SANDIP FOUNDATION

SANDIP FOUNDATION'S

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

(An autonomous institute permanently affiliated to Savitribai Phule Pune University, Pune and Accredited by NBA, NAAC 'A' Grade)

BACHELOR OF TECHNOLOGY
IN
COMPUTER ENGINEERING

PROGRAM STRUCTURE AND SYLLABI FOR I to VIII SEMESTERS FROM ACADEMIC YEAR 2023 - 24

CURRICULA FOR UG PROGRAMS

Table 1: Coverage of Subject Area over Curriculum (UG Programs)

Semester	Subject Area Coverage
I-II	Engineering Sciences (Physics & Chemistry), Engineering Mathematics,Elements of basic engineering (Mechanical, Civil & Electrical), Personality Development, Indian Knowledge System (IKS)
III-IV	Combined institute and program core courses, Open Electives, Foreign Languages (At least one), Value Added Courses, Skill Development Courses, Employability Certificate Courses
V-VI	Combined institute and program core courses, Program Electives towards specialisation, Vacational Internship (Mandatory), Value Added Courses, Skill Development Courses, Employability Certificate Courses
VII - VIII	Program core courses Program Electives, Program lined Project work,Value Added Courses

Table 2: Coding for Courses used in Curriculum

Course Code XXYYZZZE	**Definitions**
XX	Year of curriculum implementation
YY	Branch code
ZZZ	Level of program & Course no. 1: First Year (UG) 2: Second Year (UG) 3: Third Year (UG) 4: Fourth Year (UG) 5: First Year (PG) 6: Second Year (PG)
E	Suffix only for elective
VAC	Value Added Course
Branch Code (YY)	**Branch/Program**
00	Institute Level Course/Program
01	Engineering Sciences and Humanities
10	Computer Engineering
11	Electrical Engineering
12	Mechanical Engineering
13	Automation & Robotics
14	Civil Engineering
15	Information Technology
16	Master of Business Administration (M.B.A.)
17	Electronics & Telecommunication Engineering
18	Artificial Intelligence & Data Science

Table 3(a): Distribution of Credits and Marks for B.Tech Programs

	Part I: Program Courses								
	Semester								**Total**
	I	II	III	IV	V	VI	VII	VIII	
Credits	22	22	21	21	20	21	22	22	171
Marks	750	750	725	725	650	675	700	700	5675
Part II: Value Added Courses									
Credits	-	-	1	1	2	1	Audit	Audit	5
Marks	-	-	25	25	50	25	Audit	Audit	125
Total Marks	750	750	750	750	700	700	700	700	5800
TOTAL MINIMUM CREDITS TO EARN (Part I + II)							**171 + 5 = 176**		

Table 3(b): Distribution of Credits and Marks for Honors/Minors Programs (UG)

	Semester				**Total**
	V	VI	VII	VIII	
Credits	5	4	5	4	18
Marks	150	100	150	100	500

Abbreviations

CIA	Continuous Internal Assessment	**AEC**	Ability Enhancement Course
L	Theory Lecture	**BS**	Basic Science
T	Tutorial	**ES**	Engg. Science
P	Practical	**CEP**	Community Engagement Project
TC	Total Credits	**EC**	Exit Course
CP	Credits for Practical	**HSSM**	Humanities, Social Science and Management
CT	Credits for Theory	**IKS**	Indian Knowledge System
IC	Institute Core	**VSEC**	Vocational and Skill Enhancement Course
IE	Institute Elective	**MD**	Multidisciplinary Minor
OE	Open Elective	**LLC**	Liberal Learning Course
PC	Programme Core	**VEC**	Value Education Course
PE	Programme Elective	**ELC**	Experiential Learning Course
VAC	Value Added Course	[a]	Oral/ Presentation Examination
HM	Honors / Minor Program Course	[b]	Practical Examination
SDC	Skill Development Course		
EEC	Employability Enhancement Course		

Formative Assessment for Theory Course *(Scaled to allotted marks)*		
CIA	**Weightage**	**Description**
CIA 1	20%	Home Assignment
CIA 2	40%	Mid-Term Exam (MTE)
CIA 3	20%	Quizzes
CIA 4	20%	Topic Based Presentation
TOTAL	**100%**	

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B. Tech Computer Engineering

Semester – III

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2310201	Discrete Mathematics	3	--	--	3	50	--	50	--	100
2	PC	2310202	Object Oriented Programming concept using C++	3	--	--	3	50	--	50	--	100
3	PC	2310203	Data Structures	2	--	--	2	25	--	50	--	75
4	PC	2310204	OOP using C++ Lab	--	--	2	1	--	--	--	50[b]	50
5	PC	2310205	Data Structure using Python Lab	--	--	2	1	--	--	--	25[a]	25
6	OE	2310206	Open Elective-I	3	--	--	3	50	--	50	--	100
7	IC (HSSM)	2300201	Principles of Managements	2	--	--	2	25	--	50	--	75
8	IC (VEC)	2300202	Industrial Psychology	2	--	--	2	25	--	50	--	75
9	IC (MD)	2300203	Multidisciplinary –Design Thinking	1	--	2	2	25	25	--	25[a]	75
10	IC (CEP)	2300204	Community Engagement Project	--	--	4	2	--	25		25[a]	50
11	SDC	2310701	PC repairing course	--	--	2	--	--	--	--	--	--
12	EEC	2310801	Advanced Excel	--	--	--	--	--	--	--	--	--
TOTAL				**16**	**00**	**12**	**21**	**250**	**50**	**300**	**125**	**725**
Open Elective I												
7	OE	2310206A	Fundamentals of E-Commerce	3	--	--	3	50	--	50	--	100
7	OE	2310206B	E-Governance	3	--	--	3	50	--	50	--	100
7	OE	2310206C	System analysis and design	3	--	--	3	50	--	50	--	100
Value Added Course												
13	VAC	VAC101	Advanced PythonProgramming	-	--	2	1	--	25	--	--	25

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310201: Discrete Mathematics

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs./week	**Th: 03**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Familiarize the prospective learners with mathematical structures that are fundamentally discrete.
2. Introduce students to ideas and techniques from discrete mathematics that are widely used in science and engineering.
3. Know essential concepts in graph theory and related algorithms.
4. Provides some of the mathematical foundations and skills that you need in your further study of Information Technology and Computer Science & Engineering.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Provide overview of theory of discrete objects, starting with relations and partially ordered sets.
CO2: Develop recursive algorithms based on mathematical induction.
CO3: Apply knowledge about discrete mathematics in problem solving.
CO4: Provide basic knowledge about models of automata theory and the corresponding formal languages.

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S.Y. B.Tech (Computer Engineering) (2023 Pattern)

Sem-III

2310201: Discrete Mathematics

Unit 1: Logics and Functions **07 hrs.**	**CO**
Logics: Propositional equivalence, predicates and quantifiers, Methods of proofs, proof strategy, sequences and summation, mathematical induction, recursive definitions and structural induction, program correctness. **Functions:** Definition of function. Domain, co domain and the range of a function. Direct and inverse images. Injective, subjective and objective functions. Composite and inverse functions.	CO1
Unit 2: Relations and Graphs **07 hrs.**	CO2
Relations: Relations and their properties, n-array relations and their applications, representing relations, closure of relations, equivalence of relations, partial orderings. **Graph theory:** Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees. Definition and elementary results, Adjacency matrix, path matrix, representing relations using diagraphs, Warshall's algorithm - shortest path, Linked representation of a graph, Operations on graph with algorithms - searching in a graph; Insertion in a graph, deleting from a graph, Traversing a graph- Breadth-First search and Depth-First search.	
Unit 3: Counting Principles **07 hrs.**	CO3
Permutations and Combinations: Partition and Distribution of objects, Permutation with distinct and indistinct objects, Binomial numbers, Combination with identities: Pascal Identity, Vandermonde's Identity, Pascal triangle, Binomial theorem, Combination with indistinct objects, Counting Principles: Sum and Product Rules, Two-way counting, Tree diagram for solving counting problems, Pigeonhole Principle	
Unit 4: Trees **07 hrs.**	CO2, CO4
Trees: Definition and elementary results, ordered rooted tree, Binary trees, Complete and extended binary trees, representing binary trees in memory, traversing binary trees, binary search tree, Algorithms for searching and inserting in binary search trees, Algorithms for deleting in a binary search tree	
Unit 5: Group Theory **07 hrs.**	CO3, CO4
Group theory: Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, automorphisms, homomorphism and normal subgroups, rings, integral domains and fields.	
Unit 6: Coding Theory **07 hrs.**	CO3, CO4
The structure of algebra, Algebraic Systems, Semi Groups, Monoids, Groups, Homomorphism and Normal Subgroups, and Congruence relations, Rings, Integral Domains and Fields, Coding theory, Polynomial Rings and polynomial Codes, Galois Theory, Coding of binary information and error detection, decoding and error correction.	

Books

1. K.H. Rosen: Discrete Mathematics and its application, 5th edition, Tata McGraw Hill.
2. C. L. Liu: Elements of Discrete Mathematics, 2nd edition, TMH 2000.
3. Norman L. Biggs, Discrete Mathematics, Revised Edition, Clarendon Press, Oxford 1989.

Reference Books

1. Elements of Discrete Mathematics: C.L. Liu, Tata McGraw- Hill Edition.
2. Concrete Mathematics (Foundation for Computer Science): Graham, Knuth, Patashnik Second Edition, Pearson Education.
3. Discrete Mathematics: Semyour Lipschutz, Marc Lipson, Schaum's out lines, McGraw - Hill Inc.
4. Foundations in Discrete Mathematics: K.D. Joshi, New Age Publication, New Delhi
5. Discrete Mathematics with Applications (3rd edition) by Susanna S. Epp (December 22, 2003)

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310202: Object Oriented Programming concept using C++

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs./week	**Th: 03**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Explore the basic principles of Object-Oriented Programming (OOP).
2. Study the concepts of operator overloading and Inheritance.
3. Learn the concept of polymorphism and virtual function.
4. Learn the concept of Template and Exception Handling.
5. Learn the concept of file handling in C++.
6. Learn and understand concepts Standard Template Library (STL).

Course Outcomes: On completion of the course, learner will be able to–

CO1: Describe the strengths of object-oriented programming.
CO2: Understand the concept of Operator overloading and inheritance.
CO3: Demonstrate the use of Polymorphism and virtual function.
CO4: Apply the concept of Template and Exception Handling mechanism for program development.
CO5: Analyze the OOP system using File handling in C++.
CO6: Develop programming application using Standard Template Library.

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Sem-III

2310202: Object Oriented Programming concept using C++

Unit 1: C++ Programming basics **7 hrs.**	**CO**
Introduction to procedural, modular, object-oriented and generic programming techniques, Need of Object-Oriented Programming (OOP), Object Oriented Programming Paradigm, Basic Concepts of Object-Oriented Programming, C++ as object-oriented programming language. **C++ Programming**: C++ **programming** Basics, Data Types, Structures, Enumerations, control structures, Arrays and Strings, Class, Object, class and data abstraction, class scope and accessing class members, controlling access to members. Functions- Function, function prototype, accessing function and utility function, Constructors and destructors, Objects and Memory requirements, Static Class members, data abstraction and information hiding, inline function	CO1, CO2
Unit 2: Overloading and Inheritance **7 hrs.**	CO2, CO3
Operator Overloading- Concept of overloading, operator overloading, Overloading Unary Operators, Overloading Binary Operators, Data Conversion, Type casting (implicit and explicit), Pitfalls of Operator Overloading and Conversion, Keywords explicit and mutable. Function overloading Inheritance- Base Class and derived Class, protected members, relationship between base Class and derived Class, Constructor and destructor in Derived Class, Class Hierarchies, Inheritance, Public and Private Inheritance, Types of Inheritance, Ambiguity in Multiple Inheritance, Virtual Base Class, Classes Within Classes.	
Unit 3: Polymorphism and Virtual Function **7 hrs.**	CO2, CO3
Polymorphism- Concept, abstract classes, polymorphism, Overriding Member Functions Virtual Function-Pointers- indirection Operators, Memory Management: new and delete, Pointers to Objects, accessing Arrays using pointers, Function pointers, Pointers to Pointers, Smart pointers, Shared pointers. This Pointer, Virtual function, Rules of Virtual functions, dynamic binding, pure virtual function, Virtual destructor. Overloading and Overriding concept	
Unit 4: Templates and Exception Handling **7 hrs.**	CO4, CO5
Templates- function templates, Overloading Function templates, class templates, class template and No type parameters, template and inheritance, Applying Generic Function, Generic Classes, The type name and export keywords, The Power of Templates. Exception Handling- Fundamentals, other error handling techniques, simple exception handling- Divide by Zero, throwing an exception, exception specifications, processing unexpected Exceptions, constructor, destructor and exception handling	
Unit 5: Files and Streams **7 hrs.**	CO2, CO5
Data hierarchy, Stream and files, Stream Classes, Stream Errors, Disk File I/O with Streams, File Pointers, and Error Handling in File I/O, File I/O with Member Functions, Overloading the Extraction and Insertion Operators, memory as a Stream Object, Command-Line Arguments.	
Unit 6: Standard Template Library (STL) **7 hrs.**	CO2, CO6
Introduction to STL, Containers, algorithms and iterators, Containers- Sequence container and associative containers, container adapters, Algorithms- basic searching and sorting algorithms, min-max algorithm, set operations, heap sort, Iterators- input, output, forward, bidirectional and random access.	

