

Introduction to Information Technology

Semester I

Hours of Instruction/week: 4

21BITC01

No of credits: 3

Course Objectives:

1. To educate the fundamental concepts on computer.
2. To expose the students to intellectual property rights and communication process.
3. To understand about networks, various types of networks.
4. To provide knowledge about Multimedia and Virtual Reality (VR)
5. To give in-depth understanding on fundamental concepts of new technologies.

Unit I Introduction to Computer Systems

14

Introduction to Computers – Classification – Anatomy of a Digital Computer – Memory Units – Auxiliary storage devices – Input Devices – Output Devices – Programming Languages, File Processing: Data Vs Information

Unit II Social Impacts of IT and Telecommunication

12

Privacy, Security and Integrity of Information, Intellectual property Rights, Careers in IT, Telecommunication System, Communication Process, Communication Media, Characteristics of Communication Media, Telecommunication Software.

Unit III Networks

13

Introduction, Types of Networks, Network Topologies, Network Protocols, Network Architecture, Network Standardization. Internet and World Wide Web- Intranets - Extranets.

Unit IV Multimedia and Virtual reality

10

Introduction to Multimedia, Multimedia Tools, Introduction to Virtual Reality, History of Virtual Reality, Uses of Virtual Reality, Futures.

Unit V New Technologies in Information Technology

11

E-Commerce, Hypermedia, OLAP, Cloud: Introduction – Service Model – Deployment Models, IoT: Introduction and Applications of IoT: Smart Irrigation – Data Analytics: Introduction.

Total Hours:60

Text Book:

1. *Alexis Leon and Mathews Leon (2008). Introduction to Information Systems.* Second Edition. Vijay Nicole Pvt Limited.

Reference Books:

1. *V. Rajaraman (2018). Introduction to Information Technology.* Third Edition Prentice Hall of India Pvt Limited.
2. Ralph M.Stair and George W.Reynolds(2017), Principles of Information Systems, 13th Edition.

Web References:

1. <https://www.slideshare.net/adpafit/introduction-to-information-technology-lecture-1>
2. <http://www.itdesk.info/Basic%20Concepts%20of%20Information%20Technology%20notes.pdf>
3. <https://smkstictcd.files.wordpress.com/2010/11/la1-ict-topic-1-ict-and-society.pdf>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Accomplish basic computer concepts knowledge.
2. Realize knowledge of IPR, Communication Process and Communication Media.
3. Analyze the importance of networks and its types includes network protocols, architecture and network standardization.
4. Gain knowledge about Multimedia and Virtual Reality (VR).
5. Understand about the recent Information Technology concepts.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	-	L	L	M	M	-	-	-	-	L	L	-	L	L
CLO 2	-	L	L	-	M	-	-	-	-	L	L	-	L	L
CLO 3	-	L	L	M	M	-	-	-	-	L	L	-	L	L
CLO 4	-	L	L	-	M	-	-	-	-	L	L	-	L	L
CLO 5	-	L	L	-	M	-	-	-	-	L	L	-	L	L

C Programming

Semester I
21BITC02

Hours of Instruction/week: 4
No of credits: 3

Course Objectives:

1. To define basic programming and know the C control structures.
2. To understand and use the arrays and strings
3. To gain knowledge about the functions and structures of C Programming.
4. To recite about the pointers and memory management.
5. To devise advanced features of C specifically I/O and File Management.

Unit I Introduction to C & Control Structure

14

Basic structure of C program, executing a pr.

ogram, constants, variables, data types, operators and expressions, IF statement, IF ELSE, conditional operators, FOR, WHILE, Do statements, SWITCH, GOTO statement.

Unit II Arrays & Strings

12

Arrays: Introduction, One dimensional array, Two dimensional array, Multidimensional arrays, String Manipulations: Declaring and initializing strings, string manipulation, read, write, compare and concatenate, count, sub string.

Unit III Functions & Structures

12

User defined functions, category of functions, Nesting of functions, Recursion, Function with arrays, Structures and unions, Introduction, Arrays within structures, Structures within structures, structures and functions, union.

Unit IV Pointers

12

Introduction, Pointer expression, Pointers and arrays, Pointers and functions, Pointers and structures, Application of Pointers and Structures.

Unit V Files

10

Introduction, opening and closing a file, I/O operations on files, command line arguments, random access files, error condition

Total Hours:60

Text Book:

1. **E. Balagurusamy(2016).** *Programming in Ansi C.* 7th Edition, Tata McGraw Hill Publishers.

Reference Book:

1. **Yashwant Kanetkar((2017).** *Let us C Solutions.* 15th Edition BPB Publications.

Web References:

1. <https://www.tutorialspoint.com/cprogramming>
2. <https://www.programiz.com/c-programming/examples>
3. <https://www.youtube.com/watch?v=-CpG3oATGIs>

Course Learning Outcomes:

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

1. Read, understand and trace the C program execution.
2. Implement programs using arrays and strings.
3. Extend the C programming through functions, structures and arguments.
4. Relate and apply pointers and memory management into programs.
5. Demonstrate using file management in C.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	-	-	L	L	-	-	-	H	-	M	L
CLO 2	L	L	M	L	-	L	L	-	-	-	H	-	M	L
CLO 3	M	L	M	L	-	L	L	-	-	-	H	-	M	L
CLO 4	M	L	M	L	-	L	L	-	-	-	H	-	M	L
CLO 5	M	L	M	L	-	L	L	-	-	-	H	-	M	L

C programming - Practical I

Semester I
21BITC03

Hours of Instruction/week: 4
No of credits: 2

Course Objectives:

1. To define basic programming concepts and be familiar with programming environment.
2. To understand the problem solving techniques.
3. To learn to write, test and execute C programs.
4. To apply functions, pointers and structures.
5. To experiment I/O and File Management and related preprocessors.

List of Exercises:

1. Programs based on different if statements
2. Programs for using conditional operator
3. Programs to use while and do-while loops
4. Programs using for loop
5. Programs using switch-case statement
6. Programs based on arrays (single and two dimensional)
7. Programs based on strings and array of strings
8. Programs based on Functions
9. Programs based on nested functions
10. Programs on function and arrays
11. Programs based on structures
12. Programs on Unions
13. Programs using structure and functions
14. Programs based on Recursive functions
15. Programs based on Pointers
16. Programs based on array of pointers
17. Programs using pointers and functions
18. Programs for pointers and structures
19. Programs using files
20. Programs using command line arguments

Total Hours: 60

Web References:

1. <https://www.tutorialspoint.com/cprogramming/index.htm>
2. <https://www.programmingsimplified.com/c>
3. <https://www.programiz.com/c-programming>
4. <https://fresh2refresh.com/c-programming/c-basic-program/>

Course Learning Outcomes:

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

1. Read, understand and trace the C program execution.
2. Implement programs using control structures, pointers and arrays.
3. Relate and apply arrays and strings into programs.
4. Extend the C programming through functions and arguments.
5. Demonstrate using pointers and memory management in C.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	L	-	L	L	-	-	-	H	-	M	L
CLO 2	L	L	M	L	-	L	L	-	-	-	H	-	M	L
CLO 3	M	L	M	L	-	L	L	-	-	-	H	-	M	L
CLO 4	H	L	M	L	-	L	L	-	-	-	H	-	M	L
CLO 5	H	L	M	L	-	L	L	-	-	-	H	-	M	L

Fundamentals of Internet and Office Automation - Practical II

Semester I
21BITC04

Hours of Instruction/week: 3
No of credits: 2

Course Objectives:

1. To describe fundamental computer literacy curriculum to prepare students for constant learning of Computer concepts and skills.
2. To provide students an extensive understanding of significance of Computers in business, Education and society.
3. To provide hands-on training on office automation software.
4. To develop an intuitive knowledge on basic Internet Technologies
5. To develop familiarity with email operations and use of World Wide Web.

List of Exercises:

Internet:

1. Create an Email-id using any ISP.
2. E-mail Operations:
 - (i) Compose and send a mail with and without attachments
 - (ii) Forward a mail
 - (iii) Reply for a mail
 - (iv) Download the attached document(s) of a received mail
 - (v) Send a mail to a large number of recipients using CC and BCC options
3. To search a topic using various web browsers and search engines
 - (i) Apply basic Internet Search Techniques and Search Logic
 - (ii) Perform Image Search and Reverse Image Search
 - (iii) Perform Voice Search

Office Automation

I. Word

1. (i) Create a document. In the document perform basic operations such as Editing, Copy and Paste, Find and Replace, Spelling Check, Formatting and Page Layout
- (ii) Design a Text Based Advertisement for a Newspaper Edition
- (iii) Decorate a Word Document with Page border, Content border and Word Art to prepare a Poster or Cover page
- (iv) Create a letter pad for an organization
2. (i) Create a Table, enter information and format the table. Create a Chart for the table.
- (ii) Insert and adjust an image, shapes and symbols using available tools

II. Spreadsheet – Perform the following with the use of basic functions, charts and formulae

1. Prepare Students Grade Sheet
2. Create an Employee Payroll
3. Create weekly timesheet
4. Prepare an invoice
5. Illustrate and compare Rainfall data for 10 years (Using various charts)

III. PowerPoint

1. Create a PPT to present your assignment with slide transition, auto timing and animations
2. Create a basic presentation to demonstrate any product with different data types in it (table, chart, image) and with simple animations and sound effects
3. Prepare a PPT with audio and video clips about your Department and University

IV. Access

1. Create a Database, Design tables, Edit the Table design and import data
2. Access data Using Queries

Total Hours: 45**Web References:**

1. <https://www.slideshare.net>
2. <https://www.docsity.com/>
3. <http://studentsuvidha.com>
4. <http://www.openlearningworld.com>

Course Outcomes:**On successful completion of this course, the student will be able to**

1. Use Office applications to accomplish with professional excellence.
2. Complete basic operations necessary to use Internet and email independently.
3. Organize and Categorize data into logical format using spreadsheet.
4. Prepare a well-constructed presentation using powerpoint.
5. Construct databases using MS-Access to run various business applications.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	L	M	-	M	-	H	-	H	L	-	-	L	L
CLO 2	M	L	M	-	H	-	H	-	H	L	-	-	L	L
CLO 3	M	L	M	-	L	-	H	-	H	L	-	-	L	L
CLO 4	M	L	M	-	L	-	H	-	H	L	-	-	L	L
CLO 5	M	L	M	-	L	-	H	-	M	L	-	-	L	L

DSE I - Probability and Statistics

Semester I
21BITI01

Hours of Instruction/week: 4
No of credits: 3

Course Objectives:

1. To acquire the knowledge of theory of probability.
2. A good understanding of the laws of conditional probability and the use of Bayes theorem
3. To understand the fundamental concepts of statistics.
4. To provide basic knowledge in calculations for statistical analysis
5. To understand the common statistical measures to describe the amount of data variability.

Unit I**12**

Theory of probability: Definition of mutually exclusive events - Exhaustive events - Equally likely events - Independent events - Sample Space - Axioms of probability - Probability function (Only definitions) - Law of addition – Simple problems.

Unit II**12**

Conditional probability: Multiplication theorem - Baye's theorem - Simple problems.

Unit III**12**

Statistics: Definition - Functions of Statistics - Limitations of Statistics - Primary data – Secondary data Collection of data – Methods of Collection of data. Classification and Tabulation of data: Types of Classification of data - Types of tables. Representations of data: Bar diagram - Histogram - problems.

Unit IV**12**

Measures of central tendency: Definition - Objectives - Mean - Median - Mode – Geometric mean - Harmonic mean - problems.

Unit V**12**

Measures of variation: Definition - Objectives - Range -Mean deviation – Quartile deviation - Standard deviation - Coefficient of Variation - problems.

