



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited A++ Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

School of Science and Humanities Department of Computer Science

1.1.3 Courses having focus on Employability / Entrepreneurship / Skill Development

Programme:

S. No.	Course Code	Course Name	Page No.
Employability			
1	SBSB1101	PROBLEM SOLVING TECHNIQUES WITH C	3
2	SBSB1102	FUNDAMENTALS OF COMPUTER TECHNOLOGY	5
3	SBSB1201	DATABASE MANAGEMENT SYSEM	6
4	SBSB1202	DIGITAL COMPUTER FUNDAMENTALS	8
5	SBSB1302	DATA FOUNDATION	9
6	SBSB1302	COMPUTER ARCHITECTURE	11
7	SBSB1303	OPERATING SYSTEMS	12
8	SBSB1401	PYTHON PROGRAMMING	15
9	SBSB1406	QUANTUM COMPUTING	16
10	SBSB1404	CYBERSECURITY	18
11	SBSBLH51	FULL STACK WEB DEVELOPMENT	19
12	SBSB1505	DATA MANAGEMENT IN CLOUD	21
13	SBSB1502	FUNDAMENTALS OF MICROPROCESSOR	23
14	SBSB1604	CRYPTOGRAPHY AND NETWORK SECURITY	24
15	SBSB1602	SOCIETY 5.0	25

 Employabil

 Entrepreneurs

 Skill

Entrepreneurship			
1	SBSB1101	PROBLEM SOLVING TECHNIQUES WITH C	3
2	SBSB1102	FUNDAMENTALS OF COMPUTER TECHNOLOGY	5
3	SBSB1202	DIGITAL COMPUTER FUNDAMENTALS	8
4	SBSB1302	COMPUTER ARCHITECTURE	11
5	SBSB1602	SOCIETY 5.0	25
Skill Development			
1	SBSB1101	PROBLEM SOLVING TECHNIQUES WITH C	3
2	SBSB1102	FUNDAMENTALS OF COMPUTER TECHNOLOGY	5
3	SBSB1302	DATA FOUNDATION	9
4	SBSB1303	OPERATING SYSTEMS	11
5	SBSB1304	DATA MINING AND WAREHOUSING	13
6	SBSB1401	PYTHON PROGRAMMING	15
7	SBSB1406	QUANTUM COMPUTING	16
8	SBSB1403	DATA STRUCTURES	17
9	SBSB1404	CYBER SECURITY	18
10	SBSBLH51	FULL STACK WEB DEVELOPMENT	19
11	SBSB1502	FUNDAMENTALS OF MICROPROCESSOR	23
12	SBSB1604	CRYPTOGRAPHY AND NETWORK SECURITY	24
13	SBSB1602	SOCIETY 5.0	26

SBSB1101	PROBLEM SOLVING TECHNIQUES WITH C	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To learn the fundamental of PST and methodologies which are essential to building good C program.
- To demonstrate a thorough understanding of modular programming by designing programs which require the use of programmer - defined functions.
- To demonstrate Structures, pointers and file processing in C

UNIT1 INTRODUCTION TO COMPUTER PROBLEM SOLVING

9Hrs.

Algorithms - Building blocks of algorithms (statements, control flow, functions)-Notation (pseudo code, flow chart) - Algorithmic problem solving for socio economic conditions in global perspectives- Simple strategies for developing algorithms (iteration, recursion)- Efficiency of algorithms.

UNIT2 BASIC OF C PROGRAMMING

9Hrs.

Introduction to C: Features of C - Structure of C Program-Data Types- 'C' Tokens-Input/output statements-Control Statement, Functions: - Types of Functions -Recursion. Algorithms: Reversing the digits of a number - Generation of Fibonacci sequence- Factorial Computation.

UNIT3 ARRAYS AND STRINGS

9Hrs.

Arrays: Single and Multidimensional Arrays-- Array as Function Arguments, Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions).

UNIT4 STRUCTURES

9Hrs.

Structure: Nested Structures - Array of Structures - Structure as Function Argument-Function that Returns Structure, Union. Algorithms: Sum of array elements- Removal of duplicates from an array- Finding the Kth smallest element.

UNIT5 POINTERS AND FILE PROCESSING

9Hrs.

Pointers: Introduction, Arrays Using Pointers - Structures Using Pointers - Functions Using Pointer, Dynamic Memory Allocation, Storage Classes, File Handling in 'C'. Algorithms: Swap elements using Call by Reference - Sorting Arrays using pointers- Finding sum of array elements using Dynamic Memory Allocation.

Max. 45Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1-Develop solutions for the given problem.

CO2-Understand and design solutions for a problem

CO3-Able to understand variables, tokens and keywords in C

CO4-Design and Implement applications using memory allocation, arrays and string

CO5-Understand and design program using structures and unions

CO6-Demonstrate file processing functions in C

TEXT/REFERENCEBOOKS

1. Dromey.R.G, "HowtoSolveitbyComputer", Prentice-HallofIndia, 8thIndianReprint, 2008.
2. Aho.A.V., Hopcroft.J.E and Ullman.J.D, "The Design and Analysis of Computer Algorithms", Pearson education, 2004. Deitel and Deitel, C how to Program, 7th Eition, Pearson Education, 2013.
3. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Pearson Education, 2015.
4. Yashavant Kanetkar, Understanding Pointers in C, 4th Revised& Updated Edition, Bbp Publications, 2008.