Text Books

1. Bjarne Stroustrup, "The C++ Programming language", Third edition, Pearson Education. ISBN 9780201889543.
2. Deitel, "C++ How to Program", 4th Edition, Pearson Education, and ISBN: 81-297-0276-2
3. E Balgurusamy, "Object Oriented Programming with C++", 4th Edition, Tata McGraw-Hill, and ISBN- 13:978-0-07-066907-9

Reference Books

1. Robert Lafore, ―Object-Oriented Programming in C++, fourth edition, Sams Publishing, ISBN:0672323087 (ISBN 13: 9780672323089)
2. Herbert Schildt, ―C++, The complete reference‖, Eighth Edition, McGraw Hill Professional, 2011, ISBN:978-00-72226805
3. Cox Brad, Andrew J. Novobilski, ―Object –Oriented Programming: An Evolutionary Approach Second Edition, Addison–Wesley, ISBN:13:978-020-1548341

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310203: Data Structures

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Know about problem solving tools and strategies.
2. Acquainted with linear data structure, its constraints and advantages.
3. Understand the representation and memory requirements of various linear data structures.
4. Operate on data stored in linear data structures.
5. Be familiar with the applications of data structures.
6. Learn various data searching and sorting techniques.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Interpret different tools and strategies for solving the problems.
CO2: Summarize different types of data structures, and its usage.
CO3: Use appropriate data structure for solving problems and programming.
CO4: Operate on data stored in different linear data structures.
CO5: Analyze the problem to select appropriate algorithm and data structure.
CO6: Apply appropriate searching and sorting techniques for the specified problem.

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Sem-III

2310203: Data Structures

Unit 1: Introduction to Data Structure **7 hrs.**	**CO**
Algorithms and Flowcharts, Basics Analysis on Algorithm, Complexity of Algorithm. Introduction and Definition of Data Structure, Classification of Data, Arrays, Various types of Data Structure, Static and Dynamic Memory Allocation, Function, Recursion. **Arrays, Pointers and Strings:** Introduction to Arrays, Definition, One Dimensional Array and Multidimensional Arrays, Pointer, Pointer to Structure, Various Programs for Array and Pointer, Strings: Introduction to Strings, Definition, Library Functions of Strings.	CO1, CO2, CO3, CO4
Unit 2: Stacks and Queue **7 hrs.**	CO2, CO3, CO4
Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Applications of Stack and Multiple Stacks. Implementation of Multiple Stack Queues. Introduction to Queue, Definition, Queue Implementation, Operations of Queue, Circular Queue, De-queue and Priority Queue.	
Unit 3: Linked Lists **7 hrs.**	
Representation and Implementation of Singly Linked List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, doubly linked list and dynamic storage management, Circular Link List, Garbage Collection and Compaction.	CO3, CO4, CO5
Unit 4: Tree and Graphs **7 hrs.**	
Tree: Basic terminology, Binary Trees, Binary tree representation and Traversal, Algebraic Expressions, Complete Binary Tree, Threaded Binary trees, AVL tree, B+ tree, Binary Search Tree (BST), Height balanced tree and various Rotations. **Graph Theory:** Terminology & Representations, Traversal- BFS and DFS, Dijkstra's algorithm for shortest path, Prim's and Kruskal's Algorithm for Minimal Spanning tree	CO6

Text Books

1. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson Freed, Universities Press.
2. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI.

Reference Books

1. Data structures: A Pseudo code Approach with C, 2nd edition, R.F.Gilberg and B.A.Forouzan, Cengage Learning.
2. Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.
3. Data Structures using C, A.M.Tanenbaum,Y. Langsam, M.J.Augenstein, Pearson.
4. Data structures and Program Design in C, 2nd edition, R.Kruse, C.L.Tondo and B.Leung,Pearson

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S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310204: OOP using C++ Lab

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	--
Practical: 2 hrs./week	**Practical: 01**		--
Prerequisite: Nil		**Practical**	**50**
		Oral	--
		Term work	--

Course Objectives: The student should be able to

1. Study basic object-oriented programming concept.
2. Learn the operator overloading, Inheritance, virtual function.
3. Understand the exception handling concept.
4. Learn and understand file handling operation.
5. Study STL programming.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Describe the strengths of object-oriented programming
CO2: Apply the concept of operator overloading, Inheritance, virtual function.
CO3: Illustrate the concept exception handling.
CO4: Analyze the OOP system using File handling in C++
CO5: Implement the various file operations.
CO6: Develop the small application using OOP.

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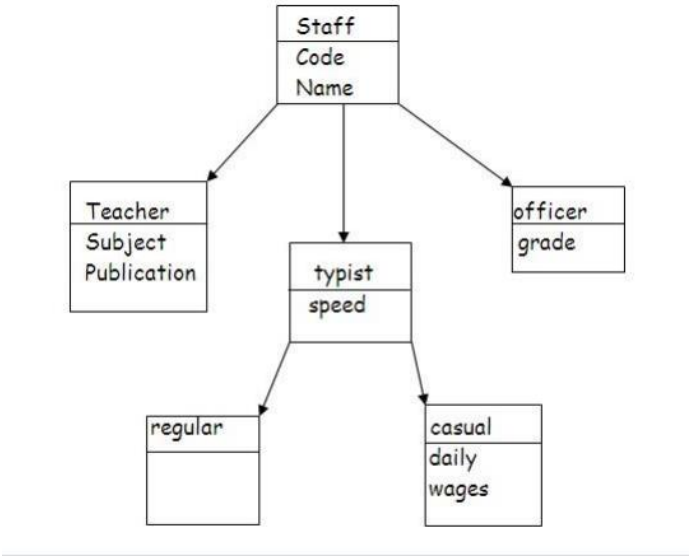
S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-III

2310204: OOP using C++ Lab

Exp No.	Experiment Title	CO
1	Implement a C++ program create a calculator for an arithmetic operator (+, -, *, /). The program should take two operands from user and performs the operation on those two operands depending upon the operator entered by user. Use a switch statement to select the operation. Finally, display the result.	CO1, CO2
2	Develop an object-oriented program in C++ to create a database of student information system containing the following information: Name, Roll number, Class, division, Date of Birth, Blood group, Contact address, telephone number, driving license no. and other. Construct the database with suitable member functions for initializing and destroying the data using constructor and destructor	CO1, CO2, CO3
3	Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data() to initialize base class data members and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine this function in the derived classes to suit their requirements.	CO3
4	Write a Program to Implement a Class STUDENT having Following Members: Data members & Member functions, accept Name of the student, marks of the student to Compute: Total,Average to Display the Data	CO2
5	An electricity board charges the following rates to domestic users to discourage large consumption of energy: For the first 100 units – 60P per unit For the first 200 units – 80P per unit For the first 300 units – 90P per unit All users are charged a minimum of Rs. 50.00. If the total amount is more than Rs. 300.00 then an additional surcharge of 15% is added. Write a program to read the names of users and number of units consumed and print out the charges with names.	CO3
6	An educational institution wishes to maintain a database of its employees. The database is divided into a number of classes whose hierarchical relationships are shown in following figure. The figure also shows the minimum information required for each class. Specify all classes and define functions to create the database and retrieve individual information as and when required.	CO3

		
7	Write a program to read and write data to and from a file.	CO5
8	Create user defined exception to check the following conditions and throw the exception if the criterion does not meet. a) User has age between 18 to 55 b) user stays has income between Rs 50000 - 100000 per month c) user stays in Nashik/Pune/Mumbai/Bangalore d) user has 4-wheeler accept age, income, city vehicle from the user and check for the conditions mentioned above. if any of the condition not meet then throw the exception	CO4
9	Write C++ program using STL for sorting and searching user defined records such as personal records (Name, DOB, Telephone number etc) using vector container.	CO5
10	To Develop a Mini project using OOP concept	CO6

Text Books

1. Bjarne Stroustrup, “The C++ Programming language”, Third edition, Pearson Education. ISBN 9780201889543.
2. Deitel, “C++ How to Program”, 4th Edition, Pearson Education, and ISBN: 81-297-0276-2 E Balgurusamy, “Object Oriented Programming with C++”, 4th Edition, Tata McGraw-Hill, and ISBN-13:978-0-07-066907-9

Reference Books

1. Robert Lafore, ―Object-Oriented Programming in C++‖, fourth edition, Sams Publishing, ISBN:0672323087 (ISBN 13: 9780672323089)
2. Herbert Schildt, ―C++ The complete reference‖, Eighth Edition, McGraw Hill Professional, 2011,ISBN:978-00-72226805.
3. Cox Brad, Andrew J. Novobilski, ―Object –Oriented Programming: An Evolutionary Approach Second Edition, Addison–Wesley, ISBN:13:978-020-1548341

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S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-III

2310205: Data Structure using Python Lab

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	**--**
Practical: 2 hrs./week	**Practical: 01**		**--**
Prerequisite: Nil		**Practical**	**--**
		Oral	**25**
		Term work	**--**

Course Objectives: The student should be able to

1. Know the representation of data in various data structures.
2. Realize the memory representation of different data structures.
3. Get familiar with ADTs of Data structures.
4. Analyze the time and space complexity of given problem solution.
5. Study various searching and sorting techniques.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Represent data in various Data structure formats.
CO2: Select appropriate data structure to solve a given problem.
CO3: Execute operation like insertion, deletion, searching and traversing on linear Data Structure.
CO4: Analyze solutions using time and space complexity.
CO5: Implement various searching and sorting techniques.

Suggested List of Assignments

Set of suggested assignment list is provided in groups- A, B, C and D. Each student must perform at least 8 assignments as at least 2 from Group A, 2 from Group B, 2 from Group C and Group D Assignments are mandatory. For each assignment program code with sample output is to be submitted as a soft copy. Handwritten write up (Title, Objectives, Problem Statement, Outcomes, Relevant Theory- Concept in brief, Algorithm, Flowchart, Test cases, Conclusion) of each assignment is to be submitted by students.

Group A: (At least 2)

1. Supermarket keeps a record for different products purchased by customers on a day. Select appropriate data structure and write a program to perform various operations on given product information.

2. Write a program for storing matrix. Write functions to:

i) Add, subtract and multiply two matrices

ii) Compute transpose of matrix

iii) Check whether given matrix is upper triangular or not

iv) Compute summation of diagonal elements

3. Write a program for sparse matrix realization and operations on it- Transpose, Fast Transpose.

4. Write a program for string operations- copy, concatenate, check substring, equal, reverse and length without using library functions.

5. Second year Computer Engineering class, set A of students like Vanilla Ice-cream and set B of students like butterscotch ice-cream. Write a program to store two sets using array. Compute and display- i. Set of students who like either vanilla or butterscotch or both, ii. Set of students who like both vanilla and butterscotch, iii. Set of students who like only vanilla not butterscotch, iv. Set of students who like only

butterscotch not vanilla, v. Number of students who like neither vanilla nor butterscotch

Group B: (At least 2)

6. Write a program to perform following operations on Singly Linked List for Employee data with fields: Emp_id, Name, Designation, Mobile No and Salary

a) Create SLL for N employees.

b) Perform insertion at front, middle and end of SLL

c) Perform deletion at front, middle and end of SLL

d) Display status of SLL and count no of employees present in SLL

7. Design a circular linked list to represent polynomials with integer coefficient. Each term of the Polynomial will be represented as a node. A node will have three fields as Coefficient, Exponent and Link to another node. Construct two CLL to represent two different polynomials. Write a program to perform addition of these two polynomials.

