception handling and Applets

Exception handling Mechanisms - try-catch, throw and Throws, Multiple catch statement, finally statement, user-defined exceptions, Applets – Applet Life cycle, Graphic Programming - Event Handling. **9**

Total Hours : 45

Course Outcomes:

1. Apply the salient features of Java programming.
2. Identify classes, objects, members of a class and relationship among them to solve a specific problem.
3. Develop client side programming using Applet and AWT
4. Implement packages to solve the complex problems and applying exceptional handling mechanisms.
5. Recall the principles and practice of object oriented concepts in the construction of robust, maintainable programs.

Text Books:

1. *E.Balaguruswamy, (2010), Programming with Java A Primer*, Tata McGraw Hill Publications, Second Edition.

Reference Books:

1. *Schildt, (2010), The Complete Reference Java*, Tata McGraw Hill Publications, Eighth Edition.
2. *C. Xavier, (2010), Programming with JAVA 2*, SciTech Publication, Chennai.

E-learning Resources:

1. <https://swayam.gov.in/course/3482-spoken-tutorials-java>
2. http://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English

Computing Laboratory - III Java

**Semester III
18BCSC13**

**Hours of Instruction/Week: 4
No. of Credits: 2**

Course Objectives:

1. To develop programming skills in Java.
2. Implement object oriented programming paradigms using Java.
3. Develop and design applications using Java

List of programs:

1. Programs using Control Statements
2. Programs using Classes and Objects

3. Programs using One dimensional array
4. Programs using Two dimensional array
5. Programs using Constructor overloading
6. Programs using Vector class
7. Programs using Method overloading
8. Programs using Single inheritance
9. Programs using Multilevel inheritance
10. Programs using Method overriding
11. Programs using Final class
12. Programs using Interfaces
13. Programs using Packages
14. Programs using String handling functions
15. Programs using String buffer class
16. Programs using Exception handling mechanism
17. Programs using Multiple catch statements
18. Programs using User defined exception
19. Programs using Applets
20. Programs using Event Handling mechanism

Total Hours : 60

Note : Minimum of 20 Programs to be completed with at least one from each topic.

Course Outcomes:

1. Develop Java applications using OOP concepts with appropriate program structure.
2. Demonstrate the concepts of polymorphism and inheritance.
3. Use and create packages and interfaces in a Java program.
4. Implement exception handling mechanisms during software development.
5. Design and develop an applet program.

Computing Laboratory - IV Graphics and Multimedia

Semester III
18BCSC14

Hours of Instruction / Week: 4
No. of Credits: 2

Objectives:

1. To provide an overall outlook of multimedia tools.
2. To apply graphics programming techniques to design, and create computer graphics scenes.
3. To understand and differentiate text, image, video and audio

List of Programs:

1. Write a program to draw line using Line Drawing Algorithms.
2. Write a program to draw Circle using Circle Drawing Algorithms.
3. Write a program to clip the lines using line clipping algorithms.
4. Write a program for 2D Transformations like Translations, Scaling and Rotations.
5. Create an invitation design using GIMP.
6. Create a layer animation using GIMP.
7. Apply the filter effect in image using GIMP.
8. Create a web index page using GIMP.
9. Create a logo design by GIMP.
10. Create natural scenery using 2D PENCIL.
11. Create a glossy button using 2D PENCIL.
12. Apply the filter effect in image or font using 2D PENCIL.
13. Create a Text animation using 2D PENCIL.
14. Create a movie clip animation using 2D PENCIL.
15. Create a symbol and guide layer using 2D PENCIL.

Note : Minimum of 20 programs to be completed with at least one from each topic.

Course Outcomes:

1. Construct basic shapes using algorithms.
2. Realize the concepts of Multimedia Systems and apply editing tools for images.
3. Design and implement an animation for various themes.
4. Create multimedia advertisement.
5. Compose audio with effects.

E-learning Resources:

1. http://spoken-tutorial.org/tutorial-search/?search_foss=GIMP&search_language=English
2. <https://www.pencil2d.org/>

DSE – III Statistical Methods

**Semester III
18BCSI03**

**Hours of Instruction /week: 7(5T+2L)
No. of credits: 5**

Objectives

1. To educate the students about the basic statistical measures such as the measures of central tendency and dispersion.
2. To train the students on the topics such as correlation, regression and time series analysis.
3. To give the students an idea of how Chi-square Testing, F-Test, T- Test and Analysis of Variance to be done for the given set of data.

Unit I - Measures of Central Tendency and Dispersion

15

Measures of Central Tendency - Mean, Median, Mode, Geometric Mean, Harmonic Mean and Relationship among the averages. Measures of Dispersion – Standard Deviation, Variance and Mean Deviation.

Unit II - Correlation Analysis **15**

Introduction to Correlation Analysis, Types of Correlation, Methods of studying Correlation, Karl Pearson's Coefficient of Correlation, Method of Least Squares, Rank Correlation Coefficient.

Unit III - Regression Analysis **15**

Introduction, Difference between Correlation and Regression, Regression Coefficients, Correlation Coefficient between Observed and Estimated values, Regression Equations - X on Y and Y on X.

Unit IV - Analysis of Time Series **15**

Introduction – Utility of Time Series Analysis – Components of Time Series – Adjustments before Analysing Time Series – Measurement of Trend – Measurement of Cyclical Variations – Measurement of Irregular Variations.

Unit V - Analysis of Variance **15**

Techniques for Analysis of Variance - One-Way Classification and Two-Way Classification.

Total Hours : 75

List of programs using SPSS:

1. Programs for finding measures of central tendency.
2. Programs for finding measures of Dispersion.
3. Programs for finding Correlation.
4. Programs for finding Regression.
5. Programs for Analysis of Variance (AOV): One – way and two – way Classifications.

Total Hours: 30

Note : Minimum 15 Programs to be completed with at least one from each topic.

Course Outcomes:

1. Compare measures of Central Tendency and Dispersion for a given set of data and discuss the nature of the sample.
2. Interpret correlation between two sets of data.
3. Compute the regression equations.

4. Perform Time Series Analysis for a given data.
5. Apply Analysis of Variance techniques given any sample set of data.

Text Books:

1. *S.P. Gupta(2014), Statistical Methods*, Sultan Chand and Sons, New Delhi, Forty Fourth Revised Edition.
2. *S.C.Gupta and V.K.Kapoor(2007), Fundamentals of Mathematical Statistics*, Chand & Sons, New Delhi, Eleventh Edition.

Reference Books:

1. *Goon A.M., Gupta M.K and Das Gupta B(2002), Fundamentals of Statistics*, World Press, Calcutta8th Edition .
2. *Mood A.M, Graybill F.A and Boes D.C(2007), Introduction to the theory of Statistics*, McGraw Hill, Third Edition.

E-Learning Resources:

1. <https://www.elearninglearning.com/statistics/>
2. <https://www.statistics.com/>
3. <https://www.tutorialspoint.com/statistics/index.htm>
4. <https://www.listendata.com/p/statistics-tutorials.html>
5. [http://cec.nic.in/e-content / Pages / REsult.aspx? p=Paper02&s= MATSC&Name=Mathematical%20Science%20\(B.Sc.\)\(Gen\)&PaperName=Statistical%20Methods-I.](http://cec.nic.in/e-content/Pages/REsult.aspx?p=Paper02&s= MATSC&Name=Mathematical%20Science%20(B.Sc.)(Gen)&PaperName=Statistical%20Methods-I)

Cyber Security

Semester IV

Hours of Instruction/week: 4

18BCSC15

No. of Credits: 3

Objectives:

1. To create security awareness and understand fundamentals of cyber security.
2. To be familiar with vulnerabilities and security attacks.
3. To develop secure systems with the knowledge of defense and analysis techniques.

