

SBSA1101	DIGITAL COMPUTER FUNDAMENTALS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To Understand the concept of digital systems
- To operate on various number systems and Simplify Boolean functions.
- To Distinguish logical and combinational circuits
- To Design counters and understand the working of arithmetic logic and control unit

UNIT 1**9 Hrs.**

Number systems - Conversion from one number system to another - compliments - Binary codes - Binary logic - Logic gates - Truth tables.

UNIT 2**9 Hrs.**

Boolean Algebra - Axioms - Truth table simplification of Boolean function - map method (upto 5 Variables) - Mc-Clausky tabulation method.

UNIT 3**9 Hrs.**

Sequential logic - RS, JK, D and T Flip flops - Registers - Shift Registers - Counters - Ripple Counters - Synchronous Counter - Design of Counters.

UNIT 4**9 Hrs.**

Adders - Subtractors - Decoders - Encoders - Multiplexer - Demultiplexer - Design of Circuits using decoders/Multiplexers - ROM - PLA - Designing circuits using ROM/PLA.

UNIT 5**9 Hrs.**

Design of ALU - Design of Status Register - Design of accumulator - Introduction to Computer Design.

Max. 45 Hours**COURSE OUTCOMES :**

- CO1 - To Understand the concept of digital systems
 CO2 - To operate on various number systems and Simplify Boolean functions.
 CO3 - To Distinguish logical and combinational circuits
 CO4 - To Design counters and understand the working of counters
 CO5 - To Design arithmetic logic and control unit
 CO6 - To evaluate the combinational circuits

Text /Reference Books:

1. M. Morris Mano, "Computer System Architecture", Pearson Education, 2008.
2. Carter Nicholas, "Computer Architecture", Schaun outline Sevies , Tata McGraw-Hill, 2008.
3. J.P. Hayes, "Computer Architecture & Organization", Tata McGraw Hill
4. 1. Leach.D.P&Malvino.A.P, (2002), "Digital Principles and Applications", FifthEdition, TMH.(UNIT I,II,III)
5. 2. MorisMano.M,(2001),"Digital Logic and Computer Design", Forth Edition,
6. AnanthiShashasaayee, Sheshasaayee.J.G,(2003), "Digital Logic Fundamentals",First Edition ,Margham Publications

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 Questions of 2 marks each uniformly distributed – No choice****20 Marks****PART B : 2 Questions from each unit of internal choice, each carrying 16 marks****80 Marks**

SBSA1102	PROGRAMMING IN C & C++	L	T	P	Credits	Total Marks
		3	0	0	4	100

COURSE OBJECTIVES

- To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ program.
- To demonstrate a thorough understanding of modular programming by designing programs which require the use of programmer-defined functions.
- To impart the knowledge about pointers which is the backbone of effective memory handling.
- To perform Inheritance, Overloading of operators, functions, constructors and File Handling
- To demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.

UNIT 1**12 Hrs.**

BASICS OF C PROGRAMMING: Introduction to C: Features of C - Structure of C program - Data Types - 'C' Tokens - Input/output statements - Control Statement, Functions: - Types of Functions - Recursion.

UNIT 2**12 Hrs.**

ARRAYS, STRINGS AND STRUCTURES: Arrays: Single and Multidimensional Arrays - Array as Function Arguments, Strings: String Handling Functions, Structure: Nested Structures - Array of Structures - Structure as Function Argument - Function that Returns Structure, Union.

UNIT 3**12 Hrs.**

POINTERS AND FILE PROCESSING: Pointers: Introduction, Arrays Using Pointers - Structures Using Pointers - Functions Using Pointer, Dynamic Memory Allocation, Storage Classes, File Handling in 'C'

UNIT 4**12 Hrs.**

OBJECT ORIENTED PROGRAMMING CONCEPTS: Introduction - Procedure vs. object oriented programming - Concepts: Classes and Objects - Operator and Function Overloading - Inheritance - Polymorphism and Virtual Functions.

UNIT 5**12 Hrs.**

TEMPLATES AND EXCEPTION HANDLING: Function Templates and Class Templates - Name spaces - Standard Template Library - Casting - Exception Handling - case study.

Max. 60 Hours**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Develop simple applications in C using basic constructs.
- CO2 - Design and Implement applications using arrays and strings.
- CO3 - Develop and Implement applications using memory allocation and File concepts.
- CO4 - Use proper class protection to provide security.
- CO5 - Describe the reusability of code through Inheritance.
- CO6 - Demonstrate the use of virtual functions to implement polymorphism.