8. Write a program for storing binary number using doubly linked lists. Write functions to:

a) Compute 1,,s and 2,,s complement

b) Add two binary numbers

Group C (At least 2)

9. Write a program to implement STACK as an ADT using array. Use same ADT to compute string reverse and to check given expression is well parenthesized.

10. Write a program to convert expression from infix to postfix and evaluate postfix expression using stack.

11. Write a program to implement Queue as an ADT using array.

12. In job scheduling operating system maintains jobs in job queue. If the operating system uses priorities, then the jobs are processed based on their priorities, job with higher priority will bescheduled first. Write a program for simulating job queue.

13. Write a program to implement Circular Queue as an ADT using array.

Group D: (Mandatory)

14. Department Library maintains records of books. Write a program to implement Linear and Binary Search operations on it. Use appropriate data structure and analyse its complexity.

15. Write a program to store first year percentage of students in an array. Sort array of floating point Numbers in ascending order using bubble sort and quick sort display three topmost scores.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-III

2310206A: Fundamentals of E-Commerce

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs./week	**Th: 03**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Introduces information systems for business and management.
2. Designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the basic concepts and technologies used in the field of management information systems.
CO2: Have the knowledge of the different types of management information systems.
CO3: Understand the processes of developing and implementing information systems.
CO4: Be aware of the ethical, social, and security issues of information systems.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) (2023 Pattern)

Sem-III

2310206A: Fundamentals of E-Commerce

Unit 1: Electronic Commerce Environment and Opportunities **07 hrs.**	**CO**
Background, The Electronic Commerce Environment, Electronic Marketplace Technologies. **Modes of Electronic Commerce:** Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward.	CO1
Unit 2: Approaches to Safe Electronic Commerce **07 hrs.**	CO2
Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks. **Electronic Cash and Electronic Payment Schemes:** Internet Monetary Payment & Security Requirements, Payment and Purchase Order Process, On-line Electronic cash.	
Unit 3: Internet/Intranet Security Issues and Solutions **07 hrs.**	CO3
The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams**.**	
Unit 4: Master Card/Visa Secure Electronic Transaction **08 hrs.**	CO4
Introduction, Business Requirements, Concepts, payment processing. **E-Mail and Secure Email Technologies for Electronic Commerce:** Introduction, The Means of Distribution, Model for Message Handling, E-mail working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.	
Unit 5: Internet Resources for Commerce **08 hrs.**	CO4
Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet. **Advertising on Internet:** Issues and Technologies, Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.	
Unit 6: The Corporate Digital Library **05 hrs.**	CO4
Introduction, dimensions of electronic commerce systems, types of digital documents, Issues behind document infrastructure, corporate data warehouses.	

Books

1. Web Commerce Technology Handbook, by Daniel Minoli, Emma Minoli, McGraw-Hill
2. Frontiers of electronic commerce by Galgotia.

Reference Books

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310206B: E-Governance

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs./week	**Th: 03**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Develop knowledge of e-governance and e-government.
2. Understand different e-governance models and infrastructure development.
3. Implement security and use data warehousing and mining in e-governance.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the concept, importance and different models of E-Governance.
CO2: Evaluate various plans and issues of E- Governance.
CO3: Demonstrate various E-Governance initiatives through presentations and learn to seek services from Administration.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310206B: E-Governance

Unit 1: Introduction to E-Government and E-Governance **07 hrs.**	**CO**
Difference between E-Government and E-Governance, E-Government as Information System, Benefits of E-Government, E-Government Life Cycle, Online Service Delivery and Electronic Service Delivery, Evolution, Scope and Content of E-Governance, Present Global Trends of Growth in E-Governance.	CO1
Unit 2: Models of E-Governance **07 hrs.**	CO1
Introduction, Model of Digital Governanc, Broadcasting / Wider Dissemination Model, Critical Flow Model, Comparative Analysis Model, Mobilization and Lobbying Model, Interactive – Service Model/Government-to-Citizen-to-Government Model (G2C2G), Evolution in E-Governance and Maturity Models, Five Maturity Levels, Characteristics of Maturity Levels, Towards Good Governance through E-Governance Models.	
Unit 3: E-Government Infrastructure Development **07 hrs.**	CO2
Network Infrastructure, Computing Infrastructure, Data centres, E-Government Architecture, Interoperability Framework, Cloud Governance, E-readiness, Data System Infrastructure, Legal Infrastructural Preparedness, Institutional Infrastructural Preparedness, Human Infrastructural Preparedness, Technological Infrastructural Preparedness.	
Unit 4: Challenges and Security for e-Government **07 hrs.**	CO2
Challenges, Prerequisites of good Governance, E-Governance in Democratic set-up, Challenges and approach of E-government Security, Security Management Model, E- Government Security Architecture, Security Standards.	
Unit 5: Applications of Data Warehousing and Data Mining in Government **07 hrs.**	CO3
Introduction, National Data Warehouses, Census Data, Prices of Essential Commodities, Other Areas for Data Warehousing and Data Mining: Agriculture, Rural Development, Health, Planning, Education, Commerce and Trade, Other Sectors.	
Unit 6: Case Studies **07 hrs.**	CO3
E-Government Initiatives in Nepal: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software, NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh: Ekal Seva Kendra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana , DGFT, PRAJA, E-Seva, E- Panchyat, General Information Services of National Informatics, Centre E-Governance initiative in USA, E-Governance in China, E-Governance in Brazil and Sri Lanka.	

Text Books/ Reference Books

1. Richard Heeks, Implementing and managing e-Government.
2. C.S. R Prabhu, e-Governance: Concepts and Case studies, prentice hall of India Pvt. Ltd.
3. J. Satyanarayana, e-Government, Prentice hall of India Pvt. Ltd.
4. Backus, Michiel, e-Governance in Developing Countries, IICD Research Brief, No.1, March 2001.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310206C: System Analysis and Design

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs./week	**Th: 03**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Address different types of organizational needs which may undertake some information technology-based solution.
2. Cover formal project management techniques and team dynamics.
3. Examine several development methodologies which may be used to manage the software development process
4. Introduce the various aspects of feasibility and their use in the determination of project feasibility.
5. Examine a variety of information gathering techniques and their potential use.
6. Discuss successful information system implementation by addressing training requirements and possibilities, physical conversion strategies, and the need for evaluation.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the types of organizational needs that can be addressed using information technology-based solutions.
CO2: Write clear and concise system requirements and convert them into technical specifications.
CO3: Understand and compare different systems development methodologies.
CO4: Understand the feasibility study and negotiation.
CO5: Outline the control measures for performance and security of information system.
CO6: Create a user interface for input and output specification, varieties of data representation, manage distribution of a group on the basis of emphasis on user interfaces.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-III

2310206C: System Analysis and Design

Unit 1: Basic Concept of Systems **7 hrs.**	**CO**
The System: Definition and Concepts; Elements of a System: Input, Output Processor, Control, Feedback, Environment, Boundaries and Interface; Characteristics of a System; Types of systems -Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories	CO1
Unit 2: Information System, System Analyst and SDLC **7 hrs.**	CO2
Information systems: TPS, OAS, MIS, DSS, ESS; System Analyst: Role and need of system analyst, System Analyst as an agent of change. **SDLC:** Introduction to SDLC, Various phases: study, analysis, design, development, testing, implementation, maintenance; System documentation: Types of documentation and their importance.	
Unit 3: System Planning and Information Gathering **7 hrs.**	CO3
Planning: Initial Investigations, Identification of user needs, Project Identification and Selection; Needs of **Information Gathering:** Determination of requirements, Information gathering tools: interviews, group communication, questionnaires, presentations and site visits.	
Unit 4: Feasibility Study and Tools for System Analysis **7 hrs.**	CO4
Feasibility Study: Definition, Importance of feasibility study, Types of feasibility study, System selection plan and proposal, Prototyping, Cost-Benefit Analysis: Tools and Techniques. **Tools for System Analysis:** Data Flow Diagram (DFD), Logical and Physical DFDs, Developing DFD; System Flowcharts and Structured charts, Structured English, Decision trees and Decision tables	
Unit 5: System Design and Input/Output **7 hrs.**	CO5
System Design: Module specifications, Module Coupling and cohesion, Top-down and bottom-up design; Logical and Physical design, Structured design. **Input design:** Input data, Input media and devices; Output design; Form Design: Classification of forms, Requirements of Form design.	
Unit 6: System Implementation/Maintenance and System Security and Audit **7 hrs.**	CO6
System Implementation: Need of System Testing, Types of System Testing, Quality Assurance; System Conversion, Conversion methods, procedures and controls, System evaluation and performance, Maintenance activities and issues. **System Security and Audit:** System Security, Security Threats, Risk Analysis, Control measures, System Audit, Disaster Recovery Planning.	

Text Books

1. Avison, D. and Fitzgerald, G. Information systems development: methodologies, techniques and tools, McGraw-Hill.
2. Silver and Silver, System Analysis and Design, Addison Wesley.
3. James A. Senn-Analysis and Design of Information Systems.
4. System Analysis and Design, Elias M Awad.
5. System Analysis and Design, Hoffer, George, Valacich, PHI, 6th Edition.

Reference Books

1. Analysis, Design of Information System, Rajaraman, PHI Management.
2. Analysis & Design of Information System by James A. Senn.
3. System Analysis & Design Hand Book, V.K. Jain, Wiley Dreamtech.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-III

2300201: Principles of Managements

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
			ESE: 50
		Practical	--
		Oral	--
		Term work	--

Course Objectives: The student should be able to

1. Comprehend the nature and characteristics of management, its scope, and various functional areas.
2. Recognize the importance of ethical values in managerial decision-making and actions.
3. Explore the concepts of authority, delegation, decentralization, and their impact on organizational structure.
4. Analyze the techniques of coordination in managing complex organizational tasks.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Inculcate The Ability To Apply Multifunctional Approach To Organizational Objective.

CO2: Apply Process Based Thinking And Risk Based Thinking For Managing And Improving The Functioning Of An Organization

CO3: Examine The Inter-Relationships Between The Planning And Organising, Directing And Communicating, Controlling And Coordinating Etc.

CO4: Develop Skills For Corrective Action Management And Continual Improvement Project Management.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-III

2300201: Principles of Managements

Unit 1: Introduction to Management **7 hrs.**	**CO**
Definition and scope of management, Evolution of management theories, Functions of management: planning, organizing, leading, and controlling, Managerial roles and skills, Challenges and opportunities in contemporary management, Management As A Science, Art Or Profession; Management And Administration; Difference Between management And Administration. Significance Of Values And Ethics In Management	CO1
Unit 2: Planning, Organizing and Decision Making **7 hrs.**	CO2
Nature, Scope, Objective And Significance Of Planning, Elements And Steps Of Planning, Decision Making Organizing Principles, Span Of Control, Line And Staff Relationship, Authority, Delegation And Decentralization. Effective Organizing, Organizational Structures, Formal And Informal Organizations, Staffing, Importance of planning in achieving organizational goals, Types of plans: strategic, tactical, operational, Process of decision making, Decision-making models and techniques, Setting objectives and formulating strategies	
Unit 3: Organizing and Organizational Structure, Leading and Managing Human Resources **7 hrs.**	CO3
Principles of organizing, Types of organizational structures, Departmentalization and delegation of authority, Coordination and integration of activities, Formal and informal organization, The role of leadership in management, Leadership styles and their impact on organizational culture, Recruitment,Selection,Placement,Promotion,Separation,Performance Appraisal, Meaning and Nature of Direction, Motivation theories and their application in the workplace, Communication and its importance in effective leadership, Managing diversity and fostering inclusivity.	
Unit 4: Communicating, Controlling and Coordinating **7 hrs.**	CO4
Communication - Meaning And Importance, Communication Process, Barriers To Communication, Steps To Overcome Communication Barriers, Types Of Communication; Motivation Theories – Maslow's Need Hierarchy Theory, Herzberg's Two Factor Theory. **Leadership** – Meaning, Formal And Informal Leadership, Characteristics Of Leadership; Leadership Styles – Autocratic Style, Democratic Style, Participative Style, Laissez Faire Leadership Styles, Transition Leadership, Charismatic Leadership Style, Elements Of Managerial Control, Control Systems, Management Control Techniques, Effective Control Systems. Coordination Concept, Importance, Principles And Techniques Of Coordination, Concept of Managerial Effectiveness.	