Total Hours:60**Text Books:**

1. **S. C. Gupta and V. K. Kapoor (2002). *Fundamentals of Mathematical Statistics*, 12th Edition Sultan Chand and Sons, New Delhi.**
2. **Dr.S. P. Gupta (2021). *Statistical Methods*, 46th Edition, Sultan Chand & Son, New Delhi.**

Course Learning Outcomes:

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

1. Acquire basic knowledge of probability.
2. Apply the probability theory in our day – to – day life.
3. Interpret the data.
4. Derive various statistical measures.
5. Apply statistical tools in various fields

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	M	H	-	-	-	-	-	L	-	-	L	-	-
CLO 2	M	M	M	-	-	-	-	-	L	-	-	L	-	-
CLO 3	M	H	M	-	-	-	-	-	M	L	-	M	-	-
CLO 4	H	M	H	-	-	-	-	-	M	L	-	M	-	-
CLO 5	H	H	H	-	-	-	-	-	M	M	-	M	-	-

Digital Fundamentals and Architecture

Semester II

Hours of Instruction/week: 5

21BITC05

No of credits: 3

Course Objectives:

1. To understand the basics of number system, arithmetic circuits and logic gates.
2. To recognize Boolean algebra, karnaugh map and combinational circuits.
3. To understand the CPU, instruction set and addressing modes.
4. To illustrate I/O organization, Interrupt and IOP.
5. To infer memory hierarchy.

Unit I Number System and Codes, Logic Gates and Arithmetic circuits

18

Decimal, Binary, Octal, Hexadecimal, Binary addition, Multiplication, Division, Floating point representation, Complements. Basic Gates, NOR, NAND, XOR Gates. BCD, Excess3, Gray Code, Half adder, Full adder, Half subtractor, Full subtractor, Parallel binary adder, Parallel binary subtractor, BCD adder.

Unit II Boolean Algebra and Minimization Techniques, Combinational Circuits, Flip Flops and Counters

17

Basic Laws of Boolean Algebra, Simplifications, Sum of Products and Product of Sums, Karnaugh map, Construction and properties, Don't care combinations. Multiplexers, Demultiplexers, Decoder, Encoder. Flip Flops: S-R, D, J-K, and T. Counters.

Unit III Central Processing Unit

10

General register organization, control word, examples of Micro operations, Stack organization, Instruction formats, Addressing modes, Data transfer and manipulation control.

Unit IV Input, Output Organization

15

Input- output interface, I/O Bus and Interface, I/O Bus Versus Memory Bus, Isolated Versus Memory Mapped I/O, Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking. Priority Interrupt: Daisy, Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input-Output Processor: CPU-IOP Communication

Unit V Memory Organization

15

Memory Hierarchy, Main Memory, Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set Associative Mapping, Writing into Cache, Initialization. Virtual Memory: Address Space and Memory Space, Address Mapping Using Pages, Associative Memory Page Table, Page Replacement.

Total Hours:75

Text Books:

1. **S. Salivahanan and S. Arivazhagan(2010).***Digital Circuits And Design*. Third Edition. Vikas publishing house Pvt ltd.
2. **M.Morris Mano(2006).***Computer System Architecture*. Third Edition.Prentice Hall of India.

Reference Books:

1. **M. Morris Mano, Michael D. Ciletti (2013),** *Digital Design*. Fifth Edition. Pearson Education.
2. **William Stallings (2010),** *Computer Organization and Architecture Designing for Performance*. Eighth Edition, Prentice Hall

Web References:

1. <http://www.csd.nutn.edu.tw/Digital%20Fundamentals/ch04.pdf>
2. <https://www.studytonight.com/computer-architecture/architecture-of-computer-system>

Course Learning Outcomes:

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

1. Know the fundamental digital principles and architecture.
2. Identify and design basic circuits.
3. Relate CPU, organization with different addressing modes and instruction formats.
4. Extend knowledge on I/O organization, Interrupt and I/O processor.
5. Structure different memory organization based on request.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	H	L	M	-	-	L	L	-	-	-	L	-	M
CLO 2	L	H	L	M	-	-	L	L	-	-	-	L	-	M
CLO 3	L	H	L	M	-	-	L	M	-	-	-	L	M	M
CLO 4	L	H	L	M	-	-	L	M	-	-	-	L	M	M
CLO 5	L	H	L	M	-	-	L	M	-	-	-	L	M	M

Object Oriented Programming with C++

Semester II

Hours of Instruction/week: 5

21BITC06

No of credits: 3

Course Objectives:

1. To know the features and basic concepts of C++ and object oriented programming
2. To gain knowledge about the relative merits and functions of C++ as an object oriented programming language
3. To understand how to apply the major object-oriented concepts to implement in C++ programs such as encapsulation, inheritance and polymorphism
4. To recite about the pointers in C++ and virtual functions
5. To devise advanced features of C++ specifically stream I/O and File Management.

Unit I Introduction to C++

17

Key Concepts of OOP, Advantages, OO Languages, I/O in C++, C++ Declarations, Control Structures, Decision Making Statements, If..Else, Jump, GOTO, Break, Continue, Switch Case Statements, Loops in C++, For, While, Do While loops, Functions in C++, In line Functions, Function Overloading.

Unit II Classes and Objects

17

Declaring objects, Defining member functions, Static member variables and functions, Array of objects, Friend functions, Overloading member functions, Constructor and Destructors.

Unit III Operator Overloading and Inheritance

14

Overloading unary, Binary operators, Overloading friend functions, Type conversion, Inheritance, Single, Multilevel, Multiple, Hierarchical, Hybrid inheritance, Virtual Base classes, Abstract Classes.

Unit IV Pointers

14

Declaration, Pointer to class, object, THIS pointer, Pointer to derived classes, Virtual functions, pure virtual functions

Unit V Working with Files

13

File stream classes, open and close, File Modes, Sequential read/write operations, Random access operations.

Total Hours:75

Text Book:

1. *Ashok N Kamthane(2011).Object Oriented Programming with ANSI and Turbo C++.* Pearson Education Publications.

Reference Books:

1. *Bjarne Stroustrup(2014). Programming – Principles and Practice using C++,* Second Edition. Addison Wesley publications.
2. *Herbert Schildt(2012). C ++ The Complete Reference.* Osborne McGraw Hill Publications.
3. *E.Balagurusamy(2014). Object Oriented Programming with C++.* Sixth Edition.Tata McGraw Hill Publications.

Web References:

1. <https://www.tutorialspoint.com/cplusplus/index.htm>
2. <http://www.cplusplus.com/doc/tutorial/>
3. <https://www.w3schools.in/cplusplus-tutorial/>

Course Learning Outcomes:

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

1. Apply programming principles to the design and implementation of C++ programs.
2. Articulate the Object oriented programming concepts and apply it in C++ programming language.
3. Describe the concepts of overloading and inheritance.
4. Demonstrate using pointers and memory management in C++.
5. Infer the File Management in C++.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	L	M	-	-	L	L	-	-	L	L	L	M
CLO 2	L	L	L	M	-	-	L	L	-	-	L	L	L	M
CLO 3	M	L	L	M	-	-	L	M	-	-	L	L	M	M
CLO 4	M	L	L	M	-	-	L	M	-	-	L	L	M	M
CLO 5	M	L	L	M	-	-	L	M	-	-	L	L	M	M

Object Oriented Programming with C++ - Practical III

Semester II

Hours of Instruction/week: 5

21BITC07

No of credits: 2

Course Objectives:

1. To be familiar with programming in C++ and able to write a C++ program to solve various problems.
2. To use Arrays, classes and objects.
3. To associate the major object-oriented concepts with C++ programs such as encapsulation, inheritance and polymorphism.
4. To understand about the pointers in C++ and different functions such as virtual functions, inline functions and friend functions.
5. To extend advanced features of C++ specifically stream I/O and File Management.

List of Exercises:

1. Program based on loops
2. Program based on control statements
3. Program based on Arrays
4. Programs based on inline functions
5. Program based on Classes and objects
6. Program based on Class and Array of objects
7. Program using member functions and non member functions
8. Program based on Objects as function arguments and Function that return objects
9. Program based on Friend function
10. Program on Function Overloading
11. Program based on constructors
12. Program based on constructor overloading
13. Program based on dynamic initialization of objects
14. Program using operator overloading
15. Program for Overloading friend functions
16. Program based on scope (private, public, protected)
17. Program on single inheritance
18. Program on Multiple inheritance
19. Program on multilevel inheritance
20. Program on Hierarchical inheritance
21. Program on this pointer
22. Program based on virtual function.
23. Program on run time polymorphism
24. Program using Pointer to members
25. Program using Files

Total Hours: 75

Web References:

1. <http://www.cplusplus.com/doc/tutorial/>
2. www.cplusplus.com/
3. www.cppreference.com/

Course Learning Outcomes:

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

1. Breakdown simple programming goals into object-oriented components, propose and evaluate different designs for solving problems.
2. Gain knowledge and usage of basic programming elements, functions and file handling in C++
3. Demonstrate the Object oriented programming concepts and apply it in C++ programming language for reusability and interoperability.
4. Correlate object oriented programming and procedure oriented programming.
5. Develop programs for file concepts.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	M	L	M	-	-	L	L	-	-	M	L	H	M
CLO 2	M	M	L	M	-	-	L	L	-	-	M	L	M	M
CLO 3	M	M	L	M	-	-	L	M	-	-	M	L	H	M
CLO 4	M	M	L	M	-	-	L	M	-	-	M	L	H	M
CLO 5	M	M	L	M	-	-	L	M	-	-	M	L	M	M

DSE II - Discrete Mathematics

Semester II
21BITI02

Hours of Instruction/week: 4
No of credits: 3

Course Objectives:

1. To understand the principles of Mathematical logic.
2. To find the type of statements and to use normal forms in different ways
3. To learn the basic concepts of Graph Theory.
4. To know applications of discrete mathematical structures.
5. To understand fundamental data structures used in programming

Unit I**12**

Mathematical Logic: Statement and Notations - Connectives - Statement formulae - The truth table of a Statement formula - Well formed formulae.

Unit II**12**

Tautology and Normal forms: Tautologies - Equivalence of formulae - Law of Duality - Tautological Implications - Normal forms.

Unit III**12**

Graph Theory: Basic terminology - Incidence and degree - Paths - Reachability and Connectedness - Some special graphs - Subgraphs and Isomorphic graphs.

Unit IV**12**

Graphs: Operations on graphs - Eulerian graphs - Hamiltonian graphs.

Unit V**12**

Trees: Trees and their properties - Spanning trees - Minimal spanning tree (MST) - Special trees.

Total Hours:60**Text Book:**

1. G.S.S. Bhishma Rao (2009). *“Discrete Structures and Graph Theory”*, SCITECH Publication Pvt., Ltd., Chennai, Third edition.

Course Learning Outcomes:

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

1. Construct truth table of a statement formulae.
2. Test the validity of a given formula using tautology.
3. Demonstrate the basic concepts in graph theory.
4. Identify Eulerian and Hamiltonian graphs.
5. Apply concepts of graph theory in networking.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	-	-	-	-	-	-	-	-	L	-	-
CLO 2	L	L	M	-	-	-	-	-	-	-	-	L	-	-
CLO 3	M	M	H	-	-	-	L	-	M	M	-	M	-	-
CLO 4	M	M	H	-	-	-	L	-	M	M	-	M	-	-
CLO 5	H	M	H	-	-	-	L	-	M	M	-	M	-	-

Software Engineering

Semester III
21BITC08

Hours of Instruction/week: 4
No of credits: 3

Course Objectives:

1. To provide knowledge on generic software development process model
2. To analyze the basic software requirement specification and Scenario based modeling
3. To Understand basic Software Design & Architecture
4. To Understand the Software Quality Assurance and Testing
5. To acquire knowledge on Software Configuration Management and Maintenance

Unit I Introduction to Software Engineering **14**

Software Engineering – The Software process – The essence of practice – Process Model: A generic process model – Waterfall model – incremental process model-RAD model - Evolutionary process model– spiral model – concurrent process model-Project management concept: Management spectrum: people-product-process, Product Life Cycle Model, Agile: Agility-Agile process –other Agile process model.

Unit II Requirements Analysis **12**

Software requirement Specification –Developing use cases-Building Requirements Model-Requirements Modeling: Requirements Analysis – Scenario Based Modeling – UML Model-Data Modeling concepts-class based modeling –flow orients Modeling – creating behavioral model- Patters for requirements modeling – requirements modeling for webapps.

