SOPHIA COLLEGE FOR WOMEN (AUTONOMOUS)

Affiliated to

UNIVERSITY OF MUMBAI

Programme: Information Technology

Programme Code: SBTTEC

S.Y.B.Sc. I.T.
2019-20

(Choice Based Credit System with effect from the year 2018-19)

Programme Outline: SYBScIT (SEMESTER III)

SEMESTER – 3			
COURSE CODE	**UNIT NO**	**COURSE TITLE**	**CREDITS**
SBTTEC301		**PYTHON PROGRAMMING**	2
	1	Introduction ,variables, expressions, conditional statements, looping and control statements	
	2	Functions, strings	
	3	Lists, Tuples, Dictionaries and files Exceptions	
	4	Regular expressions, classes and objects, multithreaded programming	
	5	GUI Forms, Widgets, Layout, Look and feel, MySQL database	
SBTTEC302		**DATA STRUCTURES**	2
	1	Introduction and array	
	2	Linked list	
	3	Stack and queue	
	4	Sorting, searching, tree and advance tree	
	5	Hashing and graph	
SBTTEC303		**COMPUTER NETWORKS**	2
	1	Introduction, network models, introduction to physical layer, digital and analog transmission	
	2	Bandwidth utilization, multiplexing , transmission media, switching , introduction to data link layer	
	3	Data link, media access control, wireless lan and virtual lan	
	4	Network layer, unicast routing and Next generation IP	
	5	Introduction to the Transport Layer, Standard Client0Server Protocols	
SBTTEC304		**DATABASE MANAGEMENT SYSTEMS**	2
	1	Introduction to Databases and Transactions , Data Models, Database Design, ER	2

		Diagram andUnified Modeling Language	
	2	Relational database model: Relational Algebra and Calculus	
	3	Constraints, Views and SQL	
	4	Transaction management and Concurrency	
	5	PL-SQL	
SBTTEC305		**APPLIED MATHEMATICS**	2
	1	Matrices, Complex Numbers:	
	2	Equation of the first order and of the first degree, Differential equation of the first order of a degree higher than the first, Linear Differential Equations with Constant Coefficients	
	3	The Laplace Transform, Inverse Laplace Transform	
	4	Multiple Integrals, Applications of integration	
	5	Beta and Gamma Functions, Differentiation Under the Integral Sign Error Functions	
SBTTECP301		PYTHON PROGRAMMING PRACTICAL	2
SBTTECP302		DATA STRUCTURES PRACTICAL	2
SBTTECP303		COMPUTER NETWORKS PRACTICAL	2
SBTTECP304		DATABASE MANAGEMENT SYSTEMS PRACTICAL	2
SBTTECP305		MOBILE PROGRAMMING PRACTICAL	2
		Total Credits	**20**

Programme Outline: SYBScIT (SEMESTER IV)

SEMESTER – IV			
COURSE CODE	**UNIT NO**	**COURSE TITLE**	**CREDITS**
SBTTEC401		CORE JAVA	2
	1	Introduction and Data types	
	2	Control Flow Statements, Iterations, Classes	
	3	Inheritance and Packages	
	4	Enumerations, Arrays, Multithreading, Exceptions and Byte streams	
	5	Event Handling, Abstract Window Toolkit, Layouts	
SBTTEC402		INTRODUCTION TO EMBEDDED SYSTEMS	2
	1	Introduction, Core of embedded systems, Characteristics and quality attributes of embedded systems	
	2	Embedded Systems – Application and Domain Specific, Embedded Hardware and Peripherals	
	3	The 8051 Microcontrollers, 8051 Programming in C	
	4	Designing Embedded System with 8051 Microcontroller and Programming embedded systems	
	5	Real Time Operating System (RTOS) and Design and Development	
SBTTEC403		COMPUTER ORIENTED STATISTICAL TECHNIQUES	2
	1	The Mean, Median, Mode, and Other Measures of Central Tendency, The Standard Deviation and Other Measures of Dispersion, Introduction to R	
	2	Moments, Skewness, and Kurtosis, Elementary Probability Theory and Elementary Sampling Theory	

	3	Statistical Estimation Theory, Statistical Decision Theory and Statistics in R	
	4	Small Sampling Theory and The Chi-Square Test	
	5	Curve Fitting and the Method of Least Squares and Correlation Theory	
SBTTEC404		SOFTWARE ENGINEERING	2
	1	Introduction and Software Requirements, Software Processes, Software Development Process Models, Agile software development	
	2	Socio-technical system, Critical system, Requirements Engineering Processes, System Models	
	3	Architectural Design, User Interface Design, Project Management And Quality Management	
	4	Verification and Validation, Software Measurement and Software Cost Estimation	
	5	Process Improvement, Service Oriented Software Engineering, Software reuse, Distributed software engineering	
SBTTEC405		COMPUTER GRAPHICS AND ANIMATION	2
	1	Introduction to Computer Graphics, Scan conversion	
	2	Two-Dimensional Transformations and Three-Dimensional Transformations	
	3	Viewing in 3D , Light, color	
	4	Visible-Surface Determination, Plane Curves and Surfaces	
	5	Computer Animation and Image Manipulation and Storage	
SBTTECP401	1	CORE JAVA PRACTICAL	2
SBTTECP402	2	INTRODUCTION TO EMBEDDED SYSTEMS PRACTICAL	2
SBTTECP403	3	COMPUTER ORIENTED	2

		STATISTICAL TECHNIQUES	
SBTTECP404	4	SOFTWARE ENGINEERING PRACTICAL	2
SBTTECP405	5	COMPUTER GRAPHICS AND ANIMATION	2
		Total Credits	**20**

Preamble:

Information Technology (IT) refers to the use, development, and management of computer systems, software, and networks to process, store, retrieve, and exchange information. It encompasses a broad range of technologies and practices aimed at solving problems, improving efficiency, and enabling communication within and between organizations and individuals.

In an era marked by rapid digital transformation and technological advancements, our program is designed to equip students with a comprehensive understanding of the foundational and emerging concepts in Information Technology.

Our BSc IT curriculum integrates theoretical knowledge with practical skills, preparing students to tackle real-world challenges and excel in a diverse range of IT careers. Through a combination of rigorous coursework, industry-relevant projects, and learning experiences, we aim to develop well-rounded professionals who are adept at problem-solving and equipped with the tools to drive technological innovation.

PROGRAMME OBJECTIVES

PO 1	To think analytically and creatively in developing robust, extensible and maintainable technological solutions to simple and complex problems.
PO 2	To work effectively as a part of a team to achieve a common stated goal.
PO 3	To imbibe quality software development practices.
PO 4	To apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related post graduate programmes.
PO 5	To communicate effectively with a range of audiences both technical and non-technical.

PROGRAMME SPECIFIC OUTCOMES

PSO 1	The Learner will be able to demonstrate a strong understanding of fundamental concepts in information technology including programming, databases, networking, and software engineering principles.
PSO 2	The Learner will be able to apply technical skills in software development, system analysis, and design using contemporary tools and technologies.
PSO 3	The Learner will able to have proficiency in identifying, formulating, and solving IT-related problems using appropriate techniques, algorithms, and methodologies.

PSO 4	The Learner will be able to have understanding of project management principles and methodologies relevant to IT projects, including planning, scheduling, and resource management
PSO 5	The Learner will be able to have effective communication skills, both oral and written, necessary for articulating technical concepts and collaborating in a team environment.

Semester – III		
NAMEOF THE COURSE	PYTHON PROGRAMMING	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC301	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	The course aims to train the student to the basic concepts of the Python programming language.
CO 2.	It aims to train the students to understand the concept of conditional statement, loop, nested loop and control statement.
CO 3.	It aims to train the students to understand the concept of function and string.
CO 4.	It aims to train the students to understand the concept List, Tuple and Dictionary in Python.
CO 5.	It aims to train the students to understand the concept Object Oriented Programming Paradigm, Regular Expression and Exception handling.

COURSE LEARNING OUTCOMES:

CLO 1.	Read, understand and trace the execution of programs in Python language.
CLO 2.	Implement the concept of control statements, loops, and functions to write a Python program.
CLO 3.	To develop Programs with concept of List, Tuple and Dictionary in Python.

CLO 4.	To develop Programs with the concept of Object Oriented Programming Paradigm in Python.
CLO 5.	Implement the concept of multithreading and exception handling in Python.