Text Books

1. Principles of Management" by P. C. Tripathi and P. N. Reddy
2. Fundamentals of Management" by R. S. Dwivedi
3. "Management: Theory and Practice" by Kris Cole
4. "Principles of Management" by V. S. Ramaswamy and S. Namakumari
5. Essentials of Management" by Harold Koontz and Heinz Weihrich (Indian adaptation by A. Aryasri)

Reference Books

1. Management: Tasks, Responsibilities, Practices" by Peter F. Drucker
2. The Practice of Management" by Peter F. Drucker
3. "Management: Text and Cases" by V. S. P. Rao
4. Management: Concepts and Practices" by Tim Hannagan
5. Management: Principles and Practice" by S. K. Chakraborty and D. Chatterjee
6. Modern Management: Concepts and Skills" by Samuel C. Certo and S. Trevis Certo
7. Management: A Global and Entrepreneurial Perspective" by Heinz Weihrich, Mark Cannice, and Harold Koontz

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) *(2023 Pattern)*

Sem-III

2300202: Industrial Psychology

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
			ESE: 50
		Practical	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Develop an awareness of the major perspectives underlying the field of Industrial Psychology.
2. Apply the principles of human psychology to the corporate field and familiarize them with the current practices in the corporate. .
3. Develop an understanding of group dynamics, norms, and cohesiveness, enabling them to build and lead effective teams within the organization.
4. Familiarize with the field of occupational psychology and its applications in selection, placement, counseling, and training of employees.

Course Outcomes: On completion of the course, learner will be able to–

CO1: learn about theories of motivation and group behavior.
CO2: Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.
CO3: Analyze and interpret the role of motivation & Morale in behavior modification.
CO4: Analyze the impact of human engineering and physical environment on job performance and employee well-being**.**
CO5: Apply psychological principles in addressing work-related challenges**...**
CO6: Design the role of psychologists in industrial settings and appreciate their impact on employee well-being and organizational performance**.**

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-III

2300202: Industrial Psychology

Unit 1: Introduction **6 hrs.**	**CO**
The role of the psychologist in industry, the field of occupational Psychology: Study of behavior in work situation and applications of Psychological principles to problems of selection, Placement, Counseling and training	CO1
Unit 2: Design of Work Environments **7 hrs.**	CO2
Human engineering and physical environment techniques of job analysis, Social environment: Group dynamics in Industry Personal psychology, Selection, training, placement, promotion, counseling, job motivations, job satisfaction. Special study of problem of fatigue, boredom and accidents	
Unit 3: Individual and Group Behavior **7 hrs.**	CO3, CO4
Introduction, Objectives, Individual Behavior, Individual Differences: Meaning, Nature, Dimensions and Values, Factors Influencing Individual Behavior, Group Behavior: Introduction, Objectives, Meaning, Definition and Advantages of Groups, Types of Groups, Group Dynamics, Group Norms Group Cohesiveness	
Unit 4: Morale, Motivation & Counseling **8 hrs.**	CO5, CO6
Morale: Meaning, Types and Aspects, Characteristics of High and Low Morale and Essential and Psychological Requirements for High Morale, Introduction, Objectives, Meaning, Importance and Types of Motivation in Industry, Monetary and Non-Monetary Incentives, Fatigue, Boredom and Monotony: Meaning, Causes and Remedies, Introduction, Objectives, Counseling: Meaning, Significance, Types and Process, Employee Health, Safety and Security, Industrial Accidents: Accident Proneness and Prevention	

Text Books

1. Tiffin, J and McCormic E.J., Industrial Psychology, Prentice Hall, 6th Edn., 1975.
2. McCormic E.J., Human Factors Engineering and Design, McGraw Hill, 4th Edn.,1976.
3. Mair, N.R.F., Principles of Human relations
4. Gilmer, Industrial Psychology
5. Ghiselli & Brown, Personnel and Industrial Psychology.
6. Myer, Industrial Psychology.
7. Dunnete, M.D., Handbook of Industrial and Organizational Psychology.
8. Blum & Taylor, Industrial Psychology

Reference books

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y: McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBSPublication.
3. Aamodt, M.G. (2007) Industrial/Organizational Psychology : An Applied Approach
4. (5 th edition) Wadsworth/Thompson : Belmont, C.A.Blum M.L. Naylor J.C., Horper& Row, Industrial Psychology, CBS Publisher, 1968
5. Luthans, Organizational Behaviour, McGraw Hill, International, 1997
6. Morgan C.t.,King R.A.,John Rweisz & John Schoples, Introduction to Psychology, McHraw Hill, 1966.
7. Schermerhorn J.R.Jr., Hunt J.G &Osborn R.N., Managing, Organizational Behaviour, John Willy

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-III

2300203: Design Thinking

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 1hrs./week	**Th:01**	**Theory**	**CIA: 25**
Practical: 2 hrs./week	**Practical: 01**		**ESE: --**
Prerequisite:		**Practical**	**--**
		Oral	**25**
		Term work	**25**

Course Objectives: The student should be able to

1. Learn design thinking concepts and principles
2. Use design thinking methods in every stage of the problem
3. Learn the different phases of design thinking
4. Apply various methods in design thinking to different problems

Course Outcomes: On completion of the course, learner will be able to

CO1. Define key concepts of design thinking

CO2. Practice design thinking in all stages of problem solving

CO3. Apply design thinking approach to real world problems

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) *(2023 Pattern)*

Sem-III

2300203: Design Thinking

Unit 1: Introduction, Understand, Observe and Define The Problem **7 hrs.**	**CO**
Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs	CO1 CO2 CO3
Unit 2: Ideation, Prototyping, Testing and Implementation **7 hrs.**	
Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques. Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking	CO1 CO2 CO3

Text Books

1. Christian Mueller-Roterberg, Handbook of Design Thinking - Tips & Tools for how to design thinking.
2. Designing for Growth: a design thinking tool kit for managers By Jeanne Liedtka and Tim Ogilvie.
3. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown.

References

1. Johnny Schneider, “Understanding Design Thinking, Lean and Agile”, O'Reilly Media, 2017.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. http://ajjuliani.com/design-thinking-activities/
5. https://venturewell.org/class-exercises

LIST OF EXPERIMENTS:

1. Case study on understanding of the design thinking problems.
2. Case study on observations of the parameters of design thinking problems.
3. Case study on defining design thinking problems.
4. Case study on description of customer needs of the parameters of design thinking problems.
5. Case study of ideation phase of solving design thinking problems
6. Case study of prototyping phase of solving design thinking problems
7. Case study of testing phase of solving design thinking problems
8. Case study of implementation phase of solving design thinking problems

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) *(2023 Pattern)*

Sem-III

2300204 : Community Engagement Project

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	**CIA: --**
Practical: 4 hrs./week	**Practical: 02**		**ESE: --**
		Practical	**--**
		Oral	**25**
		Term work	**25**

Course Objectives: The student should be able to

1. sensitize the students to the living conditions of the people in the surroundings.
2. bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.
3. make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
4. make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
5. help students to initiate developmental activities in the community in coordination with public and government authorities.
6. develop a holistic life perspective among the students by making them to study culture, traditions, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Survey for the development of the community.
CO2: Interpret the social issues that confront the vulnerable / marginalized sections of the society.
CO3: Build team for societal change.
CO4: Create an opportunity to familiarize themselves with urban / rural community they live in.
CO5: plan activities based on the focused groups.
CO6: implement the ways of transforming the society through systematic programme implementation.

PROCEDURE

Students in a group (Maximum 5) can take up a planned community work for minimum of 50 hours. Evaluation of student's work will be based on the planning, execution and documentation of work, and a viva-voce by Departmental panel.

A group of students could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.

The Community Service Project is a twofold one

i. First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. For ex., a student of Arts will focus on socio-economic conditions, social survey and about the Government's social security schemes. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could be another primary source of data.
ii. Secondly, the student/s could take up a project work related to following domains.

a. Agriculture
b. Health
c. Marketing and Cooperation
d. Animal Husbandry
e. Horticulture
f. Fisheries
g. Sericulture
h. Revenue and Survey
i. Natural Disaster Management
j. Irrigation
k. Law & Order
l. Excise and Prohibition
m. Mines and Geology
n. Energy

The assessment is to be conducted for 50 marks. The number of credits assigned is 2. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightings shall be:

Project Report	50%
Presentation	50%

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310701: PC repairing course

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	--
Practical: 2 hrs./week	**Practical: --**		--
Prerequisite: Nil		**Practical**	--
		Oral	--
		Term work	--

Course Objectives: The student should be able to

1. Understand about the hardware of computer and laptop.
2. Understand about the software used in computer.
3. Understand the errors and fault in computer software and hardware.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the hardware troubleshooting.
CO2: Understand the different parts of computers.
CO3: Learn the types of error and apply the knowledge to resolve the error.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

2310701: PC repairing course

Module 1: Computer Hardware	**CO**
Parts of computers and laptops, About desktop and laptop Motherboard, Motherboard series, Types of Motherboard, Motherboard all details – port, slot, socket, connector, components, ic etc., Use of RAM, Difference Types of ram details-DRR, DDR2, DDR3, DDR4, About Ram cache memory, FSB Speed, all voltage Detail, CPU (Processor), Details about CPU series, Difference types of CPU socket and processor details, CPU clock speed, cache memory, FSB Speed, voltage, Details of Hard disk, What is CD/DVD/Blue Ray?, Keyboard and Mouse, How to use Diagnostic card for motherboard faults error, SMPS and its connection (switch mode power supply), Assembling & dissembling computer, How to assemble new computer?	CO1
Module 2: Computer Software	CO2
How to format & install windows. Like windows xp, windows 7/ 8 / 10, How to install multi windows on system, How to install all types of driver from offline/online, How to make bootable pen drive by software & without software, How to burn & write cd/dvd/blueray by software, How to install all types of application software. Like ms-office, media players, tally, coral draw, Photoshop etc., How to install & update all types of antivirus, How to break all types of windows password, How to get backup & restore for all types of windows, How to create & Marge partition for all types of windows, How to do all data recovery from hard disk, pen drive, memory card, About bios/cmos setup.	
Module 3: Computer Card Level Fault Finding & Troubleshooting	CO3
Blue screen problem, Windows installation errors, Virus detection and solution, Driver errors for computer devices, No display faults in laptop or desktop, Dead condition solution, Restarting problem in systems, Solutions for Hanging of systems, Date & time errors, Sound problem, Network problem, SMPS not working, Keyboard not working solution, Problems related to Mouse, Cd/Dvd faults.	