ENDSEMESTEREXAMQUESTIONPAPERPATTERN

Max.Marks:100

ExamDuration:3Hrs.

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

20Marks

PARTB:2 Questions from each unit of internal choice, each carrying16marks

80Marks

SBSB1102	FUNDAMENTALS OF COMPUTER TECHNOLOGY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To understand the basic of computer and working with OS.
- To learn about internet, its types and its applications.
- To understand basics of communication and networks.

UNIT1 INTRODUCTION TO COMPUTERS

9Hrs.

Definition-Characteristics of a computer-Classification of Computers- Basic Anatomy of the Computer- Applications/Uses of Computers in different fields.

UNIT2 INPUT AND OUTPUT DEVICES

9Hrs.

Input devices-Output devices-Data Representation-Programming Languages/Computer Languages-Software: System software-Application software.

UNIT3 DATA COMMUNICATION AND COMPUTER NETWORKS

9Hrs.

Data Communication-Computer Network-The Uses of a Network-Types of Networks-Network Topologies-Transmission Media: Guided Transmission Media- Wireless Transmission.

UNIT4 INTERNET AND ITS APPLICATIONS

9Hrs.

History of Internet- Uses of Internet- Advantages of Internet - ISP - Internet Services - IP Address - Web Browser - URL - DNS - Internet Explorer - Types of Internet Connections - E-mail - Search Engine.

UNIT5 OPERATING SYSTEM

9Hrs.

Evolution of Operating Systems-Function of Operating System-Classification of Operating system-Example of Operating System- DOS- Windows-UNIX- Linux.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1-Converse in basic computer terminology
- CO2-Apply algorithmic reasoning to a variety of computational problems
- CO3-Solve basic computation problems
- CO4-Formulate opinions about the impact of computers in society
- CO5-Possess the knowledge of basic hardware peripherals
- CO6-Describe the use of internet and its applications

TEXT/REFERENCE BOOKS

1. Alex Leon and Methews Leon "Fundamentals of information Technology" Vikas Publishing House Pvt.Ltd.
2. Introduction to Information Technology, P.Rizwan Ahmed, Second Edition, Margham Publications, 2016.
3. Introduction to Information Technology, Pelin Aksoy, Leura De Nardis, Cengage Learning India Pvt.Ltd.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max.Marks:100

Exam Duration:3Hrs.

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

20Marks

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

80Marks

SBSB1201	DATABASE MANAGEMENTSYSTEM	L	T	P	EL	C	Total Marks
		3	0	0	0	3	100

COURSEOBJECTIVES

- 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

UNIT1

9Hrs.

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

UNIT2

9Hrs.

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.

UNIT3

9Hrs.

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

UNIT4

9Hrs.

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

UNIT5

9Hrs.

Transaction processing concepts - Concurrencycontrol techniques- Database recovery techniques- Database securityand Authorization. Introduction to Emerging Database Technologies and Application

Max.45Hrs.

COURSEOUTCOMES

On completion of the course, student will be able to

CO1-Design ER- model store presents implement database application scenarios

CO2-Ability to understand and design data modelling using Entity-Relationship model

CO3-Implement SQL to abroad range of query and data update problems

CO4-Articulate socio-economic applications of distributed databases and use database recovery mechanisms

CO5-Familiarize with data warehousing and datamining applications

CO6-Apply Normalization techniques to normalize and improve the data base design

TEXT/REFERENCEBOOKS

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&Johannes Gehrke,Database 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.
7. http://nptel.iitm.ac.in/courses/IIT-MADRAS/Intro_to_Database_Systems_Design/index.php

END SEMESTER EXAM QUESTION PAPER PATTERN

Max.Marks:100

Exam Duration:3Hrs.

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

20Marks

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

80Marks

SBSB1202	DIGITAL COMPUTER FUNDAMENTALS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

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

UNIT1

9Hrs.

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

UNIT2

9Hrs.

Boolean Algebra - Axioms - Truth table simplification of Boolean function - Canonical and Standard forms: Sum of product, Product of Sum, Minterm-Canonical Sum of product Expression: Maxterm - Canonical Sum of product Expression: -Map method (up to 4 Variables).

UNIT3

9Hrs.

Combinational logic - Adders - Subtractors - Decoders - Encoders - Multiplexer - Demultiplexer -- Memory Unit ROM and RAM: SRAM and DRAM.

UNIT4

9Hrs.

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

UNIT5

9Hrs.

Application of Digital Circuit: Mobile phones, Calculator, Digital Computer, Smart Card, Radio and Sensors- Digital Design of ALU - Design of Status Register- Design of accumulator

Max.45Hrs.

COURSE OUTCOMES

- CO1-To Understand the concept to 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.MorrisMano, "Computer System Architecture", Pearson Education, 2008.
2. Carter Nicholas, "Computer Architecture", Schaunoutline Sevies, Tata McGraw-Hill, 2008.
3. J.P.Hayes, "Computer Architecture & Organization", Tata McGraw Hill
4. Leach.D.P & Malvino.A.P, (2002), "Digital Principles and Applications", Fifth Edition, TMH. (UNIT I, II, III)
5. MorisMano.M, (2001), "Digital Logic and Computer Design", Fourth Edition,
6. Ananthi Shashasaayee, Sheshasaayee.J.G, (2003), "Digital Logic Fundamentals", First Edition, Margham Publications

END SEMESTER EXAM QUESTION PAPER PATTERN

Max.Marks:100

Exam Duration:3Hrs.