UNIT 1	**INTRODUCTION ,VARIABLES, EXPRESSIONS,CONDITIONAL STATEMENTS, LOOPING AND CONTROL STATEMENTS : (15 LECTURES)**
1.1	**Introduction:** The Python Programming Language, History, features, Installing Python, Running Python program, Debugging : Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces, and Parentheses
1.2	**Variables and Expressions**: Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations.
1.3	**Conditional Statements:** if, if-else, nested if –else
1.4	**Looping**: for, while, nested loops
1.5	**Control statements:** Terminating loops, skipping specific conditions
UNIT 2	**FUNCTIONS, STRINGS :(15 LECTURES)**
2.1	**Functions:** Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions? Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types
2.2	**Strings:** A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.
UNIT 3	**LISTS, TUPLES, DICTIONARIES AND FILES, EXCEPTION : (15 LECTURES)**
3.1	**Lists:** Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In

	Operator, Built-in List functions and methods
3.2	**Tuples and Dictionaries:** Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions
3.3	**Files:** Text Files, The File Object Attributes, Directories
3.4	**Exceptions:** Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions
UNIT 4	**REGULAR EXPRESSIONS, CLASSES AND OBJECTS, MULTITHREADED PROGRAMMING : (15 LECTURES)**
4.1	**Regular Expressions –** Concept of regular expression, various types of regular expressions, using match function.
4.2	**Classes and Objects:** Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances
4.3	**Multithreaded Programming:** Thread Module, creating a thread, synchronizing threads, multithreaded priority queue
4.4	**Modules:** Importing module, Creating and exploring modules, Math module, Random module, Time module
UNIT 5	**GUI FORMS, WIDGETS, LAYOUT, LOOK AND FEEL, MYSQL DATABASE :(15 LECTURES)**
5.1	**Creating the GUI Form and Adding Widgets:**
5.2	**Widgets:** Button, Canvas, Checkbutton, Entry, Frame, Label, Listbox, Menubutton, Menu, Message, Radiobutton, Scale, Scrollbar, text, Toplevel, Spinbox, PanedWindow, LabelFrame, tkMessagebox. Handling Standard attributes and Properties of Widgets.
5.3	**Layout Management:** Designing GUI applications with proper Layout Management features.
5.4	**Look and Feel Customization:** Enhancing Look and Feel of GUI using different appearances of widgets.
5.5	**Storing Data in Our MySQL Database via Our GUI :** Connecting to a MySQL database from Python, Configuring the MySQL connection, Designing the Python GUI database, Using the INSERT command, Using the UPDATE command, Using the DELETE command, Storing and retrieving data from MySQL database.

REFERENCES:

- Think Python Allen Downey O'Reilly 1st 2012
- Introduction to Problem Solving with Python E. Balagurusamy TMH 1st 2016
- Core Python Programming, Dr. R. Nageshwar Rao, Dreamtech Press 2017

NAME OF THE COURSE	PYTHON PROGRAMMING PRACTICAL	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP301	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD TOTAL MARKS PASSING MARKS	INTERNAL ASSESSMENT --- ---	SEMESTER END EXAMINATION 50 20

List of Practical: (Can be done in any imperative language)	
1.	**Write the program for the following:**
1.1.	Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old..
1.2.	Enter the number from the user and depending on whether the number is even or odd, print out an appropriate message to the user.
1.3.	Write a program to generate the Fibonacci series.
1.4	Write a function that reverses the user defined value.
1.5	Write a function to check the input value is Armstrong and also write the function for Palindrome.
1.6	Write a recursive function to print the factorial for a given number.

2.	**Write the program for the following:**
2.1.	Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise.
2.2.	Define a function that computes the *length* of a given list or string.
2.3.	Define a *procedure* histogram() that takes a list of integers and prints a histogram to thescreen. For example, histogram([4, 9, 7]) should print the following: **** ********* *******
3.	**Write the program for the following:**
3.1.	A *pangram* is a sentence that contains all the letters of the English alphabet at least once, for example: *The quick brown fox jumps over the lazy dog*. Your task here is towrite a function to check a sentence to see if it is a pangram or not.
3.2.	Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5.
4.	**Write the program for the following:**
4.1.	Write a program that takes two lists and returns True if they have at least one common member.
4.2.	Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements.
4.3.	Write a Python program to clone or copy a list
5.	**Write the program for the following:**
5.1.	Write a Python script to sort (ascending and descending) a dictionary by value
	Write a Python script to concatenate following dictionaries to create a new one. Sample Dictionary : dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60}
	Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60}
	Write a Python program to sum all the items in a dictionary.
6.	**Write the program for the following:**
6.1.	Write a Python program to read an entire text file.

6.2	Write a Python program to append text to a file and display the text.
6.3	Write a Python program to read last n lines of a file.
7.	**Write the program for the following:**
7.1.	Design a class that store the information of student and display the same
7.2.	Implement the concept of inheritance using python
7.3	Create a class called Numbers, which has a single class attribute called MULTIPLIER, and a constructor which takes the parameters x and y (these should all be numbers). i. Write a method called add which returns the sum of the attributes x and y. ii. Write a class method called multiply, which takes a single number parameter a and returns the product of a and MULTIPLIER. Write a static method called subtract, which takes two number parameters, b andc, and returns b - c. Write a method called value which returns a tuple containing the values of x and y. Make this method into a property, and write a setter and a deleter for manipulating thevalues of x and y.
8.	**Write the program for the following:**
8.1.	Open a new file in IDLE ("New Window" in the "File" menu) and save it as geometry.py in the directory where you keep the files you create for this course. Then copy the functions you wrote for calculating volumes and areas in the "Control Flow and Functions" exercise into this file and save it. Now open a new file and save it in the same directory. You should now be able to import your own module like this: import geometry
8.2.	Try and add print dir(geometry) to the file and run it. Now write a function pointyShapeVolume(x, y, squareBase) that calculates the volume of a square pyramid if squareBase is True and of a right circular cone if squareBase is False. x is the length of an edge on a square if squareBase is True and the radius of a circle when squareBase is False. y is the height of the object. First use

	squareBase to distinguish the cases. Use the circleArea and squareArea from the geometry module to calculate the base areas.
8.3.	Write a program to implement exception handling.
9.	**Write the program for the following:**
9.1	Try to configure the widget with various options like: bg=”red”, family=”times”, size=18
9.2.	Try to change the widget type and configuration options to experiment with other widget types like Message, Button, Entry, Checkbutton, Radiobutton, Scale etc.
10.	**Write the program for the following:**
10.1	Design a simple database application that stores the records and retrieve the same.
10.2	Design a database application to search the specified record from the database.

Semester – III		
NAMEOF THE COURSE	DATA STRUCTURES	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC302	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	Allow to assess how the choice of data structures and algorithm designmethods impacts the performance of programs
CO 2.	To provide the knowledge of basic data structures and their implementations.
CO 3.	To understand the concept of Dynamic memory management, data types, algorithms, asymptotic analysis and notation.
CO 4.	To understand the importance of data structures in context of writing efficient programs.
CO 5.	To develop skills to apply appropriate data structures in problem solving.

COURSE LEARNING OUTCOMES:

CLO 1.	Learn the basic types for data structure, implementation and application.
CLO 2.	Know the strength and weakness of different data structures.
CLO 3.	Use the appropriate data structure in context of solution of given problem.
CLO 4.	Develop programming skills which require for solving given problem.
CLO 5.	Ability to estimate the algorithmic complexity of simple, non-recursiveprograms.

UNIT 1	**INTRODUCTION AND ARRAY: (15 LECTURES)**
1.1	**Introduction:** Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Data structure vs. File Organization, Operations on Data Structure, Algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm, Asymptotic Analysis and Notations, Big O Notation, Big Omega Notation, Big Theta Notation, Rate of Growth and Big O Notation
1.2	**Array**: Introduction, One Dimensional Array, Memory Representation of One Dimensional Array, Traversing, Insertion, Deletion, Searching, Sorting, Merging of Arrays, Multidimensional Arrays, Memory Representation of Two Dimensional Arrays, General MultiDimensional Arrays, Sparse Arrays, Sparse Matrix, Memory
UNIT 2	**LINKED LIST: (15 LECTURES)**
2.1	**Linked List:** Linked List, One-way Linked List, Traversal of Linked List, Searching, Memory Allocation and De-allocation, Insertion in Linked List, Deletion from Linked List, Copying a List into Other List, Merging Two Linked Lists, Splitting a List into Two Lists, Reversing One way linked List, Circular Linked List, Applications of Circular Linked List, Two way Linked List, Traversing a Two way Linked List, Searching in a Two way linked List, Insertion of an element in Two way Linked List, Deleting a node from Two way Linked List, Header Linked List, Applications of the Linked list, Representation of Polynomials, Storage of Sparse Arrays, Implementing other Data Structures.
UNIT 3	**STACK AND QUEUE: (15 LECTURES)**
3.1	**Stack:** Introduction, Operations on the Stack Memory Representation of Stack, Array Representation of Stack, Applications of Stack, Evaluation of Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion.
3.2	**Queue:** Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array representation of queue, Linked List Representation of Queue, Circular Queue, Some special kinds of queues, Deque, Priority Queue, Application of Priority Queue, Applications of Queues.

UNIT 4	SORTING, SEARCHING, TREE AND ADVANCE TREE :(15 LECTURES)
4.1	**Sorting and Searching Techniques**: Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, Binary, Indexed Sequential Searches, Binary Search.
4.2	Tree: Tree, Binary Tree, Properties of Binary Tree, Memory Representation of Binary Tree, Operations Performed on Binary Tree, Reconstruction of Binary Tree from its Traversals, Huffman Algorithm, Binary Search Tree, Operations on Binary Search Tree, Heap, Memory Representation of Heap, Operation on Heap, Heap Sort.
4.3	Advanced Tree Structures: Red Black Tree, Operations Performed on Red Black Tree, AVL Tree, Operations performed on AVL Tree, 23 Tree, B-Tree.
UNIT 5	**HASHING AND GRAPH :(15 LECTURES)**
5.1	**Hashing Techniques:** Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing, Quadratic, Double hashing, Bucket hashing, Deletion and rehashing
5.2	**Graph:** Introduction, Graph, Graph Terminology, Memory Representation of Graph, Adjacency Matrix Representation of Graph, Adjacency List or Linked Representation of Graph, Operations Performed on Graph, Graph Traversal, Applications of the Graph, Reachability, Shortest Path Problems, Spanning Trees.