Books

1. Matthew R Baker, How Computers Work and What to Do When They Don't, 2019.
2. Kenneth M Jaskulski, COMPUTER REPAIR Smartiepants, 2019

1. Data Validation: Set data validation on cells to stop invalid entries - pay data

Make two sheets in one book in MS EXCEL

A)

Staff ID	*Surname*	*Initial*	*Hours Worked*	*Pay*	*Department*	*Nat Ins*	*Tax*	*Final Pay*
M/141	Abbot	R	16	£159.84	Admin	£1.14	£3.10	£155.60
M/289	Arlington	T	18	£179.82	Sales	£1.28	£3.49	£175.05
F/112	Brown	T	22	£219.78	Marketing	£1.56	£4.27	£213.95
F/219	Davies	F	19	£189.81	Web Sales	£1.35	£3.69	£184.78
F/881	Davis	G	18	£179.82	Marketing	£1.28	£3.49	£175.05
M/448	Davis	W	18	£179.82	Sales	£1.28	£3.49	£175.05
F/66	Fox	S	12	£119.88	Accounts	£0.85	£2.33	£116.70
M/557	Kelsey	A	16	£159.84	Accounts	£1.14	£3.10	£155.60
M/44	Marsh	H	16	£159.84	IT	£1.14	£3.10	£155.60
M/191	Oliver	H	18	£179.82	Sales	£1.28	£3.49	£175.05
M/352	Potts	B	22	£219.78	Web Sales	£1.56	£4.27	£213.95
F/336	Taylor	M	12	£119.88	HR	£0.85	£2.33	£116.70
TOTAL			**207**	**£2,067.93**		**£14.70**	**£40.16**	**£2,013.08**

Hourly Pay Rate	9.99
Nat Ins Rate	7%
Tax Rate	19%

B)

Department Names
Accounts
Admin
HR
IT
Marketing
Sales
Web Sales

a) Set data validation on cells **D4:D15** to restrict users to only typing in a whole number between 0 and 26

b) Try to type in the following values into column D and check that the data validation rules work and only the last item is allowed:

- 11.5
- -7
- 38
- 17

c) In column F we want to choose the department name from a list to avoid typing errors:

d) Set a data validation list for cells **F4:F15**, using the range name that is already set up on the **DV Range** tab called **Department Names**.

e) When you click in a cell in column F, you should now be able to choose a department name from the drop-down list.

2. Creation of Formulae

On a new workbook type in the text and numbers in the same cells as shown below:

	A	B	C	D	E
1	Cost item	Jan	Feb	Mar	Qtr 1 total
2	Admin costs	452	514	380	
3	Staff costs	125,319	119,800	132,670	
4	Services costs (@ £12,750 per annum				
5	Stationery	1,450	976	1,685	
6	Advertising @ 1.75% of staff costs				
7	TOTAL				

a) In cell **B4** create a formula using the following information:

- Services costs per month = annum cost of 12750 / 12 (ie. divided by 12)

b) Copy the formula across to cells C4 and D4 to work out the other monthly services costs.

c) In cell **B6** create a formula using the following information:

- Advertising = 1.75% of staff costs for that month (ie. 1.75% * staff costs in cell B3)

d) Copy the formula across to cells **C6** and **D6** to work out the other advertising costs.

e) In cell **E2**, create a formula that will add together all the monthly admin costs.

f) Copy the total formula down the column to calculate the other quarterly totals.

g) In cell **B7** create a formula to add the total costs for January, then copy this across to calculate the other column totals.

h) Save the file with the name: **Qtr1 Office Costs**

3. Lookup functions

We want Excel to search through the codes in this sheet:

Playground Safety Checks

Site Code	Site Location	Swings	Slides	Rocker	Climbing Frame	Overall Result
B55/871	Beaufort Gardens	6	8	7	9	Fail
B92/756	Church Fold	8	9	8	9	Pass
B66/997	Emily Lane	5	7	7	8	Fail
B81/222	Grange Avenue	9	8	8	9	Pass
B54/871	Howards Park	7	8	7	8	Fail
B55/993	Poppy Close	8	6	8	8	Fail
B92/771	Ribble Gardens	7	8	9	8	Pass
B11/134	Rivington Drive	7	6	7	2	Fail
B54/889	Leyton Drive	7	4	8	9	Fail
B81/156	Gibble Gabble	8	8	8	9	Pass
B81/157	Langley Road	8	8	6	8	Fail
B92/755	Arlington Close	8	9	7	8	Fail
B11/234	Flowery Fields	9	7	9	8	Pass

Site Code:	**B92/771**	<--- Change Code here
Location:	Ribble Gardens	
Swings:	7	
Slides:	8	
Rocker:	9	
C/Frame:	8	
Overall:	Pass	

When Excel finds the code in column A that exactly matches the code in cell **B18**, we want Excel to complete cells **B19:B24** with the correct information for that site:

a) First create a range name for all the data in your main spreadsheet table (**A4:G16**).

b) Also create a range name for cell **B18** where you will keep changing the site code.

c) In cell **B19** create an exact match lookup formula to return the site location from column B (the second column in your lookup table).

d)Copy the formula down to cell **B24** and then edit each formula by changing the column reference to return the correct item data.

e) Change the site code in cell **B18** to **B92/771** to check that all your formulae work.

f) Use **Save As...** to save the file in your own new Excel work folder.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

VAC101: Advance Python Programming

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	**--**
Practical: 2 hrs./week	**Practical: 01**		**--**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**25**

Course Objectives: The student should be able to

1. Learn how to design object-oriented programs with Python classes.
2. Learn about reading, writing and implementing other operation on files in Python.
3. Implement threading concept and multithreading on Python.
4. Design GUI Programs and implement database interaction using Python.
5. Implement regular expression and exceptions handling while writing robust python programs.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Implement OOP concepts in Python including Inheritance and Polymorphism.
CO2: Work with files and perform operations on it using Python.
CO3: Implement regular expression and concept of threads for developing efficient program.
CO4: Implement exception handling in Python applications for error handling.
CO5: Knowledge of working with databases, designing GUI in Python and implement networking in Python.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-III

VAC101: Advanced Python Programming

Module 1: Introduction
Working with files: Files, opening and closing a file, working with text files containing strings, knowing whether a file exists or not, working with binary files, the „with" statement, the seek() and tell() methods, random accessing of binary files, zipping and unzipping files, working with directories, running other programs from python program **Regular expressions:** What is a regular expression?, sequence characters in regular expressions, quantifiers in regular expressions, special characters in regular expressions, using regular expression on files, retrieving information from an html file,
Module 2: Threads in python
Threads in python: Difference between process and thread, types of threads, benefits of threads, creating threads, single tasking and multitasking, thread synchronization, deadlock in threads, daemon threads. **Date and time in python:** Date and time now, combining date and time, formatting dates and times, finding durations using "time delta", comparing two dates, sorting dates, stopping execution temporarily, knowing the time taken by a program, calendar module
Module 3: Database handling in using python
Database in python: Using SQL with python, retrieving rows from a table, inserting rows into a table, deleting rows from a table, updating rows in a table, creating database tables through python, Exception handling in databases. **Exceptions in python:** Errors in a python program, compile & run-time errors, logical error, exceptions-exception handling, types of exceptions, the except block, the assert statement, user-defined exceptions, logging the exceptions **Networking:** Protocols, server-client architecture, tcp/ip and udp Communication **Graphical user interface:** Creating a GUI in python, Widget classes, Working with Fonts and Colours, working with Frames, Layout manager, Event handling
Module 4: OOPs concept in Python
OOPs in python: Features of Object-Oriented Programming system (oops)-classes and objects, encapsulation, abstraction, inheritance, polymorphism, constructors and destructors. **Classes and objects:** Creating a class, the self-variable, types of variables, namespaces, types of methods, instance methods, class methods, static methods, passing members of one class to another class, inner classes. **Inheritance and polymorphism:** Inheritance in python, types of inheritance- single inheritance, multilevel inheritance, hierarchical inheritance, multiple inheritance, constructors in inheritance, overriding super class constructors and methods, the super() method, method resolution order (mro), polymorphism, duck typing, operator overloading, method overloading, method overriding, **Abstract classes and interfaces:** Abstract class, abstract method, interfaces in python, abstract classes vs. Interfaces.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-III

VAC101: Advanced Python Programming

Text books

1. Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 3rd Edition, 2018.
2. Programming through Python, M. T Savaliya, R. K. Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020.

References

1. Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, SakisKasampalis, Packt Publishing, 2019.
2. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018
3. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
4. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress,2017
5. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA,INDIA

B. Tech Computer Engineering

Semester – IV

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
								Formative Assessment CIA		Summative Assessment ESE		
				L	T	P	C	Theory	Lab	Theory	Lab	
1	PC	2310207	Object Oriented Programming using Java	3	--	--	3	50	--	50	--	100
2	PC	2310208	Database Management System	3	--	--	3	50	--	50	--	100
3	PC	2310209	Microprocessor	2	--	--	2	25	--	50	--	75
4	PC (MD)	2310210	Advanced Data Structures& Algorithms	2	--	--	2	25	--	50	--	75
5	PC	2310211	Object Oriented Programming using Java Lab	--	--	2	1	--	--	--	25[b]	25
6	PC	2310212	Database Management System Lab	--	--	2	1	--	--	--	25[b]	25
7	OE	2310213	Open Elective-II	2			2	25	--	50	--	75
8	IE (VEC)	2300205	First Level Course inForeign Language	2	--	--	2	25	--	50	--	75
9	IC (HSSM)	2300206	Industrial Economics	2	--	--	2	25	--	50	--	75
10	SDC (VSEC)	2310702	Motherboard Repairing Course	--	--	2	1	--	25	--	--	25
11	EEC	2310802	Advanced Web Designing	--	---	--	--	---	--	--	--	--
12	IC (AEC)	2300207	Industrial Work Study	2	--	--	2	25	--	50	--	75
TOTAL				**18**	**00**	**06**	**21**	**250**	**25**	**400**	**50**	**725**
First Level Course in Foreign Language (Any One)												
8	IE (VEC)	2300205A	German Language	2	--	--	2	25	--	50	--	75
8	IE (VEC)	2300205B	French Language	2	--	--	2	25	--	50	--	75
Open Elective II												
7	OE	2310213A	Introduction to Open Source Environment	2	--	--	2	25	--	50	--	75
7	OE	2310213B	ERP Systems	2	--	--	2	25	--	50	--	75
7	OE	2310213D	Cyber Forensics	2	--	--	2	25	--	50	--	75
Value Added Course												
13	VAC (VSEC)	VAC102	Advanced Data Structure	--	--	2	1	--	25	--	--	25
Course Work (for Exit Criterion to UG Diploma)												
Minor Project				--	--	--	2	--	50	--	--	50
Internship (2 Weeks)				--	--	--	2	--	50	--	--	50

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310207: Object Oriented Programming using Java

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs./week	**Th: 03**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Understand the basic concepts and fundamentals of platform independent object-oriented language.
2. Demonstrate skills in writing programs using exception handling techniques and multithreading.
3. Understand streams and efficient user interface design techniques.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Use the syntax and semantics of java programming language and basic concepts of OOP.
CO2: Understand the features of Java such as operators, classes, objects, inheritance.
CO3: Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO4: Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes
CO5: Design event driven GUI and web related applications which mimic the real word scenarios.
CO6: Acquire competence in Java through the use of swing, applets.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310207: Object Oriented Programming using Java

Unit 1: Object oriented thinking and Java Basics **07 hrs.**	**CO**
Introduction: Object oriented programming OOP"s principles, Java History, advantages, Java essentials, Writing the program, Compiling the program, How Java program compiles?, Executing the program, How Java program executes?, What is JVM and its significance in executing a program?, Architecture of JVM. program structure in java, Java Tokens, Datatypes, Operators, What are Operators? Different types of Operators, Typecasting, Control Structures and Arrays, Different types of control structures, Conditional Statements, Loops/ Iterators, Jumping Statements, Java Arrays, Multidimensional Arrays, Taking Input from keyboard, Command Line Arguments, Using Scanner Class, Using Buffered Reader class.	CO1
Unit 2: Classes, Objects and Inheritance **07 hrs.**	CO2
Classes, Methods, Objects, Description of data hiding and data encapsulation, Constructors, Use of static Keyword in Java, Use of this Keyword in Java, Array of Objects, Concept of Access Modifiers (Public, Private, Protected, Default). Understanding Inheritance, Types of Inheritance and Java supported Inheritance, Significance of Inheritance, Constructor call in Inheritance, Use of super keyword in Java, Polymorphism, Understanding Polymorphism, Types of polymorphism, Significance of Polymorphism in Java, Method Overloading, Constructor Overloading, Method Overriding, Dynamic Method Dispatching.	
Unit 3: Interfaces, Packaging and Java API **07 hrs.**	CO3
Differences between classes and interfaces, defining an interface, implementing interface, variables in interface, extending interfaces **Packages:** Defining, Creating and Accessing a Package, importing packages, access controls (public, protected, default, and private). Wrapper Classes and Auto Boxing, I/O classes	
Unit 4: Exception Handling and Multithreading **07 hrs.**	CO4
Exception Handling and Multithreading: Concepts of Exception Handling, Benefits of Exception Handling, Termination or Presumptive Models, Exception Hierarchy, Usage of Try, Catch, Throw, Throws and Finally, Built in Exceptions, Creating Own Exception Sub Classes. String Handling, Exploring Java.Util, Differences between Multi-Threading and Multitasking, Thread Life Cycle, Creating Threads, Thread Priorities, Synchronizing Threads, Interthread Communication, Thread Groups, Daemon Threads.	
Unit 5: Event Handling **07 hrs.**	CO5
Event Handling: Events, Event Sources, Event Classes, Event Listeners, Delegation Event Model, Handling Mouse and Keyboard Events, Adapter Classes. The AWT Class Hierarchy, User Interface Components- Labels, Button, Canvas, Scrollbars, Text Components, Check Box, Check Box Groups, Choices, Lists Panels – Scroll pane, Dialogs, Menu bar, Graphics, Layout Manager – Layout Manager Types – Border, Grid, Flow, Card and Grid Bag.	
Unit 6: Applets **07 hrs.**	CO6

Applets: Concepts of Applets, Differences between Applets and Applications, Life Cycle of an Applet, Types of Applets, Creating Applets, Passing Parameters to Applets. Swing: Introduction, Limitations of AWT, MVC Architecture, Components, Containers, Exploring Swing- Applet, Jframe and Jcomponent, Icons and Labels, Text Fields, Buttons – The Jbutton Class, Check Boxes, Radio Buttons, Combo Boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.	