Unit III Software Design and Software Architecture **10**

Design process- Design principles - Design concepts-Design models- Software architecture – Architectural Design- Component level design: Designing class based components – conducting component – Designing Traditional components

Unit IV Software Quality Assurance and Testing **12**

Software Quality - Achieving Software Quality – Dilemma – Achieving Software Quality – Review Metrics – Informal and Formal Technical Reviews- Software Quality Assurance: Elements– Task-Goal and Metrics- Software Reliability. Strategic Approach To Software Testing - Test Strategies For Conventional Software – Validation Testing – System Testing - White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing.

Unit V Software Configuration Management, Maintenance and Reengineering **14**

Software configuration management: Elements of a Configuration Management System – features- SCM process- Metrics for software quality - Estimation of software projects: Software project estimation – Decomposition techniques- Empirical Estimation model – COCOMO Model - Software Maintenance: Enhancing Maintainability during Development, Managerial Aspects of Software Maintenance, Reengineering: Software reengineering, reverse engineering, economics of reengineering

Total Hours:60

Text Book:

1. Roger S. Pressman(2010). *Software Engineering – A Practitioner’s Approach*, Seventh Edition, Mc Graw-Hill International Edition.

Reference Book:

- 1. Richard Farley(2004). *Software Engineering Concepts*. TMH.1/e.**
- 2. Jeff Tian(2006). *Software Quality Engineering*. Student Edition. Wiley India.**

Web References:

1. <http://www.engppt.com/2011/12/software-engineering-pressman-ppt.html>
2. http://www.nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html

Course Learning Outcomes:

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

1. Get insight of software development process model
2. Gain knowledge on software requirement specification and Scenario based modeling
3. Design the software and gain different architecture
4. Gain Knowledge on software quality metrics and testing strategies
5. Get idea on Software configuration management and software Maintenance after software development

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	M	L	M	-	L	L	H	-	-	M	L	-	L
CLO 2	L	M	L	-	-	L	L	H	-	-	M	L	-	L
CLO 3	L	M	L	M	-	L	L	H	-	-	M	L	-	L
CLO 4	M	H	L	-	-	L	M	H	-	L	M	L	-	L
CLO 5	M	H	L	-	-	L	M	H	-	L	M	L	-	L

Operating Systems

Semester III

Hours of Instruction/week: 5(3T+2P)

21BITC09

No of credits: 3

Course Objectives:

1. To understand about the basics of Operating Systems and Process.
2. To recognize Asynchronous Concurrent Processes, Concurrent Programming and Introduction to Linux Operating System.
3. To understand Deadlock and Indefinite Postponement Real Storage.
4. To illustrate Virtual Storage Organization, Job and Processor Scheduling.
5. To infer File System and Linux OS Programs.

Unit I

10

Introduction to Operating Systems & Process Concepts : Operating System: Definition, Key Architectural Trends, Hardware, Software, Firmware, Process Definition, Process States, Process State Transitions, Process Control Block, Operations, Interrupt Processing ,

Linux: Linux History, Linux Basic Commands: cat, pwd, cal, echo, who, man, info, ls, mv, wc, mail

Unit II

09

Asynchronous Concurrent Processes, Concurrent Programming and Introduction to Linux Operating System: Parallel Processing, Mutual Exclusion, Critical Sections, Semaphores, Introduction to Concurrent Programming, Critical Regions, Monitors, Path Expressions, Message Passing.

Linux: Basic Commands: sort, cmp, chod, logout, grep, pr, more, clear, tail, expr

Unit III

10

Deadlock and Indefinite Postponement Real Storage: Introduction, Deadlock examples, Indefinite Postponement, Resource Concepts, Conditions for Deadlock, Prevention, Avoidance, Detection, and Recovery of deadlock, Storage organization, Management, Management strategies, Allocation, Fixed Partition Multiprogramming, Variable Partition Multiprogramming.

Linux: Basic Shell Programming: Shell Usage

Unit IV

09

Virtual Storage Organization, Job and Processor Scheduling : Introduction, Basic concepts, multilevel storage organization, paging, segmentation, Introduction to Job and Processor Scheduling, scheduling levels, objectives and criteria, scheduling techniques.

Linux: Writing Linux shell programs

Unit V

07

File System and Linux OS Programs: Introduction to File system - Functions, Organization, allocation and accessing, backup and recovery. Using Linux shell variables, Constructs, Building programs with make command, Install & run dual operating systems

Total Hours:45

List of Exercises**Hours of Instruction/week: 2**

1. Shell script to use file system commands in Linux
2. Shell script for using I/O commands in Linux
3. Shell script to perform arithmetic operations
4. Shell script for using different types of if statements
5. Shell script for manipulating strings
6. Shell script for using loops
7. Shell script to use pipes and filters
8. Shell script for the following
9. To see currently running process
10. To stop any process
11. To get information about all running processes
12. To stop all processes except your shell
13. Program in Linux Environment to implement Shortest Job First Algorithm
14. Program in Linux Environment to implement Round Robin Algorithm
15. Program in Linux Environment to implement Shortest Remaining Time First Algorithm
16. Program in Linux Environment to implement First-Fit, Best-Fit, Worst-Fit Algorithm
17. Program in Linux Environment to implement FCFS Algorithm
18. Program in Linux Environment to implement preemptive scheduling algorithm
19. Program in Linux Environment to implement non-preemptive scheduling algorithm

Total Hours: 30**Text Books:**

1. **Harvey M.Deital(2007). *Operating Systems*.** Pearson India. Third Edition, Publishing Company. Second Edition
2. **Richard Peterson(2008). *Linux - The complete reference*.** Sixth Edition, TMH Publications,
3. Publications,

Reference Book:

1. **S Scott Harvey(2017). *Linux: Beginners Guide for Learning Linux & Shell Scripting*.** Createspace Independent Pub.

Web References:

1. www.karlin.mff.cuni.cz/~hron/NMNV532/ShellIntro.pdf
2. www.tuxarena.com/static/intro_linux_cli.php
3. <https://www.digitalocean.com/community/tutorials/an-introduction-to-linux-basics>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Know the fundamentals of Operating Systems.
2. Identify and design parallel processing and concurrent programming.
3. Recover problems in deadlocks and Multiprogramming
4. Extend knowledge on Virtual Storage and Processor Scheduling.
5. Structure different file systems and Linux Programs.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	H	M	-	-	M	M	M	L	L	L	L	L	L
CLO 2	L	M	M	-	-	M	M	L	L	L	L	L	L	L
CLO 3	H	M	M	-	-	M	M	M	L	L	L	L	L	L
CLO 4	M	M	M	-	-	M	H	H	L	M	M	M	L	M
CLO 5	M	M	M	-	-	M	H	H	L	M	M	M	L	M

Relational Database Management Systems

Semester III
21BITC10

Hours of Instruction/week: 4
No of credits: 3

Course Learning Objectives:

1. To Understand the fundamental concept of DBMS
2. To Perceive knowledge on Database Design and ER Diagram
3. To Understand integrity constraints, views and calculation over relation using algebra and calculus
4. To Apply SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS
5. To Analyze and apply various Normalization schema refinement in database design

Unit I Overview of Database Systems **12**

Managing data, Historical perspective, File system versus DBMS, Advantages of a DBMS, Describing and storing data in a DBMS, Queries in a DBMS, transaction management, structure of a DBMS.

Unit II Database Design & ER Diagrams **12**

Entities, attributes and entity sets, relationships and relationship set, additional feature of the ER model, conceptual database design with ER Model.

Unit III Relational Model **12**

Integrity constraints over relations, enforcing integrity constraints, relational data, logical database design, ER to relational. Introduction to views, destroying / altering Tables and views. Relational algebra and calculus.

Unit IV SQL **12**

Queries, programming, triggers, The form of a basic SQL query, UNION, INTERSECT and EXCEPT, nested queries, aggregate operations, null values, complex integrity constraints in SQL triggers and active data bases.

Unit V Schema Refinement and Normal Forms **12**

Introduction to Schema refinement, Functional dependencies, reasoning about functional dependencies, Normal forms, properties of decompositions, Normalization schema refinement in database design, other kinds of dependencies

Total Hours:60

Text Book:

Raghu Ramakrishnan, Johannes Gehrke(2014). *Database Management Systems*. Third Edition. McGraw Hill Higher Education.

Reference Books:

1. Silberschatz, Korth, Sudharshan(2010). *Database System Concepts*. Seventh Edition. McGraw Hill Higher Education.

2. C.J.Date(2010). *An Introduction to database systems*. Addison Wesley. Eight Edition

Web References:

1. <http://bara-databases.blogspot.in/2013/04/slides-for-database-management-systems.html>
2. http://pages.cs.wisc.edu/~dbbook/openAccess/thirdEdition/supporting_material.htm

Course Learning Outcomes:

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

1. Understand the basic concepts of the database management system.
2. Acquire the knowledge to design a database using ER diagrams
3. Acquire the knowledge on integrity constraints, views and calculation over relation using algebra and calculus.
4. Able to develop relational DBMS using SQL commands
5. Able to Develop a simple database using normalization schema refinement in database

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	L	-	L	L	L	L	L	L	L	L	L
CLO 2	M	M	M	L	-	L	L	L	L	L	L	L	L	L
CLO 3	M	M	M	L	-	M	M	M	M	M	L	L	M	M
CLO 4	H	H	M	L	-	H	H	M	M	M	L	M	H	H
CLO 5	H	H	M	L	-	H	H	M	M	M	L	H	H	H

Data Structures and Algorithms

Semester III

Hours of Instruction/week: 4

21BITC11

No of credits: 3

Course Objectives:

1. To Create and Analysis of algorithm, its representation and time complexity
2. To understand the linear and non linear data structures and its application
3. To develop the skill set to utilize data structure techniques in problem solving
4. To have a comprehensive knowledge of Memory management, Tree and its implementation
5. To understand the algorithm behind searching and sorting.

Unit I Introduction

10

Overview, creating programs, analyzing programs, Big O Notations, Arrays, Ordered lists, representation of arrays.

Unit II Stacks, Queues and Linked List

10

Definition, concepts, operations in queues and stacks, evaluation of expression, multiple stacks and queues, Linked Lists, Singly linked lists, linked stacks and queues, storage pool, polynomial addition, sparse matrices, doubly linked lists.

Unit III Dynamic Storage Management and Trees

12

Garbage collection and compaction, Trees, Terminology, binary tree, representation of trees, binary tree traversal, threaded binary trees, minimum spanning tree algorithms.

Unit IV Graphs and Sorting

14

Terminology, representations, shortest paths, transitive closure. Sorting, Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Shell Sort, Heap sort.

Unit V Searching and Algorithm Design

14

Searching, Sequential Search and Binary search, Algorithm Design, Greedy algorithms, Divide and conquer, Dynamic programming, Knapsack problem, backtracking, branch and bound.