Unit 1 Cyber Security Fundamentals

12

Network Security Concepts: Information assurance fundamentals, Basic Cryptography, Encryption, Firewalls. Microsoft Windows Security Principles: Tokens, Messages, Program execution, Firewall.

Unit 2 Attacker Techniques and Motivations

12

Antiforensics: Tracks and techniques, Fraud techniques: Phishing, Smishing, Vishing, and Mobile Malicious Code, Rogue Antivirus, Click Fraud, Threat infrastructure.

Unit 3 Exploitation

12

Shell code, Integer Overflow Vulnerabilities, Format String Vulnerabilities, SQL Injection, Malicious PDF Files, Web Exploit Tools.

Unit 4 Malicious Code

12

Self-Replicating Malicious Code, Persistent Software Techniques, Rootkits, Spywares, Attacks against Privileged User Accounts and Escalation of Privileges, Stealing Information and Exploitation.

Unit 5 Defense and Analysis Techniques

12

Memory Forensics, Honeypots, Malicious Code Naming, Automated Malicious Code Analysis Systems, Intrusion Detection Systems.

Total Hours: 60

Course Outcomes:

1. Identify various types of cyber-attacks, tools used for gathering information about target.
2. Assess different types of cyber criminals and the motives behind them.
3. Realize the exploitations and the malicious codes to be precautions.
4. Analyze the defense techniques suitable for the system.
5. Apply the techniques for securing the system

Text Books:

1. James Graham, Richard Howard and Ryan Olson, (2011), Cyber Security Essentials.
Auerbach Publications Taylor & Francis Group.

Reference Book:

1.Chwan -Hwa(john)Wu, J.David Irwin, (2013), Introduction to Computer Security and Cyber Security. CRC Press T&F Group.

E-learning Resources:

1. <http://www.open.edu/openlearn/futurelearn/cyber-security>.
2. <http://nptel.ac.in/courses/106105031/40>.

Microprocessors and Microcontrollers

Semester IV
18BCSC16

Hours of Instruction/Week : 4
No. of Credits: 3

Objectives

1. To introduce basic Microprocessor architecture and operations.
2. To learn the fundamentals of Assembly language programming.
3. To gain awareness on Microcontroller and advanced Microprocessors.

Unit 1 Microprocessor architecture **12**

Introduction – Microprocessor Evolution – 8085 MPU – Architecture and Operations.

Unit 2 Assembly language programming **12**

8085 Pin Functions - Addressing Modes – 8085 Instruction Classification- Assembly Language Programming.

Unit 3 8085 Interfacing **12**

Memory Interfacing – I/O Address Decoding – 8255 PPI – 8279 Keyboard/ Display Interface – 8259 A PIC - 8237 DMA controller.

Unit 4 8051 Microcontroller **12**

Introduction – 8051 Hardware – I/O Memory and Interrupts – Applications.

Unit 5 Advanced Microprocessors **12**

Features of Intel 8086/88, 80186/188, 80286, 80386, 80486 and Pentium microprocessors –RISC Microprocessors – Advanced Intel core Processors.

Total Hours: 60

Course outcomes:

1. Acquire knowledge on the Microprocessor basics and architecture.
2. Gain Assembly language programming skills.
3. Understanding the hardware components for interface and their functions.
4. Familiarity to relate Microcontroller parts and their operations.
5. Comprehend the features of latest Microprocessors.

Text Books:

1. **Ramesh S. Gaonkar (2013), Microprocessor architecture programming and applications with 8085**, Penram International Publications sixth Edition
2. **Kenneth J. Ayalla (2004), The 8051 Microcontroller : Architecture, Programming and Applications**, Cengage Learning

Reference Books:

1. **Aditya P. Mathur(2006), Introduction to Microprocessors** Tata McGraw Hill, 3rd Edition,
2. **Barry B. Brey(2014) “Programming the 80286,80386,80486 and Pentium based personal computer, Pearson education**, 8th Edition.

E-learning Resources:

1. <http://nptel.ac.in/courses/106108100/>
2. <https://books.google.co.in/books?isbn=8131769062>
3. www.science.smith.edu/~jcardell/Courses/EGR328/Readings/uProc%20Ovw.pdf

Relational Database Management Systems

Semester IV
18 BCSC 17

Hours of Instruction / Week : 4
No. of Credits: 3

Objectives:

1. To learn the fundamentals of database and Relational Database Management system.
2. To make a study of SQL and relational database design.
3. To understand how to manipulate data using PL/SQL block.

Unit 1 Database Systems Concepts and Architecture

12

Introduction to databases, data models, schemas and instance, Three-schema architecture and data independence, database languages and interfaces, the database system environment, centralized and client/server architectures for DBMSs, classification of DBMS, Entity types, entity sets, attributes and keys, relationship types, relationship sets, roles and structural constraints, weak entity types, E-R diagrams, naming conventions and design issues.

Unit 2 Normalization and Concurrency control

12

Informal design guidelines for relational schemas, functional dependencies, normal forms based on primary keys, general definitions of second and third normal forms, Boyce-Codd normal form, Concurrency control techniques-Two phase locking, Time stamp ordering.

Unit 3 SQL

12

Introduction to Oracle, SQL Features, Types of SQL Commands: DDL, DML and TCL commands. Integrity Constraints, Operators, GROUP BY and HAVING Clause, Sub Queries, Joins, Character Functions, Numeric Functions, Date Functions, Conversion Functions, Aggregate Functions, Roles and Privileges, Data Control Language: GRANT, REVOKE.

Unit 4 PL/SQL

12

Overview of PL/SQL, Advantages of PL/SQL, PL/SQL Character Set, Data Types, Basic Structure, Variables, Constants, If-then-else Structure, Attribute: %type, %rowtype. Iteration in PL/SQL: For loop, While loop. Cursors: Basics, Using a cursor for a multi-row SQL query.

Unit 5 Stored Procedures

12

Procedures, Functions, Exception Handling: Predefined and User defined. Triggers.

Total Hours: 60

Course Outcomes:

1. Become familiar with the database management systems.
2. Understand the functional dependencies and design of the relational database.
3. Master the basics of SQL and construct queries using SQL.
4. Design a relational database schema using SQL for a given problem-domain.
5. Understand the concept of concurrency control of database processing.

Text Book:

1. ***Ramez Elmasri and Shamkant B. Navathe (2011), Fundamentals of Database Systems***, Sixth Edition, Tata McGraw Hill Publications.
2. ***Alexis Leon, Mathews Leon (2008), SQL: A Complete Reference***, Sixth edition, Tata McGraw Hill.

Reference books:

1. ***Abraham Silberschatz, Henry F.Korth and S.Sudarshan (2011). Database System Concepts***, Fifth Edition, Tata McGraw Hill Publications.
2. ***C.J.Date (2006). An Introduction to database systems***, Addison Wesley, Third Edition.

3. *P. S. Deshpande (2008). SQL/PL SQL for Oracle 9i*, Reprint Edition, Dream Tech Press.

4. *James. R. Groff and Paul. N. Weinberg (2008), The Complete Reference SQL*, Tata McGraw Hill, Second Edition.

