SOPHIA COLLEGE, (AUTONOMOUS)

Affiliated to

UNIVERSITY OF MUMBAI

Programme: Information Technology

Programme Code: SBTTEC

S.Y.B.Sc.IT

(Choice Based Credit System with effect from the year 2018-2019)

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, lists, tuples, dictionaries and files	
	3	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 Diagram and Unified Modeling Language	
	2	Relational database model: , Relational Algebra and Calculus	

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

Preamble:

The B.Sc. Information Technology programme is a systematically designed course with an aim to make the students employable in software industry and impart industry-oriented training.

PROGRAMME OBJECTIVES

PO 1	To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems
PO 2	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 3	To be capable of managing complex IT projects with consideration of the human, financial and environmental factors
PO 4	To work effectively as a part of a team to achieve a common stated goal.
PO 5	To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct
PO 6	To communicate effectively with a range of audiences both technical and non-technical.
PO 7	To communicate effectively with a range of audiences both technical and non-technical.
PO 8	To communicate effectively with a range of audiences both technical and non-technical.
PO 9	To develop an aptitude to engage in continuing professional development.
PO 10	To imbibe quality software development practices
PO 11	To create awareness about process and product standards
PO 12	To prepare necessary knowledge base for research and development in IT
PO 13	To help students build-up a successful career in IT.

PROGRAMME SPECIFIC OUTCOMES

The students will be ready for the jobs available in different fields like:

PO 1	Software Development (Programming)
PO 2	Mobile app development
PO 3	Embedded Systems Programming
PO 4	Website Development
PO 5	Embedded Systems Development
PO 6	Software Testing
PO 7	Networking
PO 8	Database Administration
PO 9	IT Service Desk
PO 10	Security
PO 11	System Administration

And many others

The students will also be trained in communication skills and green computing.

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 C-programming language.
CO 2 It aims to train the students to understand the concept of conditional statement, loop, nested loop and break a large problem into smaller parts as a module or function.
CO 3 It aims to train the students to understand the concept of string and be able to use an array.to store multiple pieces of homogeneous data
CO 4It aims to train the students to understand the concept of pointer, and use a structure to store multiple pieces of heterogeneous data.
CO 5This course involves a lab component which is designed to give the student hands-on experience with the concepts.

COURSE LEARNING OUTCOMES:

CLO 1 Read, understand and trace the execution of programs in C language.
CLO 2 Draw flowchart and write the C code for a given algorithm.
CLO 3 Implement the concept of control statements, loops, and functions to write a C program.
CLO 4 Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
CLO 5 Implement Programs with structures and union

UNIT 1	PYTHON PROGRAMMING (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

1.2 1.3 1.4 1.5	Parentheses, **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. **Conditional Statements:** if, if-else, nested if –else **Looping**: for, while, nested loops **Control statements:** Terminating loops, skipping specific conditions
2 2.1 2.2	**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 **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.

3 3.1 3.2 3.3 3.4	**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 **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 **Files:** Text Files, The File Object Attributes, Directories **Exceptions:** Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions
4 4.1 4.2 4.3	**Regular Expressions –** Concept of regular expression, various types of regular expressions, using match function. **Classes and Objects:** Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as **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
5 5.1 5.2	**Creating the GUI Form and Adding Widgets:** **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 5.4 5.5	**Layout Management:** Designing GUI applications with proper Layout Management features. **Look and Feel Customization**: Enhancing Look and Feel of GUI using different appearances of widgets. **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.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Think Python	Allen Downey	O'Reilly	1st	2012
2.	An Introduction to Computer Science using Python 3	Jason Montojo, Jennifer Campbell, Paul Gries	SPD	1st	2014
3.	Python GUI Programming Cookbook	Burkhard A. Meier	Packt		2015
4.	Introduction to Problem Solving with Python	E. Balagurusamy	TMH	1st	2016
5.	Murach's Python programming	Joel Murach, Michael Urban	SPD	1st	2017
6.	Object-oriented Programming in Python	Michael H. Goldwasser, David Letscher	Pearson Prentice Hall	1st	2008

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	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	---	50
PASSING MARKS	---	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 the screen. 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 to write 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 $_{\text{Numbers}}$, 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 $_{\text{add}}$ 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. iii. Write a static method called subtract, which takes two number parameters, b and c, 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 the values 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 $_{\text{print dir(geometry)}}$ 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 Objective:

CO1 Allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs

CO2 To provide the knowledge of basic data structures and their implementations.