Total Hours:60

Text Books:

1. Eillis Horowitz, Sartaj Sahni, Susan Anderson-Freed (2008). *Fundamentals of Data Structure using C*. Galgotia publications Pvt.Ltd. Second Edition
2. Eillis Horowitz, Sartaj Sahni, SanguthevarRajasekaran *Fundamentals of Computer Algorithm*

Reference Book:

1. Jean Paul Tremblay and Paul Anderson(2005). *An introduction to Data Structures with Applications*. McGraw Hill International Student Edition.
2. E.Horowitz and S.Shani(2015). *Fundamentals of Data Structures in C++*. Galgotia Publication

Web References:

1. <http://nptel.ac.in/courses/106103069/>
2. https://lecturenotes.in/materials/11971-data-structure-using-c?utm_source=subjectpage&utm_medium=web&utm_campaign=materialpage

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Write and analyze efficient algorithm for a given problem and to analyze its time complexity
2. Apply the suitable data structure to a given problem.
3. Utilize data structure techniques in problem solving.
4. Gain Knowledge on Memory management, Tree and its implementation.
5. Apply data structures and algorithms for different type of searching and sorting.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	M	M	-	-	M	M	-	-	M	H	H	M	M
CLO 2	M	M	M	M	-	H	H	-	L	M	M	H	L	L
CLO 3	H	M	M	L	-	H	-	M	-	-	M	M	L	L
CLO 4		M	M	-	-	H	L	-	-	-	-	-	L	-
CLO 5	M	M	M	L	-	H	H	-	-	M	M	M	-	-

Database Management System using SQL-Practical IV

Semester III

Hours of Instruction/week: 3

21BITC12

No of credits: 2

Course Objectives:

1. To give the students an experience in working with Database system
2. To provide extensive hands-on training on SQL and PL/SQL
3. To understand and use data manipulation language to query, update, and manage a database
4. To Familiarize the students with PL/SQL
5. To design and build a simple database system

List of Exercises:

1. Creating tables using constraints
2. Altering, Updating and deleting the tables
3. Queries using DML commands.
4. Queries using Date functions
5. Queries for sorting the data in the table.
6. Queries using Aggregate functions
7. Queries using set operators
8. Queries using joins.
9. Queries using group by and Having.
10. Queries using sub queries.
11. PL/SQL program using Procedures
12. PL/SQL program using Functions
13. PL/SQL program using cursors
14. PL/SQL program using triggers
15. PL/SQL program for Exception handling

Total Hours: 45

Web References:

1. <https://www.tutorialspoint.com/sql/index.htm>
2. <https://www.guru99.com/sql.html>
3. <https://www.w3schools.com/sql/>

Course Learning Outcomes:

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

1. Identify Structure Query Language statements used in creation and manipulation of Database
2. Write queries using various DML commands.
3. Construct complex queries using joins and group by and test.
4. Experiment PL/SQL cursors, functions, triggers, procedures and Exception handling.
5. Analyze and design a database application.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	H	M	M	M	M	M	M	M	M	M	M	M	M
CLO 2	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CLO 3	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CLO 4	H	H	M	M	M	H	H	M	M	M	L	M	H	H
CLO 5	H	H	M	M	M	H	H	M	M	M	M	H	H	H

Data Structures - Practical V

Semester III

21BITC13

Hours of Instruction/week: 5

No of credits: 2

Course Objectives:

1. To Design and implement the concept of Arrays.
2. To implement the application of stacks to evaluate expression and converting infix to postfix notation.
3. Design data structures and implement linear queue, circular queue, priority queue
4. To implement linked list, queues using linked list such as singly, doubly and circular linked list.
5. To implement a non linear data structure like a Binary tree and Search and sorting

List of Exercises

1. Program using single dimensional array
2. Program using 2 D arrays
3. Program to implement Polynomial Addition
4. Program to implement Evaluation of Expressions (Infix to Postfix notation)
5. Program to Implementation of Stack (Using Arrays)
6. Program to implement Implementation of Queue (Using Arrays)
7. Program to implement parenthesis checking.
8. Program to implement Priority Queue using Multiple queue
9. Program to Convert a Stack into a Queue Using Multiple Stack.
10. Program to Convert a Queue into a Stack using Multiple Queues
11. Program to implement Singly linked list
12. Program to implement Doubly linked list
13. Program to implement Circular linked list
14. Program to implement Binary tree
15. Program to demonstrate linear search.
16. Program to demonstrate Binary search.
17. Program to implement traveling sale man algorithm
18. Program to implement sort using Insertion Sort
19. Program to implement sort using Quick-Sort
20. Program to implement sort using Bubble-Sort.
21. Program to implement sort using Selection-Sort.
22. Program to implement sort using Heap-Sort.
23. Program to implement sort using Merge-Sort.
24. Program to implement sort using Shell-Sort.
25. Program to implement sort using Radix-Sort

Total Hours: 75

Web References:

1. <https://www.sanfoundry.com/cpp-programming-examples-data-structures/>
2. <http://cplusplus.happycodings.com/data-structures/>
3. <http://www.includehelp.com/c-programming-data-structure-examples.aspx>

Course Learning Outcomes:

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

1. Design and implement various application using arrays
2. Apply stack concept providing solution to evaluate expression and convert infix to postfix expression.
3. Implement various types of queues.
4. Design and develop linked list like singly, doubly linked list and circular linked list.
5. Implement a non linear data structure like a Binary tree Search and Sorting

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	H	H	L	-	M	M	-	-	-	M	H	M	-
CLO 2	L	M	M	L	-	M	M	-	M	M	M	M	M	-
CLO 3	L	M	M	L	-	M	-	-	-	-	M	M	M	-
CLO 4	-	L	H	L	-	M	-	-	-	-	M	M	M	-
CLO 5	-	L	H	-	-	M	L	L	M	M	M	M	M	-

Client / Server Computing

Semester IV

Hours of Instruction/week: 4

21BITC14

No of credits: 3

Course Objectives:

1. To introduce client/server concepts and their building blocks
2. To make familiar with client operating system and server operating system
3. To Provide Knowledge on RPC, MOM, and SQL database server
4. To gain knowledge on Transaction properties, models and standard
5. To learn the importance of groupware, distributed objects, web client /server components

Unit I Introduction to Client

10

Server computing, What is Client / Server ?, Different Servers- File servers, Database servers, Transaction servers, Groupware servers, Object servers, Web servers, FAT servers or client / server, Client / Server building blocks

Unit II Client/Server and Operating Systems

12

The Anatomy of a server program, Needs of Client / Server from an OS, server scalability, Client anatomy, Client and server OS trends, Client OS and Server OS

Unit III NOS, RPC, MOM and SQL Database Servers

12

NOS: Creating the single system image, Remote Procedure Calls (RPC), Messaging and Queuing, The MOM Middleware. Fundamentals of SQL and Relational Database ,ISO standards, Database server Architecture

Unit IV Client / Server Transaction Processing

12

Properties of Transactions, Transaction Models, TP monitors, Management standards

Unit V Client / Server groupware and Distributed objects

14

Importance of Groupware, What is Groupware, The components of Groupware. Distributed objects and components, Web Client/Server component.

Total Hours:60

Text Book:

1. **Robert Orfali, Dan Harkey and Jeri Edwards (2011). *The Essential Client/Server Survival Guide*. Third Edition. Galgotia Publication Pvt. Ltd.**

Reference Book:

2. **Smith Patrick, Guengerich Steve (2011). *Client Server Computing. Second Edition*, Prentice Hall of India.**

Web References:

1. https://www.tutorialspoint.com/data_communication_computer_network/client_server_model.htm
2. <https://www.unf.edu/public/cop4610/ree/Notes>

Course Learning Outcomes:

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

1. Get Knowledge on client and server
2. Interpret client and server operating system
3. Gain knowledge on RPC, MOM, SQL database server
4. Acquire knowledge on properties ,models and standards on transaction
5. Relate knowledge about groupware, distributed object and web client/server components

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	L	-	L	L	L	L	L	L	L	L	L
CLO 2	L	M	M	M	-	L	L	L	M	L	M	L	L	M
CLO 3	L	M	M	M	-	M	M	M	M	M	M	M	L	M
CLO 4	L	M	M	M	-	M	M	M	M	M	M	M	L	H
CLO 5	L	M	M	M	-	H	H	M	H	M	M	M	L	H

Data Communications and Networks

Semester IV
21BITC15

Hours of Instruction/week: 4
No of credits: 3

Course Objectives:

1. To understand the fundamental concepts of data communications.
2. To Familiarize the student with different transmission media and switching techniques
3. To Introduce different types of networks preparing the student for entry into advanced courses in computer networking
4. To gain expertise on various protocols involved in data communication
5. To inculcate the knowledge on OSI Layers and their functions

Unit I Fundamentals of Data Communications	10
Introduction to Data Communications and Networking. Transmission Methods - Modes of Data Transmission and Multiplexing. Transmission Errors- Detection and Correction	
Unit II Transmission media, Switching techniques, Routing and OSI Model	12
Transmission Media - Guided Media, Unguided Media. Network Topologies- Mesh, Star, Tree, Ring, Bus, Hybrid. Switching - Circuit switching, Message switching, Packet switching. Routing - Routers and Routing, Factors affecting Routing Algorithms, Routing Algorithms, Approaches to Routing. Network Protocols and OSI Model – OSI Model, OSI layer functions.	
Unit III Types of Networks	12
Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Integrated Services Digital Network (ISDN), Frame Relay.	
Unit IV Internetworking and TCP/IP	12
Internetworking Concepts -Devices, Internet Basics, History and Architecture. TCP/IP - Introduction, IP Datagrams, Concept of IP Address, ARP, RARP, ICMP.	
Unit V TCP, UDP and Application Layer Protocols	14
TCP -Features of TCP, Relationship between TCP and IP, Ports and Sockets, TCP connections, TCP Reliability, TCP Packet Format. User Datagram Protocol (UDP) - UDP Packet, Difference between UDP and TCP. Domain Name System (DNS), Electronic Mail (Email), File Transfer Protocol (FTP), TFTP.	
Total Hours:60	

Text Book:

1. **Achyut S.Godbole(2010). Data Communications and Networks.** Tata McGraw Hill Pub Company Ltd 10th Edition.

Reference Book:

1. **Behrouz A. Forouzan(2007). Data Communications and Networking.** Tata McGraw Hill Pub Company Ltd 2nd Edition.
2. **Andrew S. Tanenbaum(2000). Computer Networks.** Prentice Hall of India. 3rd Edition.

Web References:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
2. <http://what-when-how.com/data-communications-and-networking/data-communications-networks/>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Understand the basic concepts of data communications and Networking
2. Compare different switching techniques and Transmission media
3. Classify different types of networks and Recognize the different internetworking devices and their functions
4. Describe how TCP and UDP function and Explain the role of protocols in networking
5. List the functions performed by layers in the OSI model

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	L	L	L	M	L	M	M	L	L	L	L
CLO 2	L	L	L	L	L	L	L	L	M	M	L	L	L	L
CLO 3	M	M	M	L	L	M	M	M	M	M	L	L	M	M
CLO 4	H	H	M	L	L	H	H	M	M	M	L	M	H	H
CLO 5	H	H	M	L	L	H	H	M	M	M	L	H	H	H

Software Testing

Semester IV

Hours of Instruction/week: 4

21BITC16

No of credits: 3

Course Objectives:

1. To learn fundamentals on testing, white box testing and challenges in it.
2. To study about black box testing, its challenges and Integration Testing.
3. To gain knowledge on functional, non-functional and testing phases.
4. To understand performance testing, its tools, process, challenges & its types and, regression testing and best practices.
5. To explore about test management, process, reporting and test metrics.

Unit I Principles of Software Testing and White Box testing **13**

Context of testing, Illustrated Principles, White Box Testing: Static Testing, Testing by Humans, Desk checking, Code Walkthrough, Formal Inspection, Structural Testing, Unit testing, Types of Coverage, Code, Path, Conditional, Functional, Code Complexity Testing, Challenges in White Box Testing.

Unit II Black Box Testing and Integration Testing **10**

What is Black Box Testing?, Why Black Box Testing?, When to do Black Box Testing?, How to do Black Box Testing?, Challenges in Black Box Testing, Integration Testing, Integration Testing as Type of Testing, Integration Testing as a Phase of Testing, Scenario Testing, Defect Bash.

Unit III System and Acceptance Testing **12**

System Testing Overview, Why System testing is done?, Functional versus Non-functional Testing, Functional testing, Non-functional Testing, Acceptance Testing, Summary of Testing Phases.

Unit IV Performance and Regression Testing **12**

Factors governing Performance Testing, Methodology of Performance Testing, Tools for Performance Testing, Process for Performance Testing, Challenges, Regression Testing- What is Regression Testing?, Types of Regression Testing, When to do Regression Testing, How to do Regression Testing, Best Practices in Regression Testing.

Unit V Test Management and Automation **13**

Test Planning, Management, Execution and Reporting, Test Planning, Test Management, Test Process, Test Reporting, Best Practices, Test Metrics and Measurements- Project Metrics, Progress Metrics, Productivity Metrics, Release Metrics.

Total Hours:60

Text Book:

1. **Srinivasan Desikan & Gopalswamy Ramesh (2006).** *Software Testing Principles and Practices*. Second Edition, Pearson Education.

Reference Books:

1. **William E.Perry (2006).** *Effective Methods of Software Testing*. 3rd Edition. Wiley India.
2. **Milind G.Limaya(2009),** *Software Testing – Principles, Techniques and Tools*, Tata McGraw Hill Education Private Limited.
3. **William E.Lewis (2017)** *Software Testing and Continuous Quality Improvement*. 3rd Edition, CRC Press Taylor and Francis Group.