REFERENCES:

- Data Structures by Lipschutz, Seymour
- Data Structure and algorithm analysis in C – 2nd Edition by Weiss, Mark Allen
- A simplified approach to Data Structures - 5th Edition by Goyal, Vishal and others

NAME OF THE COURSE	DATA STRUCTURES PRACTICAL	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP302	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical	
1.	**Implement the following:**
1.1.	Write a program to store the elements in 1-D array and perform the operations like searching, sorting and reversing the elements. [Menu Driven]
1.2.	Read the two arrays from the user and merge them and display the elements in sorted order.[Menu Driven]
1.3.	Write a program to perform the Matrix addition, Multiplication and Transpose Operation. [Menu Driven]
2.	**Implement the following for Linked List:**
2.1.	Write a program to create a single linked list and display the node elements in reverse order.
2.2.	Write a program to search the elements in the linked list and display the same
2.3.	Write a program to create double linked list and sort the elements in the linked list.
3.	**Implement the following for Stack:**
3.1.	Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations.
3.2	Write a program to convert an infix expression to postfix and prefix conversion.
3.3	Write a program to implement Tower of Hanoi problem.
4.	**Implement the following for Queue:**

4.1.	Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations.
4.2.	Write a program to implement the concept of Circular Queue
4.3.	Write a program to implement the concept of Deque.
5.	**Implement the following sorting techniques:**
5.1.	Write a program to implement bubble sort.
5.2.	Write a program to implement selection sort.
5.3.	Write a program to implement insertion sort.
6.	**Implement the following data structure techniques:**
6.1	Write a program to implement merge sort.
6.2	Write a program to search the element using sequential search.
6.3	Write a program to search the element using binary search.
7.	**Implement the following data structure techniques:**
7.1	Write a program to create the tree and display the elements.
7.2	Write a program to construct the binary tree.
7.3	Write a program for inorder, postorder and preorder traversal of tree
8.	**Implement the following data structure techniques:**
8.1.	Write a program to insert the element into maximum heap.
8.2.	Write a program to insert the element into minimum heap.
9.	**Implement the following data structure techniques:**
9.1	Write a program to implement the collision technique.
9.2	Write a program to implement the concept of linear probing.
10.	**Implement the following data structure techniques:**
10.1	Write a program to generate the adjacency matrix.
10.2	Write a program for shortest path diagram.

Semester – III		
NAMEOF THE COURSE	COMPUTER NETWORKS	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC303	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	To learn to differentiate between topologies, networking devices, OSI and TCP/IP models.
CO 2.	To able to identify and describe various techniques for efficient bandwidth utilization under wired and wireless medium
CO 3.	To distinguish between various wireless network models.
CO 4.	To be able to analyze the different networking protocols and Ip header formats
CO 5.	To be able to explain the different acknowledging schemes used in case data loss

COURSE LEARNING OUTCOMES:

CLO 1.	State the functionality of each layer of OSI model when the data is passed from sender toreceiver
CLO 2.	Compare FDM, TDM and WDM
CLO 3.	Explain the working of cellular telephony
CLO 4.	State the reason why ipv6 is more robust than ipv4
CLO 5.	Describe the difference in TCP and UDP header formats

UNIT 1	**INTRODUCTION, NETWORK MODELS, INTRODUCTION TO PHYSICAL LAYER, DIGITALAND ANALOG TRANSMISSION: (15 LECTURES)**
1.1	**Introduction:** Data communications, networks, network types, Internet history, standards and administration.
1.2	**Network Models:** Protocol layering, TCP/IP protocol suite, The OSI model.
1.3	**Introduction to Physical layer:** Data and signals, periodic analog signals, digital signals, transmission impairment, data rate limits, performance.
1.4	**Digital and Analog transmission:** Digital-to-digital conversion, analog-to-digital conversion, transmission modes, digital-to-analog conversion, analog-to-analog conversion.
UNIT 2	**BANDWIDTH UTILIZATION, MULTIPLEXING ,TRANSMISSION MEDIA, SWITCHING, INTRODUCTION TO DATA LINK LAYER : (15 LECTURES)**
2.1	**Bandwidth Utilization: Multiplexing and Spectrum Spreading:** Multiplexing, Spread Spectrum
2.2	**Transmission media:** Guided Media**,** Unguided Media
2.3	**Switching:** Introduction, circuit switched networks, packet switching, structure of a switch.
2.4	**Introduction to the Data Link Layer:** Link layer addressing, Data Link Layer Design Issues, Error detection and correction, block coding, cyclic codes, checksum, forward error correction, error correcting codes, error detecting codes.
UNIT 3	**DATA LINK, MEDIA ACCESS CONTROL, WIRELESS LAN AND VIRTUAL LAN : (15 LECTURES)**
3.1	**Data Link Control:** DLC services, data link layer protocols, HDLC, Point-to-point protocol.
3.2	**Media Access Control**: Random access, controlled access, channelization, Wired LANs – Ethernet Protocol, standard ethernet, fast ethernet, gigabit ethernet, 10 gigabit ethernet,

3.3	**Wireless LANs:** Introduction, IEEE 802.11 project, Bluetooth, WiMAX, Cellular telephony, Satellite networks.
3.4	**Connecting devices and Virtual LANs.**
UNIT 4	**NETWORK LAYER, UNICAST ROUTING ANDNEXT GENERATION IP: (15 LECTURES)**
4.1	**Introduction to the Network Layer:** Network layer services, packet switching, network layer performance, IPv4 addressing, forwarding of IP packets, Internet Protocol, ICMPv4, Mobile IP
4.2	**Unicast Routing:** Introduction, routing algorithms, unicast routing protocols.
4.3	**Next generation IP:** IPv6 addressing, IPv6 protocol, ICMPv6 protocol, transition from IPv4 to IPv6.
UNIT 5	**INTRODUCTION TO THE TRANSPORT LAYER,STANDARD CLIENT0SERVER PROTOCOLS: (15 LECTURES)**
5.1	**Introduction to the Transport Layer**: Introduction, Transport layer protocols (Simple protocol, Stop-and-wait protocol, Go-Back-n protocol, Selective repeat protocol, Bidirectional protocols), Transport layer services, User datagram protocol, Transmission control protocol,
5.2	**Standard Client Server Protocols:** World wide-web and HTTP, FTP, Electronic mail, Telnet, Secured Shell, Domain name system.

REFERENCES:

- Forouzan, Behrouz A ,Data communication and networking.5th ed
- Tanenbaum,Andrew S.& Wetherall ,David J. , Computer networks 5th ed.
- Forouzan, Behrouz A. Tcp /IP Protocol suite.4th ed.

NAME OF THE COURSE	COMPUTER NETWORKS PRACTICAL	
CLASS	FYBSCIT	
COURSE CODE	SBTTECP103	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical	
1.	**IPv4 Addressing and Subnetting**
1.1	Given an IP address and network mask, determine other information about theIP address such as: Network address Network broadcast address Total number of host bits Number of hosts
1.2	Given an IP address and network mask, determine other information about theIP address such as: The subnet address of this subnet The broadcast address of this subnet The range of host addresses for this subnet The maximum number of subnets for this subnet mask The number of hosts for each subnet The number of subnet bitsThe number of this subnet
2.	Use of ping and tracert / traceroute, ipconfig / ifconfig, route and arp utilities.
3.	Configure IP static routing.
4.	Configure IP routing using RIP.
5.	Configuring Simple OSPF.
6	Configuring DHCP server and client.
7.	Create virtual PC based network using virtualization software and virtual NIC.
8.	Configuring DNS Server and client.
9	Configuring OSPF with multiple areas.

10.	Use of Wireshark to scan and check the packet information of following protocols: • HTTP • ICMP • TCP • SMT • POP3

Semester – III		
NAMEOF THE COURSE	DATABASE MANAGEMENT SYSTEM	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC304	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	The main objective of this course is to enable students to learn the fundamental concepts of database management system and design.
CO 2.	To emphasize the importance of normalization in databases. Discuss normalization techniques and relational algebra concepts which helps in understanding queries.
CO 3.	To demonstrate the use of Integrity constraints. Students will be able to understand and write various advanced queries.
CO 4.	Understanding the properties of transaction management and concurrency control methods.
CO 5.	Beginning with PL / SQL and learning Control Structures, Cursors, Procedures, Functions, Exceptions Handling and Packages.

COURSE LEARNING OUTCOMES:

CLO 1.	Explain basic database concepts, data models, Unified Modeling language, schemas and instances. Compare file systems and database management system. Draw entity relationship diagrams using appropriate components.

CLO 2.	Explain the importance of normalization in databases. Discuss normalization techniques and various types of joins. Explain the use of relational algebra concepts.
CLO 3.	State and explain the use of Integrity constraints. Write SQL queries involving advanced concepts.
CLO 4.	State and explain the properties of transaction management and concurrency control methods.
CLO 5.	Write PL / SQL programs using various Control Structures, Cursors, Procedures, Functions, Exceptions Handling and Packages.