CO3 To understand the concept of Dynamic memory management, data types, algorithms, asymptotic analysis and notation.

CO4 To understand the importance of data structures in context of writing efficient programs.

CO5 To develop skills to apply appropriate data structures in problem solving.

Course Outcome:

Upon Completing the Course, Students will able to:

CLO1 Learn the basic types for data structure, implementation and application.

CLO2 Know the strength and weakness of different data structures.

CLO3 Use the appropriate data structure in context of solution of given problem.

CLO4 Develop programming skills which require for solving given problem.

CLO5 Ability to estimate the algorithmic complexity of simple, non-recursive programs.

CLO6 Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

CLO7 Understand the hashing techniques and hash functions.

Unit 1	DATA STRUCRTURES (15 LECTURES)
1.1	**Introduction:** Data and Information, Data Structure, Classification of Data

1.2	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. **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
2 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.

3 3.1 3.2	**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**.** **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.
4 4.1 4.2 4.3	**Sorting and Searching Techniques** Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, Binary, Indexed Sequential Searches, Binary Search. **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. **Advanced Tree Structures:** Red Black Tree, Operations Performed on Red Black Tree, AVL Tree, Operations performed on AVL Tree, 23 Tree, B-Tree.

5 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.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	A Simplified Approach to Data Structures	Lalit Goyal, Vishal Goyal, Pawan Kumar	SPD	1st	2014
2.	An Introduction to Data Structure with Applications	Jean – Paul Tremblay and Paul Sorenson	Tata MacGraw Hill	2nd	2007
3.	Data Structure and Algorithm	Maria Rukadikar	SPD	1st	2017
4.	Schaum's Outlines Data structure	Seymour Lipschutz	Tata McGraw Hill	2nd	2005
5.	Data structure – A Pseudocode Approach with C	AM Tanenbaum, Y Langsam and MJ Augustein	Prentice Hall India	2nd	2006
	Data structure and Algorithm Analysis in C	Weiss, Mark Allen	Addison Wesley	1st	2006

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 TOTAL MARKS	INTERNAL ASSESSMENT ---	SEMESTER END EXAMINATION 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]
1.4	
	Implement the following for Linked List:
2.	Write a program to create a single linked list and display the node elements in reverse order.
2.1.	Write a program to search the elements in the linked list and display the same
2.2.	Write a program to create double linked list and sort the elements in the linked list.
2.3.	
	Implement the following for Stack:
3.	Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations.
3.1.	Write a program to convert an infix expression to postfix and prefix conversion.
	Write a program to implement Tower of Hanoi problem.
4.	
4.1.	**Implement the following for Queue:**
4.2.	Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations.
4.3.	Write a program to implement the concept of Circular Queue
4.4.	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.
	Write a program to search the element using binary search.
7.	
7.1	**Implement the following data structure techniques:**
7.2	Write a program to create the tree and display the elements.
7.3	Write a program to construct the binary tree.
7.4	Write a program for inorder, postorder and preorder traversal of tree
7.5	

8.1.	
8.2.	**Implement the following data structure techniques:**
8.3.	Write a program to insert the element into maximum heap.
8.4.	Write a program to insert the element into minimum heap.
9.1	**Implement the following data structure techniques:**
9.2	Write a program to implement the collision technique.
	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.

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	Data Structures and Algorithms Using Python	Rance Necaise	Wiley	First	2016
2.	Data Structures Using C and C++	Langsam , Augenstein, Tanenbaum	Pearson	First	2015

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 OBJECTIVE

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 OUTCOMES

CLO 1State the functionality of each layer of OSI model when the data is passed from sender to receiver

CLO 2compare 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	OPERATING SYSTEMS (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.
2	
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.
3	**Data Link Control:** DLC services, data link layer protocols, HDLC, Point-to-point protocol.
3.1	
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.**
4 4.1 4.2 4.3	**Introduction to the Network Layer**: Network layer services, packet switching, network layer performance, IPv4 addressing, forwarding of IP packets, Internet Protocol, ICMPv4, Mobile IP **Unicast Routing:** Introduction, routing algorithms, unicast routing protocols. **Next generation IP:** IPv6 addressing, IPv6 protocol, ICMPv6 protocol, transition from IPv4 to IPv6.
5 5.1 5.2	**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, **Standard Client0Server Protocols:** World wide-web and HTTP, FTP, Electronic mail, Telnet, Secured Shell, Domain name system.