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

20Marks

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

80Mark

SBSB1306	DATA FOUNDATION	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To acquire knowledge on Data science and its Foundations.
- To explore about the various data process and evaluation methods.
- To understand distinct analysis tools and practice ethical decision and actions.

UNIT 1 INTRODUCTION

9 Hrs.

Overview of Data: Definition - Types of data - Quantitative and Qualitative (Nominal, Ordinal, Discrete and Continuous) Big Data: **Structured, Unstructured and semi-structured** - **Metadata: Concepts of metadata** - Types of metadata - Uses Data Source: Enterprise Data Source, Social Media Data Source, Public Data Source - Web Scrapping- Basic Concepts of Data Warehouse and Data Mining - Distributed File System.

UNIT 2 DATA PROCESS OVERVIEW

9 Hrs.

Defining Goals- **Data Acquisition** - Sources of acquiring the data - **Data preprocessing- Imputation of Missing values** - **Data cleaning**- Data Reduction, **Data Transformation** and Data Discretization. **Exploratory Data Analysis (EDA)** - Philosophy of EDA - The Data Science Process. Significance of EDA in data science - Basic tools (**plots, graphs and summary statistics**) of EDA.

UNIT 3 DATA ORGANIZATION

9 Hrs.

Data Structures: Basics - stack, Queue, Linked List, Tree, Graph - Data Organizational Models- Centralized Model-Embedded Model- Hybrid Model-The Three-Layered structure-Centre of Excellence Model - Roles and Responsibilities- Data Governance- Data Privacy-Data Quality- Data Extraction- Extraction and **ETL(Extract,Load,Transform)**-Types- Physical -Logical-Data extraction with SQL.

UNIT 4 DATA ANALYSIS AND VISUALIZATION

9 Hrs.

Spreadsheets: Data Manipulations- Sort, filter, remove duplicates-text and math functions-pivot table-lookup functions-Data visualizations for quantitative and qualitative data- charts-Excel Modelling-forecast models using advanced lookup and data validation tools.Tableau: Creating Visualizations in Tableau-Data hierarchies, filters, groups, sets, calculated fields-Map based visualizations-Build interactive dashboards-Data Stories.

UNIT 5 ETHICS AND RECENT TRENDS

9 Hrs.

Data and Business Insights- Data Science Engineering: - Need of Data Science - **Ethics** - Doing good data science - **Natural Language Processing** - **Machine Learning Model- Valuing Data privacy** - Getting **informed consent** - The Five Cs - Diversity - Inclusion - Future Trends.

Max.45 Hrs.

COURSE OUTCOMES

- CO1 - Explore the fundamental concepts of Data science.
- CO2 - Understand Data Science Process and Tools of EDA.
- CO3 - Address how Organizational structure's influence efficiency and effectiveness.
- CO4 - Analyse and Validate data using Spreadsheets and Tableau.
- CO5 - Think through the ethics incorporating privacy, data sharing and decision-making.
- CO6 - Build interactive dashboards for Business.

TEXT / REFERENCEBOOKS

1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016.
2. Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018.
3. Introduction to Machine Learning with Python-A Guide for Data Scientists, by Andreas C. Mueller, Sarah Guido, O'Reilly; 1st edition, October 2016.
4. Getting Started with Tableau 2019.2 (Second Edition), Tristan Guillevin, Packt Publishing; 2nd edition June, 2019.

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**

SBSB1302	COMPUTER ARCHITECTURE	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To impart knowledge on various types of Registers and Microinstructions.
- To discuss about the Data path design and Process or design in detail.
- To understand the types of memory organizations.

UNIT1

9Hrs.

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.

UNIT2

9Hrs.

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

UNIT3

9Hrs.

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

UNIT4

9Hrs.

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

UNIT5

9Hrs.

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 interprocessor 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

Exam Duration:3Hrs.

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

20Marks

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

80Marks

SBSB1303	OPERATING SYSTEMS	L	T	P	EL	Credits	Total Marks
		3	0	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.

UNIT1 INTRODUCTION TO OPERATING SYSTEM

9Hrs.

Introduction: Basic of Operating system - Views and Goals - Types of System - OS Structure - Components - Services - System Structure - Layered Approach - Process Management Introduction to Process - Process State- PCB- Process Scheduling - Cooperating Process - Thread- Inter process Communication.

UNIT2 OS SCHEDULING

9Hrs.

CPU Scheduling: Introduction types of CPU Schedulers - Scheduling Criteria - Scheduling Algorithms- FCFS Scheduling- SJF Scheduling- Priority Scheduling- Round Robin Scheduling- Multilevel Queue Scheduling- Data Dead lock- Basic concept of dead lock prevention - Deadlock Avoidance- Dead lock Detection and Memory.

UNIT3 MEMORY MANAGEMENT

9Hrs.

Basic Concept of Memory Address - Binding logical - Physical Address Space - Memory Allocation - Production Fragmentation and Compaction.

UNIT4 SWAPPING

9Hrs.