UNIT 1	**INTRODUCTION TO DATABASES ANDTRANSACTIONS , DATA MODELS, DATABASE DESIGN, ER DIAGRAM ANDUNIFIED MODELING LANGUAGE: (15 LECTURES)**
1.1	**Introduction to Databases and Transactions** What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management
1.2	**Data Models** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.
1.3	**Database Design, ER Diagram and Unified Modeling Language** Database design and ER Model: overview, ER Model, Constraints, ER Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML
UNIT 2	**RELATIONAL DATABASE MODEL: RELATIONAL ALGEBRA AND CALCULUS: (15 LECTURES)**
2.1	**Relational database model:** Logical view of data, keys, integrity rules, Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).
2.2	**Relational Algebra and Calculus:**

	Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison.
2.3	**Calculus:** Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities
UNIT 3	**CONSTRAINTS, VIEWS AND SQL: (15 LECTURES)**
3	**Constraints, Views and SQL** Constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and viewsSQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.
UNIT 4	**TRANSACTION MANAGEMENT ANDCONCURRENCY :** **(15 LECTURES)**
4	**Transaction management and Concurrency** Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods,optimistic methods, database recovery management.
UNIT 5	**PL-SQL :(15 LECTURES)**
5.1	**PL-SQL**: Beginning with PL / SQL, Identifiers and Keywords, Operators, Expressions, Sequences, Control Structures, Cursors and Transaction, Collections and composite data types, Procedures and Functions
5.2	Exceptions Handling, Packages, With Clause and Hierarchical Retrieval, Triggers.

REFERENCES:

- Database System and ConceptsA Silberschatz, H Korth, S Sudarshan McGraw-Hill Fifth Edition
- Introduction to Database SystemC.J.DatePearsonPearson 2003
- Database Systems Rob Coronel Cengage Learning Twelfth Edition
- Oracle database 11g PL/SQL programming McLaughlin, Michael

NAME OF THE COURSE	DATABASE MANAGEMENT SYSTEM PRACTICAL	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP304	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical: Write the programs for the following	
1.	**SQL Statements – 1**
1.1	Writing Basic SQL SELECT Statements
1.2	Restricting and Sorting Data
1.3	Single-Row Functions
2.	**SQL Statements – 2**
2.1.	Displaying Data from Multiple Tables
2.2.	Aggregating Data Using Group Functions
2.3.	Subqueries
3.	**Manipulating Data**
3.1.	Using INSERT statement
3.2.	Using DELETE statement
3.3	Using UPDATE statement
4.	**Creating and Managing Tables**
4.1.	Creating and Managing Tables
4.2.	Including Constraints
5	**Creating and Managing other database objects**
5.1	Creating Views
5.2	Other Database Objects
5.3	Controlling User Access
6	**Using SET operators, Date/Time Functions, GROUP BY clause (advanced features) and advanced subqueries**
6.1	Using SET Operators
6.2	Datetime Functions
6.3	Enhancements to the GROUP BY Clause

6.4	Advanced Subqueries
7	**PL/SQL Basics**
7.1	Declaring Variables
7.2	Writing Executable Statements
7.3	Interacting with the Oracle Server
7.4	Writing Control Structures
8	**Composite data types, cursors and exceptions.**
8.1	Working with Composite Data Types
8.2	Writing Explicit Cursors
8.3	Handling Exceptions
9	**Procedures and Functions**
9.1	Creating Procedures
9.2	Creating Functions
9.3	Managing Subprograms
9.4	Creating Packages
10	**Creating Database Triggers**
10.1	**SQL Statements – 1**
10.2	Writing Basic SQL SELECT Statements
10.3	Restricting and Sorting Data
10.4	Single-Row Functions
11	**SQL Statements – 2**
11.1	Displaying Data from Multiple Tables
11.2	Aggregating Data Using Group Functions
11.3	Subqueries
12.	**Manipulating Data**
12.1.	Using INSERT statement
12.2.	Using DELETE statement
12.3.	Using UPDATE statement

Semester – III		
NAMEOF THE COURSE	APPLIED MATHEMATICS	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC305	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	Apply the knowledge of matrices to solve the problems.
CO 2.	Know and to understand various types of numerical methods.
CO 3.	Ability to interpret the mathematical results in physical or practical terms for complex numbers.
CO 4.	Inculcate the habit of Mathematical Thinking through Indeterminate forms and Taylor series expansion
CO 5.	Solve and analyze the Partial derivatives and its application in related field of engineering

COURSE LEARNING OUTCOMES:

CLO 1.	Solve the matrix operations, identify the linear dependence and independence of a vectors.
CLO 2.	Familiar with the various forms and operations of a complex number.
CLO 3.	Find the Laplace transform of a function and Inverse Laplace transform of a function using definition also solve ordinary differential equations using Laplace transform.

CLO 4.	Evaluate the multiple integrals in Cartesian, Polar coordinates, change the order of the integral
CLO 5.	Apply integration methods to calculate the areas and volumes of solids.
CLO 6.	Evaluate the Beta, Gamma, Differentiation Under integral sign and error functions

UNIT 1	**MATRICES, COMPLEX NUMBERS: (15 LECTURES)**
1.1	**Matrices:** Inverse of a matrix, Properties of matrices, Elementary Transformation, Rank of Matrix, Echelon or Normal Matrix, Inverse of matrix, Linear equations, Linear dependence and linear independence of vectors, Lineartransformation, Characteristics roots and characteristics vectors, Properties of characteristic vectors, CaleyHamilton Theorem, Similarity of matrices, Reduction of matrix to a diagonal matrix which has elements as characteristics values.
1.2	**Complex Numbers:** Complex number, Equality of complex numbers, Graphical representation of complex number(Argand's Diagram), Polar form ofcomplex numbers, Polar form of x+iy for different signs of x,y, Exponential form of complex numbers, Mathematical operation with complex numbers and their representation on Argand's Diagram, Circular functions of complex angles, Definition of hyperbolic function, Relations between circular and hyperbolic functions, Inverse hyperbolic functions, Differentiation and Integration, Graphs of the hyperbolic functions, Logarithms of complex quality, j(=i)as an operator(Electrical circuits)
UNIT 2	**EQUATION OF THE FIRST ORDER AND OF THE FIRST DEGREE, DIFFERENTIAL EQUATION OF THE FIRST ORDER OF A DEGREE HIGHER THAN THE FIRST, LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS: (15 LECTURES)**
2.1	**Equation of the first order and of the first degree:** Separation of variables, Equations homogeneous in x and y, Non-homogeneous linear equations, Exact differential Equation, Integrating Factor, Linear Equation and equation reducible to this form, Method of substitution.

2.2	**Differential equation of the first order of a degree higher than the first:** Introduction, Solvable for p (or the method of factors), Solve for y, Solve for x, Clairaut's form of the equation,Methods of Substitution, Method of Substitution.
2.3	**Linear Differential Equations with Constant Coefficients:** Introduction, The Differential Operator, Linear Differential Equation f(D) y = 0, Different cases depending on the nature of the root of the equation f(D) = 0, Linear differential equation f(D) y = X, The complimentary Function, The inverse operator 1/f(D)and the symbolic expiration for the particular integral 1/f(D) X; the general methods, Particular integral : Short methods, Particular integral : Other methods, Differential equations reducible to the linear differential equations with constant coefficients.
UNIT 3	**THE LAPLACE TRANSFORM, INVERSE LAPLACE TRANSFORM: (15 LECTURES)**
3.1	**The Laplace Transform:** Introduction, Definition of the Laplace Transform, Table of Elementary Laplace Transforms, Theorems on Important Properties of Laplace Transformation, First Shifting Theorem, Second Shifting Theorem, The Convolution Theorem, Laplace Transform of an Integral, Laplace Transform of Derivatives,
3.2	**Inverse LaplaceTransform:** Shifting Theorem, Partial fraction Methods, Use of Convolution Theorem, Solution of Ordinary Linear Differential Equations with Constant Coefficients, Solution of Simultaneous Ordinary Differential Equations, Laplace Transformation of Special Function, Periodic Functions, Heaviside Unit Step Function, Dirac-delta Function(Unit Impulse Function),
UNIT 4	**MULTIPLE INTEGRALS, APPLICATIONS OF INTEGRATION: (15 LECTURES)**
4.1	**Multiple Integrals:** Double Integral, Change of the order of the integration, Double integral in polar co-ordinates, Triple integrals.
4.2	**Applications of integration:** Areas, Volumes of solids.
UNIT 5	**BETA AND GAMMA FUNCTIONS, DIFFERENTIATION UNDER THE INTEGRAL SIGNERROR FUNCTIONS : (15 LECTURES)**
5.1	**Beta and Gamma Functions –** Definitions**,** Properties and Problems. Duplication formula.
5.2	**Differentiation Under the Integral Sign**

5.3	**Error Functions**

REFERENCES:

- A text book of AppliedMathematics Vol I P. N. Wartikarand J. N. Wartikar Pune VidyathiGraha
- Applied Mathematics II P. N. Wartikar and J. N.Wartikar Pune VidyathiGraha
- Higher EngineeringMathematics Dr. B. S. Grewal Khanna Publications