Web References:

1. <http://istqbexamcertification.com/what-is-software-testing/>
2. <https://www.guru99.com/software-testing.html>
3. <http://www.softwaretestinghelp.com/software-test-metrics-and-measurements/>

Course Learning Outcomes:

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

1. Understand the basic concepts of testing and context of testing.
2. Analyze about black box testing, its challenges and Integration testing.
3. Provide opportunity to explore about functional and non-functional testing.
4. Formulate various tools, types of performance and regression testing.
5. Gain expertise in managing the test, test process, reporting and metrics of testing.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	L	-	M	M	L	L	-	L	-	L	-	L
CLO 2	L	L	L	-	M	M	L	L	-	L	-	L	-	L
CLO 3	L	L	L	-	M	M	L	L	-	L	-	L	-	L
CLO 4	L	L	L	-	M	M	L	H	-	L	-	L	-	L
CLO 5	L	L	L	-	M	M	L	H	-	L	-	L	-	L

Java Programming

Semester IV

Hours of Instruction/week: 4

21BITC17

No of credits: 3

Course Objectives:

1. To know the features and basic concepts of java and SDK environment
2. To understand about the object paradigm with core java related to strings, methods and arrays.
3. To illustrate the use of Interfaces, Packages and Multithreading concepts in programming
4. To employ the Exception handling scenario and learn Applet programming
5. To apply AWT and Database Connectivity with different backend technology

Unit I Overview of Java

12

Java Features, How Java differs from C and C++, Environment, Java program syntax, program structure, Tokens, statements, JVM, command line arguments, constants, variables, data types, scope of variables, symbolic constants, type casting. Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment, Decrement, conditional, bitwise, special operators, type conversions, mathematical functions. Control Structures.

Unit II Classes, Objects, Methods and Arrays

13

Introduction to classes, Objects and Methods, Method Overloading, Inheritance, Overriding Methods, Final variables and methods, Arrays, Strings and Vectors, One dimensional, two dimensional, wrapper classes.

Unit III Interfaces, Packages and Multithreading

11

Interfaces, definition, extending interfaces, implementing, Accessing interface variables, Packages, API system packages, creating packages and accessing, using a package, Multithreaded Programming, Creating threads, life cycle of a thread, Synchronization, Inter thread communication

Unit IV Exception handling and Applet Programming

10

Managing Errors and Exceptions, types, syntax, throwing own exceptions, using exceptions for debugging. Applet Programming, Building Applet Code, Applet Life Cycle, Executable Applet, Designing a web page, Graphics Programming.

Unit V Database Connectivity

14

Basics of AWT –AWT Hierarchy, Textfield, Buttons. Introduction to swings, Introduction to Database-JDBC, ODBC-JDBC connectivity with Access and SQL.

Total Hours:60

Text Books:

1. **E.BalaGurusamy(2014). *Programming with JAVA, A Primer*. Tata McGraw,Hill Publishing Company Limited.Fifth Edition.**
2. **Herbert Schildt (2017). *Java2,Complete Reference*. Tenth Edition.TMH.**

Reference Books:

1. **Paul Deitel., & Harvey Deitel (2011). *Java : How to program*. Tenth Edition, Prentice Hall Publications**
2. **Steven Holzner (2004). *Java2 programming Black Book*. Dreamtech**

Web References:

1. <https://introc.cs.princeton.edu/java/10elements/>
2. <https://www.javatpoint.com/java-programs>
3. <https://www.programmingsimplified.com/java-source-codes>

Course Learning Outcomes:

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

1. Use the JVM and basic Java programming elements.
2. Know the Class-Object paradigm and make use of strings, arrays and functions in programming.
3. Create and use the Interfaces, packages and threaded programming.
4. Demonstrate the Applet programming and handling exceptions.
5. Construct AWT components and two tier programming using JDBC

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	-	-	L	L	L	-	-	L	L	M	M
CLO 2	M	M	M	-	-	M	M	L	-	-	M	M	H	H
CLO 3	H	H	M	-	-	M	M	M	-	-	M	M	H	H
CLO 4	H	M	M	-	-	M	H	H	-	-	H	M	H	H
CLO 5	H	M	M	-	-	M	H	H	-	-	H	H	H	H

Java Programming - Practical VI

Semester IV

21BITC18

Hours of Instruction/week: 5

No of credits: 2

Course Objectives:

1. To recognize Java SDK environment to create, debug and run Java programs.
2. To understand fundamentals of programming such as variables, conditional and iterative execution, APIs etc.
3. To define fundamentals of object oriented concepts
4. To develop programs to solve specific problems.
5. To devise the Database connectivity, AWT and web programming.

List of Exercises

1. Programs using control structures
2. Program using Inheritance
3. Program for String handling functions.
4. Program using Arrays.
5. Program using Interfaces.
6. Program using abstract classes.
7. Program for method overloading
8. Program for method overriding
9. Program for creating your own package
10. Program using multiple user defined packages
11. Program for Multithreading
12. Program for Inter Thread Communication
13. Program for Exception Handling
14. Program for user defined exceptions.
15. Program using awt buttons
16. Program using awt choice and check boxes
17. Program using awt textboxes.
18. Program for mouse event handling in applet
19. Program for displaying a digital clock using applet
20. Program for drawing human face using applet
21. Program using Applets for changing the background color of the applet depending on the button pressed.
22. Program to create applet animation
23. Program to create calculator using applet
24. Program for drawing various shapes using Graphics Programming.
25. Program to implement Database Connectivity.

Total Hours: 75

Web References:

1. java.sun.com/docs/books/tutorial/
2. www.en.wikipedia.org/wiki/Java
3. www.java.net/

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Identify classes, objects, members of a class and the relationships among them for a specific problem
2. Know about new ideas and advances, techniques, and tools and to use them effectively.
3. Develop programs using appropriate packages for Inter –thread Communication and Synchronization
4. Construct GUI applications to handle events.
5. Design, develop, test and debug Java programs using object – oriented principles in conjunction with development tools including integrated development environments

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	M	M	-	-	M	M	M	-	-	M	M	M	M
CLO 2	M	M	M	-	-	M	H	M	-	M	M	M	M	H
CLO 3	H	H	M	-	-	M	H	M	-	M	M	H	H	H
CLO 4	H	H	M	-	-	M	H	M	-	H	H	H	H	H
CLO 5	H	H	M	-	-	H	H	H	-	M	M	H	H	H

.Net Programming- Practical VII**Semester IV****21BITC19****Hours of Instruction/week: 5****No of credits: 2****Course Objectives:**

1. To gain a working knowledge of .Net environment.
2. To create .Net applications using standard .Net controls, forms and built in functions.
3. To devise text editors using rich textbox and menu strip control.
4. To illustrate the working of xml files and cookies in .Net application.
5. To use ADO.NET with a Windows Forms application to insert, select, edit, update, delete and search records in databases and generate reports.

List of Exercises

1. Write a VB.Net program to implement a calculator.
2. Write a VB.Net program using built in functions
 - a) String Functions
 - b) Numeric Functions
 - c) Date and Time
 - d) Financial functions.
3. Write a VB.Net program using Controls like radio button and check box.
4. Write a VB.Net program to add, arrange and delete items in the list box.
5. Write a VB.Net program to draw different shapes.
6. Write a VB. Net program to animate picture using Timer control.
7. Write a VB.Net program to implement notepad using menu editor and dialog controls.
8. Write a VB.Net program using Drive, Directory and File controls.
9. Write a VB.Net program using
 - a) MDI form
 - b) Picture control
 - c) Vertical and Horizontal scroll bar.
10. Write a VB.Net program to create an application using data grid.
11. Write a VB.Net program to calculate students mark detail and print the grade.
12. Develop an Employee payroll system using Microsoft Access(ADO) as backend and generate report .
13. Develop a Student Information System using Oracle as backend and generate report.
14. Write an ASP .NET program to bind different web controls.
15. Write an ASP .NET program to design a Calendar and restrict the dates.
16. Write an ASP .NET program to rotate the advertisement using Adrotator Control.
17. Write an ASP .NET program using all validator controls.
18. Write an ASP .NET program to create, write and read a cookie.
19. Write an ASP.NET program to read and write XML files.
20. Write a ASP.NET program to create menus.
21. Using Repeater Control display the details from XML File.
22. Create a student information Form and input records to a table in MS Access Database. Using Datalist control display the records.
23. Create an Employee information Form and input records to a table in SQL Server. Using Gridview control, display the records.

24. Write an ASP .NET program to upload and download a file using ADO.NET
25. Write an ASP.NET program to Insert, Select, Edit, Update, Search and Delete records using ADO.NET.

Total Hours: 75

Web References:

1. <https://www.tutorialspoint.com/vb.net>
2. <https://www.microsoft.com/net/learn/languages>
3. <https://www.visualstudio.com/vs/features/net-development/>
4. <https://www.lynda.com/Visual-Studio-tutorials>

Course Learning Outcomes:

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

1. Demonstrate VB.Net integrated development environment.
2. Design and create .Net applications using forms and controls.
3. Construct programs and develop interface using .Net.
4. Perform tests, resolve defects and revise existing code.
5. Develop database connected applications with ADO.NET and generate reports based on the applications.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	H	L	L	-	M	H	M	M	H	H	M	M	H
CLO 2	H	H	L	L	-	M	H	M	M	H	H	M	M	H
CLO 3	H	H	L	L	-	M	H	M	M	H	H	M	M	H
CLO 4	H	H	L	L	-	M	H	M	M	H	H	M	M	H
CLO 5	H	H	L	L	-	M	H	M	M	H	H	M	H	H

DSE IV - Operations Research**Semester IV****Hours of Instruction/week: 4****21BITI04****No of credits: 3****Course Objectives:**

1. To learn various analytical methods to solve problems in Operations Research.
2. To provide scientific basis to make optimal decision in policies..
3. To get touch with the applications of Operations Research in industries.

Unit I Linear Programming Problem:**12**

Mathematical Formulation of the Problem - Graphical Solution Method - Some Exceptional Cases - General Linear Programming Problem - Canonical and Standard forms of L.P.P.

Unit II Transportation problem:**12**

Existence of Solution in Transportation Problem - Transportation problem as a linear programming problem - Finding an initial basic feasible solution - Moving towards optimality (MODI method).

Unit III Assignment problem:**12**

Mathematical formulation and solution of an Assignment problem - Hungarian algorithm - Dual of the Assignment Method - The Travelling Salesman Problems.

Unit IV Games and Strategies:**12**

Introduction - Two-Person Zero-Sum Games - Maximin-Minimax Principle - Games Without Saddle Points-Mixed Strategies - Graphic solution of $2 \times n$ and $m \times 2$ games - Dominance Property.

Unit V Sequencing Problems:**12**

Introduction - Problem of Sequencing - Processing n Jobs through 2 Machines - Processing n Jobs through k Machines - Processing 2 Jobs through k Machines.

Total Hours:60**Text Book:**

1. **Kanti Swarup, P. K. Gupta, Manmohan (2010). *Operations Research*, S.Chand and Sons (Fifteenth Edition), New Delhi.**

Reference book:

1. **B.J.Ranganath, Sri Kantappa A.S (2015). *Operations Research*, Yes Dee Publishing Pvt.Ltd.**

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Understand the mathematical tools that are needed to solve optimization problems.
2. Make decisions in the management of organizations.
3. Identify and interpret the information and data in support of assignments - projects or research.
4. Turn real life problems into formulation of models.
5. Apply the knowledge of game theory for making profit and predict political outcome.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	L	H	-	-	L	-	-	-	L	-	-	L
CLO 2	L	L	L	H	-	-	L	-	-	-	L	-	-	L
CLO 3	L	L	L	H	-	-	L	-	-	-	L	-	-	L
CLO 4	L	L	L	H	-	-	L	-	-	-	L	-	-	L
CLO 5	L	L	L	H	-	-	L	-	-	-	L	-	-	L

E-Commerce

Semester V
21BITC20

Hours of Instruction/week: 5
No of credits: 3

Course Objectives:

1. To inculcate knowledge on E-Commerce concepts in the present IT world.
2. To describe the key components of major ecommerce business models and internet technologies in New Economy.
3. To identify the ecommerce security issues and payment systems in digital era.
4. To discuss the essential concept of consumer behavior, purchasing decision and identify the current trends in online retail sector.
5. To explain about different types of social networks, auctions and portals.