Using bits maps- using linked list Paging- Mapping of pages to frames- Hierarchical page tables- Segmentation Virtual Memory demand paging- Transaction look a side Buffer (TLB)- Inverted page table- Page replacement algorithms.

UNIT5 FILE MANAGEMENT

9Hrs.

File System: Basic Concepts of Files - Access Methods - Directory Structures - Protection Consistency Semantics - File System Structures - Allocation Methods - Various Disk Scheduling Algorithm. Free Space Management.

Max.45Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

- 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 implementation file system such as FAT.

TEXT/REFERENCE BOOK

1. Silberschatz P.B.Galvin, Gange., Operating System Concepts, 6th Edition., Addison-Wesley Publishing Co., 2002.
2. William Stallings, Operating Systems, Fourth Edition, PHI.
3. Andrew S. Tanenbaum, Operating Systems: Design and Implementation, Third Edition,

END SEMESTER EXAM QUESTION PAPER PATTERN

Max.Marks:100

Exam Duration:3Hrs.

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

20Marks

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

80Marks

SBSB1304	DATA MINING AND DATA WAREHOUSING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To understand the overall architecture of a data warehouse and techniques and methods for data gathering and data pre-processing
- Identify the scope and necessity of Data Mining & Warehousing for the society.
- Describe various Data Models and Design Methodologies of Data Warehousing destined to solve the root problems.

UNIT1

9Hrs.

Introduction To Data Warehouse- A Multidimensional Data Model - Data Warehouse architecture- Efficient Methods for Data Cube Computation- Further Development of Data Cube and OLAP Technology- Attribute-Oriented Induction. Introduction to Data Mining- Data Mining Functionalities- Classification of Data Mining systems, Major issues in Data mining- Data preprocessing- Data cleaning- Data integration and Transformation.

UNIT2

9Hrs.

Data mining primitives: Task-relevant data-kind of knowledge to be mined- Background knowledge- interestingness measures- presentation.

UNIT3

9Hrs.

Visualization of discovered pattern- Data Mining Query language- Designing Graphical User interfaces based on DMQL - Architecture of Data mining. Basic concepts - market basket analysis - Mining single dimensional Boolean association rules from transactional databases. Classification & prediction: What's classification- issues regarding classification and prediction- Bayesian classification- prediction: linear- non linear.

UNIT4

9Hrs.

Types of Data in cluster analysis - Major clustering methods. Data mining applications- Clustering High Dimensional Data, Outlier Analysis. Mining Streams, Time-Series, And Sequence Data Mining Data Streams, Mining Time-Series Data, and Mining Sequence Patterns in Transactional Databases and Biological Data.

UNIT5

9Hrs.

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Max.45Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Assess Raw Input Data and process it to provide suitable input for a range of data mining algorithm.

CO2- Design and Modelling of Data Warehouse.

CO3- Discover interesting pattern from large amount of data **CO4-**

Design and Deploy appropriate Classification Techniques **CO5-**

Able to cluster high dimensional Data

CO6- Apply suitable data mining techniques for various real time applications

TEXT/REFERENCEBOOKS

1. Jiawei Han & Micheline Kamber, Data Mining- Concepts and Techniques-2nd Edition- Morgan Kaufmann Publishers, 2006.
2. Immon.W.H., Building the Data Warehouse, Wiley Dream Tech, 3rd Edition, 2003.
3. Anahory S., Murray, D, Data Warehousing in the Real World, 1st Edition, Addison Wesley, 1997.
4. Arun K Pujari, Data Mining Techniques, 2nd edition, Universities Press.
5. Sam Anahory & Dennis Murray, Data Warehousing in the Real World- Pearson Edn Asia. K.P.Soman, S.Diwakar, V.Ajay, Insight into Data Mining, PHI, 2008.

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

SBSB1401	PYTHON PROGRAMMING	L	T	P	EL	Credits	Total Marks
		2	0	0	3	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

UNIT1

9Hrs.

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

UNIT2

9Hrs.

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiersandkeywords,Literals,Strings,Operators(Arithmeticoperator,Relationaloperator,Logicalor Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

UNIT3

9Hrs.

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.

UNIT4

9Hrs.

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.

UNIT5

9Hrs.

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

Max.45Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

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, ISBN: 9781111822705

END SEMESTER EXAM QUESTION PAPER PATTERN

Max.Marks:100

Exam Duration:3Hrs.

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

20Marks

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

80Marks

SBSB1406	QUANTUM COMPUTING	L	T	P	EL	C	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To introduce the basics of Quantum Computing
- To understand Quantum state transformation and classical computation versions
- To know various Quantum Computation Algorithms.

UNIT 1 QUANTUM BUILDING BLOCKS-I

9 Hrs.

Introduction - Single Qubit Quantum Systems - Multiple Qubit Systems.

UNIT 2 QUANTUM BUILDING BLOCKS-2

9 Hrs.

Measurement of multiple Qubit Systems-Quantum State Transformations-Quantum versions of Classical Computations.

UNIT 3 BASIC ALGEBRA FOR QUANTUM ALGORITHMS

9 Hrs.

Introduction-Numbers and Strings-Basic linear algebra-Boolean Functions, Quantum, Bits and Feasibility, Special Matrices, Tricks.