E-learning Resources:

1. www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. beginnersbook.com/2015/04/rdbms-concepts/
3. beginnersbook.com/2015/04/dbms-tutorial/
4. www.tutorialspoint.com/dbms/index.htm

Programming in Python

Semester IV

Hours of instruction/week: 3

18BCSC18

No. of credits: 3

Objectives:

1. To know the basic concepts of Python
2. To define Python functions and call them
3. To understand the various data structures tuple, list and dictionary

Unit 1 Introduction to Python

Python overview, Getting started with python, Comments, Identifiers, Reserved keywords, Variables, Standard Data Types, Operators, Statements and Expressions, String Operations, Boolean Expressions. Control Statements- for, while, if elif else, while.

9

Unit 2 Functions

Built-in Functions, Composition of Functions, User Defined Functions, Parameters and Arguments, Function Calls, Python Recursive Function, The Anonymous Functions, Writing Python Scripting 9

Unit 3 Strings and Lists

Strings - Compound Data type, len Function, String Slices, Strings are immutable, Escape Characters, String Formatting Operator, String Formatting Functions. Lists - Values and Accessing Elements, Traversing a List, Deleting Elements from List, Built-in List Operators, Built –in List Methods. 9

Unit 4 Tuples and Dictionaries

Tuples -Creating Tuples, Accessing Values in Tuples, Tuple Assignment, Tuples as Return Values, Basic Tuples Operations, Built-in Tuple Functions. Dictionaries -Creating a Dictionary 9
Accessing Values in a Dictionary, Updating Dictionary, Deleting Elements from Dictionary, properties of Dictionary Keys.

Unit 5 Files and Exceptions

Text Files - Different modes of opening the file, closing a file, writing to a file, Reading from a File.Directories - Exceptions - Built-in Exceptions, Handling Exceptions, Exception with 9
Arguments, User-Defined Exceptions.

Total Hours : 45

Course Outcomes:

1. Apply decision and repetition structures in program design.
2. Develop functions to improve readability of programs
3. Design the programs with the use of Python lists and dictionaries
4. Adopt file and exception handling mechanisms
5. Ability to build python program to solve real world problems

Text Book:

1. *E. Balagurusamy (2016), Introduction to Computing and Problem Solving Using Python*, McGraw Hill Education, First edition.

Reference Books:

1. *R. Nageswara Rao (2016), Core Python Programming*, Dreamtech Press.
2. *Timothy A. Budd (2015), Exploring Python*, Mc-Graw Hill Education (India) Private Ltd.
3. *Allen B. Downey (2016), Think Python: How to Think like a Computer Scientist*, updated for Python 3, Shroff/O'Reilly Publishers, 2nd edition.

E-learning Resources:

1. http://spoken-tutorial.org/tutorial-search/?search_foss=Python&search_language=English
2. <http://nptel.ac.in/courses/117106113/34>
3. <https://swayam.gov.in/courses/3544-computational-science-and-engineering-using-python>
4. <https://swayam.gov.in/courses/4178-spoken-tutorial-python-english>

Computing Laboratory - V Python

Semester IV

18BCSC19

Hours of instruction/week: 4

No. of credits: 2

Objectives:

1. Get familiar with basics of Python programming
2. Apply the concept of decision making and functions in Python
3. Gain knowledge about the basics of file handling mechanism.

List of Programs:

1. Program using conditional control structures
2. Program using looping structures
4. Program using standard built-in functions
5. Program using user defined functions

6. Program using recursive function
7. Program to explore string functions
8. Program using single dimensional Array
9. Program using multi-dimensional arrays
8. Program to demonstrate the use of list and related functions
9. Program to demonstrate use of tuple and related functions
10. Program to demonstrate use of set related functions
11. Program to implement a dictionary
12. Program to implement a nested dictionary
13. Program to read and write into a file
14. Program using command line arguments
15. Program to demonstrate exception handling mechanism
16. Program to implement a sequential search
17. Program to implement a binary search
18. Program to implement selection sort
19. Program to implement stack using lists
20. Program to implement queue using lists

Total Hours: 60

Course Outcomes:

1. Develop Python programs with conditional statements
2. Apply functions and calling them
3. Adopt Python lists, tuples, dictionaries for representing compound data
4. Analyze the mechanisms for handling files and exceptions
5. Utilize the salient features of python

Computing Laboratory - VI RDBMS

Semester IV

Hours of Instruction / Week: 4

18BCSC20

No. of Credits: 2

Objectives:

1. To learn the fundamentals of Structured Query Language.
2. To design SQL queries and PL/SQL blocks.
3. To manipulate data for transactions and to create reports.

List of Programs:

1. SQL queries using DDL using constraints
2. SQL queries using DML, TCL commands
3. SQL queries using built in functions
4. SQL queries using group functions
5. SQL queries using HAVING clause

6. SQL queries using advanced SQL operators
7. SQL queries using multiple sub query
8. SQL queries using correlated sub query
9. PL/SQL block using %type attribute
10. PL/SQL block using %row type attribute
11. PL/SQL block using conditional statements
12. PL/SQL block using loops
13. PL/SQL block using implicit cursors
14. PL/SQL block using explicit cursors
15. PL/SQL block using procedures
16. PL/SQL block using predefined exception
17. PL/SQL block using custom defined exception
18. PL/SQL block using functions
19. PL/SQL block using triggers before and after updating records
20. Field Level Triggers.

Total Hours: 60

Note: Minimum 20 Programs to be completed with at least one from each topic.

Course Outcomes:

1. Identify Structure Query Language statements used in creation and manipulation of Database.
2. Develop and evaluate a real relational database application.
3. Create and maintain tables using PL/SQL.
4. Solve Query for a given relational database.
5. Learn the concept of generating suitable reports.

DSE – IV Optimization Techniques

Semester IV
18BCSI04

Hours of Instruction /week: 7(5T +2L)

No of Credits: 5

Objectives:

1. To solve the optimization problems using simplex method and Dual simplex method.
2. To understand the Transportation model, Assignment model, Network Scheduling and PERT/CPM and sequencing.
3. To educate the students with automated Operation Research tools.

Unit 1 Linear Programming

15

Introduction to LP formulation, Graphical method for two variable problems, General LPP, Characteristics of General LPP, Simplex method I, Simplex method II, Dual simplex method.

Unit 2 Transportation

15

Introduction, Mathematical Model of Transportation problem, Finding an Initial Basic Feasible solution using NWCR, LCEM, VAM. Test for optimality using MODI method.

Unit 3 Assignment model **15**

Introduction to Assignment problem, mathematical model of Assignment problem, Assignment problem and its solution by Hungarian method.

Unit 4 PERT/CPM **15**

Introduction to Network Scheduling, Basic components, Rules for construction of network, rules for Labeling nodes (i,j)/D.R Fulkerson's rule, Critical Path Analysis. Three time estimates (t_o, t_m, t_p), probability consideration in PERT, distinction between PERT and CPM, application of PERT/CPM.

Unit 5 Sequencing **15**

Introduction, Basic assumptions, Optimal sequence algorithm, Problems with 'n' jobs and two machines, problems with 'n' jobs and 'm' machines.

Total Hours: 75

List of Programs:

1. Program for PERT analysis.
2. Programs to solve linear programming problem using simplex method.
3. Programs using Dual simplex method.
4. Programs for Transportation Problem.
5. Programs for Assignment Problem.

Total Hours: 30

Note: Minimum 15 Programs to be completed with at least three from each topic.