Text Books

1. Java the Complete Reference, 7th Edition, Herbert Schildt, TMH.
2. Understanding OOP with Java Updated Edition, T. Budd, Pearson Education.
3. Java Fundamentals, A Comprehensive Introduction, Herbert Schildt, 2014, McGraw-Hill

Reference Books

1. An Introduction to Programming and OO Design using Java, J. Nino and F.A. Hosch, John Wiley & Sons.
2. An Introduction to OOP, Third Edition, T. Budd, Pearson Education.
3. Introduction to Java Programming, Y. Daniel Liang, Pearson Education.
4. An Introduction to Java Programming and Object-Oriented Application Development, R.A. Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay. S. Horstmann and Gary Cornell, Eighth Edition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay. S. Horstmann and Gary Cornell, eighth Edition, Pearson Education
7. Herbert Schildt, The Complete Reference Java 2, McGraw-Hill.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) (2023 Pattern)

Sem-IV

2310208: Database Management System

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs./week	**Th: 03**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: - The student should be able to

1. Understand the basic concepts and the applications of database systems.
2. Master the basics of SQL and construct queries using SQL.
3. Understand the relational database design principles.
4. Become familiar with the basic issues of transaction processing and concurrency control.
5. Become familiar with database storage structures and access techniques.

Course Outcomes: - On completion of the course, learner will be able to

CO1: Empowering the knowledge analysing different types of data.
CO2: Data Modelling techniques.
CO3: Process of maintaining the corporate database.
CO4: Tools for examining business performance.
CO5: Implementing databases and applications software primarily in the relational model.
CO6: Using querying languages, primarily SQL, and other database supporting software.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) (2023 Pattern)

Sem-IV

2310208: Database Management System

Unit 1: Introduction to Database **7 hrs.**	**CO**
Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file-oriented approach verses database-oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational.	CO1
Unit 2: Relational Model & Relational Algebra **7 hrs.**	CO2
Entity-Relationship model as a tool for conceptual design-entities, attributes and relationships. ER diagrams: Concept of keys; Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational schema. Extended ER features, Introduction to UML, Representation in UML diagram (Class Diagram etc.)	
Unit 3: Relational Database Design **7 hrs.**	CO3
Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self-join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages.	
Unit 4: Structured Query Language (SQL) **7 hrs.**	CO4
Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (INF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi- Valued Dependencies, 4NF, SNF. De-normalization.	
Unit 5: Query Processing and Security **7 hrs.**	CO4, CO5
Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING… ORDERBY….), INSERT, DELETE, UPDATE, DROP, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Inner and Outer Joins. Query Processing: Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base: Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.	
Unit 6: Concurrency Control, and Recovery **7 hrs.**	CO4, CO5, CO6
Concurrency Control Techniques; Two-Phase Locking (Types of Lock, Basic, Conservative, Strict, and Rigorous Two-Phase Locking, Deadlock and Starvation, Deadlock Prevention, Deadlock Detection) and Timestamp Ordering (Timestamp, Read Timestamp, Write Timestamp, Basic Timestamp Ordering, Strict Timestamp Ordering. Recovery Concepts (Recovery outline and categorization of recovery algorithms; Caching (Buffering) of disk blocks; Write-ahead logging, Steal/nosteal, and Force/no-force; Checkpoints and Fuzzy Checkpointing; Transaction rollback and cascading rollback)	

Text Books

1. Data base System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except III)
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.
3. Database System Concept: 4. Silberschatz , HLF. Korth and S. Sudarshan, TMH.
4. Fundamentals of Database Systems: E/masri & Nawathe, Pearson Education

Reference Books

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.
3. Database Management System: K. Majumdar & P. Bhattacharya, TMH An Introduction to Database Systems: C. J. Date, AWL Publishing Company.
4. An introduction to database systems: Bipin Desai, Galgotia Publication.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310209: Microprocessor

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Understand microprocessors, design and coding knowledge on 80386.
2. Learn and distinguish the architecture and programmer's model of advanced processor.
3. Identify the system level features and processes of advanced processors.
4. Acquaint the learner with application instruction set and logic to build assembly language programs.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Exhibit skill of assembly language programming.
CO2: Classify Processor architectures.
CO3: Illustrate advanced features of 80386 Microprocessor.
CO4: Use interrupts mechanism in applications.
CO5: Understand the need of protection mechanism in microprocessor.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310209: Microprocessor

Unit 1: Introduction to 80386 **7 hrs.**	**CO**
Brief History of Intel Processors, 80386 DX Features and Architecture, Programmers Model, operating modes, Addressing modes and data types. **Applications Instruction Set**: Data Movement Instructions, Binary Arithmetic Instructions, Decimal Arithmetic Instructions, Logical Instructions, Control Transfer Instructions, String and Character Transfer Instructions, Instructions for Block Structured Language, Flag Control Instructions, Coprocessor Interface Instructions, Segment Register Instructions, Miscellaneous Instructions.	CO1
Unit 2: Bus Cycles and System Architecture **7 hrs.**	CO2
Initialization- Processor State after Reset, functional pin Diagram, functionality of various pins, I/O Organization, Memory Organization (Memory banks), Basic memory read and writes cycles with timing diagram. **Systems Architecture**- Systems Registers (Systems flags, Memory Management registers, Control registers, Debug registers, Test registers), System Instructions.	
Unit 3: Memory Management **7 hrs.**	CO3
Global Descriptor Table, Local Descriptor Table, Interrupt Descriptor Table, GDTR, LDTR, IDTR.Formats of Descriptors and Selector, Segment Translation, Page Translation, Combining Segment and Page Translation.	
Unit 4: Interrupts, Exceptions and Protection **7 hrs.**	CO4, CO5
Interrupts and Exceptions: Identifying Interrupts, Enabling and Disabling Interrupts, Priority among Simultaneous Interrupts and Exceptions, Interrupt Descriptor Table (IDT), IDT Descriptors, Interrupt Tasks and Interrupt Procedures, Error Code, and Exception Conditions. **Protection:** Need of Protection, Overview of 80386DX Protection Mechanisms: Protection rings and levels,Privileged Instructions, Concept of DPL, CPL, RPL, EPL. Inter privilege level transfers using Call gates, Conforming code segment, Privilege levels and stacks. Page Level Protection, Combining Segment and Page Level Protection.	

Text Books

1. Douglas Hall, “Microprocessors & Interfacing”, McGraw Hill, Revised 2 Edition, 2006 ISBN 007-100462-9.
2. A.Ray, K.Bhurchandi, ”Advanced Microprocessors and peripherals: Arch, Programming & Interfacing”, Tata McGraw Hill,2004 ISBN 0-07-463841-6

Reference Books

1. Chris H. Pappas, William H. Murray, “80386 Microprocessor Handbooks”, McGraw-Hill Osborne Media, ISBN-10: 0078812429, 13: 978-0078812422.
2. Walter A. Triebel, “The 80386Dx 1, Microprocessor: Hardware”, Software, and Interfacing, Pearson Education, ISBN: 0137877307, 9780137877300.

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S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310210: Advanced Data Structures & Algorithms

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Understand and apply linear data structures-List, Stack and Queue.
2. Understand the graph algorithms.
3. Learn different algorithms analysis techniques.
4. Apply data structures and algorithms in real time applications.
5. Analyse the efficiency of algorithm.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Describe, explain and use abstract data types including stacks, queues and lists.
CO2: Design and Implement Tree data structures and Sets.
CO3: Understand and implement non-linear data structures – graphs.
CO4: Understand various algorithm design and implementation.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310210: Advanced Data Structures & Algorithms

Unit 1: Linear Data Structures **7 hrs.**	**CO**
Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.	CO1
Unit 2: Non-Linear Tree Structures **7 hrs.**	CO2
Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap- Heap operations- -Binomial Heaps - Fibonacci Heaps- Hash set.	
Unit 3: Graphs **7 hrs.**	CO3
Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra‟s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms	
Unit 4: Algorithm Design and Analysis **7 hrs.**	CO4
Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree – Warshall’s Algorithm for Finding Transitive Closure. Backtracking – N Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem- Amortized Analysis.	

Text Books/ Reference Books

1. Anany Levitin “Introduction to the Design and Analysis of Algorithms” Pearson Education, 2015.
2. E.Horowitz, S.Sahni and Dinesh Mehta, “Fundamentals of Data structures in C++”, University Press, 2007.
3. E. Horowitz, S. Sahni and S. Rajasekaran, “Computer Algorithms/C++”, Second Edition, University Press, 2007.
4. Gilles Brassard, “Fundamentals of Algorithms”, Pearson Education 2015
5. Harsh Bhasin, “Algorithms Design and Analysis”, Oxford University Press 2015
6. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Thrid Edition, PHI Learning Private Ltd, 2012
7. Tanaenbaum A.S, Langram Y. Augestein M.J, “Data Structures using C” Pearson Education, 2004.
8. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310211: Object Oriented Programming using Java Lab

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	--
Practical: 2 hrs./week	**Practical: 01**		--
Prerequisite: Nil		**Practical**	**25**
		Oral	--
		Term work	--

Course Objectives: The student should be able to

1. Understand the basic concepts and fundamentals of platform independent object-oriented language.
2. Demonstrate skills in writing programs using exception handling techniques and multithreading.
3. Understand streams and efficient user interface design techniques.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Use the syntax and semantics of java programming language and basic concepts of OOP.
CO2: Understand the features of Java such as operators, classes, objects, inheritance.
CO3: Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO4: Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
CO5: Design event driven GUI and web related applications which mimic the real word scenarios.
CO6: Acquire competence in Java through the use of swing, applets.

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S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310211: Object Oriented Programming using Java Lab

List of Experiments	CO
1.Write a java program to find the Fibonacci series using recursive and non-recursive functions.	CO1, CO2
2.Write a java program to multiply two given matrices.	CO1, CO2
3.Write a java program for Method overloading and Constructor overloading.	CO2
4.Write a program to demonstrate execution of static blocks, static variables & static methods.	CO3
5. Write a program to display the employee details using Scanner class.	CO3
6. Write a program to implement single and Multi level inheritance.	CO3
7. Write a program to implement method overriding.	CO3
8. Write a program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape.	CO1, CO2, CO3
9. Write a program to implement Interface.	CO3, CO4
10. Write a program to create user defined package and demonstrate various access modifiers.	CO3, CO4
11. Write a program if number is less than 10 and greater than 50 it generates the exception out of range. else it displays the square of number.	CO5
12. Write a program with multiple catch Statements.	CO5
13. Write a Java program that implements a multi-thread application that has three threads.	CO5
14. Write an applet program that displays a simple message	CO6
15. Write a Java program compute factorial value using Applet. Write a program for passing parameters using Applet.	CO6

Text Books

1. Java the Complete Reference, 7th Edition, Herbert Schildt, TMH.
2. Understanding OOP with Java Updated Edition, T. Budd, Pearson Education.
3. Java Fundamentals, A Comprehensive Introduction, Herbert Schildt, 2014, McGraw-Hill

Reference Books

1. An Introduction to Programming and OO Design using Java, J. Nino and F.A. Hosch, John Wiley & Sons.
2. An Introduction to OOP, Third Edition, T. Budd, Pearson Education.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) (2023 Pattern)

Sem-IV

2310212: Database Management System Lab

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	**--**
Practical: 2 hrs./week	**Practical: 01**		**--**
Prerequisite: Nil		**Practical**	**25**
		Oral	**--**
		Term work	**--**

Course Objectives: - The student should be able to

1. Learn to create and use a database.
2. Be familiarized with a query language.
3. Have hands on experience on DDL Commands.
4. Have a good understanding of DML Commands and DCL commands.
5. Familiarize advanced SQL queries.
6. Be Exposed to different applications.