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	Data Communication and Networking	Behrouz A. Forouzan	Tata McGraw Hill	Fifth Edition	2013
2.	TCP/IP Protocol Suite	Behrouz A. Forouzan	Tata McGraw Hill	Fourth Edition	2010
3.	Computer Networks	Andrew Tanenbaum	Pearson	Fifth	2013
4.	Operating Systems	Godbole and Kahate	McGraw Hill	3rd	

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	a) Given an IP address and network mask, determine other information about the IP address such as: • Network address • Network broadcast address • Total number of host bits • Number of hosts
1.2	b) Given an IP address and network mask, determine other information about the IP 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 bits The 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 • SMTP 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

CO1. The main objective of this course is to enable students to learn the fundamental concepts of database management system and design.

CO2. To emphasize the importance of normalization in databases. Discuss normalization techniques and relational algebra concepts which helps in understanding queries.

CO3. To demonstrate the use of Integrity constraints. Students will be able to understand and write various advanced queries.

CO4. Understanding the properties of transaction management and concurrency control methods.

CO5. Beginning with PL / SQL and learning Control Structures, Cursors, Procedures, Functions, Exceptions Handling and Packages.

COURSE OUTCOMES

CLO1. 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.

CLO2. Explain the importance of normalization in databases. Discuss normalization techniques and various types of joins. Explain the use of relational algebra concepts.

CLO3. State and explain the use of Integrity constraints. Write SQL queries involving advanced concepts.

CLO4. State and explain the properties of transaction management and concurrency control methods.

CLO5. Write PL / SQL programs using various Control Structures, Cursors, Procedures, Functions, Exceptions Handling and Packages.

Unit 1	DISCRETE MATHEMATICS(15 LECTURES)
1.1	**Introduction to Databases and Transactions** What is database system, purpose of database system, view of data, relational

1.2 1.3	databases, database architecture, transaction management **Data Models** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction. **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
2 2.1 2.2 2.3	**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). **Relational Algebra and Calculus** Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. **Calculus:** Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities
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 views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

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.
5 5.1 5.2	**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, Exceptions Handling, Packages, With Clause and Hierarchical Retrieval, Triggers.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year

1.	Database System and Concepts	A Silberschatz, H Korth, S Sudarshan	McGraw-Hill	Fifth Edition	
2.	Database Systems	Rob Coronel	Cengage Learning	Twelfth Edition	
3.	Programming with PL/SQL for Beginners	H. Dand, R. Patil and T. Sambare	X –Team	First	2011
4.	Introduction to Database System	C.J.Date	Pearson	First	2003

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
2.4.	
	Manipulating Data
3.	Using INSERT statement
3.1.	Using DELETE statement
3.2.	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:

COURSE LEARNING OUTCOMES:

Unit 1	COMMUNICATION SKILLS (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, Linear transformation, 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 of complex 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)
2.1 2.2 2.3	**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. **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. **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.
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
3.2	Theorem, Second Shifting Theorem, The Convolution Theorem, Laplace Transform of an Integral, Laplace Transform of Derivatives, **Inverse Laplace Transform:** 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),
4.1 4.2	**Multiple Integrals:** Double Integral, Change of the order of the integration, Double integral in polar co-ordinates, Triple integrals. **Applications of integration:** Areas, Volumes of solids.
5.1 5.2 5.3	**Beta and Gamma Functions –** Definitions**,** Properties and Problems. Duplication formula. **Differentiation Under the Integral Sign** **Error Functions**

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	A text book of Applied Mathematics Vol I	P. N. Wartikar and J. N. Wartikar	Pune Vidyathi Graha		

2.	Applied Mathematics II	P. N. Wartikar and J. N. Wartikar	Pune Vidyathi Graha		
3.	Higher Engineering Mathematics	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 1.2Adding and Using Buttons 1.3Adding and Using Event Listeners
2.	
	2.1Creating and Using Functions 2.2Using Events 2.3Handling and Using Back Button
3.	
	3.1Installing and Using Plugins 3.2Installing and Using Battery Plugin 3.3Installing and Using Camera Plugin
4.	
	4.1Installing and Using Contacts Plugin 4.2Installing and Using Device Plugin 4.3Installing and Using Accelerometer Plugin
5.	
	5.1Install and Using Device Orientation plugin 5.2Install and Using Device Orientation plugin 5.3Create and Using Prompt Function
6.	
	6.1Installing and Using File Plugin 6.2Installing and Using File Transfer Plugin

	6.3Using Download and Upload functions
7.	
	7.1Installing and Using Globalization Plugin 7.2Installing and Using Media Plugin 7.3Installing and Using Media Capture Plugin
8.	8.1Installing and Using Network Information Plugin 8.2Installing and Using Splash Screen Plugin 8.3Installing 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:

COURSE LEARNING OUTCOMES:

Unit 1	CORE JAVA (15 LECTURES)
1.1 1.2	**Introduction:** History, architecture and its components, Java Class File, Java Runtime Environment, 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 **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.
2.1 2.2 2.3	**Control Flow Statements:** The If…Else If…Else Statement, The Switch…Case Statement **Iterations:** The While Loop, The Do … While Loop, The For Loop, The Foreach Loop, Labeled Statements, The Break And Continue Statements, The Return Statement **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.
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, What Is 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.
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
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.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Core Java 8 for Beginners	Vaishali Shah, Sharnam Shah	SPD	1st	2015
2.	Java: The Complete Reference	Herbert Schildt	McGraw Hill	9th	2014
3.	Murach's beginning Java with Net Beans	Joel Murach , Michael Urban	SPD	1st	2016
4.	Core Java, Volume I: Fundamentals	Hortsman	Pearson	9th	2013
5.	Core Java, Volume II: Advanced Features	Gary Cornell and Hortsman	Pearson	8th	2008
6.	Core Java: An Integrated Approach	R. Nageswara Rao	DreamTech	1st	2008

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.
c.	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.
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 – II		
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:

COURSE LEARNING OUTCOMES:

Unit 1	**Introduction to Embedded Systems** (15 lectures)
1.1	**Introduction:** Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems

1.2 1.3	**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. **Characteristics and quality attributes of embedded systems:** Characteristics, operational and non-operational quality attributes.
2.1 2.2 2.3	**Embedded Systems – Application and Domain Specific:** Application specific – washing machine, domain specific - automotive. **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. **Peripherals:** Control and Status Registers, Device Driver, Timer Driver - Watchdog Timers

3.1 3.2	**The 8051 Microcontrollers:** Microcontrollers and Embedded processors, Overview of 8051 family. 8051 Microcontroller hardware, Input/output pins, Ports, and Circuits, External Memory. **8051 Programming in C:** Data Types and time delay in 8051 C, I/O Programming, Logic operations, Data conversion Programs.
4.1 4.2	**Designing Embedded System with 8051 Microcontroller:** Factors to be considered in selecting a controller, why 8051 Microcontroller, Designing with 8051. **Programming embedded systems:** structure of embedded program, infinite loop, compiling, linking and debugging.
5.1 5.2	**Real Time Operating System (RTOS):** Operating system basics, types of operating systems, Real-Time Characteristics, Selection Process of an RTOS. **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.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Programming Embedded Systems in C and C++	Michael Barr	O'Reilly	First	1999

2.	Introduction to embedded systems	Shibu K V	Tata Mcgraw-Hill	First	2012
3.	The 8051 Microcontroller and Embedded Systems	Muhammad Ali Mazidi	Pearson	Second	2011
4.	Embedded Systems	Rajkamal	Tata Mcgraw-Hill		

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.
6.1	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:

COURSE LEARNING OUTCOMES:

Unit 1	**Computer Oriented Statistical Techniques** (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.

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. **Elementary Probability Theory**: Definitions of Probability, Conditional Probability;

2.2 2.3	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 of Probability to Point Set Theory, Euler or Venn Diagrams and Probability. **Elementary Sampling Theory** : Sampling Theory, Random Samples and Random Numbers, 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.
3.1 3.2 3.3	**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. **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. **Statistics in R:** mean, median, mode, Normal Distribution , Binomial Distribution, Frequency Distribution in R.

4	

4.1 4.2	**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. **The Chi-Square Test**: Observed and Theoretical Frequencies, Definition of chi-square, Significance Tests, The Chi-Square Test for Goodness of Fit, Contingency Tables, Yates' Correction for Continuity, Simple Formulas for Computing chi-square, Coefficient of Contingency, Correlation of Attributes, Additive Property of chi square.	**12**
5 .1 5.2	**Curve Fitting and the Method of Least Squares:** Relationship Between Variables, Curve Fitting, Equations of Approximating Curves, Freehand Method of Curve Fitting, 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. **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.	