TEXT/ REFERENCE BOOKS

1. Deitel and Deitel, C how to Program, 7th Edition, Pearson Education, 2013.
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Pearson Education, 2015.
3. Yashavant Kanetkar, Understanding Pointers in C, 4th Revised & Updated Edition, Bpp Publications, 2008.
4. E Balagurusamy, Object Oriented Programming with C++, 3rd edition, Tata McGraw Hill, 2006.
5. Bhav, Object Oriented Programming with C++, Pearson Education, 2004.
6. John R Hubbard, "Programming with C++", Schaums Outline Series, McGraw Hill, 2nd edition, 2009.
7. Bjarne Stroustrup, Programming: Principles and Practice using C++, 1st Edition, Addison Wesley Publications, 2008

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 Questions of 2 marks each uniformly distributed – No choice****20 Marks****PART B : 2 Questions from each unit of internal choice, each carrying 16 marks****80 Marks**

SBSA1201	FUNDAMENTALS OF DATA STRUCTURES	L	T	P	Credits	Total Marks
		3	0	0	4	100

COURSE OBJECTIVES :

- It focuses on how to organize VCDsQe data for more efficient problem solving using data structures methods and techniques.
- To impart the basic concepts of data structures and algorithms
- To be familiar with writing recursive methods.
- To understand concepts about searching and sorting techniques.
- To implement basic concepts about stacks.
- To apply the concepts of queues and its types.

Unit I**12 Hrs.**

Arrays- Linked List - Single Linked List - Insertion and Deletion - Doubly Linked List- Circular Linked List – Stack- Queues- Array implementation of a Stack and queue - Linked List implementation of a Stack and Queue- Priority Queues

Unit II**12 Hrs.**

Evaluation of arithmetic expression using stack- Prefix –Infix-Postfix-notations, Converting infix expressions to postfix- Evaluation of postfix expression,-Towers of Hanoi problem.

Unit III**12 Hrs**

Tree Structures: Binary Trees- Implementation of Binary Trees- Linear Representation of Binary Tree-Linked representation of a Binary Tree. Binary Tree Traversal : Pre order – In order - Post order.

Unit IV**12 Hrs**

Sorting Techniques: Bubble Sort- Merge Sort - Shell Sort- Insertion Sort- Selection Sort-Quick Sort- Heap Sort. Searching Techniques: Sequential Search- Binary Search-Hashing- Indexing.

Unit V**12 Hrs**

Graphs and Networks: Implementation of Graphs - Adjacency Matrix- Depth First Search-Breadth First Search. Networks: Minimum Spanning Tree - The Shortest path Algorithm.

Max 60 Hrs**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Understand the concept of recursive algorithms.
- CO2 - Demonstrate the different types of data structures.
- CO3 - Able to understand the operations on linear data structures.
- CO4 - Summarize searching and sorting techniques.
- CO5 - Choose appropriate data structure as applied to specified problem definition.
- CO6 - Understand and implement the applications of linear data structures.

TEXT / REFERENCE BOOKS:

1. E. Horowitz, S. Sahni, Fundamentals of Data Structures.
2. Bhagat Singh and Thomas L, Introduction to Data Structures, Naps, TMH.
3. Helieman, Data Structures, Algorithms and Object Oriented Programming.
4. Thomas H Coreman, Charles E Leiseron, Ronald L Rivest, Introduction to Algorithms, PHI 2002.
5. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application', TMH, 2017.
6. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2nd Edition.
7. Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Prentice Hall Editin, 2004.
8. Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", 3rd Edition, 2010.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1202	PYTHON PROGRAMMING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES :

- To provide Basic knowledge of Python
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs
- To learn syntax of Python language
- To create dynamic applications in Python
- To implement object oriented concepts using Python

Unit 1

9 Hrs.

Overview of Programming : Structure of a Python Program, Elements of Python.

Unit 2

9 Hrs.

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

Unit 3

9 Hrs.

Creating Python Programs : Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions.

Unit 4

9 Hrs.

Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Tables, Two-dimensional tables.

Unit 5

9 Hrs.

Strings and Lists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists.

Max. 45 hours

COURSE OUTCOMES:

- CO1 - To provide Basic knowledge of Python
- CO2 - To learn how to design and program Python applications.
- CO3 - To learn how to use lists, tuples, and dictionaries in Python programs
- CO4 - To learn syntax of Python language
- CO5 - To create dynamic applications in Python
- CO6 - To implement object oriented concepts using Python

TEXT /REFERENCE BOOKS:

1. Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist learning with Python / 1st Edition, 2012
2. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning

Useful websites:

1. <http://docs.python.org/3/tutorial/index.html>
2. <http://interactivepython.org/courselib/static/pythonds>
3. <http://www.ibiblio.org/g2swap/byteofpython/read/>

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

PART A : 10 Questions of 2 marks each-No choice

PART B : 2 Questions from each unit with internal choice, each carrying 16 marks

Exam Duration : 3 Hrs.

20 Marks

80 Marks

SBSA1301	OPERATING SYSTEMS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES :

- To learn how computers work and to learn about system design (performance vs. simplicity, HW vs. SW, etc.)
- To have an overview of different types of operating systems.
- To learn and implement the concept of process management.
- To observe the concept of storage management.
- To understand the concept of I/O and file systems.
- To learn the basics of Linux Programming

UNIT I**9 Hrs**

Introduction: Operating system –Views and Goals - Types of System- OS Structure - Components - Services - System Structure - Layered Approach - Process Management: Process - Process Scheduling - Cooperating Process - Threads - Inter-process Communication.