Unit I Introduction to E-Commerce	15
E-commerce: The revolution is just beginning, E-commerce : A Brief History, Understanding E-commerce: organizing Themes, Pirate bay	
Unit II E-commerce business models	15
E-commerce Business Models, Major Business to Consumer (B2C) business models, Major Business to Business (B2B) business models, How ecommerce change business: strategy, structure and process,	
The internet and World Wide Web	
The Internet: Technology Background, The Internet Today, The future internet infrastructure, The Internet and the Web : Features and services	
Unit III E-Security and E- payment	15
The e-commerce security environment, Security threats in the e-commerce environment, Technology solution, Management policies, Business procedures, and public laws, E-payment: Payment system, E-commerce payment system, Electronic billing presentment and payment	
Unit IV E-commerce marketing concepts, Online retailing services	15
Consumer online: The Internet Audience and Consumer Behavior, Internet Marketing Technologies, The Retail sector, Analyzing the viability of online firms, E-commerce in action: E-tailing Business Models, Common Themes in online retailing, The service sector: offline and online, Online financial services, Online Travel Services, Online career services	
Unit V : Social Networks Auction and Portals	15
Social networks and online communities, Online auctions, E-commerce portals	

Total Hours:75

Text Book:

1. **Kenneth C. Laudon (2014), *E-Commerce: Business, Technology, Society*, 10th Edition, Pearson**

Reference Book:

1. **S. J. Joseph (2015), *E-Commerce: an Indian perspective*, Fifth Edition PHI Learning Private Limited**

Web References:

1. https://www.tutorialspoint.com/ecommerce/ecommerce_pdfversion.htm
2. <http://smartebook.us/E-Commerce-2016-Busi-0133938956.html>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Explain the components and roles of the Electronic Commerce environment.
2. Analyze the impact of E-commerce business models and internet technologies.
3. Illustrate the current challenges and security issues in e-commerce.
4. Understand Web marketing approaches and elements of branding.
5. Enumerate the major types of social networks, auctions and portals.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	L	L	-	L	L	L	-	-	-	L	-	H
CLO 2	L	L	L	L	-	L	L	L	-	-	-	L	-	H
CLO 3	L	L	L	L	-	L	L	L	-	-	-	L	-	H
CLO 4	L	L	L	L	-	L	L	L	-	-	-	L	-	H
CLO 5	L	L	L	L	-	L	L	L	-	-	-	L	-	H

Python Programming

Semester V
21BITC21

Hours of Instruction/week: 5(3T+2P)
No of credits: 3

Course Objectives:

1. To describe the basic concepts of python.
2. To construct python programs with conditionals, loops and functions.
3. To examine python data structures.
4. To illustrate the concept of files and exception handling.
5. To demonstrate the advanced concepts of python.

Unit I Introduction to Python

09

Introduction-features-Comparative study-Comments-Operators-Variables and Assignments-identifier-syntax and statements. Numbers: Introduction- Integer-Floating Point-Complex numbers-Operators-Built-in-functions-Other numeric type-Sequence-Strings-Strings and Operator-String only operator-Built-in-Functions-Built-in-Methods-String Features-Unicode-Related Modules.

Unit II Control Flow, Functions

09

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Functions, Calling Functions, Creating Functions, Formal Arguments, Positional Arguments, Default Arguments, Why Default Arguments?, Default Function Object Argument Example, Variable-length Arguments, Non-keyword Variable Arguments (Tuple), Keyword Variable Arguments (Dictionary)

Unit III Data structures

09

List-Operators-Built-in-Functions-Built-in-Methods-Features of List-**Tuple**: Introduction-Operators and Built-in-Functions-Features-Related Modules-Mapping type.**Dictionaries**-Operators-Built-in and Factory Functions-Built-in- Methods. **Set type**: Introduction-Operators-Built-in Function-Built-in Methods-Related Modules.

Unit IV Files, Errors and Exception

09

File: Objects- Built in Functions-Methods-Attributes-Standard files-Command line Argument-File System-File Execution-Persistent Storage Modules-Related Module. **Errors and Exception**: What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Why use it?-Exception roles-Try/finally statement.

Unit V Regular Expression, Modules

09

Regular Expression: Introduction-Special Symbols and characters-Regexes and Python-Examples of Regexes. **Modules**: What are modules?-Modules and Files-Namespaces-importing modules-Modules built in functions.

Total Hours:45

List of Exercises:**Hours of Instruction/week: 2**

1. Python program based on conditional statements.
2. Python program based on looping constructs.
3. Python program based on built in string methods.
4. Python program based on list.
5. Python program based on tuple.
6. Python program based on dictionaries.
7. Python program based on set.
8. Python program based on array
9. Python program based on functions.
10. Python program to display the date and time
11. Python program for binary search
12. Python program to sort a list of elements using the selection sort algorithm.
13. Python program to solve the Fibonacci sequence using recursion.
14. Python program to calculate the area of a parallelogram.
15. Python program to read an entire text file.

Total Hours: 30**Text Books:**

1. **Chun, J Wesley (2010).** *Core Python Programming*, 2nd Edition, Pearson.

Reference Books:

1. **Allen B. Downey (2016),** *Think Python: How to Think Like a Computer Scientist*, 2nd edition, O'Reilly Publishers.
2. **Robert Sedgewick, Kevin Wayne, Robert Dondero (2016).** *Introduction to Programming in Python: An Inter-disciplinary Approach*, Pearson India Education Services Pvt. Ltd.
3. **Timothy A. Budd (2015).** *Exploring Python*, Mc-Graw Hill Education (India) Private Ltd.

Web References:

1. <https://www.tutorialspoint.com/python/index.htm>
2. <https://www.w3schools.in/python-tutorial/>
3. <https://www.w3resource.com/python/python-tutorial.php>
4. <https://www.guru99.com/python-tutorials.html>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Demonstrate the working environment of python.
2. Develop programs using conditional statements, looping constructs and functions.
3. Devise lists, tuples, dictionaries and files in python.
4. Identify and debug errors in the program.
5. Make use of python modules for reusability.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	H	M	M	M	M	M	M	M	M	M	M	M	M
CLO 2	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CLO 3	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CLO 4	H	H	M	M	M	H	H	M	M	M	L	M	H	H
CLO 5	H	H	M	M	M	H	H	M	M	M	M	H	H	H

Web Technologies

Semester V
21BITC22

Hours of Instruction/week: 5(3T+2P)
No of credits: 3

Course Objectives:

1. To furnish in-depth understanding of various web development tools and platforms
2. To develop expertise with the JavaScript framework to construct web client/server applications incorporated with dynamic effects
3. To provide comprehensive PHP programming skills to build dynamic web applications.
4. To impart intuitive experience on MySQL to create data-driven applications to implement in web.
5. To provide hands-on experience in recent web technologies to design and implement informative and interactive web applications.

Unit I Introduction to HTML

09

HTML Introduction, Basic Tags, Meta Tags, Attributes, Formatting, Phrase Tags, Comments, Fonts, Marquees, Images, Text Links, Image Links, Email Links, Tables, Frames, Lists, Layouts, Colors, Forms, Backgrounds, Embed Multimedia, Styles

Unit II CSS

09

CSS Introduction, Syntax, Inclusion, Units, Colors, Backgrounds, Fonts, Text, Images, Links, Tables, Borders, Margins, Lists, Padding, Cursors, Outlines, Dimension, Scrollbars

Unit III Introduction to JavaScript and XML

09

JavaScript Overview, JavaScript Syntax, JavaScript Enabling, JavaScript Placement, JavaScript Variables, JavaScript Operators, JavaScript If...Else, JavaScript Switch Case, JavaScript While Loop, JavaScript For Loop, JavaScript For...in, JavaScript Loop Control, JavaScript Functions, JavaScript Events, JavaScript Cookies, JavaScript Page Redirect, JavaScript Dialog Boxes, JavaScript Void Keyword, JavaScript Page Printing.

XML– Introduction, How to use, XML Tree, Syntax, XML Elements, XML Attributes, XML Namespaces, XML Encoding, XML Viewing, XML CSS

Unit IV Introduction to PHP

09

PHP Introduction, PHP Syntax Overview, Variable Types, Constants, Operator Types, Decision Making, Loop Types, Arrays, Strings, GET & POST, Functions, Cookies, Sessions, Web Hosting

Unit V MySQL

09

MySQL Introduction, MySQL PHP Syntax, PHP MySQL Functions, MySQL Connection, MySQL Select Database, MySQL Insert Query, MySQL Select Query, MySQL Where Clause, MySQL Update Query, MySQL Delete Query, PHP and MySQL Application.

Total Hours:45

List of Exercises**Hours of Instruction/week: 2**

1. Create a homepage in HTML using Link, Marquees, Images and all basic elements.
2. Create a static webpage using table tags of HTML.
3. Create a webpage using list tags of HTML.
4. Create an Employee Registration Page using HTML form objects.
5. Write a program to create menu using HTML and CSS.
6. Create a Navigation bar (with dropdown) with CSS.
7. Create a Travel Reservation Form using HTML with CSS
8. Create a News website by using external Style sheet in CSS.
9. Create and validate registration form using JavaScript.
10. Design a simple calculator using JavaScript.
11. Create a multiplication table using JavaScript which accepts the number of rows and columns from the user.
12. Create an application to generate simple Interest and compound Interest.
13. Create a simple Shopping Site using PHP & MySQL.
14. Create a Job portal using PHP & MySQL..
15. Create a Student Detail website using PHP and MySQL.

Total Hours: 30**Text Books:**

1. **Wendy Willard (2013)**, *HTML: A Beginner's Guide*, 5th Edition, McGraw Hill Higher Education.
2. **Navneet Mehra, Bunny Mehra(2013)**, *Website Development Using HTML and CSS*, Unicorn Books.
3. **Kogent Learning Solutions Inc (2012)**, *Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and Ajax*, Black Book, Dreamtech Press.
4. **N.P.Gopalan, J.Akilandeswari (2014)**, *Web Technology: A Developer's Perspective*, Second Edition, PHI Learning Private Ltd.

Reference Books:

1. **Achyut S Godbole and Atul Kahate**, *Web Technologies*, 2nd Edition, Tata McGraw Hill, 2013
2. **Uttam Kumar Roy(2010)**, *Web Technologies*, Oxford University Press

Web References:

1. <https://www.w3schools.com>
2. <https://www.codecademy.com>
3. <https://ocw.mit.edu>
4. <https://developers.google.com/web/>
5. <http://www.learn-js.org/>
6. <http://www.learn-php.org/>
7. <https://www.w3resource.com>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Know the recent web technologies and able to opt the appropriate technology to develop web applications based on the given requirements.
2. Design web applications with aesthetics perception in designing and incorporating interactive visual elements.
3. Design and implement static web pages and dynamic web applications with the available technologies
4. Combine and make use of multiple technologies to implement web applications incorporated with dynamic effects using JavaScript
5. Build efficient data-driven web based applications using PHP and MySQL

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	H	M	L	L	M	H	M	M	M	H	M	H	M
CLO 2	H	H	M	L	L	M	H	M	M	M	H	M	H	M
CLO 3	H	H	M	L	L	M	H	M	M	M	H	M	H	M
CLO 4	H	H	M	L	L	M	H	M	L	M	H	M	H	M
CLO 5	H	H	M	L	L	M	H	M	M	M	H	M	H	M

Computer Graphics

Semester V
21BITC23

Hours of Instruction/week: 5(3T+2P)

No of credits: 3

Course Objectives:

1. To acquire knowledge about graphics applications, display devices, user interfaces.
2. To understand drawing algorithms and to envision all the filling algorithms.
3. To obtain ideas of graphic system attributes.
4. To provide the understanding of 2D transformations, converting coordinates and clipping operations.
5. To encompass 3D display methods, graphic packages and transformations.

Unit I Overview of graphics systems

06

Video and display devices, Cathode Ray Tubes, raster scan display, random scan displays, color CRT monitors, Direct view storage tubes, flat panel Displays, three dimensional viewing devices, stereoscopic and virtual reality system, graphics monitors and workstations, graphical user interfaces: Keyboards, mouse, joystick, digitizers, image scanners, touch panels, light pens, voice systems, graphics software, coordination representations, Hard copy devices, PHIGS workstations.