UNIT 4 QUANTUM ALGORITHMS

9 Hrs.

Phil's algorithm, Deutsch's algorithm, Jozsa Algorithms, Simon's Algorithm, Shor's Algorithms, Grover's Algorithms.

UNIT 5 ENTANGLED SUBSYSTEMS AND ROBUST QUANTUM COMPUTATIONS

9 Hrs.

Quantum subsystems and properties of entangled states-Quantum error correction-Fault tolerance and Robust.

Max. 45 Hrs.

COURSE OUTCOMES

- CO1 - An ability to identify, analyse Quantum Building Blocks.
- CO2 - Know Quantum state transformations.
- CO3 - Identify the advantages and limitations of some Quantum Computation Algorithms
- CO4 - Apply advanced quantum computation algorithms
- CO5 - Proficiency on the concepts of robust computation and error correction
- CO6 - Analyze error correction mechanisms

TEXT / REFERENCE BOOKS

1. Quantum Computing A Gentle Introduction, Eleanor Rieffel and Wolfgang Polak, The MIT Press Cambridge, Massachusetts London.
2. Quantum Algorithms Via Linear Algebra, Richard J. Lipton, Kenneth W. Regan, The MIT Press Cambridge, Massachusetts London, England, 2014.
3. Quantum Computing Devices: Principles, Designs And Analysis, Goong Chen, David A. Church, Berthold-Georg Englert, Carsten Henkel, Bernd Rohwedder, Marlan O. Scully, M. Suhail Zubairy, Chapman and Hall/CRC.

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

SBSB1403	DATA STRUCTURES	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- It focuses on how to organize data form or 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.

UNIT1**9Hrs.**

Arrays-LinkedList-SingleLinkedList-InsertionandDeletion-DoublyLinkedList.-CircularLinkedList - Stack-Queues- Array implementation of a Stack and queue - Linked List implementation of a Stack and Queue- Priority Queues.

UNIT2**9Hrs.**

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

UNIT3**9Hrs.**

TreeStructures: 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.

UNIT4**9Hrs.**

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

UNIT5**9Hrs.**

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

Max.45Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1**-Understandtheconceptofrecursivealgorithms.
- CO2**-Demonstratethedifferenttypesofdatastructures.
- CO3**-Abletounderstandtheoperationsonlineardatastructures.
- CO4**-Summarizesearchingandsortingtechniques.
- CO5**-Chooseappropriatedatastructureasappliedtospecifiedproblemdefinition.
- CO6**-Understandandimplementtheapplicationsoflineardatastructures.

TEXT/REFERENCE BOOKS

1. E.Horowitz,S.Sahni,Fundamentals of Data Structures.
2. BhagatSinghandThomasL,IntroductiontoDataStructures,Naps, TMH.
3. Helieman,DataStructures,AlgorithmsandObject-OrientedProgramming.
4. ThomasHCoreman,CharlesELeiserson,RonaldLRivest,IntroductiontoAlgorithms,PHI2002.
5. Jean-PaulTremblay,PaulG.Sorenson,'AnIntroductiontoDataStructureswith Application', TMH,2017.
6. RichardF,Gilberg,Forouzan,"DataStructures",Cengage,2004,2ndEdition.
7. Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Prentice Hall Editin, 2004.
8. ThomasH.Cormen,CharlesE.Leiserson,"IntroductiontoAlgorithms",3rdEdition,2010.

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

SBSB1404	CYBER SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To introduce the basic concepts of cyber security
- To acquire knowledge on cyber threats and attacks
- To become aware of significant security technologies and tools

UNIT1 INTRODUCTION TO CYBER SECURITY**9Hrs.**

Introduction - Need for Security - Security Approaches - Principles of Security - Components - Balancing Security & Access - Software Development Life Cycle - Security Systems Development Life Cycle - Security Professionals and the organization.

UNIT2 CYBER SECURITY - THREATS & ATTACKS**9Hrs.**

Threats: Intellectual Property - Software Attacks - Deviations in QoS - Espionage - Forces of Nature - Human Error - Information Extortion - Missing, inadequate or incomplete organization policy and Controls - sabotage - Theft - Hardware Failures - Software Failures - Attacks: Malicious Code - Hoaxes - Back Doors - Password Crack - Brute Force - DoS and DDoS - Spoofing - Man-in-the-Middle - Spam - Email Bombing - Sniffer - Timing Attack.

UNIT3 SECURITY TOOLS & TECHNOLOGIES**9Hrs.**

Firewall and VPNs - Intrusion Detection and Prevention Systems - Other Security Tools - Access Control - Firewalls - Protecting Remote Connections - Intrusion Detection and Prevention Systems - Honeypots, Honeynets and Padded Cell Systems.

UNIT4 CRYPTOGRAPHY**9Hrs.**

Cryptology Terminology - Cipher methods - Cryptographic Algorithms - Cryptographic tools - Attacks on cryptosystems - Physical Security.

UNIT5 PROTOCOLS FOR SECURE COMMUNICATION**9Hrs.**

Basic Concepts - HTTP, SSL & SET - S/MIME, PEM & PGP - WEP, WPA & WPA2 - IPSEC & PGP.

Max. 45Hrs.**COURSE OUTCOME**

On completion of the course, student will be able to

CO1-Understand the basic concepts, need, approaches, principles and components of security.