Course Outcomes:

1. Formulate a real-world problem as a mathematical programming model with application software.
2. Solve the linear problems and analyze the simplex and dual simplex principles.
3. Apply optimality and allocation methods for resources
4. Demonstrate network scheduling concepts and apply critical path analysis and time estimates for real time project completion.
5. Apply sequencing algorithm for job scheduling.

Text Books:

1. *Kanthi Swarup, P.K.Gupta and Manmohan (2012). Operations Research*, Sultan Chand & Sons, Fifteenth Edition.
2. *P.K.Gupta and Manmohan (2014), Problems in OR*, Sultan Chand & Sons.

Reference Books:

1. *Hamdy. A.Taha, (2012). Operations Research an Introduction* , Seventh Edition, PHI.
2. *Gupta Prem Kumar, Hira D. S Chand (2011). Operations Research*, Sultan Chand & Company Ltd.
3. *Sharma.J.K.,(2009). Operations Research: Theory And Applications*, Macmillan India Limited, Fourth Edition.

E-learning Recourses:

1. [http://cec.nic.in/e-content/Pages/Result.aspx?p=Paper15:Theory&s=STAT&Name=Statistics%20\(B.Sc.%20Hons\)&PaperName=Operational%20Research](http://cec.nic.in/e-content/Pages/Result.aspx?p=Paper15:Theory&s=STAT&Name=Statistics%20(B.Sc.%20Hons)&PaperName=Operational%20Research).
2. <http://www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html>.

Fundamentals of Data Science**Semester V****Hours of Instructions / Week: 5****18BCSC21****No. of Credits: 4****Objectives:**

1. To enable the students to gain knowledge about the basics of data science.
2. To Introduce Students to Choosing and Evaluating Models.
3. To help students to practically understand on the concept of Documentation and Deployment.

Unit 1 Introduction to Data Science**15**

The Data Science Process – Roles, Stages - Defining Goal, Data Collection and Management, Modeling, Model Evaluation, Presentation and Documentation, Deployment and Maintenance. Loading Data into R – Working with Data from Files, Working with Relational Databases, Exploring Data – Using Statistics, Using Graphics and Visualization. Managing Data - Cleaning Data, Sampling for Modeling.

Unit 2 Choosing and Evaluating Models

15

Mapping Problems to Machine Learning tasks – Solving Classification Problems, Solving Scoring Problems, Working without known targets, Problem to method mapping. Evaluating Models – Evaluating Classification Models, Evaluating Scoring Models, Evaluating Probability Models, Evaluating Ranking Models, Evaluating Clustering Models, Validating Models – Identifying common model problems, Quantifying model soundness, Ensuring Model Quality.

Unit 3 Linear Regression

15

Using Linear Regression – Understanding Linear Regression, Building a linear Regression Model, Making Predictions, Finding Relations and Extracting Advice, Reading the Model summary and Characterizing coefficient quality, Linear Regression takeaways

Unit 4 Unsupervised Methods

15

Cluster Analysis – Distances, Preparing the Data, Hierarchical Clustering, K-Means Algorithm, Assigning new points to clusters, Clustering takeaways. Association Rules – Overview, Example, Mining Association rules, Association rules takeaway.

Unit 5 Delivering Results

15

Documentation and Deployment – The buzz dataset – Using Knitr to produce milestone documentation, Using Comments and Version control for running documentation, Deploying Models. Producing Effective Presentations – Presenting your results to the Project Sponsor, Presenting models to end users, Presenting our work to other data scientists.

Total Hours: 75

Course Outcomes:

1. Students will be able to apply the basic Data Science knowledge on the day to day problems they encounter.
2. Students will realize that there are various phases that contribute to the completion of a Data Science Project and can select among the various modeling techniques.
3. Students will be able to apply Regression techniques for modeling a data science project.
4. Students will be able to apply the Clustering and Association rule mining for modeling a data science project.
5. Students can reproduce the knowledge gained and come out with a sample case study which they come across in their daily life and implement, document and present the same using the R Tool.

Text Books:

1. *Nina Zumel, John Mount, (2014), "Practical Data Science with R",* Manning.
2. *Rachel Schutt, Cathy O'Neil, (2013), "Doing Data Science: Straight Talk from the Frontline",* Schroff O'Reilly.
3. *Foster Provost, Tom Fawcett, (2013), "Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking",* O'Reilly.

Reference Books:

1. *John W. Foreman, (2013), "Data Smart: Using data Science to Transform Information into Insight"* John Wiley & Sons.
2. *David Dietrich, Barry Heller, Beibei Yang, (2015), "Data Science and Big Data Analytics"* EMC Education Series, John Wiley.

E-learning Resources:

1. https://education.emc.com/guest/campaign/data_science.aspx
2. <https://www.thoughtworks.com/big-data-analytics>

Cloud Computing

Semester V

Hours of Instruction / Week: 5

18BCSC22

No. of Credits: 3

Objectives:

1. To understand the basic concepts of cloud computing.
2. To familiarize with the various cloud deployment and service models.
3. To acquire knowledge on cloud management and security issues.

Unit 1 Introduction to Cloud Computing

Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing, Comparison of cloud computing with other computing paradigms: Cloud computing vs. Cluster computing vs. Grid computing **15**

Unit 2 Cloud Computing Architecture

Cloud Computing Architecture, Comparison with traditional computing architecture (client/server), Services provided at various levels, ServiceModels- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing

Works, Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud, Case study of NIST architecture.

Unit 3 Service Management in Cloud Computing

Service Level Agreements (SLAs), Billing and Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling. **15**

Unit 4 Cloud Security

Infrastructure Security- Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing. **15**

Unit 5 Case Study

Case study of Service model using Google App Engine, Microsoft Azure, Amazon EC2, Eucalyptus. **15**

Course Outcomes:

1. Understand the cloud computing paradigm and its importance. **Total Hours: 75**
2. Analyze components of cloud computing and understand how business agility in an organization can be created.
3. Critique the consistency of services deployed from a cloud architecture.
4. Compare and contrast the economic benefits delivered by various cloud models based on application requirements, economic constraints and business requirements.
5. Explore some important cloud computing driven commercial systems.

Text Books:

1. *Barrie Sosinsky, (2011), Cloud Computing Bible*, Wiley-India.
2. *Gautam Shroff, (2010), Enterprise Cloud Computing - Technology, Architecture, Applications*, Cambridge University Press.

Reference Books:

1. *Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, (2011), Cloud Computing: Principles and Paradigms*, Wiley.
2. *Ronald L. Krutz, Russell Dean Vines, (2010), Cloud Security: A Comprehensive Guide to Secure Cloud Computing*, Wiley-India.

E-learning Resources:

1. <https://swayam.gov.in/courses/3742-cloud-computing>
2. <http://www.serc.iisc.ernet.in/~jlakshmi/Research/CloudsandQoS/Cloud%20Computing-BirdsEyeView-Oct2011.pdf>

Software Engineering

Semester V
18BCSC23

Hours of Instruction /Week: 5
No. of Credits: 3

Objectives:

1. To apply software engineering methods and practices.
2. Choose appropriate technology and methodology for software development.
3. Understand the significance of risk, testing and quality control.

Unit 1 A Generic View of Process

Software Engineering - A Layered Technology, Process Framework, Capability Maturity Model Integration (CMMI), Process Patterns, Process Assessment. Personal and Team Process Models - Personal Software Process, Team Software Process. Process Technology, Product and Process.

15

Unit 2 Process Models

Prescriptive Models, Waterfall Model, Incremental Process Models – Incremental model, RAD model. Evolutionary Process Models - Prototyping, Spiral model. Agile Process

15

Models – Extreme programming, Adaptive Software Development (ASD), Dynamic Systems Development Method (DSDM), Scrum, Crystal, Feature Driven Development (FDD), Agile Modeling.