UNIT II**9 Hrs**

CPU Scheduling: CPU Schedulers - Scheduling Criteria - Scheduling Algorithms, Process Synchronization: Critical-Section Problem - Synchronization Hardware - Semaphores Classical Problems of Synchronization - Critical Region - Monitors.

UNIT III**9 Hrs**

Deadlocks: Characterization- Methods for Handling Deadlocks - Deadlock Prevention - Avoidance - Detection - Recovery.

UNIT IV**9 Hrs**

Memory Management: Address Binding - Dynamic Loading and Linking - Overlays - Logical and Physical Address Space - Contiguous Allocation- Non-Contiguous Allocation.

UNIT V**9 Hrs**

File System: File Concepts - Access Methods - Directory Structures - Protection Consistency Semantics - File System Structures - Allocation Methods - Free Space Management.

Max : 45hrs**COURSE OUTCOMES:**

- CO1 - Understand the fundamental components of a computer operating system and how computing resources are managed by the operating system.
- CO2 - Apply the concepts of CPU scheduling, synchronization and deadlocks in real computing problems.
- CO3 - Demonstrate the different memory and I/O management techniques used in Operating Systems.
- CO4 - Have practical exposure to the concepts of semaphores and monitors for process synchronization.
- CO5 - Create design and construct the following OS components: Schedulers, Memory management systems in the modern operating system.
- CO6 - Understand file system structure and implement a file system such as FAT.

TEXT /REFERENCE BOOK:

1. A. Silberschatz P.B.Galvin, Gange., Operating System Concepts, 6th Edition., Addison-Wesley Publishing Co., 2002.
2. H.M. Deitel, An Introduction to Operating System, Second Edition, Addison Wesley, 1990.
3. A.S. Godbole, Operating System-Tata McGraw Hill-1999.
4. William Stallings, Operating Systems, Fourth Edition, PHI.
5. Andrew S Tanenbaum, Operating Systems: Design and Implementation, Third Edition,

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1302	JAVA PROGRAMMING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To understand and apply the fundamentals core java, packages, database connectivity for computing
- To provide knowledge on advanced features like Swing, JavaBeans, Sockets
- To understand the principles and concepts of object oriented programming
- To Store and retrieve the information from Files.
- To learn multithreading concepts

UNIT I**(9 Hrs)**

An Overview of Java - Features of Java - Object oriented concepts - Lexical Issues - Data Types - Variables - Type Conversions and Casting - Arrays - Operators - Control Statements.

UNIT II**(9 Hrs)**

Introduction to Classes and Objects - Declaring Objects and Methods - Constructors - this keyword - finalize() method - Overloading Methods - Overloading Constructors - Recursion - Access Control - Static and Final methods and variables - Nested and Inner class - String class - String Handling

UNIT III**(9 Hrs)**

Inheritance - Using super - Overriding Methods - Abstract classes - Final with Inheritance – Multi Threaded programming

UNIT IV**(9 Hrs)**

Packages - Access Protection – Importing Packages – Interfaces – Exception Handling – throw and throws. – Sting tokenizer – Date – Calendar- Random.

UNIT V**(9 Hrs)**

Applet - AWT Controls - Layout Managers and Menus - Swing - JDBC/ODBC Connection

Max 45hrs**COURSE OUTCOME :**

- CO1 - To understand the principles and concepts of object oriented programming
 CO2 - To Store and retrieve the information from Files.
 CO3 - To learn multithreading concepts
 CO4 - Implement the interface, package and multithread concepts
 CO5 - Implement various built in package and its applications
 CO6 - Develop web based applications using applet programming

TEXT /REFERENCE BOOKS:

1. Herbert Schildt, The Complete Reference JAVA2, 7th Edition, McGraw-Hill/Osborne Media.
2. Bruce Eckel, Thinking in Java, 4th edition, Prentice Hall
3. Michael Morrison, Java Unleashed, 3rd edition, SAMS Publishing
4. Clayton Walnum, Java By Example, QUE Publications, 2000.
5. K. Arnold and J. Gosling, The JAVA programming language, Third edition, Pearson Education, 2000

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1302	COMPUTER ARCHITECTURE	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To design and analyze the main functional units of computer and to understand the combinational and sequential circuits.
- Implementing assembly programs that accomplish basic computational and I/O operations.
- To impart knowledge on various types of Registers and Microinstructions.
- To discuss about the Data path design and Processor design in detail.
- To understand the types of memory organizations.
- To discuss about the registers, interface and communication in I/O devices.
- To analyze about the characteristics, structure communication and synchronization of multiprocessors.

UNIT I (9 Hrs)

Number systems - Conversion from one number system to another - Compliments - Binary codes - Binary logic - Binary Arithmetic - Logic gates - Truth tables. Boolean Algebra - Axioms - Truth table simplification of Boolean function - Map method - Mc-Clausky tabulation method.