CO2-Explain the various cyber threats and attacks.

CO3-Describe the various Security Technologies and Tools

CO4-Explain the basic principles of cryptography and algorithms.

CO5-Examine the various protocols for secure communication.

CO6-Explore the significant aspects of cyber security.

TEXT/REFERENCE BOOKS

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", CENGAGE Learning, 4th Edition.
2. William Stallings, "Cryptography and Network Security - Principles and Practice", Pearson Education, 7th Edition.
3. Atul Kahate, "Cryptography and Network Security", McGraw Hill, 4th Edition.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3Hrs.**

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

SBSBLH51	FULL STACK WEBDEVELOPMENT	L	T	P	EL	Credits	Total Marks
		2	0	4	0	4	100

COURSE OBJECTIVES

- To provide knowledge of languages ,frameworks, and tools to create interactive and engaging websites
- To provide basic design principles to presentide as,information,products,and serviceson websites
- To induce basic programming principles to the construction of websites

UNIT1

9Hrs.

Introduction to Dynamic Web Content-Three-tier architecture-architecture for client-server applications- Introduction to HTML5-Elements, Tags and Attributes- Formatting Tags - Styles - List, Table, Phrase- Embedding Audio and Video - Block elementsand Layouts- Forms -The HTML5 Canvas.

Practice:

1. WriteanHTMLdocumentwithanexampleofOrderedListandUnorderedList.
2. WriteanHTMLdocumentwithanexampleofTableformattoprintyourBio-Data.

UNIT2

9Hrs.

Introductions to CSS-Box Modeland Text properties- Font and Display Properties- Floatand Overflow- Link - List - Table- Forms- Web Layout- Accessing CSS from JavaScript- Expressions and Control Flow in JavaScript-JavaScript Functions, Objects, and Arrays- Event and Event Listeners - Closure- Classes - Fetch API.

Practice:

1. Createalloginformwithverificationandvalidations
2. Createasimplewebpagewithwebsitevisitorcounter

UNIT3

9Hrs.

Introduction to PHP. -Expressionsand ControlFlow in PHP. -PHP Functions and Objects-PHP Arrays- GET, POST variables- Embedding PHP-PHP and MySQL

Practice:

1. WriteaPHPscriptto:-
2. a)transformastringalluppercaseletters
b)transformastringalllowercaseletters.
3. WriteaPHPscripttoremovecomma(s)fromthefollowingnumericstring
4. WriteaPHPscripttoremovepartofastring

UNIT4

9Hrs.

IntroductiontoAngularJS.-AngularJS-Overview-EnvironmentSetup-MVCArchitecture-Directives- Expressions- Controllers - Filters - Tables- Animations

Practice:

1. CreateaweatherApplication
2. Createasoundnoteapplication

UNIT5

9Hrs.

HTMLDOM -Modules-Forms - Includes - AJAX - Views -Scopes -Services-DependencyInjection -Custom Directives - Fetching Data from a PHP Server Running MySQL

1. CreateaprogramusingPHPandMySQL
 - a. StudentInformationSystem
 - b. PayrollSystem
 - c. InventoryManagementSystem

COURSE OUTCOME

On the completion of the course, students will be able to

CO1-Understand and develop HTML applications

CO2-Design and style webpage using CSS

CO3-Design webpage to perform form validation using client-side scripting language

CO4-Implement new technologies such as AngularJS

CO5-Develop web applications using server-side scripting language..

CO6-Understand the differences between usability and user experience.

SBSB1505	DATA MANAGEMENT IN CLOUD	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To understand manage data across cloud platforms, either with or instead of on-premises storage
- To understand data storage tier for disaster recovery, backup, and long-term archiving
- Data prepared by vendor, delivered ready to use
- Can be integrated into larger data set to increase analytic validity

UNIT 1 DISTRIBUTED DATABASE

Distributed database concepts, Data fragmentation, Replication, Structure of Distributed Data base, Trade-offs in Distributing the Data base, Advantages and Disadvantages of Data Distribution, Allocation techniques for Distributed Database Design, Design of Distributed Database.

UNIT 2 CLOUD DATA MANAGEMENT

Data as a service (Daas)- Data location-Data control- Securing data for transport, Scalability and Cloud services- Large scale data processing- Data bases and Data stores- Data archival- Data quality- Data security.

UNIT 3 DATA MANAGEMENT-AS-A-SERVICE

Data Management Essentials, Meta Data, Auto-tiered storage, Single instance storage, Time-indexed Data system, Data management challenges, Case study, Fast and secure enterprise cloud backup, Cloud disaster recovery, Bounce back with cloud disaster recovery.

UNIT 4 OPEN SOURCE CLOUD SYSTEM

Server virtualization techniques- Big Data processing frameworks (e.g. Apache Hadoop, Spark and Spark streaming)- Map reduce programming model and their applications. Cloud Computing and Big Data- Efficient cloud resource management- Performance control- Energy Efficiency

UNIT 5 INFORMATION STORAGE IN CLOUD COMPUTING

Storage as a Service, Storage providers- Amazon simple storage service- Nirvanix- Google Bigtable datastore, MobileMe-Live mesh, Storage security, Merits and Demerits of storage. Cloud computing for storing IOT data, AWS IOT-data, Google cloud, IOT technology and tool- MapReduce/Hadoop. In-Database Analytics, MADlib and advanced SQL tools.