Unit 3 Software Engineering Practice

Software Engineering Practice, Communication Practices, Planning Practices, Modeling Practices, Construction Practices. Requirements Engineering Tasks - Inception, Elicitation, Elaboration, Negotiation, Specification, Validation, Requirements Management. Initiating the Requirements Engineering process – Identifying the stakeholders, recognizing multiple viewpoints, working toward collaboration.

15

Unit 4 Analysis Modeling, Design Engineering and Architectural Design

Requirements Analysis, Analysis Modeling Approaches, Data Modeling Concepts, A Strategic approach to Software Testing Objects Oriented Analysis. Design Concepts - Abstraction, Architecture, Patterns, Modularity, Information Hiding, Functional Independence, Refinement, Refactoring, Design classes. Software Architecture, Data Design, Architectural Design.

15

Unit 5 Testing Strategies and Tactics

Verification and Validation, Test Strategies for Conventional Software, Validation Testing, System Testing – Recovery Testing, Security Testing, Stress Testing, Performance Testing. Software Testing Fundamentals, Black Box Testing, White Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing.

15

Total Hours: 75

Course Outcomes:

1. Acquire strong fundamental knowledge in software engineering.
2. Ability to apply software engineering principles, techniques, tools and practices.
3. Effectively demonstrate competence in communication, planning, analysis, design, construction, testing and deployment.
4. Adapt to new emerging technologies and methodologies.
5. Cope up with software quality standards.

Text Book:

1. **Roger S. Pressman, (2016), *Software engineering-A Practioner's Approach*, Mc Graw Hill Higher Education, Seventh Edition.**

Reference Books:

1. **Richard Fairley, (2006), *Software Engineering Concepts*, Tata MacGraw Hill.**
2. **Ian Sommerville, (2016), *Software Engineering*, Pearson Education, 10th Edition.**
3. **Shooman, (2005), *Software Engineering*, Tata McGraw Hill, Sixth Edition.**

E-learning Resources:

1. nptel.ac.in/courses/106101061
2. tutorialspoint.com

Computing Laboratory - VII PHP and MySQL

**Semester V
18BCSC24**

**Hours of Instruction/Week: 6 (2T + 4P)
No. of Credits: 3**

Objectives:

1. To develop hands on experience using open source technologies such as PHP and MySQL.
2. To implement static, dynamic and interactive web pages and web applications.
3. To be able to analyse the available open source technologies and select the appropriate one based on need.

Overview: Introduction to PHP - Configuring and installation-Apache, PHP, MySQL - Handling html form with PHP - Structure and syntax- Constant, Variable, Superglobals, Data types, Operators, Expression and PHP tag–ECHO and PRINT Statements - Decisions and loop – Function – String – Array – Numeric, Associative, Multidimensional- Forms – Filters - Cookies and Sessions - Setting cookies with PHP, Using cookies with sessions, Deleting cookies, Registering session variables - Working with file and directories–Exception Handling- Connecting to MySQL - Selecting the Database - Executing Simple Queries - Retrieving Query Results

List of Programs:

1. Program to demonstrate the use of local and global variables.
2. Program to demonstrate If... Else Statement.
3. Program to demonstrate Switch Statement.
4. Program to demonstrate FOR Loop.
5. Program to demonstrate Nested FOR Loop.
6. Program to demonstrate Do ... While Loop.
7. Program to demonstrate User-Defined Functions.
8. Program to demonstrate Date Functions.
9. Program to demonstrate String Functions.
10. Program to demonstrate Array.
11. Program to demonstrate Multidimensional Array.
12. Program to demonstrate cookies.
13. Program to demonstrate Sessions.
14. Program to demonstrate the use of Files.
15. Program to demonstrate the use of Exception Handling.
16. Program to demonstrate the use of Filters.
17. Program to get user input from Forms.
18. Program to read and display form the database.
19. Program to get input from Forms and store in database.
20. Program to perform DML commands using web form.

Total Hours: 90

Note: Minimum of 20 Programs to be completed with at least one from each topic.

Course Outcomes:

1. Understand the general concepts of PHP scripting language for the development of Internet websites.
2. Use PHP logical and comparison operators, branching structures (if/switch), and loop structures (for, for each, do, do/while)
3. Build database using MySQL for the required applications.
4. Construct PHP program to connect and query database.
5. Understand, analyze and build web applications using PHP.

Text Book:

1. *Robin Nixon, (2014), Learning PHP, MySQL, JavaScript, CSS & HTML5*, Paperback, O'reilly, 3rd Edition.

Reference Books:

1. *David Sklar, Adam Trachtenberg, (2014), PHP Cookbook: Solutions & Examples for PHP Programmers*, O'Reilly Media.
2. *Timothy Boronczyk, Martin E. Psinas, (2008), PHP and MYSQL (Create-Modify-Reuse)*, Wiley India Private Limited.

E-learning Resources:

1. http://spoken-tutorial.org/tutorial-search/?search_foss=PHP+and+MySQL&search_language=English

Computing Laboratory - VIII R Programming

Semester V
18BCSC25

Hours of Instructions / Week: 6 (2 T + 4 P)

No. of Credits: 3

Objectives:

1. To understand the basic programming using all the data types and programming constructs available in the R Software.
2. To practice the usage of graphical plots available in R
3. To know how statistical analysis can be done using the R Software

Basics of R - Introducing R, Installing R, Initiating R, First Program, Help in R, Assigning Variables, Basic Mathematical Operations, Packages in R. Environments and Functions, Variable Scope, Flow Control - If and Else Statement, Switch Statement, Loops, Repeat Loops, While Loops, For Loops. Basic Data Types in R - Numeric, Integer, Complex, Logical, Character, Vectors, Matrices and Arrays, Lists. Complex Data Types in R - Data Frames, Factors, Strings, Dates and Times. Working with Data - Datasets, Importing and Exporting Files, Text and CSV Files, Unstructured Files, XML and HTML Files, JASON and YAML Files, Excel Files, SAS, SPSS and MATLAB Files. Accessing Databases - Data Cleaning and Transforming, Manipulating Strings, Manipulating Data Frames, Data Reshaping, Grouping Functions. Graphics Using R - Exploratory Data Analysis, Main Graphical Packages, Pie Charts, Scatter

Plots, Line Plots, Histograms, Box Plots, Bar Plots, Other Graphical Packages. Statistical Analysis Using R - Basic Statistical Measures, Mean, Median, Mode, Standard Deviation and Variance, Quartile Ranges, Other Statistical Functions, Summary Statistics, Correlation Analysis, Regression Analysis, Analysis of Variance (ANOVA), Chi Square Test, Hypothesis Testing.

Total Hours: 30

List of Programs:

1. Programs to perform operations on the data types like Numeric, Integer, Complex, Logical, and Character.
2. Programs to perform operations on the data types like Vectors, Matrices and Arrays and Lists.
3. Programs to perform operations on the data types like Data Frames and Factors.
4. Programs to perform operations on the data types like Strings, Dates and Times.
5. Program to import different types (text, CSV, Excel) of datasets to the R Tool from the external data source.
6. Program to export different types (text, CSV, Excel) of datasets from the R Tool to the external data source.
7. Program using Control Flows.
8. Program using Looping.
9. Program for Creating User Defined Functions.
10. Create Data Visualization with Basic Plots.
11. Create Data Visualization with Advanced Plots.
12. Program to perform basic statistics on a dataset to get the various measures of central tendency.
13. Program to perform Correlation Analysis for the given dataset.
14. Program to perform simple Linear Regression Analysis.
15. Program to perform Multi Linear Regression Analysis.