Unit II Algorithms for Graphics Systems

12

Points and lines, lines drawing algorithms: DDA algorithms, Bresenham's algorithm, circle generating algorithms, ellipse generating algorithms, Pixel addressing, filled area primitives, scan line polygon fill algorithm, scan lines fill of curved boundary, Boundary fill algorithm, flood fill algorithm, fill area functions, cell array, character generation.

Unit III Attributes Packages for Graphics systems

08

Line attribute, Curves attributes, Color and gray scale levels, Area fill attributes, Character attributes, bundled attributes, inquiry functions, Antialiasing.

Unit IV Operations for 2D Graphics

12

Two Dimensional geometric Transformation: Basic transformation, translation, rotation, scaling, matrix representation and homogenous coordinates, composite transformations, other transformations. Viewing pipeline, viewing coordinate, reference frame, window-to-view port coordinating transformation, two dimensional viewing functions, clipping operations, point clipping, line clipping, Cohen Sutherland clipping, polygon clipping, curve, text clipping, exterior clipping

Unit V Operations for 3D Graphics

07

Three Dimensional Concepts: Three Dimensional Display methods, Three Dimensional Graphics packages, Three Dimensional Geometric and Modeling Transformations: Translation, Rotation, Scaling, Other Transformations, Three Dimensional Transformation, Modeling and coordinate Transformation, Color Models and Applications. Augmented and Virtual Reality.

Total Hours:45

List of Exercises**Hours of Instruction/week: 2**

1. Write a program for 2D line drawing using DDA algorithm.
2. Write a program to draw a line using Bresenham's Algorithm
3. Write a program to draw a circle using Midpoint algorithm.
4. Write a program to draw an Ellipse
5. Write a program to rotate a point and any shape about origin.
6. Write a program to scale the Rectangle
7. Write a program to translate the triangle
8. Write a program to reflect the triangle
9. Write a program for polygon filling.
10. Write a program for line clipping and polygon clipping.

Total Hours: 30**Text Books:**

1. **Donald Hearn, M.Pauline Baker(2006). *Computer Graphics*. 2nd edition , Prentice Hall of India Pvt Ltd.**
2. **Amarendra N Sinha and Arun D Udai(2008), *Computer Graphics*, McGraw - Hill Companies**

Reference Books:

1. **Apurva A Desai, *Computer Graphics (2008)*, Eastern Economy Edition, PHI Learning Pvt Ltd.**
2. **Cooley(2006). *The Essence of Computer Graphics*, Pearson Education.**
3. **Foley(2006). *Computer Graphics: Principles & Practice. 2/e in C*. Pearson Education.**

Web References:

1. https://www.tutorialspoint.com/computer_graphics/index.htm
2. <http://www.eazynotes.com/pages/computer-graphics/computer-graphics-algorithms.html>
3. <https://www.cs.uic.edu/~jbell/CourseNotes/ComputerGraphics/2DTransforms.html>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Define about computer graphics and devices used for graphic implementation.
2. Implement lines, circle and ellipse generating algorithms.
3. Capable to ascertain graphic system attributes.
4. Know how to determine 2D transformations and various clipping operations.
5. Develop underlying ideas about 3D graphic methods, packages and transformations.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	-	H	H	M	L	-	-	-	-	-	-	-	L	-
CLO 2	-	H	H	M	L	L	M	L	H	H	-	H	M	L
CLO 3	-	M	H	M	-	-	-	-	-	-	-	M	M	-
CLO 4	M	M	H	M	-	-	M	M	M	M	-	M	M	-
CLO 5	-	H	H	M	-	M	M	M	M	M	L	H	M	M

Multimedia Applications - Practical VIII

Semester V

21BITC24

Hours of Instruction/week: 5

No of credits: 3

Course Objectives:

1. To explore fundamental techniques in Photoshop
2. To discover the possibilities of tools and develop an understanding of layering techniques.
3. Identify the built-in functions and manipulate on their own.
4. To interpret own ideas for creating animated wallpaper for PC.
5. To incorporate button for sound effects and adding colors to frames.

List of Exercises:

Adobe Photoshop

1. Create a threefold or four fold Broacher in Photoshop
2. Restore a picture in Photoshop
3. Create a poster for the department symposium using at least 4 text effects
4. Design a birthday card using bending modes and filters
5. With the given picture use color balancing, brightness and contrast in Photoshop
6. Using Photoshop transform the given picture and implement cropping also.
7. Create a watermarking using adobe Photoshop
8. Convert a photo into line art drawing using Photoshop

Adobe Image ready

1. Design a smiley using Image Ready
2. Bring out a small animation using Image Ready
3. Develop an Animated banner using image ready
4. Exporting an SWF file from ImageReady into flash 8
5. Create a animated wallpaper for your PC using Image ready

Macromedia Flash

1. Use flash and create buttons with text and sound effects
2. Use flash to design an e-card of any occasion
3. Implement frames in a flash picture and also add colors to it.
4. Design an advertisement for a product using flash effects like rotating skewing and scaling
5. Design a animated banner add advertisement using macromedia flash
6. Implement shape and motion tweens in the given picture using flash.
7. Create a movie in flash with a concept and add sounds to it
8. Create a movie in flash and add it to a webpage
9. Create a stickman Animation using Macromedia flash
10. Create an animated cartoon movie with background voice using macromedia flash
11. Create a car game with sounds using action script using macromedia flash
12. Create a photo gallery slideshow using macromedia flash

Total Hours: 75

Web References:

1. <https://helpx.adobe.com/photoshop/tutorials.html>
2. https://www.tutorialspoint.com/photoshop_online_training/photoshop_setting_the_preferences.asp

3. <https://www.photoshopesentials.com/basics/upscale-images-photoshop-cc-2018/>
4. <https://www.w3schools.in/photoshop/create-animated-GIF-banner/>
5. <http://www.teacherclick.com/flash8/index.htm>
6. <https://msu.edu/course/cas/892/hypermedia/web101PDF/fl/Flash%20Lesson%201.pdf>
7. <http://www.refreshi.com/blog/create-animated-gif-imageready7>

Course Learning Outcomes:

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

1. Design Web pages, Animated banner, Broucher for Conferences, Cards for any events.
2. Gains knowledge of filtering techniques using transformations.
3. Design wallpaper using color balancing, watermarking and blending modes.
4. Able to create cartoon movies with voice buttons.
5. Create Stickman and photo gallery slideshow

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	H	M	L	L	M	M	-	H	H	-	M	H	M
CLO 2	L	M	M	L	L	L	M	-	M	M	-	L	M	M
CLO 3	L	L	M	L	L	L	M	-	M	M	-	L	M	M
CLO 4	M	M	M	L	L	L	M	-	M	M	-	M	M	M
CLO 5	-	L	-	-	-	L	L	-		M	-	-	L	M

Object Oriented Analysis and Design (Self Study)

Semester V
21BITC25

Hours of Instruction/week: 1
No of credits: 4

Course Objectives:

1. To educate the fundamental concepts of OOAD and various object models
2. To provide knowledge in modeling the functional requirements of the software using modeling languages
3. To develop skills in designing the conceptual model of the software
4. To inculcate essential skills to cope up with the complexity in software design
5. To provide knowledge about various testing strategies to test quality of the software

Unit I System Development

Object Basics, Development Life Cycle, Methodologies, Patterns, Frameworks, Unified Approach, UML.

Unit II Use Case Models

Object Analysis, Object relations, Attributes, Methods, Class & Object Responsibilities, Case Studies.

Unit III Design process

Design Axioms, Class Design, Object Storage, Object Interoperability, Case Studies.

Unit IV User Interface Design

View Layer Classes, Micro Level Processes, View Layer Interface, Case Studies.

Unit V Quality Assurance Tests

Testing Strategies, Object Orientation on Testing, Test Cases, Test Plans, Continuous Testing, Debugging Principles, System Usability, Measuring User Satisfaction, Case Studies.

Text Books:

1. **Ali Bahrami (2008)**. *Object Oriented Systems Development*, First Edition, Tata McGraw-Hill Education
2. **Atul Kahate(2007)**, *Object Oriented Analysis & Design*, First Edition, Tata McGraw-Hill Education

Reference Book:

1. **Grady Booch (2000)**. *Object Oriented Analysis & Design with applications*, Third Edition, Pearson Education.

Web References:

1. <https://swayam.gov.in/courses/3822-object-oriented-analysis-and-design>
2. <https://www.tutorialspoint.com>
3. <https://ooduml.com/>
4. <https://www.codeproject.com>
5. <https://education.oracle.com>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Examine software application specifications based on the logical components of the system
2. Analyze and model the functional requirements of the application
3. Have familiarization with the application of UML in analyzing and designing the system
4. Design an application using a variety of Software Development Methodologies and able to develop robust software components
5. Perform testing to evaluate the correctness and quality of the Software

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	H	L	M	-	M	H	H	-	M	M	H	-	H
CLO 2	H	H	L	M	-	M	H	H	-	M	M	H	-	H
CLO 3	H	H	L	M	-	M	H	H	M	M	M	H	-	H
CLO 4	H	H	L	M	-	M	H	H	-	M	M	H	-	H
CLO 5	H	H	L	M	-	M	H	H	-	M	M	H	-	H

Mobile Communications

Semester VI

Hours of Instruction/week: 4

21BITC27

No of credits: 3

Course Objectives:

1. To introduce the basic concepts and principles in mobile communication.
2. To familiarize with various protocols involved in mobile communication systems
3. To study the functionalities of Telecommunication Systems
4. To gain knowledge on satellite and broadcast systems
5. To introduce the student to the major concepts involved in Wireless LANs .

Unit I Introduction to Mobile Communication	12
Applications, simplified reference model. Wireless Transmission: Frequencies of transmission, Signal propagation, multiplexing, Modulation.	
Unit II Medium Access Control (MAC)	10
Specialized MAC - Hidden and exposed terminals, Near and far terminals. SDMA, FDMA, TDMA – Fixed TDM, Classical Aloha, Slotted Aloha, CDMA, Comparison of S/F/T/CDMA.	
Unit III Telecommunication system	14
GSM (Global system for Mobile Communication) mobile services, GSM system architecture, Radio interface, Hand over, Security, New data services - HSCSD,GPRS. DECT – System Architecture, Protocol Architecture.	
Unit IV Satellite Systems and Broadcast Systems	14
Application, Basics - GEO, LEO, MEO, routing, localization, Hand over. Broadcast system - cyclical Repetition of data, digital audio broadcasting, Multimedia object transfer protocol, digital video broadcasting.	
Unit V Wireless LAN	10
Infrared Vs Radio transmission, Infrastructure and adhoc networks, wireless ATM.	
Total Hours:60	

Text Book:

1. **Jochen Schiller (2009). *Mobile Communications*.** Second Edition. Addison - Wesley Publications, Pearson Education Limited.

Reference Book:

1. **Asoke K Talukder, Roopa R Yavagal (2008). *Mobile Computing*.** TMH.
2. **KurnkumGarg (2010), *Mobile Computing*,** Pearson Education Limited.

Web References:

1. https://www.tutorialspoint.com/wireless_communication/index.htm
2. http://www.radio-electronics.com/info/cellulartelecomms/gsm_technical/gsm_introduction.php

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Understand the basic concepts and list the applications of mobile communications
2. Describe the features and functions of multiplexing and modulation
3. Compare different Multiple Access Techniques
4. List the applications of satellite systems and describe the routing techniques of satellite transmission.
5. Differentiate various wireless LAN Technologies.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	-	-	H	M	-	M	-	L	-	-	-	M	-	M
CLO 2	-	L	H	M	L	-	M	M	L	M	M	L	L	L
CLO 3	L	-	H	M	-	-	-	M	L	-	-	L	-	-
CLO 4	-	L	H	M	M	L	-	M	-	M	L	-	-	L
CLO 5	-	L	H	M	M	L	-	L	-	M	-	-	L	-

Cryptography and Network Security

Semester VI
21BITC28

Hours of Instruction/week: 4
No of credits: 3

Course Objectives:

1. To provide conceptual understanding of basic functionalities of Network Security Architecture
2. To furnish knowledge of the Classical Cryptography Techniques and various Cryptographic Algorithms.
3. To build familiarization with preserving the Confidentiality, Integrity and Authentication of the data
4. To give in-depth knowledge on Network and Systems Security Mechanisms
5. To understand how to secure data in the communication across Networks using various Security Mechanisms

Unit I Introduction and Symmetric Ciphers **12**

OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Classical Encryption Techniques, Block Cipher Principles, The Data Encryption Standard, Block Cipher Design Principles, Basic Concepts in Number Theory and Finite Fields - Advanced Encryption Standard, Block Cipher Operation: Triple DES, Modes of Operation.