UNIT II (9 Hrs)

Combinational Logic: Adders - Subtractors - Decoders - Encoders - Multiplexer – Demultiplexer Sequential logic: RS, JK, D and T Flip flops - Registers -Shift Registers Counters - Design of Counters.

UNIT III (9 Hrs)

Associative Memory – Cache Memory – Virtual Memory – Auxiliary Memory Memory Management Hardware. Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer: Handshaking – Serial Transfer – Communication Interface – Modes of Transfer – Priority Interrupt – DMA –Serial Communication-

UNIT IV (9 Hrs)

Introduction to micro computers, Microprocessors and Assembly languages - Microprocessor architecture and its operations - 8085 MPU - 8085 instruction set and Classifications.

UNIT V (9 Hrs)

Central Processing unit: General register and stack organizations, instruction formats - Addressing modes, Data transfer and manipulation - program control, RISC – Pipelining – Arithmetic and instruction, RISC pipeline – vector processing and array processors.

Max 45hrs**COURSE OUTCOMES**

- CO1 - Classify the various types of registers, microinstructions and addressing modes.
 CO2 - Design the data path for processor
 CO3 - Demonstrate the usage of Memory Organization.
 CO4 - Describe about the I/O devices.
 CO5 - Explain the characteristics, structure, communication and synchronization of multiprocessor.
 CO6 - State the inter processor communication and synchronization.

TEXT /REFERENCE BOOKS:

1. M.Moris Mano, Computer system Architecture. PHI (Third edition, 1993)
2. M.M. Mano, Digital Logic and Computer Design, Prentice Hall of India, 1994.
3. Carl Hamacher, uonko G.Vranesic, Safwat G.Zaky – Computer Organisation, McGraw hill ISE 1987.
4. John, P.Hayes., Computer System architecture, McGraw Hill, ISE,1988.
5. Hwang.K.Briggs .F.A -Computer Architecture and parallel Processing, McGraw Hill ISE, 1988.
6. T.C.Bartee, Computer Architecture and logical Design, McGraw Hill, 1991.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1304	SOFTWARE ENGINEERING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES :

- Knowledge of basic SW engineering methods and practices, and their appropriate application.
- A general understanding of software process models, role of project management, different software architectural styles and approaches to verification and validation
- Software process models and compare their applicability
- Identify the key activities in managing a software project
- Concepts of requirements engineering and Analysis Modelling
- Apply systematic procedure for software design and deployment

UNIT I (9 Hrs)

Definition of software and software engineering – Software myths –Software Engineering paradigms: Linear Sequential Model and Prototyping Model-Incremental – Spiral Model- Iterative Model. Software Project Management. Software Cost Estimation – Software Project Planning.

UNIT II (9 Hrs)

Introduction – The software requirement specifications – Formal specification techniques – Languages and processors for requirements specification : SDAT, SSA, GIST, PSL/PSA, REL/REVS- Software prototyping – rapid prototyping techniques- user interface prototyping- Analysis and modeling – data, functional and behavioral models – Structured analysis and data dictionary.

UNIT III (9 Hrs)

Abstraction – Modularity – Software architecture – Cohesion, coupling – Various design concepts and notations – Real time and distributed system – Design – Documentation – Data flow oriented design – Jackson system development – Design for reuse – Programming standards. User interface Design- principles- SCM- Need for SCM- Version control – Introduction to SCM process – software configuration items

UNIT IV (9 Hrs)

Levels - Test activities - Types of s/w test - Black box testing - Testing boundary condition - Structural testing- Test coverage criteria based on data flow mechanisms - Regression testing - Testing in the large- S/W testing strategies - Strategic approach and issues - Unit testing - Integration testing - Validation testing - System testing and debugging. Case studies – Writing black box and white box testing

UNIT V (9 Hrs)

Introduction – Quality assurance – Walk through and inspections – Static analysis – Symbolic execution- Software Maintenance: Introduction – Enhancing maintainability during development- Managerial aspects of software maintenance – Configuration management – Source code metrics – Other maintenance tools and techniques

Max 45hrs**COURSE OUTCOMES**

- CO1 - Identify and apply software lifecycle model for a given problem and will know the criteria for each level of CMM.
 CO2 - Comprehend types of requirements and summarize Requirement Engineering Process
 CO3 - Design data, functional and behavioral model for any given software requirement.
 CO4 - Identify and analyze levels of testing and perform white box testing and black box testing for a given problem.
 CO5 - Describe concepts of software quality assurance and software configuration management.
 CO6 - Compare and contrast forward engineering, reverse engineering and reengineering.