16. Program to perform Analysis of Variance on distributed data.
17. Program to perform Analysis of CoVariance on distributed data.
18. Program to implement the Chi-square testing on the given data.
19. Program to perform Hypothesis Testing.
20. Program to perform outlier analysis.

Total Hours: 60

Minimum 20 Programs to be Completed with at least one from each topic.

Course Outcomes:

1. Students can use the R tool for data analysis by writing simple programs using the data types and programming constructs available in it.
2. Students will be familiar with exporting and importing of files from and to R tool.
3. Students will understand the methods of obtaining visual interpretations of the data and thereby have a better understanding of the data before processing it further.
4. Students will be able to know how the statistical techniques can be effectively applied upon the given data and interpret the results.
5. Students will practice how to write user defined functions and applying the same on the data on hand.

Text Books:

1. ***Richard Cotton, "Learning R",*** O'Reilly Media Inc., 2013.
2. ***Paul Teetor, "R Cookbook",*** O'Reilly Media Inc., 2011.
3. ***Roger D. Peng, "R Programming for Data Science",*** Lean Publishing, 2014.

Reference Books:

1. ***G. Sudhamathy, C. Jothi Venkateswaran, "R Programming – An Approach to Data Analytics",*** MJP Publishers, 2018.
2. ***Norman Matloff, "The Art of R Programming : A Tour of Statistical Software Design",*** No Starch Press, San Fransisco, 2011.

E-Learning Resources:

1. <https://cran.r-project.org/doc/>
2. http://spoken-tutorial.org/tutorial-search/?search_foss=R&search_language=English
3. <https://www.w3schools.in/r/>

Technical Communication (Self – study)

Semester V
18BCSC26

Hours of Instruction / Week: 1
No. of Credits: 4

Objectives:

1. Elucidate the various forms of communication.
2. Improve the capacity to communicate effectively through oral and writing skills.
3. Create and build expertise in various reporting styles.

Unit 1 Fundamentals of Communication 3

Stages in communication- channels-nature of technical communication-types of communication skill- organization and style of technical communication.

Unit 2 Professional Speaking 3

Job interviews-Characteristics- preparation techniques- questions and answering strategies, group discussions, presentation skills-oral presentation- planning, preparing and organizing the presentation.

Unit 3 Writing Strategies 3

Writing effective sentences- structure, coherence and emphasis, using connectives, Paragraph writing-structure, principles -unity, coherence, developing a paragraph. Note making and summarizing techniques.

Unit 4 Professional Writing

3

Routine business letters- letter writing skills- form and structure- style and tone. Resume writing and Job application letters, business memos, writing for the Web.

Unit 5 Reports

3

Reports- Types and formats- structure of formal reports, parts of a report-writing strategies. Proposals- nature and significance, types and structure of formal proposals. Technical articles- review and research articles-writing strategies. Investigative reports. Standard email practices and strategies.

Total Hours: 15

Course Outcomes:

1. Improved grammatical structure and usage in communication.
2. Ability to choose between appropriate writing and communication styles.
3. Expertise in various reporting styles.
4. Effective presentation and writing skills.
5. Applying the learned skills in different areas of communication

Text Books:

1. *M. Ashraf Rizvi, (2008), Effective Technical Communication*, Tata Mcgraw Hill company.
2. *Smith-Worthington and Sue Jefferson, (2017), Technical Writing for Success*, Cengage Publishers, Fourth Edition.

Reference Books:

1. *Krista Van Laan, (2013) The insider's guide to technical writing*, XML Press, First edition.

E-learning Resources:

1. <https://libguides.sjsu.edu/techwriting>
2. www.techprose.com/assets/techwriting_guidelines.pdf
3. <http://www.ewh.ieee.org/soc/es/Aug1996/030/cd/write/begin.htm>

Artificial Intelligence

Semester VI
18BCSC28

Hours of Instruction / Week: 5
No of Credits: 4

Objectives:

1. To learn the characteristic of AI.
2. To know the various strategies in solving a problem.
3. To evaluate different knowledge Representation schemes for typical AI problems.

Unit1 Introduction

15

What is AI, Turing Test Approach, Thinking humanly, Thinking rationally, Acting rationally. Intelligent Agents, Agents and Environments, Good behavior, the nature of environments, structure of agents, Problem solving, problem solving agents, example problems, searching for solutions, uninformed search strategies, avoiding repeated states, searching with partial information.

Unit 2 Searching Techniques

15

Informed search and exploration, informed search strategies, heuristic function, local Search algorithm and optimistic problem, local search in continuous spaces, online search agents and unknown environments, Constraint satisfaction problems (CSP), Backtracking search and Local

search for CSP, Structure of problems, Adversarial Search, Games, optimal decisions in games, Alpha, Beta Pruning, imperfect real, time decision, games that include an element of chance.

Unit 3 Knowledge Representation

15

First order logic –representation revisited –Syntax and semantics for first order logic –Using first order logic – Knowledge engineering in first order logic, Inference in First order logic– propositional versus first order logic –unification and lifting – forward chaining – backward chaining, Resolution, Knowledge representation .

Unit 4 Learning

15

Learning from observations, forms of learning, Inductive learning, Learning decision trees, Ensemble learning, Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming, Statistical learning methods, Learning with complete data, Learning with hidden variable.

Unit 5 Applications

15

Communication, Communication as action, Formal grammar for a fragment of English, Syntactic analysis, Augmented grammars, Semantic interpretation, Ambiguity and disambiguation.

Total hours: 75

Course Outcomes:

1. Develop computer applications based on perception & Learning.
2. Simulate intelligence for reasoning and Learning.
3. In depth Understanding to tackle any AI problem.
4. Representing knowledge appropriately
5. Distinguishing ambiguity in grammars

TextBooks:

1. *Stuart Russell, Peter Norvig, (2016), “Artificial Intelligence – A Modern Approach”, Pearson Education / Prentice Hall of India, 3rd Edition.*

Reference Books:

1. *Nils J. Nilsson, (2000), “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., I.S.ed Edition.*

2. *Elaine Rich and Kevin Knight, (2017), “Artificial Intelligence”, Tata McGraw,Hill, 3rd Edition.*
3. *George F. Luger, (2002), “Artificial Intelligence,Structures And Strategies For Complex Problem Solving”, Pearson Education / PHI.*

E-learning Resources:

- 1) https://www.tutorialspoint.com/artificial_intelligence/index.html
- 2) <https://hackr.io/tutorials/learn-artificial-intelligence-ai>

Introduction to IoT

Semester VI

Hours of Instruction/Week: 4

18BCSC29

No. of Credits: 3

Objectives:

1. To know the fundamentals of Internet of Things
2. To learn about the basic components of IoT
3. To understand various opportunities to work with IoT

Unit 1 Introduction to IoT

Introduction – Definition and Characteristics. Physical Design of IoT. Logical Design of IoT – Functional blocks, Communication models and APIs. IoT enabling technologies – WSN, Cloud computing, Big data analytics, Embedded systems.

12

Unit 2 Domain specific IoTs

Home Automation – Smart lighting, Smart appliances, Smoke/Gas detectors. Cities – Smart parking, Surveillance, Emergency response. Environment – Weather monitoring, Air pollution, River flood detections. Health & Lifestyle – Health and Fitness monitoring, Wearable devices.