Unit II Asymmetric Ciphers and Public Key Cryptography **12**

Number Theory, Public Key Cryptography and RSA, Public Key Cryptosystems: Diffie-Hellman key Exchange, ElGamal Cryptosystem, Elliptic Curve Architecture, Elliptic Curve Cryptography, Key Management.

Unit III Message Authentication and Integrity **12**

Message Authentication requirements, Message Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs, Secure Hash Algorithm, SHA-3, HMAC, Digital Signatures, Digital Signature Standard.

Unit IV User Authentication Protocols and Network Security **12**

Remote User Authentication Protocols, Remote User Authentication Using Symmetric Encryption, Authentication Applications: Kerberos, Remote User Authentication Using Symmetric Encryption, Federated Identity Management, Electronic Mail Security: PGP, S/MIME, IP Security, Internet Security: Transport Level Security.

Unit V System Level Security **12**

Intruders, Intrusion Detection, Password Management, Malicious Software, Viruses, Virus Counter Measures, Worms, Distributed Denial of Service Attacks, Firewalls, Legal and Ethical Issues.

Total Hours:60

Text Books:

1. **William Stallings (2010), *Cryptography and Network Security: Principles and Practices*, Fifth Edition, Prentice Hall of India.**
2. **Atul Kahate (2003), *Cryptography and Network Security*, Second Edition, Tata McGraw Hill.**

Reference Books:

1. **Behrouz A. Forouzan, *Cryptography and Network Security*, Second Edition, TMH.**
2. **Bruce Schneier (2001). *Applied Cryptography*, John Wiley & Sons Inc.**

3. **Charles B. Pfleeger, Shari Lawrence Pfleeger (2007), *Security in Computing*, Fourth Edition, Pearson Education.**

Web References:

1. <https://learncryptography.com/>
2. <https://blogs.cisco.com/security>
3. <https://www.cybrary.it>
4. <http://nptel.ac.in>

Course Learning Outcomes:

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

1. Identify various security attacks and hence able to deal with them using various handling mechanisms
2. Explore the vulnerabilities in computing systems and so able to discover an effective security solution.
3. Protect Systems and Network against various network threats
4. Design a security application which provides C-I-A of data
5. Defend the systems from Viruses and Intruders.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	L	M	-	H	M	M	L	-	-	L	L	L	L
CLO 2	L	L	M	-	H	H	H	M	-	-	H	M	L	H
CLO 3	L	M	M	-	H	H	H	H	-	M	H	L	L	M
CLO 4	L	M	M	-	H	M	L	M	-	M	M	L	L	H
CLO 5	L	M	M	-	H	M	L	L	-	M	M	L	L	H

Compiler Design

Semester VI
21BITC29

Hours of Instruction/week: 4
No of credits: 3

Course Objectives:

1. To impart knowledge on compiler design.
2. To understand the concept of lexical Analysis.
3. To enrich the knowledge in Syntax Analysis.
4. To develop theoretical knowledge in constructing a compiler.
5. To identify various techniques for code optimization.

Unit I Overview of Compiler Design	12
Introduction – Why to write Compiler? - Compilation process - Cousins of the Compiler – Concepts of Pass – Types of Compiler – Bootstrapping of Compiler - Interpreter – Comparison of Compilers and Interpreter – Compiler Construction Tools	
Unit II Lexical Analysis	12
Introduction – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Block Schematic of Lexical Analyzer – Automatic Construction of Lexical Analyzer – LEX Specification and Features – Lexical Analyzer Generator	
Unit III Syntax Analysis	12
Introduction – Derivation and Parse Trees – Ambiguous Grammar – Parsing Techniques – Top-down Parser – Bottom-up Parser – LR Parser – Comparison of LR Parsers using Ambiguous Grammar – Error Recovery in LR Parser – Automatic Construction of Parser	
Unit IV Code Generation and Intermediate Code Generation	12
Introduction – Code Generation – Issues in Code Generation – Target Machine Description – Basic Blocks and Flow Graphs – Next Use Information – Register Allocation and Assignment – DAG Representation of Basic Blocks – Peephole Optimization – A Simple Code Generator – Benefits of Intermediate Code Generation – Intermediate Languages – Generation of Three Address Code – Declarations – Assignment Statements – Arrays – Boolean Expressions – Case Statements – Back patching – Procedure Calls.	
Unit V Code Optimization	12
Introduction – Classification of Optimization – Principle Sources of Optimization – Optimization of basic blocks – Loops in Flow Graphs – Local Optimization – Global Optimization – Computing Global Data Flow Information – Data Flow Equations – Iterative Data Flow Analysis – Redundant Common Subexpression Elimination – Copy Propagation – Induction Variable	

Total Hours:60

Text Book:

1. Mrs.Anuradha A. Puntambekar(2009), *Principles of Compiler Design*, Technical Publications, Pune

Reference Book:

1. Alfred V.Aho and Jeffrey D.Ullman(2011), *Principles of Compiler Design*, Narosa Publishing House.
2. Dhamdhare D M, *Compiler Construction Principles and Practice*, second edition, Macmillan India Ltd., New Delhi, 2001.

3. **Jean Paul Tremblay, Paul G Serenson, *The Theory and Practice of Compiler Writing*, McGraw Hill, New Delhi, 2001.**
4. **Dick Grone, Henri E Bal, Cerial J H Jacobs and Koen G Langendoen, *Modern Compiler Design*, John Wiley, New Delhi, 2000.**

Web References:

1. <https://www.nptel.ac.in/courses/106108052/1>
2. http://www.diku.dk/~torbenm/Basics/basics_lelu2.pdf

Course Learning Outcomes:

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

1. Demonstrate knowledge in basic concepts of compiler designing techniques.
2. Understand and build rules and grammars using the concepts of lexical analysis
3. Facilitate to comprehend syntax analysis concepts.
4. Accomplish and devise experiments for code and Intermediate code generation.
5. Familiar with code optimization techniques to enhance the performance of a program

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	M	L	-	-	L	L	L	-	-	L	L	-	M
CLO 2	H	M	L	-	-	L	L	L	-	-	L	L	-	M
CLO 3	H	M	L	-	-	L	L	L	-	-	L	L	-	M
CLO 4	H	M	L	-	-	L	L	L	-	-	L	L	-	M
CLO 5	H	M	L	-	-	L	L	L	-	-	L	L	-	M

Fundamentals of Cyber Security

Semester VI

Hours of Instruction/week: 4

21BITC30

No of credits: 3

Course Objectives:

1. To inculcate basic knowledge on Cyber Security.
2. To obtain an idea about Information and Application security
3. To establish knowledge about threats in various aspects and securing information systems.
4. To explore security issues and policies.
5. To obtain knowledge about various security standards.

Unit I Introduction to Information Systems 14

Introduction – Modelling the business process – Information System components – Information System Categories – Individuals in the information system – Development of information Systems.

Unit II Information Security and Application Security 12

Introduction – Threats to Information System - Information Assurance - Cyber Security risk analysis.

Introduction – Data Security consideration – Security Technology – Intrusion Detection – Access Control.

Unit III Security Threats and Secure Information System 13

Introduction to Security Threats – Network and Service Attack - Security threats to E-Commerce.

Introduction – Developing Secure Information System – Key elements – Information System Development Life Cycle – Application Security – Information Security Governance and Risk Management – Risk Management – Security Architecture and Design

Unit IV Security Issues and Policies 10

Introduction – Data Storage and Downloadable Device – Physical Security of IT Assets – CCTV and IDS – Security Policies –

Introduction – Why do we need Security Policies? – Security Policy Development – Email Security Policies – Policy Review Process – Corporate Policy – Sample Template of Cyber Security Policy

Unit V Information Security Standards 11

Introduction – ISO – IT ACT 2000 – Copyright – Patent - Intellectual Property Rights – Cyber laws in India – Software Licensing – Semi Conductor Law and Patent Law – Chip Act Right and Exceptions

Total Hours:60

Text Book:

1. **Mayank Bhushan, Rajukumar Singh Rathore and Aatif Jamshed (2017). *Fundamentals of Cyber Security*. 1st Edition. BPB Publications.**

Reference Book:

1. **Haq Kamar (2017). *What is Cyber Security?.* 1st Edition. Britannica Educational Publishing.**

Web References:

1. <http://whatis.techtarget.com/definition/cybersecurity>
2. <https://www.csoonline.com/article/3242690/data-protection/what-is-cyber-security-how-to-build-a-cyber-security-strategy.html>

3. https://www.acs.org.au/content/dam/acs/acs-publications/ACS_Cybersecurity_Guide.pdf
4. <https://www.youtube.com/user/GoogleCyberSecurity>

Course Learning Outcomes:

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

1. Evaluate the needs of the information security of data
2. Analyze various security threats and attacks
3. Assess security system policies so as to effectively protect the critical data of an organization
4. Frame and update cyber security tactics and policies to enhance the information security
5. Administer various activities related to Security Standards

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	-	-	M	-	H	M	-	-	-	L	-	-	-	M
CLO 2	-	-	M	-	H	M	-	-	-	L	-	-	-	M
CLO 3	-	-	M	-	H	M	-	-	-	L	-	-	-	M
CLO 4	-	-	M	-	H	H	-	-	-	L	-	-	-	M
CLO 5	-	-	M	-	H	M	-	-	-	L	-	-	-	M

Android Programming - Practical IX

Semester VI

Hours of Instruction/week: 5

21BITC31

No of credits: 2

Course Objectives:

1. To understand Android application development environment
2. To describe how Android applications work, their life cycle, manifest, Intents and using external resources.
3. To practice layouts, menus and other controls
4. To experiment features of Android
5. To illustrate storing and retrieving data

List of Exercises

1. Android program for displaying text in the middle of the emulator screen with text color and image.
2. Program to Create a spinner and perform action
3. Program to change image when button clicked
4. Program to demonstrate activity life cycle
5. Program to create scroll view
6. Program to set the wallpaper of your device
7. Program to Create menu
8. Program to create a list
9. Program to create Radio Group Button
10. Program to draw on canvas
11. Program to create a calculator application
12. Program to use Android alert dialog box
13. Program to use Date and Time Picker
14. Program to set count down timer
15. Program to use String.xml file
16. Program to use download manager
17. Program to create an Application for Login
18. Program to Send SMS using SMS manager
19. Program to open a file from SD card
20. Program to create a database connectivity
21. Program to Search data in a database
22. Program to Insert data in a database
23. Program to Delete data in a database
24. Program to Update data in a database
25. Program to Insert data in a database

Total Hours: 75

Web References:

1. <https://www.sanfoundry.com/java-android-programing-examples/>
2. <http://www.developer.android.com>
3. <http://developer.android.com/about/versions/index.html>
4. <http://developer.android.com/training/basics/firstapp/index.html>
5. <http://docs.oracle.com/javase/tutorial/index.html>.

6. <http://developer.android.com/guide/components>

Course Learning Outcomes:

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

1. Distinguish between Android and other mobile development environments.
2. Simulate basic Android controls
3. Construct small Android applications
4. Create user interfaces for mobile applications
5. Use Android's communication API

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	L	H	M	L	-	H	H	L	M	M	M	M	M	M
CLO 2	M	H	M	L	-	H	H	M	H	H	H	M	M	H
CLO 3	H	H	H	M	-	H	H	H	H	H	H	H	H	H
CLO 4	H	H	H	H	-	H	H	H	H	H	H	H	H	H
CLO 5	H	H	H	H	-	H	H	H	H	H	H	H	H	H