NAME OF THE COURSE	MOBILE PROGRAMMING PRACTICAL	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP305	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical Questions:	
1.	Setting up CORDOVA, PhoneGAP Project and environment.
1.1	Creating and building simple “Hello World” App using Cordova
1.2	Adding and Using Buttons
1.3	Adding and Using Event Listeners
2.	
2.1	Creating and Using Functions
2.2	Using Events
2.3	Handling and Using Back Button
3.	
3.1	Installing and Using Plugins
3.2	Installing and Using Battery Plugin
3.3	Installing and Using Camera Plugin

4.	
4.1	Installing and Using Contacts Plugin
4.2	Installing and Using Device Plugin
4.3	Installing and Using Accelerometer Plugin
5.	
5.1	Install and Using Device Orientation plugin
5.2	Install and Using Device Orientation plugin
5.3	Create and Using Prompt Function
6.	
6.1	Installing and Using File Plugin
6.2	Installing and Using File Transfer Plugin
6.3	Using Download and Upload functions
7.	
7.1	Installing and Using Globalization Plugin
7.2	Installing and Using Media Plugin
7.3	Installing and Using Media Capture Plugin
8.	
8.1	Installing and Using Network Information Plugin
8.2	Installing and Using Splash Screen Plugin
8.3	Installing and Using Vibration Plugin
9.	
9.1	Developing Single Page Apps
9.2	Developing Multipage Apps
9.3	Storing Data Locally in a Cordova App
10.	
10.1	Use of sqlite plugin with PhoneGap / apache Cordova
10.2	Using Sqlite read/write and search
10.3	Populating Cordova SQLite storage with the JQuery API

SEMESTER IV

Semester – IV		
NAMEOF THE COURSE	CORE JAVA	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC401	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	To introduce the basic concepts of Java and its data types.
CO 2.	To gain knowledge about the control flow statement, iterations and classes in Java.
CO 3.	To become familiar with concept of inheritance and packages.
CO 4.	To use enumerations, arrays, multithreading, exceptions and byte streams with ease.
CO 5.	To study concepts of event handling, abstract window toolkit and layouts.

COURSE LEARNING OUTCOMES:

CLO 1.	Use the syntax and semantics of java programming language and basic concepts of OOP.
CLO 2.	Implement the use of a variety of basic control structures including selection and repetition; classes and objects.
CLO 3.	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CLO 4.	Apply the concepts of Array, Multithreading and Exception handling to develop

	efficient and error free codes.
CLO 5.	Design event driven GUI and web related applications.

UNIT 1	INTRODUCTION AND DATA TYPES :(15 LECTURES)
1.1	**Introduction:** History, architecture and its components, Java Class File, Java RuntimeEnvironment, The Java Virtual Machine, JVM Components, The Java API, java platform, java development kit, Lambda Expressions, Methods References, Type Annotations, Method Parameter Reflection, setting the path environment variable, Java Compiler And Interpreter, java programs, java applications, main(), public, static,void, string[] args, statements, white space, case sensitivity, identifiers, keywords, comments, braces and code blocks, variables, variable name
1.2	**Data types:** primitive data types, Object Reference Types, Strings, Auto boxing, operators and properties of operators, Arithmetic operators, assignment operators, increment and decrement operator, relational operator, logical operator, bitwise operator, conditional operator.
UNIT 2	**CONTROL FLOW STATEMENTS, ITERATIONS, CLASSES: (15 LECTURES)**
2.1	**Control Flow Statements:** The If…Else If…Else Statement, The Switch…Case Statement
2.2	**Iterations:** The While Loop, The Do … While Loop, The For Loop, The Foreach Loop, Labeled Statements, The Break And Continue Statements, The Return Statement
2.3	**Classes:** Types of Classes, Scope Rules, Access Modifier, Instantiating Objects From A Class, Initializing The Class Object And Its Attributes, Class Methods, Accessing A Method, Method Returning A Value, Method's Arguments, Method Overloading, Variable Arguments [Varargs], Constructors, this Instance, super Instance, Characteristics Of Members Of A Class, constants, this instance, static fields of a class, static methods of a class, garbage collection.
UNIT 3	**INHERITANCE AND PACKAGES : (15 LECTURES)**

3.1	**Inheritance:** Derived Class Objects, Inheritance and Access Control, Default Base Class Constructors, this and super keywords. Abstract Classes And Interfaces, Abstract Classes, Abstract Methods, Interfaces, WhatIs An Interface? How Is An Interface Different From An Abstract Class?, Multiple Inheritance, Default Implementation, Adding New Functionality, Method Implementation, Classes V/s Interfaces, Defining An Interface, Implementing Interfaces
3.2	.**Packages:** Creating Packages, Default Package, Importing Packages, Using A Package.
UNIT 4	**ENUMERATIONS, ARRAYS, MULTITHREADING, EXCEPTIONS AND BYTE STREAMS :(15 LECTURES)**
4.1	**Enumerations, Arrays:** Two Dimensional Arrays, Multi-Dimensional Arrays, Vectors, Adding Elements To A Vector, Accessing Vector Elements, Searching For Elements In A Vector, Working With The Size of The Vector.
4.2	**Multithreading:** the thread control methods, thread life cycle, the main thread, creating a thread, extending the thread class.
4.3	**Exceptions:** Catching Java Exceptions, Catching Run-Time Exceptions, Handling Multiple Exceptions, The finally Clause, The throws Clause
4.4	**Byte streams:** reading console input, writing console output, reading file, writing file, writing binary data, reading binary data, getting started with character streams, writing file, reading file
UNIT 5	**EVENT HANDLING, ABSTRACT WINDOW TOOLKIT, LAYOUTS : (15 LECTURES)**
5.1	**Event Handling:** Delegation Event Model, Events, Event classes, Event listener interfaces, Using delegation event model, adapter classes and inner classes.
5.2	**Abstract Window Toolkit:** Window Fundamentals, Component, Container, Panel, Window, Frame, Canvas. Components – Labels, Buttons, Check Boxes, Radio Buttons, Choice Menus, Text Fields,
5.3	Text, Scrolling List, Scrollbars, Panels, Frames **Layouts:** Flow Layout, Grid Layout, Border Layout, Card Layout.

REFERENCES:

- Core Java for beginners, Shah, Sharanam & Shah, Vaishali Shroff Publishers & Distributors, 2010
- Java the complete reference. 9th ed , Schildt, Herbert, McGraw Hill Education (India), 2014
- Core Java: An integrated approach. Covers concepts, programs and interview questions. Rao, R. Nageswara, Dreamtech Press, 2017
- Core Java. Volume.II: Advanced features. 9th ed. , Horstmann, Cay S. & Cornell, Gary Dorling Kindersley (India) 2013

NAME OF THE COURSE	CORE JAVA PRACTICAL	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP401	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical: To be implemented using object oriented language	
1.	**Java Basics**
1.1	Write a Java program that takes a number as input and prints its multiplication table upto 10.
1.2	Write a Java program to display the following pattern. ***** **** *** ** *
1.3	Write a Java program to print the area and perimeter of a circle.
2.	**Use of operators**
2.1	Write a Java program to add two binary numbers.
2.2	Write a Java program to convert a decimal number to binary number and vice versa.

2.3	Write a Java program to reverse a string.
3.	**Java Data Types**
3.1	Write a Java program to count the letters, spaces, numbers and other characters of an input string.
3.2	Implement a Java function that calculates the sum of digits for a given char array consisting of the digits '0' to '9'. The function should return the digit sum as a long value.
3.3.	Find the smallest and largest element from the array
4.	**Methods and Constructors**
4.1	Designed a class SortData that contains the method asec() and desc().
4.2	Designed a class that demonstrates the use of constructor and destructor.
4.3	Write a java program to demonstrate the implementation of abstract class.
5.	**Inheritance**
5.1	Write a java program to implement single level inheritance.
5.2	Write a java program to implement method overriding
5.3	Write a java program to implement multiple inheritance.
6.	**Packages and Arrays**
6.1	Create a package, Add the necessary classes and import the package in java class.
6.2	Write a java program to add two matrices and print the resultant matrix.
6.3	Write a java program for multiplying two matrices and print the product for the same.
7.	**Vectors and Multithreading**
7.1	Write a java program to implement the vectors.
7.2	Write a java program to implement thread life cycle.
7.3	Write a java program to implement multithreading.
8.	**File Handling**
8.1	Write a java program to open a file and display the contents in the console window.
8.2	Write a java program to copy the contents from one file to other file.
8.3	Write a java program to read the student data from user and store it in the file.

9.	**GUI and Exception Handling**
9.1	Design a AWT program to print the factorial for an input value.
9.2	Design an AWT program to perform various string operations like reverse string, string concatenation etc.
9.3	Write a java program to implement exception handling.
9.3	Write a java program to implement exception handling.
10.	**GUI Programming.**
10.1	Design an AWT application that contains the interface to add student information and display the same.
10.2	Design a calculator based on AWT application.
10.3	Design an AWT application to generate result marks sheet.