12

Unit 3 IoT Design methodology

Introduction – Purpose and requirements specification, Process specification, Domain model specification, Information model specification, Service specification, IoT level specification, Functional view specification, Operational view specification, Device and component integration, Application development. **12**

Unit 4 IoT Physical Devices and Endpoints

What is an IoT Device – Building blocks of IoT. Exemplary Device: Raspberry PI. About the Board. Linux on Raspberry PI. Raspberry PI Interfaces – Serial interfaces, SPI, I2C. Programming Raspberry PI with Python – Controlling and interfacing LED switches. Other IoT Devices – pcDuino, BeagleBone Black, Cubieboard. **12**

Unit 5 Case Studies illustrating IoT Design

Home Automation – Home Intrusion Detection. Productivity Applications – IoT printers. **12**

Total Hours: 60

Course Outcomes:

1. Understand the basic ideas of IoT
2. Learn the functional design of the IoT based devices
3. Design and implement an IoT device for a given problem-domain
4. Understand the areas in which IoTs can be designed
5. Master the basics of IoT design methodologies

Text Books:

1. *Arshdeep Bahga, Vijay Madiseti (2014), Internet of Things: A Hands-On Approach*, VPT Publishers.

Reference Books:

1. *Adrian McEwen, Hakim Cassimally, (2013), Designing the Internet of Things*, Wiley Publications.
2. *Cuno Pfister, (2011), Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud, 1st Edition*, Maker Media, Inc.

E-learning Resources:

1. onlinecourses.nptel.ac.in
2. www.academy-cube.com/cisco-internet-of-things

Client/Server Computing

Semester VI

Hours of Instruction / Week: 4

18BCSC30

No. of Credits: 3

Objectives:

1. To introduce the basic concepts of client/server computing.
2. To acquaint knowledge on SQL Database server, Data warehouse and Transaction processing concepts.
3. To make students familiar with the concepts of Distributed Objects.

Unit 1 Client Server Introduction

Basic concepts of Client/Server - Characteristics, File Servers, Database Servers, Transaction Servers, Groupware Servers, Object Servers, Web Servers, Fat Servers, Fat Clients, 2-Tier, 3-Tier. Client/Server Building Blocks.

12

Unit 2 Operating System Services and NOS

Operating system services - Base Services, Extended Services – Server Scalability, Client Anatomy. NOS Middleware, Peer-to-Peer Communication, Remote Procedure Calls, MoM, RPC vs MoM.

12

Unit 3 SQL Database Server, Data Warehouse

SQL Database Servers - Server Architecture, Stored Procedure, Triggers and Rules, Data Warehouse - Elements, Warehouse Hierarchies, Replication vs Direct Access, Replication mechanism.

Unit 4 Client Server with Transaction Processing

ACID properties* - Transaction Model - TP Monitor and Operating System, TP Monitor ar Transaction Management, TP Monitor Client Server Interaction Types - Transactional RPCs, Queues and Conversations - TP Lite, TP Heavy.

12

Unit 5 Client Server with Distributed Objects

Groupware - Components of Groupware, Distributed Objects-Components and Distributed Objects. CORBA -Components, Object Management Architecture (IORB),Services, Business Objects.

12

Total Hours: 60

Course Outcomes:

1. Describe and synthesize the client server concepts and different types of servers.
2. Analyze the operating system services required for client/server architecture.
3. Master the concepts of SQL database server and Data Warehouse.
4. Familiarity with the concepts of transaction processing, functions of TP monitor and client/server interaction types.
5. Exposure to the concepts of distributed objects in client/server computing.

Text Books:

1.Robert Orfali, Dan Harkey and Jeri Edwards (2007). *The Essential Client/Server Survival Guide*, Third Edition, Wiley India Edition.

2.ThomasErl (2009). *Service Oriented Architecture: Concepts, Technology and Design*, Prentice Hall of India.

Reference Books:

1. **James E. Goldman, Phillip T. Rawles, Julie R. Mariga (200), *Client/Server Information Systems, A Business Oriented Approach*, John Wiley & Sons, Singapore.**

2. *Eric J Johnson, A complete guide to Client / Server Computing (2001)*, First Edition, PrenticeHall, New Delhi, 2001.
3. *Smith &Guengerich, Client /Server Computing(2002)*, Prentice Hall, New Delhi, 2002.

E-learning Resources:

1. http://www.shsu.edu/~csc_tjm/summer2000/cs334/Chapter12/Chapter12.html
2. <http://www1.se.cuhk.edu.hk/~seem3430/Tutorial%20Notes/client-server.pdf>

Computing Laboratory - IX Web Technologies

Semester VI
18BCSC31

Hours of Instruction /Weeks: 6(2 T+4L)

No. of Credits: 3

Objectives:

1. To understand the basics of internet and its services.
2. To become familiar with .NET framework.
3. To acquire knowledge on ADO and OLE concepts.

Introduction – Basic concepts of internet, internet services, uses of the internet, web Concepts, Client/Server Model, Internet Standards, Internet protocols, Internet Applications-The .NET Framework-Basic concepts, Web Controls, Validation and Rich Controls, State Management-View State, Transferring Information, Cookies, Session State, ADO.NET Overview: Characteristics of ADO.NET, Data Binding, Accessing Data using ADO.NET.

List of Programs:

1. Design a web page using images and hyperlinks
2. Design a web page Web page using buttons and textbox
3. Design a web page using list box and combo box
4. Design a web page using session variables
5. Design a web page using cookies
6. Design a web page using request and response objects.

7. Design a web page using events
8. Design a web page using calendar control
9. Design a web page using wizard control
10. Design a web page using range and compare validator
11. Design a web page using custom and required field validator
12. Design a web page using Menus
13. Design a web page using rich controls
14. Design a web page using ad rotator control
15. Design a web page using CSS
16. Design a web page using ADO.NET
17. Design a web page using Grid view control
18. Design a web page using Tree view control
19. Design a web page using Repeater control
20. Design a web page using Data list control

Total Hours: 90

Course Outcomes:

1. Knowledge on basic controls to develop web pages
2. Employing skills on session concepts in web page designing
3. Ability to select and apply appropriate validation controls in designing interactive web pages
4. Clarity in combining multiple rich text controls in web page design.
5. Apply ADO.Net concepts to connect to the backend database for processing

Reference Books:

1. ***David Chappell (2009). Understanding .NET***, Addison Wesley, Second Edition.
2. ***Matthew Macdonald (2017). ASP.NET: The Complete Reference (2017)***, McGraw-Hill.
3. ***Virginia Anderson (2008).Microsoft Office Access 2007 ,The Complete Reference***, Tata McGraw Hill Publications, First Edition.

Computing Laboratory - X Android Programming

Semester VI

Hours of instruction/week: 6 (2T+4L)

18BCSC32

No. of credits: 3

Objectives:

1. To apply java to android platform to develop mobile apps
2. To provide an architecture/design overview of the android environment
3. To practice the programming skills and develop marketable software for smart phones

Overview: Introduction-Why Android?, About Android, Features of Android. Android architecture – Linux Kernel ,Libraries ,Android Runtime ,Application Framework. Application Components – Activities ,Services, Broadcast Receiver, Content Providers. Additional Components. Environmental Setup and Run the Application – Install Java Development Kit (JDK), Install Android SDK, Create Android Virtual Device (Emulator), Create and Run Android Program. Anatomy of Android Application- Folder, File & Description, Main activity file, Manifest file, XML file, String file, Layout file, Component Tree, Palette, Gradle, Attributes. Database- Understanding of SQLite database, connecting with the database.