TEXT / REFERENCE BOOKS:

1. Pressman. R. S. ,Software Engineering - Fourth Edition- McGraw Hill International Edition 1997.
2. Richard Fairley, Software Engineering - (Design Reliability and Management), -Tata McGraw hill Edition -1983.
3. Fleeger.P Software Engineering, - Prentice Hall, 1999.
4. Pflieger and Lawrance, "Software Engineering: Theory and Practice" Pearson Education, Second Edition, 2001
5. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited ,2009.
6. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
7. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1305	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- It aims at teaching about geometric information, 2D and 3D graphics, animation and multimedia.
- To introduce Two and Three dimensional graphical structure.
- To design 2D and 3D methods and Models
- To explore the visible surface detection with illumination and color models.
- To understand the concepts involved in multimedia and basis tools.
- To gain knowledge on Multimedia compression and animations.

UNIT I**(9 Hrs)**

Introduction to computer Graphics - Video display devices- Raster scan Systems - Random Scan Systems - Interactive input devices - Hard copy devices - Graphics software - Output primitives - line drawing algorithms - initializing lines - line function - circle Generating algorithms.

Unit II**(9 Hrs)**

2D Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations. 2D Viewing: The Viewing Pipeline – Viewing Co-ordinate Reference Frame – Window-to-Viewport Co-ordinate Transformation - 2D Viewing Functions – Clipping Operations- Point Clipping-Line Clipping-Polygon Clipping-Curve Clipping-Text Clipping-Exterior Clipping.

Unit III**(9 Hrs)**

Three Dimensional Concepts - 3D Geometric and Modeling Transformations – Three-Dimensional Viewing - Visible-Surface Detection Methods: Back-Face Detection - Depth-Buffer Method -Scan Line Method - A-Buffer Method-Depth Sorting Method- BSP Tree Method-Area Subdivision Method.

Unit IV**(9 Hrs)**

Multimedia – Definition- Introduction-Multimedia Software- Basic Tools- Multimedia Authoring Tools- Multimedia Building Blocks: Text- Font Editing and Design Tools – Hypermedia and Hypertext – Multimedia System Sounds – MIDI Versus Digital Audio – Making MIDI Audio – Audio File Formats– Adding Sound to Your Multimedia Project.

Unit V**(9 Hrs)**

Images: **Making Still Images** – Color – Image File Formats – Animation: The Power of Motion – Principles of Animation – Making Animations that Work – Video: Using Video – How Video works - Broadcast Video Standards – Integrating Computers and Television – Shooting and Editing Video – Video Tips – Recording Formats – Digital Video-Multimedia and the Internet

Max 45hrs**COURSE OUTCOMES :**

- CO1 - Identify the various line & circle drawing algorithm. Study the various transformations in 2D and 3D objects.
 CO2 - Understand the concepts of curves and surface.
 CO3 - Apply transformation and clipping algorithm in 2D and 3D objects.
 CO4 - Design Illumination and color models.
 CO5 - Implement 2D and 3D Transformation concepts in Real world Applications
 CO6 - To explore the visible surface detection with illumination and color models.

TEXT /REFERENCE BOOKS:

1. D. Hearn and M.P. Baker ,Computer Graphics, 2nd Edition ,PHI 1996
2. Tay Vaughan ,Multimedia: Making it Work,7th Edition, Tata McGraw Hill Edition ,2008
3. W.M. Neumann and R.F. Sproull ,Principle of Interactive Computer Graphics , McGraw Hill,2nd edition ,2002
4. Ranjan Parekh, Principles of multimedia – Sixth edition, Tata McGraw Hill – 2008
5. D. P. Mukherjee , “Fundamentals Of Computer Graphics And Multimedia ” Prentice Hall of India Private Limited, 2006.
6. D. McClelland, L.U.Fuller ,”Photoshop CS2 Bible”, Wiley Publishing, 2005.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1401	DATABASE MANAGEMENT SYSTEM	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To gain knowledge in fundamentals of data models using ER diagram.
- To make a study of SQL and relational database design.
- To understand about Query processing, optimization and Concurrency control technique
- To understand terms related to database design and management
- To gain knowledge in relational model and relational database management system
- To implement relational databases using SQL & My SQL

UNIT I**(9 Hrs)**

Basic Concepts: Database and Database users – Database system concepts and architecture – Data modeling using Entity Relationship model – Enhanced entity relationship and object modeling – Record storage and file organizations – Index Structures for files

UNIT II**(9 Hrs)**

Relational Model, Languages and Systems: The Relational Data Model, Relational Constraints, and the relational Algebra – SQL – The Relational Database Standard – ER and EER to Relational Mapping and Other Relational Languages – Examples of Relational Database Management Systems: Oracle and Microsoft Access.