Semester – IV		
NAMEOF THE COURSE	Introduction to Embedded Systems	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC402	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	To introduce the Building Blocks of Embedded System
CO 2.	To Educate in Various microcontrollers used in Embedded Development
CO 3.	To Introduce Bus Communication in processors, Input/output interfacing.
CO 4.	To impart knowledge in sensors and actuators.
CO 5.	To familiar with the real world application development using embedded system

COURSE LEARNING OUTCOMES:

CLO 1.	Differentiate between general purpose and embedded systems
CLO 2.	Discuss the characteristics and quality attributes of embedded systems
CLO 3.	Use different types of sensors for appropriately
CLO 4.	Design and develop embedded systems

UNIT 1	**INTRODUCTION, CORE OF EMBEDDED SYSTEMS, CHARACTERISTICS AND QUALITY ATTRIBUTES OF EMBEDDED SYSTEMS :(15 LECTURES)**
1.1	**Introduction:** Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems
1.2	**Core of embedded systems:** microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components.
1.3	**Characteristics and quality attributes of embedded systems:** Characteristics, operational and non-operational quality attributes.
UNIT 2	**EMBEDDED SYSTEMS – APPLICATION AND DOMAIN SPECIFIC, EMBEDDEDHARDWARE AND PERIPHERALS :(15 LECTURES)**
2.1	**Embedded Systems – Application and Domain Specific:** Application specific – washing machine, domain specific - automotive.
2.2	**Embedded Hardware:** Memory map, i/o map, interrupt map, processor family, external peripherals, memory – RAM , ROM, types of RAM and ROM, memory testing, CRC ,Flash memory.
2.3	**Peripherals:** Control and Status Registers, Device Driver, Timer Driver – Watchdog Timers
UNIT 3	**THE 8051 MICROCONTROLLERS, 8051 PROGRAMMING IN C: (15 LECTURES)**
3.1	**The 8051 Microcontrollers:** Microcontrollers and Embedded processors, Overview of 8051 family. 8051 Microcontroller hardware, Input/output pins, Ports, and Circuits, External Memory.
3.2	**8051 Programming in C:** Data Types and time delay in 8051 C, I/O Programming, Logic operations, Dataconversion Programs.
UNIT 4	**DESIGNING EMBEDDED SYSTEM WITH8051 MICROCONTROLLER AND PROGRAMMING EMBEDDED SYSTEMS: (15 LECTURES)**
4.1	**Designing Embedded System with 8051 Microcontroller:** Factors to be considered in selecting a controller, why 8051 Microcontroller, Designing with 8051.
4.2	**Programming embedded systems:** structure of embedded program, infinite loop,

	compiling, linking and debugging.
UNIT 5	**REAL TIME OPERATING SYSTEM (RTOS) AND DESIGN AND DEVELOPMENT: (15 LECTURES)**
5.1	**Real Time Operating System (RTOS):** Operating system basics, types of operating systems, Real-Time Characteristics, Selection Process of an RTOS.
5.2	**Design and Development:** Embedded system development Environment – IDE, types of file generated on cross compilation, disassembler/ de-compiler, simulator, emulator and debugging, embedded product development life-cycle, trends in embedded industry.

REFERENCES:

- The 8051 Microcontroller and Embedded Systems Muhammad Ali Mazidi Pearson Second 2011
- Programming Embedded Systems in C and C++ Michael Barr, O'ReillyFirst 1999
- Introduction to embedded systems Shibu K V Tata Mcgraw-Hill First , 2012

NAME OF THE COURSE	INTRODUCTION TO EMBEDDED SYSTEMS PRACTICAL	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP402	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical	
1.	Design and develop a reprogrammable embedded computer using 8051 microcontrollers and to show the following aspects. a. Programming b. Execution Debugging
2.	

2.1	Configure timer control registers of 8051 and develop a program to generate given time delay.
2.2	To demonstrate use of general purpose port i.e. Input/ output port of two controllers for data transfer between them.
3.	
3.1	Port I / O: Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's
3.2	To interface 8 LEDs at Input-output port and create different patterns.
	To demonstrate timer working in timer mode and blink LED without using any loop delay routine.
4.	
4.1	Serial I / O: Configure 8051 serial port for asynchronous serial communication with serial port of PC exchange text messages to PC and display on PC screen. Signify end of message by carriage return.
4.2	To demonstrate interfacing of seven-segment LED display and generate counting from 0 to 99 with fixed time delay.
4.3	Interface 8051 with D/A converter and generate square wave of given frequency on oscilloscope.
5.	
5.1	Interface 8051 with D/A converter and generate triangular wave of given frequency on oscilloscope.
5.2	Using D/A converter generate sine wave on oscilloscope with the help of lookup table stored in data area of 8051.
6.	
6.1	Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clock wise direction.
7.	
7.1	Generate traffic signal.
8.	
8.1	Implement Temperature controller.
9.	
9.1	Implement Elevator control.
10.	**Using FlashMagic**
10.1	To demonstrate the procedure for flash programming for reprogrammable embedded system board using FlashMagic
10.2	To demonstrate the procedure and connections for multiple controllers programming of same type of controller with same source code in one go, using flash magic.

Semester – IV		
NAMEOF THE COURSE	**Computer Oriented Statistical Techniques**	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC403	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	To learn the different methods of calculating the central tendencies.
CO 2.	To introduce the moments, skewness and kurtosis.
CO 3.	To learn scientific view to conduct the survey in proper way to collect the data about specific perspective.
CO 4.	To Learn variety of probability sampling methods for selecting a sample from a population.
CO 5.	To learn the sampling theory and testing of hypothesis and making inferences.
CO 6.	To introduce the students with understanding of the curve fitting, regression and correlation techniques.

COURSE LEARNING OUTCOMES:

CLO 1.	To calculate and apply measures of central tendencies and measures of dispersion -grouped and ungrouped data cases.
CLO 2.	To calculate the moments, skewness and kurtosis by various methods.
CLO 3.	How to apply discrete and continuous probability distributions to various business problems.

CLO 4.	Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-values
CLO 5.	Apply simple linear regression and correlation model to real life examples

UNIT 1	**THE MEAN, MEDIAN, MODE, AND OTHERMEASURES OF CENTRAL TENDENCY, THE STANDARD DEVIATION AND OTHER MEASURES OF DISPERSION,INTRODUCTION TO R: (15 LECTURES)**
1.1	**The Mean, Median, Mode, and Other Measures of Central**
1.2	**Tendency**: Index, or Subscript, Notation, Summation Notation, Averages, or Measures of Central Tendency ,The Arithmetic Mean , The Weighted Arithmetic Mean ,Properties of the Arithmetic Mean ,The Arithmetic Mean Computed from Grouped Data ,The Median ,The Mode, The Empirical Relation Between the Mean, Median, and Mode, The Geometric Mean G, The Harmonic Mean H ,The Relation Between the Arithmetic, Geometric, and Harmonic Means, The Root Mean Square, Quartiles, Deciles, and Percentiles, Software and Measures of Central Tendency.
1.3	**The Standard Deviation and Other Measures of Dispersion**: Dispersion, or Variation, The Range, The Mean Deviation, The SemiInterquartile Range, The 10–90 Percentile Range, The Standard Deviation, The Variance, Short Methods for Computing the Standard Deviation, Properties of the Standard Deviation, Charlie's Check, Sheppard's Correction for Variance, Empirical Relations Between Measures of Dispersion, Absolute and Relative Dispersion; Coefficient of Variation, Standardized Variable; Standard Scores, Software and Measures of Dispersion.
1.4	**Introduction to R:** Basic syntax, data types, variables, operators, control statements, R-functions, R –Vectors, R – lists, R Arrays.
UNIT 2	**MOMENTS, SKEWNESS, AND KURTOSIS,ELEMENTARY PROBABILITY THEORY AND ELEMENTARY SAMPLING THEORY: (15 LECTURES)**
2.1	**Moments, Skewness, and Kurtosis** : Moments , Moments for Grouped

	Data ,Relations Between Moments , Computation of Moments for Grouped Data, Charlie's Check and Sheppard's Corrections, Moments in Dimensionless Form, Skewness, Kurtosis, Population Moments, Skewness, and Kurtosis, Software Computation of Skewness and Kurtosis.
2.2	**Elementary Probability Theory**: Definitions of Probability, Conditional Probability; Independent and Dependent Events, Mutually Exclusive Events, Probability Distributions, Mathematical Expectation,Relation Between Population, Sample Mean, and Variance, Combinatorial Analysis, Combinations, Stirling's Approximation to n!, Relation ofProbability to Point Set Theory, Euler or Venn Diagrams and Probability.
2.3	**Elementary Sampling Theory** : Sampling Theory, Random Samples and RandomNumbers, Sampling With and Without Replacement, Sampling Distributions, Sampling Distribution of Means, Sampling Distribution of Proportions, Sampling Distributions of Differences and Sums,Standard Errors, Software Demonstration of Elementary Sampling Theory
UNIT 3	**STATISTICAL ESTIMATION THEORY, STATISTICAL DECISION THEORY ANDSTATISTICS IN R :(15 LECTURES)**
3.1	**Statistical Estimation Theory**: Estimation of Parameters, Unbiased Estimates, Efficient Estimates, Point Estimates and Interval Estimates; Their Reliability, Confidence-Interval Estimates of Population Parameters, Probable Error.
3.2	**Statistical Decision Theory:** Statistical Decisions, Statistical Hypotheses, Tests of Hypotheses and Significance, or Decision Rules, Type I and Type II Errors, Level of Significance, Tests Involving Normal Distributions, Two- Tailed and One-Tailed Tests, Special Tests, Operating-Characteristic Curves; the Power of a Test, p-Values for Hypotheses Tests, Control Charts, Tests Involving Sample Differences, Tests Involving Binomial Distributions.
3.3	**Statistics in R:** mean, median, mode, Normal Distribution , Binomial Distribution,Frequency Distribution in R.
UNIT 4	**SMALL SAMPLING THEORY AND THE CHI-SQUARE TEST: (15 LECTURES)**