COURSE OUTCOMES

- CO1 - Able to Design and handle Distributed database in cloud computing environment.
- CO2 - Able to manage cloud database and apply distributed database with DaaS cloud
- CO3 - Analyze DaaS for Fast and secure enterprise cloud backup, Recovery
- CO4 - Design Cloud server environment/ setup for implement Apache Hadoop, Spark and Spark Streaming to manage cloud big data
- CO5 - Design and can be able to use cloud storage services, servers.
- CO6 - Evaluate cloud storage for storing IoT data at cloud computing environment

TEXT / REFERENCE BOOKS

1. Data Management in the Cloud: Challenges and Opportunitis, Divyakant Agarwal, Sudipto Das, and Amr EL Abbadi, Morgan & Claypool Publishers, 2013
2. Cloud Data Management and Storage A Standards-Based Approach, Mark Carlson, McGraw-Hill Osborne Media; 1 edition (September 5, 2013)
3. <https://blog.panoply.io/data-management-concepts-and-techniques-in-a-cloud-based-world>
4. <https://vilmate.com/blog/data-management-in-cloud-computing-best-practices-challenges-trends/>
5. <https://www.networkworld.com/article/3290240/the-5-pillars-of-cloud-data-management.html>
6. <https://www.druva.com/blog/how-the-cloud-impacts-data-management/>
7. https://link.springer.com/chapter/10.1007/978-3-642-12038-1_1#citeas
8. <https://www.rocketsource.co/blog/data-as-a-service/>

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**

SBSB1502	FUNDAMENTALS OF MICROPROCESSOR	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- The prime objective of this course is to introduce to the students the fundamentals of Microprocessor Microcontroller and Arduino.
- The students will be equipped with the basic knowledge of microprocessor, microcontroller, and Arduino
- The students will have the knowledge of interfacing microprocessor, microcontroller, Arduino and their applications.

UNIT1 INTRODUCTION TO INTEL 8085**9Hrs.**

Evolution of Microprocessor-Architecture of 8085-Instruction format-Addressing modes-Basic timing diagram of opcode fetch, memory read, memory write I/O read and I/O write- Interrupts of 8085-Software interrupts, Hardware interrupts, Priorities of interrupts 8085 based system design.

UNIT2 INTEL 8085 INTERFACING**9Hrs.**

Interfacing devices-8255 Programmable Peripherals Interface-Architecture & various modes of operation- 8251 USART Architecture and programming features-8237, interfacing with ADC and DAC, LCD, keyboard Interface. Application: Stepper Motor Control, Temperature Control.

UNIT3 INTRODUCTION TO 8051**9Hrs.**

Introduction to 8-bit Microcontrollers - 8051/8051, Microcontroller Architecture - Internal RAM & Internal ROM, Instruction set, Addressing Modes, Simple programs.

UNIT4 INTERNAL PERIPHERALS OF 8051**9Hrs.**

Modes of Timer/Counter operation - Serial Port operation & Modes - Interrupt Structure of 8051 - Memory Interfacing with 8051- I/O ports- Input and output devices interfacing with 8051.

UNIT5 ARDUINO UNO**9Hrs.**

Arduino - Architecture, Pin diagram, Programming Structure, Simple program to blink LED, Subroutine, 16x2 LED display, interfacing with Arduino: LCD, Temperature Sensor, Humidity Sensor and ultrasonic sensor.

Max. 45Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

CO1-Understanding architectural principle of 8085 & 8051.

CO2-Interpret the various peripheral devices with 8085 & 8051 microprocessor

CO3-Design and implement programs on 8051 microprocessors.

CO4-Examine various I/O devices with 8051 microcontrollers

CO5-Apply Arduino code and how to interface various sensors with the Arduino Board.

CO6-Implement the interface circuit with various sensor and I/O devices with microprocessor and microcontroller and Arduino Board.

TEXT/REFERENCE BOOKS

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming, and application with 8085, 4th Edition, Penram International Publishing, New Delhi, 2000.
2. Kenneth J. Ayala, 8051 Microcontroller, Thomson, 2005.
3. Charles M. Gilmore, Microprocessor Principle and Application, McGraw Hill Publication, 1995.
4. Nagoor Kani A., Microprocessor & Microcontroller, Tata McGraw Hill, 3rd Edition, 2012.
5. Ram B., Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai Publications, 2001.
6. Michael McRoberts, beginning Arduino, 2nd Edition, 2013.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3Hrs.****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**

SBSB1604	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To explore the aspects of classic and public key cryptography.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To become aware of system security components.

UNIT 1 INTRODUCTION**9 Hrs.**

Basic Concepts - Security Architecture, Attacks, Services, Mechanisms, Model - Cryptography Basics - Symmetric Ciphers- Transposition, Substitution, Rotor Machines - Block Cipher - Data Encryption Standard - Confidentiality using Symmetric Encryption.

UNIT 2 PUBLIC KEY CRYPTOGRAPHY**9 Hrs.**

Principles - RSA algorithm - Key Management - Diffie Hellman Key Exchange - Message Authentication - Requirements, Functions, Message Authentication - Hash Functions - Digital Signatures - Authentication Protocols.