Course Outcomes: - On completion of the course, learner will be able to

CO1: Learn foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
CO2: Learn SQL programming through a variety of database problems.
CO3: Develop database applications using front-end tools and back-end DBMS. Descriptions (if any)
CO4: Design and implementation of typical database applications
CO5: Use of a front-end tool for GUI based application development.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) (2023 Pattern)

Sem-IV

2310212: Database Management System Lab

Group A	**Compulsory 4 assignments**	
1. Creation of a database and writing SQL queries to retrieve information from the database.		CO1
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.		CO1, CO2
3. Query the database tables using different where clause conditions and also implement aggregate functions.		CO2
4. Query the database tables and explore sub queries and simple join operations.		CO2
5. Query the database tables and explore natural, equi and outer joins		CO3
6.Write a PL/SQL block to satisfy some conditions by accepting input from the user.		CO4
Group B	**Any Two**	
1. Execute complex transactions and realize DCL and TCL commands.		CO2
1. Create an XML database and validate it using XML schema.		CO3
2. Create Document, column and graph based data using NOSQL database tools.		CO4
3. Develop a simple GUI based database application and incorporate all the above-mentioned features		CO5
Group C	**Any Two**	
Case Study using any of the real life database applications from the following list a. Inventory Management for a EMart Grocery Shop b. Society Financial Management c. Cop Friendly App – Eseva d. Property Management – eMall e. Star Small and Medium Banking and Finance Or		CO4, CO5
Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application.		
Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer.		
Mini project (Application Development using Oracle/ Mysql) Inventory Control System. Material Requirement Processing. Hospital Management System.		

Text Books

1. Data base System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except IIIrd)
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA Mc Graw Hill 3rd Edition.
3. Database System Concept: 4. Silberschatz , HLF. Korth and S. Sudarshan, TMH
4. Fundamentals of Database Systems: E/masri & Nawathe, Pearson Education

Reference Books

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.
3. Database Management System: K. Majumdar & P. Bhattacharya, TMH An Introduction to Database Systems: C. J. Date, AWL Publishing Company.
4. SQL, PL/SQL: Ivan Bayross, BPB Publication 5, An Introduction to database systems: Bipin Desai, Galgotia Publication.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310213A: Introduction to Open Source Environment

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Learn basic concepts, syntax and uses of PHP as server-side scripting language.
2. Learn and implement PHP script and Arrays.
3. Learn and implement decision making, looping and object oriented features supported by PHP.
4. Learn various tools and implement forms in PHP.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the basic concepts, syntax and uses of PHP as general-purpose language.
CO2: Understand basic of PHP as scripting Language and implement Arrays in PHP.
CO3: Understand and implement decision making, looping and other object-oriented features supported by PHP.
CO4: Understand latest framework supported by PHP and implement forms using PHP.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310213A: Introduction to Open Source Environment

Unit 1: Introduction to PHP **7 hrs.**	**CO**
Introduction, Uses of PHP, Using PHP in Web Application, Using PHP for Database Applications, Using PHP with your File System, Using PHP for System Commands, Understanding the working of PHP, PHP as a General-Purpose Language, PHP for the Web, keeping up with Changes in PHP, PHP 5, Writing PHP Statements, Adding PHP Sections to HTML File, PHP Output Statement, Documenting your Scripts.	CO1
Unit 2: Basics of PHP Script & Working with Data **7 hrs.**	CO2
Understanding Data Types, Performing Arithmetic, Manipulating Characters String, Using Date and Time, Naming Variables, assigning values to Variable, Removing Variables, Using Constants, Handling Errors. **Storing Data in Group by using Arrays:** Introduction, Building Arrays, Assigning values to Arrays, Sorting Arrays, using value in Arrays, Building Multidimensional Arrays	
Unit 3: Controlling the Flow Script & Reusing PHP Code **7 hrs.**	CO3
Introduction, Changing the order of Statements Executed, setting up Condition, Joining Simple Conditions to make Complex Conditions, Using Conditions in Conditional Statements and Loops, writing if Statements, Building and using Loops, Breaking Loop, Including Files in Scripts, Understanding Store for included Files, Writing Functions, Using Functions in PHP. **Object Oriented Concepts in PHP:** Introduction, Understanding Object Oriented Programming, Identifying Objects, Writing Classes, Object Oriented Concepts.	
Unit 4: Web Application and PHP **7 hrs.**	CO4
Introduction, Understanding Web Security, Displaying Static Pages, Collecting Information from User with HTML Forms, Processing Information received from Users, Passing Information from Page to Page, Using Cookies, Using Hidden Fields in HTML Forms, Using HTTP Session Functions, Adding JavaScript to PHP Scripts, Writing and Reading Flat Files in PHP. Introduction to CMS (Drupal, Joomla) and PHP Framework (Cake PHP).	

Text Books

1. Vikram Vaswani, “PHP and MySQL”, Tata McGraw-Hill, 2005
2. Ben Forta, “MySQL Crash Course”, SAMS, 2006.

Reference Books

1. Robert Sheldon, Geoff Moes, “Beginning MySQL”, Wrox, 2005
2. Tim Converse, Joyce Park and Clark Morgan, “PHP 5 and MySQL”, Wiley India Reprint, 2008.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310213B: ERP Systems

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th:02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral:	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Learn the basic concepts of Enterprise Resource Planning.
2. Learn different technologies used in ERP.
3. Learn the concepts of ERP Manufacturing Perspective and ERP Modules. To learn what are the benefits of ERP.
4. Study and understand the ERP life cycle.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the basic knowledge of Enterprise Resource Planning.
CO2: Identify different technologies used in Enterprise Resource Planning.
CO3: Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules.
CO4: Understand the benefits, Success and Failure Factors of an ERP Implementation.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310213B: ERP Systems

Unit 1: Introduction to ERP **7 hrs.**	**CO**
Common Myths, Advantages, Basic Concepts, Risks and Benefits. **Evolution of ERP:** Material Requirement Planning, Manufacturing Resource Planning, ERP, e-ERP. ERP and Related Technologies: Business Process Reengineering (BPR), Data Warehousing, Data Mining, Online Analytical Processing (OLAP), Online Transaction Processing (OLTP), Supply Chain Management (SCM) and Customer Relationship Management (CRM).	CO1
Unit 2: ERP Marketplace and Marketplace Dynamics **7 hrs.**	CO2
Market Overview, Marketplace Dynamics, Changing ERP Market, Functional Modules. **ERP Implementation Basics:** Technological, Operational, and Business reasons for Implementing ERP, Implementation Challenges, Implementation Life Cycle, Package Selection.	
Unit 3: ERP Transition Strategies **7 hrs.**	CO3
Big Bang Strategy, Phased Implementation, Parallel Implementation, Process Line Transition Strategy, Hybrid Transition Strategy. **ERP Implementation Process:** Implementation Methodologies, Implementation Plan, Risk Assessment, ERP Project Teams, Implementation Vendors Evaluation Criterion	
Unit 4: Success and Failure Factors of an ERP Implementation **7 hrs.**	CO4
Success Factors, Failure Factors in ERP implementation. **ERP Operation and Maintenance:** After Going Live, Ongoing Implementation Efforts, Upgrading Vs New Software, Operation and Maintenance of the ERP System, ERP Maintenance Phase, Maximizing the ERP System Commonly Used ERP Packages: Tally ERP, TCS-ION, SAP.	

Text Books

1. Alexis Leon, ERP demystified, second Edition Tata McGraw-Hill,2008.
2. Sinha P. Magal and Jeffery Word, Essentials of Business Process and Information System, Wiley India,2012.
3. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill,2008.
4. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill,2008.
5. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India,2009.
6. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, PHI,2006.

Reference Books

1. Lexis Leon, “Enterprise Resource Planning”, TMH.
2. Brady, Manu, Wegner, “Enterprise Resource Planning”, TMH.
3. V.K Garg, N.K. Venkitakrishnan, “ERP Ware: ERP Implementation Framework”, Prentice Hall of India.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310213D: Cyber Forensics

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Learn computer forensics
2. Become familiar with forensics tools
3. Learn to analyze and validate forensics data

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the basics of computer forensics
CO2: Apply a number of different computer forensic tools to a given scenario
CO3: Analyze and validate forensics data
CO4: Identify the vulnerabilities in a given network infrastructure
CO5: Implement real-world hacking techniques to test system security

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S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310213D: Cyber Forensics

Unit 1: Introduction to Cyber Forensics **7 hrs.**	**CO**
Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.	CO1
Unit 2: Evidence Collection and Forensics Tools **7 hrs.**	CO2
Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.	
Unit 3: Analysis and Validation **7 hrs.**	CO3
Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics	
Unit 4: Ethical Hacking **7 hrs.**	CO4, CO5
Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing Ehical Hacking in Web: Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.	

Text Books

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, India Edition, 2016.
2. CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

Reference Books

1. Cyber Forensics: A Field Manual** by Andrew G. Katz
2. Digital Forensics with Open Source Tools** by Brian Carrier
3. Malware Forensics** by Michael Sikorski and Andrew Honig

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-IV

2300205A: German Language

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th:02**	**Theory**	**CIA: 25**
Practical: --			**ESE: 50**
		Practical	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Understand grammar & structure of the German language and use it in daily basic conversations and communication.
2. Speak and write German language.
3. Critically think in German.

Course Outcomes: On completion of the course, learner will be able to–

CO1: do the proper pronunciation of the sounds of the German language.
CO2: understand a basic vocabulary.
CO3: comprehend the basic grammatical structures.
CO4: understand German that is spoken at a moderate conversational speed and that deals with everyday topics and will be able to engage in simple conversations in everyday situations.
CO5: demonstrate that they can think critically, read& write with a basic knowledge of non-technical German.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) *(2023 Pattern)*

Sem-IV

2300205A: German Language

Module 1: Introduction **7 hrs.**	**CO**
Greetings, Introduction To Basic Phonetics; Writing System; Tones; Spelling Rules, Introducing Oneself And Others, Talk About Family and Family Members, Express likes and dislikes, Hobbies, Asking For Personal Information, Talking About Date, Month, Year, Talking About Time, Talking About Age	CO1
Module 2: Grammar **7 hrs.**	CO1, CO2, CO3
Alphabet- Numerals - Nominal Classifiers – Sentences with Adjectival Predicate – Names of Countries and places- Personal Pronoun- Interrogative Sentences - Structural Particle - Verbs and Verb Conjugation – Articles- Singular and Plural- Prepositions – Negative articles – Ja/Nein and W-Fragen (Yes/No and W- Questions) - Negation – Adjective- Possessive Article – Nominative and Accusative cases – Writing notes, SMS and filling up forms- Listen and Understand Telephonic Conversation and Conversations at specific places- Songs and Quiz	
Module3: Oral Communication **7 hrs.**	CO4, CO5
Stellungnahme (Taking a particular stance on a given topic)/ Debate/Discussions/ Interview/ Role play/ group discussion/Narration, interview skills etc.	
Module4: Writing Communication **7 hrs.**	CO1 & CO5
Writing skills: Formal and Informal letters, Email, SMS blogs, Essays, Report, Article, statistical Analysis, book/Film review etc	

Text Books

1. Kraft, Wolfgang S. Deutsch Aktuell 1, 7th edition (2017). St. Paul: EMC/Paradigm Publishing ISBN 978-0-8219-8076-7
2. Kraft, Wolfgang S. Deutsch Aktuell 1 Workbook, 7th edition (2017). St. Paul: EMC /Paradigm Publishing. ISBN 978-0-8219-8078-1

Reference books

1. Funk, Hermann u.a. (hrsg.): Studio D A1. Deutsch AlsFremdsprache. Kurs Und Übungs buch.Cornelsen and GOYAL SaaB. , 2009.
2. Funk, Hermann, u.a. (hrsg.): Studio D A1. Deutsch AlsFremdsprache. Sprachtraining. Cornelsenand GOYAL SaaB. , 2009.
3. Hirschfeld, Ursula, Reinke, Kerstin, Stock, Eberhard (hrsg.): Phonothekintensiv. München. Langenscheidt, 2007.
4. Studio 21 A1 Glossardeutsch-englisch, CornelsenVerlag, Berlin, 2013.
5. Tangram aktuell 1, Max HueberVerlag, Ismaning 2005 and GOYAL Publishers, Delhi2005.
6. Swick, Ed: Complete German Grammar. Mcgraw-Hill Publ. Comp. New York City, 2012.
7. Evans, Richard J.: Rereading German History, 1800-1996. From Unification to Reunification. Routledge. London & New York, 1997.
8. Fraser, Catherine C. & Hoffmann, Dierk O. (hrsg.): Pop Culture in Germany! Media, Art and Life style. ABC-CLIO. England, 2006.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) *(2023 Pattern)*

Sem-IV

2300205B: French Language

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs./week	Th: 02	Theory	CIA: 25
Practical: --			ESE: 50
		Practical	--
		Oral	--
		Term work	--

Course Objectives: The student should be able to

1. Understand grammar & structure of the French language and use it in daily basic conversations and communication.
2. Speak and write French language.
3. Critically think in French.