4.1	**Small Sampling Theory**: Small Samples, Student's t Distribution, Confidence Intervals, Tests of Hypotheses and Significance, The ChiSquare Distribution, Confidence Intervals for Sigma, Degrees of Freedom, The F Distribution.
4.2	**The Chi-Square Test**: Observed and Theoretical Frequencies, Definition of chi-square, Significance Tests, The Chi-Square Test for Goodness ofFit, Contingency Tables, Yates' Correction for Continuity, Simple Formulas for Computing chi-square, Coefficient of Contingency, Correlation of Attributes, Additive Property of chi square.
UNIT 5	**CURVE FITTING AND THE METHOD OF LEAST SQUARES AND CORRELATION THEORY: (15 LECTURES)**
5.1	**Curve Fitting and the Method of Least Squares:** Relationship Between Variables, Curve Fitting, Equations of Approximating Curves, Freehand Method of CurveFitting, The Straight Line, The Method of Least Squares, The Least-Squares Line, Nonlinear Relationships, The Least-Squares Parabola, Regression, Applications to Time Series, Problems Involving More Than Two Variables.
5.2	**Correlation Theory:** Correlation and Regression, Linear Correlation,Measures of Correlation, The Least-Squares Regression Lines, Standard Error of Estimate, Explained and Unexplained Variation, Coefficient of Correlation, Remarks Concerning the Correlation Coefficient,Product-Moment Formula for the Linear Correlation Coefficient, Short Computational Formulas, Regression Lines and the Linear Correlation Coefficient, Correlation of Time Series, Correlation of Attributes, Sampling Theory of Correlation, Sampling Theory of Regression.

REFERENCES:

- STATISTICS Murray R.Spiegel, Larry J. Stephens. McGRAW – HILL ITERNATIONAL FOURTH
- A Practical Approachusing R R.B. Patil, H.J. Dandand R. Bhavsar SPD 1st 2017
- FUNDAMENTAL OF MATHEMATICAL STATISTICS S.C. GUPTA andV.K. KAPOOR SULTAN

- CHAND andSONS ELEVENTHREVISED 2011
- MATHEMATICALSTATISTICS J.N. KAPUR andH.C. SAXENA S. CHAND TWENTIETH REVISED 2005

NAME OF THE COURSE	**COMPUTER ORIENTED STATISTICAL TECHNIQUES PRACTICAL**	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP403	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical	
1.1	Using R execute the basic commands, array, list and frames.
2.1	Create a Matrix using R and Perform the operations addition, inverse, transpose and multiplication operations.
3.1	Using R Execute the statistical functions: mean, median, mode, quartiles, range, inter quartile range histogram
4.1	Using R import the data from Excel / .CSV file and Perform the above functions.
5.1	Using R import the data from Excel / .CSV file and Calculate the standard deviation, variance, co-variance.
6.1	Using R import the data from Excel / .CSV file and draw the skewness.
7.1	Import the data from Excel / .CSV and perform the hypothetical testing.
8.1	Import the data from Excel / .CSV and perform the Chi-squared Test.
9.1	Using R perform the binomial and normal distribution on the data.
10.1	Perform the Linear Regression using R.
11.1	Compute the Least squares means using R.
12.1	Compute the Linear Least Square Regression

Semester – IV		
NAMEOF THE COURSE	SOFTWARE ENGINEERING	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC404	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	To get deep understanding of various process models used in software development
CO 2.	To be able to determine the complexity of the system based on the type of the application
CO 3.	To be able to relate/map the quality activities with that of the process model
CO 4.	To be able to calculate the cost of a project depending on the various associated factors
CO 5.	To analyze the reusability, process improvement, distributed engineering concepts .

COURSE LEARNING OUTCOMES:

CLO 1.	Why is Spiral Model used in complex projects? Justify your answer with its process activities.
CLO 2.	Describe critical system with an example. State the dependability attributes in brief.
CLO 3.	How is project scheduling and risk management interrelated? Explain.

CLO 4.	Describe the factors effecting the software productivity
CLO 5.	What are the different levels elaborated in CMMI

UNIT 1	**INTRODUCTION AND SOFTWARE REQUIREMENTS, SOFTWARE PROCESSES, SOFTWARE DEVELOPMENT PROCESS MODELS, AGILE SOFTWAREDEVELOPMENT :(15 LECTURES)**
1.1	**Introduction:** What is software engineering? Software Development Life Cycle, Requirements Analysis, Software Design, Coding, Testing, Maintenance etc.
1.2	**Software Requirements:** Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements.
1.3	**Software Processes:** Process and Project, Component Software Processes.
1.4	**Software Development Process Models.** • Waterfall Model. • Prototyping. • Iterative Development. • Rational Unified Process. • The RAD Model • Time boxing Model.
1.5	**Agile software development**: Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods.
UNIT 2	**SOCIO-TECHNICAL SYSTEM, CRITICAL SYSTEM, REQUIREMENTS ENGINEERING PROCESSES, SYSTEM MODELS: (15 LECTURES)**
2.1	**Socio-technical system:** Essential characteristics of socio technical systems, Emergent System Properties, Systems Engineering, Components of system such as organization, people and computers, Dealing Legacy Systems.
2.2	**Critical system:** Types of critical system, A simple safety critical system, Dependability of a system, Availability and Reliability, Safety and Security of Software systems.

2.3	**Requirements Engineering Processes:** Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management.
2.4	**System Models:** Models and its types, Context Models, Behavioural Models, Data Models, Object Models, Structured Methods.
UNIT 3	**ARCHITECTURAL DESIGN, USER INTERFACEDESIGN, PROJECT MANAGEMENT AND QUALITY MANAGEMENT: (15 LECTURES)**
3.1	**Architectural Design:** Architectural Design Decisions, System Organisation, Modular Decomposition Styles, Control Styles, Reference Architectures.
3.2	**User Interface Design:** Need of UI design, Design issues, The UI design Process, User analysis, User Interface Prototyping, Interface Evaluation.
3.3	**Project Management** Software Project Management, Management activities, Project Planning, Project Scheduling, Risk Management.
3.4	**Quality Management:** Process and Product Quality, Quality assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics.
UNIT 4	**VERIFICATION AND VALIDATION, SOFTWARE MEASUREMENT AND SOFTWARE COSTESTIMATION: (15 LECTURES)**
4.1	**Verification and Validation:** Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods.
4.2	**Software Testing:** System Testing, Component Testing, Test Case Design, Test Automation.
4.3	**Software Measurement**: Size-Oriented Metrics, Function-Oriented Metrics, Extended Function Point Metrics
4.4	**Software Cost Estimation:** Software Productivity, Estimation Techniques,Algorithmic Cost Modelling, Project Duration and Staffing
UNIT 5	**PROCESS IMPROVEMENT, SERVICE ORIENTED SOFTWARE ENGINEERING, SOFTWARE REUSE, DISTRIBUTED SOFTWARE ENGINEERING: (15 LECTURES)**
5.1	**Process Improvement:** Process and product quality, Process Classification, Process Measurement, Process Analysis and Modeling, Process Change, The CMMI Process Improvement Framework. Service Oriented Software Engineering: Services as reusable components, Service Engineering, Software Development with Services.

5.2	**Software reuse:** The reuse landscape, Application frameworks, Software product lines, COTS product reuse.
5.3	**Distributed software engineering**: Distributed systems issues, Client– server computing, Architectural patterns for distributed systems, Software as a service

REFERENCES:

- Software Engineering, edition, Ian Somerville Pearson Education. Ninth
- Software Engineering Pankaj Jalote Narosa Publication
- Software engineering, apractitioner's approach Roger Pressman Tata Mcgraw-hill Seventh
- Software Engineering principles and practice WS Jawadekar Tata Mcgraw-hill
- Software EngineeringAConcise Study S.A Kelkar PHI India.
- Software EngineeringConcept and Applications Subhajit Datta Oxford Higher Education
- Software Design D.Budgen Pearson education 2nd
- Software Engineering KL James PHI EEE 2009

NAME OF THE COURSE	**Software Engineering** PRACTICAL	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP404	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical	
1.1.	Study and implementation of class diagrams.
2.1	Study and implementation of Use Case Diagrams.
3.1	Study and implementation of Entity Relationship Diagrams.

4.1	Study and implementation of Sequence Diagrams.
5.1	Study and implementation of State Transition Diagrams.
6.1	Study and implementation of Data Flow Diagrams.
7.1	Study and implementation of Collaboration Diagrams.
8.1	Study and implementation of Activity Diagrams.
9.1	Study and implementation of Component Diagrams.
10.1	Study and implementation of Deployment Diagrams.