UNIT 3 SYSTEM SECURITY**9 Hrs.**

Intruders - Detection - Password Management - Malicious Software - Virus - Countermeasures - Distributed Denial of Service Attacks - Firewalls - Design Principles - Trusted Systems.

UNIT 4 OPERATIONS AND PHYSICAL SECURITY**9 Hrs.**

Origin - Process - Laws - Physical Security - Controls - Protecting People - Protecting Data - Protecting Equipment.

UNIT 5 APPLICATION SECURITY**9 Hrs.**

Software Development Vulnerabilities - Buffer Overflow - Race Condition - Web Security - Database Security - Tools.

Max. 45 Hrs**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1** - Identify the basics of cryptography.
- CO2** - Provide security of the data over the network.
- CO3** - Explore the aspects of system security.
- CO4** - Illustrate operations and physical security aspects.

CO5 - Analyze the vulnerabilities in any computing system and hence be able to design a security solution.

CO6 - Design and implement secure applications.

TEXT / REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security", 4th Edition, Pearson, 2009.
2. Jason Andress, Steven Winterfeld, "The Basics of Information Security", 2nd Edition, Elsevier, 2014.
3. Harold F.Tipton, Micki Krause Nozaki, "Information Security Management Handbook", 6th Edition, Vol.5, CRC Press, 2012.
4. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw-Hill, 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**

SBSB1602	SOCIETY 5.0	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSEOBJECTIVE

- To understand the society5.0, Cyberspace And Physical Space to solve
- To Provide knowledge and overview about Bigdata, IoT and Artificial Intelligence for Society 5.0.
- Discuss To understand Augmented Reality and Virtual Reality, Next Generation Sensors

UNIT1 INTRODUCTIONTOSOCIETY5.0**9Hrs.**

Introduction -Schema of society 5.0-Characteristics of Society 5.0. Introduction to communication technologies: Artificial Intelligence - robotics - 3D Printing. People: Centric Society -Knowledge Sharing-Physicalspace-Cyberspace-HumanityVSSociety5.0-ElementsofSociety5.0-DataDrivento Society-Modeling real world Issues.

UNIT2 EMERGINGTECHNOLOGIESWITHSOCIETY5.0**9Hrs.**

Introduction to Big Data -Issuesand Challengesin the traditional systems-Intelligent Data Analysis- Big Data Storage Statistical Concepts: Sampling Distributions - Re-Sampling - Prediction Error - Random Sampling- Artificial Intelligence - - Foundations of AI - Intelligent agent - Types of agents - Structure - Problem solving agents-Internet of Things- Introduction to IoT- Basic Architecture of an IoT, From M2M to IoT, M2M towards IoT-Robotics- Robotics system components - Robot classification Coordinate frames- degree of freedom - dynamic stabilization of robots.

UNIT3 INTRODUCTIONTOINDUSTRY4.0**9Hrs.**

Introduction-Globalization and Emerging Issues, LEAN Production Systems, Smart and Connected Business Perspective, Cyber Physical Systems and Next Generation Sensors, Augmented Reality and VirtualReality, Artificial Intelligence, BigData and Advanced Analysis- An emerging industrialstructurefor IoT -Cyber security in Industry 4.0-Basics of Industrial IoT. Common Issues in Industry 4.0 and Society 5.0.

UNIT4 CHALLENGESANDTECHNOLOGIESTOWARDSSOCIETY5.0**9Hrs.**

Overcome with Economic Development and Solution to Social Problems in Society 5.0- Security of Cyber Physical Systems -Embedded and CPS security - attacks and countermeasures, authentication, identification, confidentiality, data integrity, authorization, access control, malware attacks and counter measures, security protocols-Social Issues in Society5.0-human-centeredociety (Society5.0)- Sustainable Development Goals-Economic Advancement-Resolution to Social Problems..

UNIT5 INNOVATIONWITHFUTURETRENDSWITHAPPLICATIONS**9Hrs.**

Mobility-HealthCare-Agriculture-FoodProducts-DisasterPrevention.

Max.45Hrs.**COURSEOUTCOMES**

- CO1-**Able to understand the Social Problems by A System That Highly Integrates Cyber space and Physical Space to solve
- CO2-** Ability to get skills For Economic Development and A Human-Cantered Society That Balances Economic Advancement
- CO3-**Achieve A High Degree of Convergence Between Cyberspace (Virtual Space) And Physical Space (Real Space)
- CO4-**Able to Use Of Emerging Technologies With Society 5.0 To Achieve The More Production / Avoid Loss Of Productions
- CO5-**Able Internet and IoT, Bigdata for production lines to be adaptive, intelligent, and flexible enough to meet the updated requests.
- CO6-**Design and apply in Health Care, Agriculture, FoodProducts,DisasterPrevention

TEXT/REFERENCEBOOKS

1. Society 5.0 A People-Centric Super-Smart Society, Hitachi-Utokyo Laboratory, Springer, 2020.
2. Society 5.0 Industry of the Future Technologies Methods and Tools By Bruno Salgues, Wiley, 2018
3. Stuart J. Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2009.
4. The Internet of Things: Applications and Protocols, Wiley publications. Author(s): Oliver Hersent, David Boswarthick, Omar Elloumi., 2012.
5. McKerrow P.J. "Introduction to Robotics", Addison Wesley, USA, 1991.

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