UNIT III**(9 Hrs)**

Database Design, Theory and Methodology: Functional dependencies and normalization for relational database – Relational database design algorithms and further dependencies – Practical database design and tuning

UNIT IV**(9 Hrs)**

System Implementation Techniques: Database system architectures and the system catalog – Query processing and optimization

UNIT V**(9 Hrs)**

Transaction processing concepts – Concurrency control techniques – Database recovery techniques – Database security and Authorization. Introduction to Emerging Database Technologies and Application

Max 45hrs**COURSE OUTCOMES**

- CO1 - Design ER-models to represent simple database application scenarios
- CO2 - Ability to understand and design data modelling using Entity-Relationship model
- CO3 - Implement SQL to a broad range of query and data update problems
- CO4 - Articulate socio-economic applications of distributed databases and use database recovery mechanisms
- CO5 - Familiar with data warehousing and data mining applications
- CO6 - Apply Normalization techniques to normalize and improve the database design

TEXT / REFERENCE BOOKS:

1. Elmasri & Navathe, Fundamentals of Database Systems, 6th Edition, Addison Wesley, 2010
2. Korth, Silberschatz & Sudarshan, Database System Concepts, 5th Edition, Tata McGraw Hill, 2010
3. Raghu Ramakrishnan & Johannesgerhrke, Data Base Management Systems, 3rd Edition, Tata Mc Graw Hill, 2002.
4. Abraham Silberschatz, Henry.F.Korth and S.Sudharshan, "Database System Concepts", 4th Edition, 2002.
5. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", 3rd Edition, Elsevier, 2012
6. Jan L. Harrington, "Object oriented database design", Harcourt India private limited 2000.

USEFUL WEBSITES:

http://nptel.iitm.ac.in/courses/IIT-MADRAS/Intro_to_Database_Systems_Design/index.php

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1402	CLOUD COMPUTING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To articulate the main concepts, key technologies, strengths, and limitations of cloud computing
- To learn how to use Cloud Services.
- To implement Virtualization
- To understand the basic concepts of cloud computing and cloud enables.
- To understand cloud services and Multi-tenancy computing
- To study about various models of cloud environments and virtualization.
- To manage the cloud computing infrastructure with security.
- To gain knowledge of cloud and to understand about Fog, edge computing.

UNIT I**(9 Hrs)**

The vision of cloud computing - The cloud computing reference model - Characteristics and benefits - Challenges ahead - Historical developments - Distributed systems - Virtualization - Building cloud computing environments - Application development - Infrastructure and system development - Computing platforms and technologies. Parallel vs. distributed computing - Elements of parallel computing - Hardware architectures for parallel processing Approaches to parallel programming - Laws of caution.

Unit-II**(9 Hrs)**

Introduction - The cloud reference model - Types of clouds - Economics of the cloud Virtualization: Introduction - Characteristics of virtualized environments - Taxonomy of virtualization techniques - Virtualization and cloud computing - Pros and cons of virtualization - Technology example: VMware: full virtualization.

Unit-III**(9 Hrs)**

Anatomy of the Aneka container - Introducing parallelism for single-machine computation - Programming applications with threads - Multithreading with aneka - Programming applications with aneka threads. Cloud computing economics: Cloud infrastructure - Economics of private clouds - Software productivity in the cloud - Economies of scale: public vs. private clouds.

Unit-IV**(9 Hrs)**

Multi-entity support - Multi-schema approach - Multi-tenancy using cloud data stores - Data access control for enterprise applications. Data in the cloud: Relational databases - Cloud file systems: GFS and HDFS - BigTable, HBase - Cloud data stores: Datastore and SimpleDB.

Unit-V**(9 Hrs)**

Amazon web services: Compute services - Storage services - Communication services - Additional services. Google AppEngine: Architecture and core concepts - Application life cycle - Cost model - Observations. Microsoft azure: Azure core concepts - SQL azure - Windows azure platform appliance.

Max 45hrs**COURSE OUTCOMES**

- CO1 - Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
 CO2 - Implement and install the cloud tools to make enable the cloud computing infrastructures.
 CO3 - Apply and design suitable Virtualization concept, Cloud Resource Management and collaboration services.
 CO4 - Create combinatorial auctions for cloud resources and services for computing clouds Develop and make cloud services as commercial.
 CO5 - Assess cloud and cloud to Fog with IoT.
 CO6 - Ability to, understand fog computing architecture

TEXT/REFERENCE BOOKS :

1. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, "Mastering Cloud Computing" - Foundations and Applications Programming , MK publications, 2013.
2. Gautam Shroff, "Enterprise Cloud Computing: Technology, Architecture, Applications" by Cambridge University Press, 2010.
3. Cloud computing concepts, technology and Architecture – Thomas Erl, Zaigham Mahmood, Ricardo Puttini , Pearson , 2017.
4. Instant Guide to Cloud Computing, Anand Nayar(Ed), Ashokkumar, sudeep Tanwar, BPB, 2019.

5. Cloud computing a practical approach - Anthony T. Velte, Toby J. Velte Robert Elsenpeter TATA McGraw - Hill, New Delhi - 2010
6. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA1403	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES :

- To Understand the fundamentals of Object Oriented System Development
- To understand the object oriented methodologies.
- To use UML in requirements elicitation and designing.
- To understand concepts of relationships and aggregations.
- To test the software against its requirements specification

UNIT I (9 hrs.)**INTRODUCTION**

Overview of object oriented language systems development – Object basics hierarchy – Object and identity –Static and dynamic binding – Object oriented SDLC.