Semester – IV		
NAMEOF THE COURSE	**Computer Graphics and Animation**	
CLASS	SYBSc IT	
COURSE CODE	SBTTEC405	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	5	
TOTAL NUMBR OF LECTURES PER SEMESTER	75	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESER END EXAMINATION
TOTAL MARKS	25	75
PASSING MARKS	10	30

COURSE OBJECTIVES:

CO 1.	To learn the fundamentals of computer graphics and scan conversion algorithms.
CO 2.	To learn Geometrical Transformations in 2-Dimensional and 3-Dimensional perspectives.
CO 3.	To learn stages in 3D viewing, Canonical View Volume, Radiometry, Colorimetry, Color Spaces, Color Appearance
CO 4.	To learn visible-surface determination algorithms, Curve Representation, Bezier Curves, B-spline Curves.
CO 5.	To learn Principles of Animation, Key framing, Image, Digital image file formats, Image compression standard

COURSE LEARNING OUTCOMES:

CLO 1.	Explore the structure of an interactive computer graphics system, and the separation of system components.
CLO 2.	Apply the concept of 2D and 3D geometrical transformations
CLO 3.	Implement the knowledge of viewing in 3D, Canonical View Volume, Radiometry, Photometry.

CLO 4.	Get familiar with Visible-Surface Determination algorithm and Curve Representation.
CLO 5.	Get accustomed to Principles of Animation, Image Manipulation and Storage.

UNIT 1	**INTRODUCTION TO COMPUTER GRAPHICS, SCAN CONVERSION: (15 LECTURES)**
1.1	**Introduction to Computer Graphics:** Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays.
1.2	**Scan conversion** – Digital Differential Analyzer (DDA) algorithm, Bresenhams' Line drawing algorithm. Bresenhams' method of Circle drawing, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines, Scan Converting Circles, Clipping Lines algorithms– Cyrus-Beck, Cohen-Sutherland and Liang-Barsky, Clipping Polygons, problem with multiple components.
UNIT 2	**TWO-DIMENSIONAL TRANSFORMATIONSAND THREE-DIMENSIONAL TRANSFORMATIONS: (15 LECTURES)**
2.1	**Two-Dimensional Transformations:** Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation, Transformation of Points, Transformation of The Unit Square, Solid Body Transformations, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric Interpretation of Homogeneous Coordinates, The Window-to-Viewport Transformations.

2.2	**Three-Dimensional Transformations:** Three-Dimensional Scaling, Three-Dimensional Shearing, Three Dimensional Rotation, Three-Dimensional Reflection, Three Dimensional Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations, Affine and Perspective Geometry, Perspective Transformations, Techniques for Generating Perspective Views, Vanishing Points, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections.
UNIT 3	**VIEWING IN 3D, LIGHT, COLOR: (15 LECTURES)**
3.1	**Viewing in 3D:** Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Examples of 3D Viewing, The Mathematics of Planar Geometric Projections, Combined transformation matrices for projections and viewing, Coordinate Systems and matrices, camera model and viewing pyramid.
3.2	**Light:** Radiometry, Transport, Equation, Photometry
3.3	**Color:** Colorimetry, Color Spaces, Chromatic Adaptation, Color Appearance
UNIT 4	**VISIBLE-SURFACE DETERMINATION, PLANE CURVES AND SURFACES: (15 LECTURES)**
4.1	**Visible-Surface Determination:** Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter's algorithms(depth sorting), Area sub-division method, BSP trees, Visible-Surface Ray Tracing, comparison of the methods.
4.2	**Plane Curves and Surfaces:** Curve Representation, Nonparametric Curves, Parametric Curves, Parametric Representation of a Circle, Parametric Representation of an Ellipse, Parametric Representation of a Parabola, Parametric Representation of a Hyperbola, Representation of Space Curves, Cubic Splines, , Bezier Curves, B-spline Curves, B-spline Curve Fit, B-spline Curve Subdivision, Parametric Cubic Curves, Quadric

	Surfaces. Bezier Surfaces.
UNIT 5	**COMPUTER ANIMATION AND IMAGE MANIPULATION AND STORAGE: (15 LECTURES)**
5.1	**Computer Animation:** Principles of Animation, Key framing, Deformations, Character Animation, Physics- Based Animation, Procedural Techniques, Groups of Objects.
5.2	**Image Manipulation and Storage:** What is an Image? Digital image file formats, Image compression standard – JPEG, Image Processing - Digital image enhancement, contrast stretching, Histogram Equalization, smoothing and median Filtering.

REFERENCES:

- Computer graphics. 2nd ed. Mishra, Ruchi, Global Academic Publishers & Distributors 2015
- Computer graphics. Mishra, Ruchi Wiley India, 2011
- Computer graphics with virtual reality systems, Maurya, Rajesh K. Wiley India 2009
- Fundamentals of computer graphics. 4th ed. Marschner, Steve & Shirley, Peter CRC Press / Taylor and Francis Group 2016

NAME OF THE COURSE	**Computer Graphics and Animation**	
CLASS	SYBSCIT	
COURSE CODE	SBTTECP405	
NUMBER OF CREDITS	2	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	20

List of Practical	
1.	**Solve the following:**

1.1	Study and enlist the basic functions used for graphics in C / C++ / Python language. Give an example for each of them.
1.2	Draw a co-ordinate axis at the center of the screen.
2.	**Solve the following:**
2.1	Divide your screen into four region, draw circle, rectangle, ellipse and half ellipse in each region with appropriate message.
2.2	Draw a simple hut on the screen.
3.1	**Draw the following basic shapes in the center of the screen :**
4.	**Solve the following:**
4.1	Develop the program for DDA Line drawing algorithm.
4.2	Develop the program for Bresenham's Line drawing algorithm.
5	**Solve the following:**
5.1	Develop the program for the mid-point circle drawing algorithm.
5.2	Develop the program for the mid-point ellipse drawing algorithm.
6	**Solve the following:**
6.1	Write a program to implement 2D scaling.
6.2	Write a program to perform 2D translation
7	**Solve the following:**
7.1	Perform 2D Rotation on a given object.
7.2	Program to create a house like figure and perform the following operations. i. Scaling about the origin followed by translation. ii. Scaling with reference to an arbitrary point. iii. Reflect about the line y = mx + c.
8	**Solve the following:**
8.1	Write a program to implement Cohen-Sutherland clipping.
8.2	Write a program to implement Liang - Barsky Line Clipping Algorithm
9	**Solve the following:**
9.1	Write a program to fill a circle using Flood Fill Algorithm.
9.2	Write a program to fill a circle using Boundary Fill Algorithm.
10	**Solve the following:**
10.1	Develop a simple text screen saver using graphics functions.

10.2	Perform smiling face animation using graphic functions.
10.3	Draw the moving car on the screen.

ASSESSMENT DETAILS:(this will be same for all the

theory papers)Internal Assessment (25 marks)

Part 1: Project Work (**20 Marks**) **/** Test

- At the beginning of the semester, students should be assigned projecttopics drawn from Unit 1 to Unit 5.
- Students can work in groups of not more than 3 per topic.
- Project Marks will be divided as written submission: 10 Marks &Presentation & Viva: 10 marks)
- The Project/Assignment can take the form of Street-Plays/Power-Point Presentations/Poster Exhibitions and similar other modes of presentation appropriate to the topic.
- Students must submit a hard copy of the Project before the lastteaching day of the semester.

Part 2: Attendance **– 05marks**

Semester End Examination – External Assessment (75 marks)

- The duration of the paper will be two and a half hours.
- There shall be five compulsory questions
- Q1-5 shall correspond to the five units. Q1-5 shall contain an internal choice (attempt any3 of 6). Q1-5 shall carry a maximum of 15 marks

Practical Assessment (for papers with practicals)

- The duration of the practical exam will be two and a half hours.
- The students are allowed to write the paper if the attendance for practicals is more than 75%
- To appear in the practical exam, students must bring a properly certified journal.

Evaluation Scheme:

1. **Internal Evaluation (25 Marks).**
   - **i. Test: 1 Class test of 20 marks. (Can be taken online)**

Q	Attempt ***any four*** of the following:	20
a.		
b.		
c.		
d.		
e.		
f.		

   - **ii. 5 marks: Active participation in the class, overall conduct, attendance.**

2. **External Examination: (75 marks)**

	All questions are compulsory	
Q1	(Based on Unit 1) Attempt ***any three*** of the following:	15
a.		
b.		
c.		
d.		
e.		
f.		
Q2	(Based on Unit 2) Attempt ***any three*** of the following:	15
Q3	(Based on Unit 3) Attempt ***any three*** of the following:	15
Q4	(Based on Unit 4) Attempt ***any three*** of the following:	15
Q5	(Based on Unit 5) Attempt ***any three*** of the following:	15

3. **Practical Exam: 50 marks**

A Certified copy journal is essential to appear for the practical examination.

1.	Practical Question 1	20
2.	Practical Question 2	20
3.	Journal	5
4.	Viva Voce	5

OR

1.	Practical Question	40
2.	Journal	5
3.	Viva Voce	5