List of Programs:

1. Design a Mobile App using Textbox, Colors.
2. Design a Mobile App using Image Effects.
3. Design a Mobile App Using Checkbox.
4. Design a Mobile App to perform Mathematical operations.

5. Design a Mobile App using conditional Statements.
6. Design a Mobile App using function.
7. Design a Mobile App using Button.
8. Design a Mobile App using Image Button.
9. Design a Mobile App using Switch.
10. Design a Mobile App String Functions.
11. Design a Mobile App to indent activity.
12. Design a Mobile App to perform Multiple Activity pages.
13. Design a Mobile App for Login Activity.
14. Design a Mobile App to Single-touch and Multi-touch on Screen.
15. Design a Mobile App for Media player.
16. Design a Mobile App using Google Map Activity.
17. Design a Mobile App to perform Text to Speech Activity.
18. Design a Mobile App to Connect with SQLite Database (using Student table).
19. Design a Mobile App to Connect with SQLite Database (using Employee table).
20. Design a Mobile App to Connect with SQLite Database (using Product table).

Total Hours: 90

Note: Minimum of 20 Programs to be completed with at least one from each topic.

Course Outcomes:

1. Prepare to use the development tools in the Android environment
2. Learn major components of Android API set to develop their own apps
3. Understand the Java programming language to build Android apps
4. Become familiar with new UI components
5. Prepare android apps for distribution on the Google Play Store

Text Books:

1. ***Joseph Annucci, Jr. Lauren Darcey, Shane Conder, Addison,(2014),Advanced Android Application Development***, Welsey Professional Publisher, 4th Edition.

Reference Books:

1. ***Erik Hellman ,(2015),Android Programming: Pushing the Limits***, Konoplvos

Publisher, 1st Edition.

2. *Joseph Joyner,(2015), Android Programming for Beginners: the Ultimate Android App Developer's Guide.*

E-learning Resources:

1. <https://www.androidauthority.com>
2. <http://www.vogella.com/tutorials/Android/article.html>

Desktop Publishing
(Value Added Course)

Semester III
18BCSV01

Hours of Instruction: 40(10T+30P)

No. of Credits: 2

Objectives:

1. To understand the Fundamentals of Page maker, Corel Draw and Quark Xpress.
2. To create Brochures, Natural Scenes and Logos using appropriate software
3. To get hands-on experience in desktop publishing

Introduction to Desktop Publishing (DTP), Salient features, applications and advantages, working with Page Maker, Creating a Document, Document Setup and Saving, Working with Frames, Formatting Text, Working with Indents, Tabs and Rules, Graphics, Working with Text and Graphics, Attaching Text to a Frame, Introduction to CorelDraw, Moving Around and Viewing Drawings, Basic Drawing Skills, Using Text, Working with Text, Working with Objects, Transforming Objects, Adding Special Effects, Introduction to Quark Express, getting around and moving within a document, Text, Input, Importing, Manipulation, Pictures and graphics, Internal graphic elements.

Total Hours: 10

List of Programs:

1. Program to design an ID card/visiting card using page maker.
2. Program to design an attractive Invitation card/letter pad using Page maker.
3. Program to prepare a small booklet with 6 pages using Page Maker.
4. Program to design a handbill/advertisement using page maker.
5. Program to draw a natural scene using Corel Draw.
6. Program to draw a logo of any reputed company using Corel draw.
7. Program to create a 2-fold, 3-fold, 4-fold, 6-fold cards and brochures using Corel draw.
8. Program to make a presentation including diagrams, charts, graphics and images using Corel Draw.
9. Program to create a type setting of text matter for bookwork using Quark Express.
10. Program to create a type setting of text matter for newspaper using Quark Express.

Course Outcomes:

1. Identify desktop publishing terminology and concepts.
2. Manipulate text and graphics to create a balanced and focused layout.
3. Create fliers, brochures, and multiple page documents.
4. Demonstrate presentations with multiple contents.
5. Apply text setting for the preparation of books.

Text Books:

1. *Gary David Bouton(2017), Corel Draw X8 The Official Guide* , McGraw Hill.
2. *Carolyn M.Connally(2005), Page Maker 7: The Complete Reference*, Dreamtech.
3. *David Blatner (2008), Realworld QuarkXpress 7 Bible*, Peachpit Press.

Reference Books:

1. *Starks (Shelly Cashman Series)(2016), Microsoft Office 365 Publisher 2016 Comprehensive*, Cengage Learning.
2. *Robert Shufflebotham (2011), InDesign in easy steps - covers CS3-CS5: for Windows and Mac*, ISBN 978-1-84078-414-5.

E-learning Resources:

1. http://spoken-tutorial.org/tutorial-search/?search_foss=Inkscape&search_language=English.

Computer Fundamentals and Office Automation
Generic Elective (GE) Course

Semester V
18BCSO01

Hours of Instruction / week: 2
No. of credits: 2

Objectives

1. To enable students in preparation of letter documentation using Text Processing.
2. To create a spreadsheet by embedding graphs and working with Hyperlinks, to create a database and to retrieve data using queries from DBMS.
3. To create slides for professional level presentation.

Unit I Introduction to Computer and Text Processing

Introduction to Computer, Input, Output devices and storage Units, Operating System, organizing files and folders, working with windows, basic elements of windows, working with Browsers, working with documents, working with tables, Mail merge concepts.

6

Unit II Worksheet

Introduction to Worksheet, working with worksheet, simple formula, copying the formula, paste function, creating charts, formatting with charts, enhancing the worksheet with Graphics Inserting, removing WordArt object, Drawing Auto shapes, working with cliparts, pictures, moving, Resizing, Rotating, Flipping, Arranging objects. Adding shadow and 3D effects.

6

Unit III PowerPoint Presentation

Introduction to PowerPoint Presentation, Creating a presentation, using Auto content wizard Design template, Blank presentation, Modifying a presentation, enhancing a presentation, viewing a presentation using different views, using slide show features.

6

Unit IV DBMS

Introduction to DBMS, Database concepts, Database Terminology, Normalization and its types, Import and link the data, Create and design tables, working with tables, Filtering

6

records, Search and replace records, Sorting records, Relationship and its type, Design simple query, Multiple queries, Using build function, Design forms, Hyperlinks, Reports , Summary options, Customizing reports.

Unit V Introduction to Internet

History of Internet and WWW, Basic Internet Definitions, Browsers, Modems Usenet, Gopher, Search Engines, Surfing in the Internet, Browsers, Blogs, Sending and Receiving E-Mail.

6

Course Outcomes:

Total Hours: 30

1. Understand the preparation of letter documentation.
2. Enable to work with formula and graphs.
3. Creating the powerful power point presentation.
4. Understand the database concepts and create queries.
5. Enhance the knowledge about Internet.

Text Books:

1. *J.B. Dixit (2010). Fundamentals of computers*, First Edition, Laxmi Publications.
2. *K.L James (2010). The Internet, User's Guide*, Second Edition.

Reference Books:

1. *Kogent solutions Inc (2008). Excel 2007 in simple steps*, Dreamtech press.
2. *Harely Hahn, (2008). The Internet Complete Reference*, Tata McGraw Hill, Second Edition.
3. *D.P. Nagpal (2000). Mastering Microsoft Office 2000*, A.H. Wheeler Publishing.

E-learning Resource:

1. https://www.tutorialspoint.com/computer_fundamentals/computer_fundamentals_tutorial.pdf