UNIT II (9 hrs.)**OBJECT ORIENTED METHODOLOGIES**

Rumbaugh et al.'s technique – Booch, Jacobson Methodologies – Patterns – Framework – Unified approach –UML – UML diagrams – UML dynamic modeling – UML extensibility – UML meta-model.

UNIT III**OBJECT-ORIENTED ANALYSIS (9 hrs.)**

Use case model – Object analysis classification – Approaches for identifying classes – Classes responsibilities and collaborators – Identifying object relationships, attributes and methods.

UNIT IV (9 hrs.)**OBJECT ORIENTED DESIGN**

Design process and design axioms – Designing classes – Access Layer – Object storage and object Interoperability – View layer – Designing interface objects.

UNIT V (9 hrs.)**SOFTWARE QUALITY**

Software quality assurance – Testing strategies – Test cases – Test plan – Myers debugging principle – System usability and measuring user satisfaction.

Max 45hrs**COURSE OUTCOMES**

- CO1 - Understand the basics object model for System development.
- CO2 - Understand the object Oriented Methodologies
- CO3 - Express software design with UML diagrams
- CO4 - Understand the concept of Relationships
- CO5 - Design software applications using OO concepts.
- CO6 -Understand the various testing methodologies for OO software

TEXT/ REFERENCE BOOKS:

1. Ali Bahrami, "Object oriented systems development using the unified modeling language", 1st Edition, McGraw- Hill, 1998.
2. Grady Booch, James Rumbaugh, and Ivar Jacobson, "The Unified Modeling Language User Guide", 3rd Edition Addison Wesley, 2007.
3. John Deacon, "Object Oriented Analysis and Design", 1st Edition, Addison Wesley, 2005.
4. Grady Booch, James Rumbaugh, and Ivar Jacobson, "The Unified Modeling Language User Guide", 3rd Edition Addison Wesley.
5. John Deacon, "Object Oriented Analysis and Design", 1st Edition, Addison Wesley,.
6. Bernd Oestereich, "Developing Software with UML, Object - Oriented Analysis and Design in Practice", Addison-Wesley.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A :** 10 Questions of 2 marks each uniformly distributed – No choice**PART B :** 2 Questions from each unit of internal choice, each carrying 16 marks**Exam Duration : 3 Hrs.****20 Marks****80 Marks**

SBSA2101	PROGRAMMING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

LIST OF PROGRAMS

1. Program to check whether a number is positive or negative or zero using if statement.
2. Program to check vowel or consonant using switch case statement.
3. Program to check whether a number is prime or not using while statement.
4. Program to generate multiplication table using do...while statement.
5. Program to check the given string is palindrome or not using for statement.
6. Program to display Fibonacci series.
7. Program to search an element in an array using linear search method.
8. Program to find the smallest and largest number among 'n' numbers.
9. Program to sort elements in an array.
10. Program to add two matrices.
11. Program for manipulating the strings using string handling functions.
12. Program to find the sum of 'n' numbers by making function.
13. Program to calculate factorial of a number using recursion.
14. Program to generate the mark sheet of the student using structure.
15. Program to copy the content of one file to other file.
16. Program to read and print student details using structure pointer.

SBSA2201	DATA STRUCTURES LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

LIST OF EXPERIMENTS

1. Linked List Implementation .
2. Stack Implementation using Array
3. Queue Implementation using Linked List (Make the program for Ex.1 as a header file and use it)
4. Binary Search Tree Traversal
5. Implementation of Dijkstra's Algorithm
6. String Pattern Matching Algorithm
7. Sorting Techniques
 - a. Heap Sort
 - b. Quick sort
8. Searching Techniques
 - a. Linear Search b. Binary Search
9. Greedy Method – Minimum Spanning Tree
10. Backtracking – N Queens Problem
11. Divide & Conquer – Merge Sort

SBSA2301	JAVA PROGRAMMING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

LIST OF PROGRAMS

1. Substring removal from a String using StringBuffer class.
2. Determining the orders of the numbers generated randomly using Random class
3. Usage of Calendar class and manipulation
4. String manipulation using CharArray
5. Usage of Vector class
6. Implementing Thread based applications and exception handling
7. Application using synchronization such as Thread based, Class based and synchronized Statement Using Applets and swings
8. Working with frames and other controls
9. Working with Dialog and Menus
10. Working with Panel and Layout
11. Incorporating Graphics
12. Database creation for storing email addresses and manipulation using Swing

SBSA2401	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

LIST OF EXPERIMENTS

1. Data Definition Language (DDL).
2. Data Manipulation Language (DML)
3. Data Control Language (DCL)
4. Constraints and Built-in functions.
5. Joins and Group-by functions.
6. PL/SQL programs using functions
7. PL/SQL programs using procedures
8. PL/SQL programs using triggers
9. Developing GUI applications using PHP.
10. Student Information System.
11. Inventory Management.
12. Payroll Processing.