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	STATISTICS	Murray R. Spiegel, Larry J. Stephens.	McGRAW – HILL ITERNATIONAL	FOURTH	
2.	A Practical Approach using R	R.B. Patil, H.J. Dand and R. Bhavsar	SPD	1st	2017
3.	FUNDAMENTAL OF MATHEMATICAL STATISTICS	S.C. GUPTA and V.K. KAPOOR	SULTAN CHAND and SONS	ELEVENTH REVISED	2011
4.	MATHEMATICAL STATISTICS	J.N. KAPUR and H.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

	Compute the Linear Least

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	A Practical Approach to R Tool	R.B. Patil, H.J. Dand and R. Dahake	SPD	First	2011
2.	STATISTICS	Murray R. Spiegel, Larry J. Stephens.	McGRAW –HILL INTERNATIONAL	FOURTH	2006

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:

Upon successful completion of the course the students will be able to

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	**Software Engineering** (15 LECTURES)
1.1 1.2 1.3 1.4 1.5	**Introduction:** What is software engineering? Software Development Life Cycle, Requirements Analysis, Software Design, Coding, Testing, Maintenance etc. **Software Requirements:** Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements. **Software Processes:** Process and Project, Component Software Processes. **Software Development Process Models.** • Waterfall Model. • Prototyping. • Iterative Development. • Rational Unified Process. • The RAD Model • Time boxing Model. **Agile software development**: Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods.
2.1 2.2 2.3 2.4	**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. **Critical system:** Types of critical system, A simple safety critical system, Dependability of a system, Availability and Reliability, Safety and Security of Software systems. **Requirements Engineering Processes:** Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management. **System Models:** Models and its types, Context Models, Behavioural Models, Data Models, Object Models, Structured Methods.
3.1	**Architectural Design:** Architectural Design Decisions, System Organisation, Modular Decomposition Styles, Control Styles, Reference Architectures.

3.2 3.3 3.4	**User Interface Design:** Need of UI design, Design issues, The UI design Process, User analysis, User Interface Prototyping, Interface Evaluation. **Project Management** Software Project Management, Management activities, Project Planning, Project Scheduling, Risk Management. **Quality Management:** Process and Product Quality, Quality assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics.

4.1 4.2 4.3 4.4	**Verification and Validation:** Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods. **Software Testing:** System Testing, Component Testing, Test Case Design, Test Automation. **Software Measurement**: Size-Oriented Metrics, Function-Oriented Metrics, Extended Function Point Metrics **Software Cost Estimation:** Software Productivity, Estimation Techniques, Algorithmic Cost Modelling, Project Duration and Staffing
5.1 5.2 5.3	**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. **Software reuse:** The reuse landscape, Application frameworks, Software product lines, COTS product reuse. **Distributed software engineering**: Distributed systems issues, Client– server computing, Architectural patterns for distributed systems, Software as a service

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Software Engineering, edition,	Ian Somerville	Pearson Education.	Ninth	
2.	Software Engineering	Pankaj Jalote	Narosa Publication		
3.	Software engineering, a practitioner's approach	Roger Pressman	Tata Mcgraw-hill	Seventh	
4.	Software Engineering principles and practice	WS Jawadekar	Tata Mcgraw-hill		

5.	Software EngineeringA Concise Study	S.A Kelkar	PHI India.		
6.	Software Engineering Concept and Applications	Subhajit Datta	Oxford Higher Education		
7.	Software Design	D.Budgen	Pearson education	2nd	
8.	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:

COURSE LEARNING OUTCOMES:

Unit 1	GREEN COMPUTING (15 LECTURES)
1.1 1.2	**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. **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.

2.1 2.2	**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. **Three-Dimensional Transformations:** Three-Dimensional Scaling, Three-Dimensional Shearing, ThreeDimensional Rotation, Three-Dimensional Reflection, ThreeDimensional 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.

3.1 3.2 3.3	**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. **Light:** Radiometry, Transport, Equation, Photometry **Color:** Colorimetry, Color Spaces, Chromatic Adaptation, Color Appearance

4.1 4.2	**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. **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.
5.1 5.2	**Computer Animation:** Principles of Animation, Key framing, Deformations, Character Animation, Physics-Based Animation, Procedural Techniques, Groups of Objects. **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.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Computer Graphics - Principles and Practice	J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes	Pearson	2nd	
2.	Steve Marschner, Peter Shirley	Fundamentals of Computer Graphics	CRC press	4th	2016
3.	Computer Graphics	Hearn, Baker	Pearson	2nd	
4.	Principles of Interactive Computer Graphics	William M. Newman and Robert	TMH	2nd	

		F. Sproull			
	Mathematical Elements for CG	D. F. Rogers, J. A. Adams	TMH	2nd	

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

Project and Viva Voce	
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 project topics 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 last teaching 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 any 3 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**