SBSA1501		L	T	P	Credits	Total Marks
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SBSA3010	INTRODUCTION TO IOT	L	T	P	Credits	Total Marks
		3	*	0	4	100

COURSE OBJECTIVES

- To understand the concepts of Internet of Things .
- To identify the various elements of an IoT System
- To understand the various means of communication from Node / Gateway to Cloud Platforms
- To identify types of data analytics and data visualization tools
- To make students aware of security concerns and challenges while implementing IoT solutions

UNIT1

12 Hrs.

Introduction to IoT, **Current technological trends and future prospects**, - Evolution of IoT , Business Scope, Relation with embedded system, - Basic Architecture of an IoT, An emerging industrial structure for IoT.

UNIT 2

12 Hrs.

Application Sensors & Actuators - **Edge Networking (WSN) – Gateways** - WPAN & LPWA, Overview of IoT supported Hardware platforms :Rasperry pi, Arduino boards, Wearable Development Boards.

UNIT 3

12 Hrs.

IoT Communication Model, Cloud computing in IoT, IoT in cloud architecture, Logging on to cloud, Selecting and Creating cloud service, Cloud based IoT platforms.

UNIT 4

12 Hrs.

Big Data Analytics , Architecture, Big data analytical tools, Data Visualization, Visualization tools for IoT

UNIT 5

12 Hrs.

Home automation, Industry applications, Surveillance applications, Soil moisture monitoring, Weather monitoring, Air quality Monitoring, Movement Detection.

Max.60 Hours

COURSE OUTCOMES

On Completion of course the student will be able to

- CO1:** To learn and understand the technology and current trends in Internet of things.
- CO2:** To understand the various elements of IoT system and hardware devices.
- CO3:** To understand the cloud computing and its relevance for developing IoT applications.
- CO4:** To design and implement IoT applications that manages big data with data analytics and visualization tools.
- CO5:** To implement hands-on projects using an appropriate software and hardware devices in various applications.
- CO6:** To implement IoT solutions using sensors, actuators and Devices

TEXT / REFERENCE BOOKS

1. Boswarthick, Omar Elloumi., The Internet of Things: Applications and Protocols, Wiley publications., 2012
2. Dieter Uckelmann, Mark Harrison, Florian Michahelles., Architecting the Internet of Things, Springer publications.2011
3. Marco Schwatz Internet of Things with Arduino Cookbook, Packt Publications.2016 .
4. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machineto-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
5. Vijay Madiseti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach" published by Vijay Madiseti 2014

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

Exam Duration : 3 Hrs.

PART A : 10 Questions of 2 marks each-No choice

20 Marks

PART B : 2 Questions from each unit with internal choice, each carrying 16 marks

80 Marks

SBSA3011	FOUNDATION OF AI	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To understand the various characteristics of intelligent agents
- To learn the different search strategies in AI.
- To understand the knowledge in solving AI problems.
- To learn the concepts of learning and communication in AI.
- To know about the various applications of AI.

UNIT 1

12 Hrs.

Introduction – Foundations of AI – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies – Breadth first search – Uniform cost search – Depth first search – Depth limited search – Bidirectional search – Searching with partial Information.

UNIT 2

12 Hrs.

Informed search – Strategies – A* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm – Optimal decisions in games - Pruning - Imperfect decisions – Alpha-Beta pruning – Games that include an element of chance.

UNIT 3

12 Hrs.

Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules – First-order logic – Syntax and semantics – Situation calculus – Building a knowledge base – Electronic circuit domain – Ontological Engineering – Forward and backward chaining – Resolution – Truth maintenance system-Mental Events and Mental Objects.

UNIT 4

12 Hrs.

Planning – Representation of planning – Partial order planning –Planning and acting in real world – Acting under uncertainty – Bayes's rules – Semantics of Belief networks – Inference in Belief networks – Making simple decisions – Making complex decisions.

UNIT 5

12 Hrs.

AI applications – Language Models – Information Retrieval- Information Extraction –Fields of Natural Language Processing, Chatbots and its types , Artificially Intelligent Chatbots, Introduction to Chatbot Applications(Retrieval based- Conversation based)-Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

Max. 60 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

- CO1:** An ability to identify, analyze the search algorithm for the AI problems.
CO2: Represent a problem using first order logic.
CO3: Provide the knowledge based agent to solve the problem.
CO4: Understand the Informed search strategies.
CO5: Apply the baye's rule to solve the problem for societal concern.
CO6: Design user centric applications that use AI concepts

TEXT / REFERENCE BOOKS

1. Stuart J. Russel, Peter Norvig, "Artificial Intelligence A Modern Approach ", 3rd Edition, Pearson Education, 2009.
2. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009.
3. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc., First Edition, 2008.
4. Artificial Intelligence: Foundations of Computational Agents, 2nd Edition, David L. Poole and Alan K. Mackworth, 2010
5. Introduction to Artificial Intelligence , Ertel, Wolfgang, 1st Edition , 2017

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

PART A : 10 Questions of 2 marks each-No choice

PART B : 2 Questions from each unit with internal choice, each carrying 16 marks

Exam Duration : 3 Hrs.

20 Marks

80 Marks