Course Outcomes: On completion of the course, learner will be able to–

CO1: do the proper pronunciation of the sounds of the French language.
CO2: understand a basic vocabulary.
CO3: comprehend the basic grammatical structures.
CO4: understand French that is spoken at a moderate conversational speed and that deals with everyday topics and will be able to engage in simple conversations in everyday situations.
CO5: demonstrate that they can think critically, read& write with a basic knowledge of non-technical French.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) *(2023 Pattern)*

Sem-IV

2300205B: French Language

Module 1: Introduction **7 hrs.**	**CO**
Greetings, Introduction To Basic Phonetics; Writing System; Tones; Spelling Rules, Introducing Oneself And Others, Talk About Family and Family Members, Express likes and dislikes, Hobbies, Asking For Personal Information, Talking About Date, Month, Year, Talking About Time, Talking About Age	CO1
Module 2: Grammar **7 hrs.**	CO1, CO2, CO3
Alphabet- Numerals - Nominal Classifiers – Sentences with Adjectival Predicate – Names of Countries and places- Personal Pronoun- Interrogative Sentences - Structural Particle - Verbs and Verb Conjugation – Articles- Singular and Plural- Prepositions – Negative articles –- Negation – Adjective- Possessive Article – Nominative and Accusative cases – Writing notes, SMS and filling up forms- Listen and Understand Telephonic Conversation and Conversations at specific places- Songs and Quiz	
Module3: Oral Communication **7 hrs.**	CO4, CO5
Stellungnahme (Taking a particular stance on a given topic)/ Debate/ Discussions/ Interview/ Role play/ group discussion/ Narration, interview skills etc.	
Module4: Writing Communication **7 hrs.**	CO1, CO5
Writing skills: Formal and Informal letters, Email, SMS blogs, Essays, Report, Article, statistical Analysis, book/Film review etc	

Text Books

1. Alter Ego, A1 (ISBN: 9782011554208); Publisher: Hachette; Author: Annie Berthet, Catherine Hugot et al.; Published: 2006.
2. Alter Ego, A1 – Cahier d'activités - A1 (ISBN: 9782011558114); Publisher: Hachette; Author: Annie Berthet, Catherine Hugot et al.; Published: 2006.

Reference books

1. Écho (2e edition), A1 (ISBN: 9782090385885); Publisher: CLE International; Authors: Jacky Girardet, Jacques Pecheur; Published: 2013.
2. Écho (2e edition), A1 - Cahier personnel d'apprentissage (ISBN: 9782090385892); Publisher: CLE International; Authors: Jacky Girardet, Jacques Pecheur; Published: 2013.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-IV

2300206: Industrial Economics

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs./week	**Th: 02**	**Theory**	**CIA: 25**
			ESE: 50
		Practical	**--**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Gain comprehensive knowledge of industrial organization, serving as a cornerstone for exploring various interconnected fields within the industry.
2. Develop a profound understanding of how firms interact within the economy, encompassing areas such as business strategy, corporate finance, marketing, international trade, banking, and organizational economics.
3. Learn historical progression of industrial economies, with a primary focus on contemporary advancements in studying firms' behavior.
4. Equipped with a holistic perspective on industrial organization, paving the way for exploration into numerous other disciplines linked to the industrial sector.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Learn definition, scope, and economic significance in various sectors.

CO2: Recognize the importance of studying Industrial Economics and its role in economic analysis, decision-making, and influencing diverse fields such as marketing, finance, and international trade.

CO3: Analyze the interplay between economic development and industrialization, as well as the impact of industrialization on the agricultural sector.

CO4: Identify and assess key factors influencing industrial development, considering socioeconomic and political influences on industrial growth.

CO5: Learn dynamics of competition and cooperation among firms, their implications on industrial outcomes, and the strategies like mergers, takeovers, and acquisitions.

CO6: Analyze industrial location decisions, determine the determinants of industrial location, and evaluate theories like Weber's and Florence's to understand industrial location patterns.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-IV

2300206: Industrial Economics

Unit 1 - Introduction to Industrial Economics **7 hrs.**	**CO**
Definition of Industrial Economics and its scope of study, Understanding the industrial sector's economic significance, Importance of Industrial Economics, Need and Significance of Studying Industrial Economics, Role of Industrial Economics in Economic Analysis, Economic Development, Agricultural Development, and Industrialization, Interplay between Economic Development and Industrialization, Impact of Industrialization on Agricultural Sector, Factors Influencing Industrial Development, Analysis of Key Factors Affecting Industrial Growth, Socioeconomic and Political Factors in Industrial Development.	CO1, CO2
Unit 2- Industrial Decisions and Market Structure. **7 hrs.**	CO3, CO4
Competition and Cooperation in Industries, The concept of Competition and Cooperation among Firms, Implications of Different Approaches on Industrial Outcomes, Firm Behavior and Market Outcomes, Understanding Firm Behavior under Different Market Structures, Relationship between Firm Behavior and Market Outcomes, Cartels, Collusion, Mergers, Takeovers, and Acquisitions, Overview of Cartels and Collusion in Industries, Merger, Takeover, and Acquisition Strategies.	
Unit 3- Price Competition and Pricing Strategies **7 hrs.**	
Factors Influencing Pricing Decisions, General Considerations for Pricing Decisions in Various Industries, Market Conditions and Pricing Strategies, Pricing under Perfect & Imperfect Competition: Theoretical Perspectives, Pricing Strategies in Perfectly Competitive Markets, Pricing Challenges in Imperfectly Competitive Markets, Pricing Procedures and Methods in Practice, Practical Approaches to Pricing Decisions, Comparative Analysis of Pricing Methods, Pricing in Public Enterprises, Pricing Policies and Practices in Public Sector Enterprise, Economic and Social Implications of Public Enterprise Pricing, Price Wars: Theories and Empirical Evidence, Theoretical Explanations of Price Wars, Empirical Evidence and Impact on Industries	CO5
Unit 4 - Non-Price Competition and Product Differentiation **7 hrs.**	
Non-Price Competition and Product Differentiation, Understanding Non-Price Competition and Product Differentiation, Importance of Product Differentiation in Competitive Markets, Horizontal Product Differentiation, Analysis of Horizontal Product Differentiation and Consumer Behavior, Case Studies and Examples, Brand Proliferation as an Entry Deterrence Strategy, The Role of Brand Proliferation in Deterring New Entrants, Evaluation of Effectiveness and Challenges, Vertical Product Differentiation, Explanation of Vertical Product Differentiation and its Implications, Comparison with Horizontal Differentiation, Price Discrimination: First-, Second-, and Third-Degree Price Discrimination.	CO6

Text Books

1. “Modern Small Industry in India" -R. K. Vepa
2. “Problems of Accountability of Public Enterprises in India" -M. P. Srivastava
3. “Economic Development Perspectives, Vol. 3, Public Enterprises and Performance" -Binode Mohanty
4. “Public Enterprises in India - Principles and Performance" - V. K. L. Srivastava

Reference Books / Reading

1. “Industrial Economics - Issues and Perspectives"- Paul R. Ferguson and Glenys J. Ferguson
2. “The Economics of Industrial Organization" - William G. Shepherd
3. “Modern Small Industry for Developing Countries"- E. Staley and R. Morse
4. “Indian Growth and Stagnation - The Debate in India" - A. V. Desai

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310702: Motherboard Repairing Course

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	**--**
Practical: 2 hrs./week	**Practical: 01**		**--**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**25**

Course Objectives: The student should be able to

1. Understand the components of Computers.
2. Understand the components of motherboard.
3. Learn the process of soldering and de-soldering.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Learn the basic components of motherboards.
CO2: Learn about the soldering and de-soldering process.
CO3: Understand the process of fault finding on motherboard.
CO4: Apply knowledge to remove fault from the motherboard.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

2310702: Motherboard Repairing Course

Module 1	**CO**
Basic Electronics: Introduction of Volt, current, Watt, Ohms, Introduction of AC and DC, How to Use Digital Multimeter. **Identification of Electronics Component:** Resistor, Capacitor, Transistor, Mosfet, Diode, Crystal, IC, Transformer, Fuse, Jumper, Thermistor, Switch, Coil etc.	CO1
Module 2	CO1, CO2
Soldering & De-Soldering Practice: How to remove all motherboard components: Like- capacitor, transistor, mosfet, crystal, coil, diode, fuse etc.?, How to fix all electronics components on motherboard easily?, How to remove and fix all types of IC/chip from motherboard?, How to remove and fix all types of port, connector, slot, socket: Like -VGA Port, USB Port, ps2 port, SATA connector, CMOS battery?	
Module 3	CO2, CO3
Tracing of Laptop and Desktop Motherboard: Volt in section, Step down section, VRM section, RAM section, Chip section (Graphic Section, North Bridge, South Bridge Section), Battery section (Charging & Discharging Section), I/O (Input-Output) section, Bios section, LAN section, Sound section, USB section, VGA section, SATA section, 3.3v, 5v section, 1.2v, 1.8v, 1.5v, 2.5volt section, Odd section, LVDS section (LCD & LED Panel and Screen section), Keyboard section, Clock generator section, Wi-Fi section, Fan section, RTC section, Soc section, Adaptor circuit, Sensor circuit3, Intel GFX section, Touch pad section, Camera section, SSD section, GFX Section	
Module 4	CO2, CO3
Faults Finding and Onboard Solution: No display problem solution, Dead motherboard problem solution, Automatic Restarting error repairing, Hanging problem of laptop and desktop, Charging & discharging faults of laptops, Dim screen faults solution, Automatic off problem & Blue screen, Date and time error, Heating faults of laptop and desktop, Fan not working faults of laptop and computer, Motherboard Shorting faults, Linkage problem & USB not working faults, Hard disk not working, Error from Webcam (camera), Wi-Fi not working problem, Sound related faults solution, Network related problem, Laptop Touch pad not working, Keyboard not working faults of laptop and desktop, Bluetooth and card reader problem, White screen faults of laptops, Hinge repair of laptops, On/off switch related faults, BIOS password removing method.	
Module 5	CO4
Schematic Diagram Concept of Motherboard: Desktop block Diagram of Motherboard, Laptop block Diagram of motherboard, Difference Between Laptop & Desktop Block Diagram, How to download schematic from different website?, How to read schematic?, How to read board viewer software?	

Text Books

1. Laptop Repair Motherboard Chips Step by Step, by Mohamed Bayr, Kindle Edition.
2. Laptop Repair Complete Guide: Including Motherboard and Component Level Repair, Garry Romaneo.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) *(2023 Pattern)*

Sem-IV

2310802: Advanced Web Designing

Module 1
Basic Principles for website development, Computer Fundamentals, Planning Process, Rules of web design, Page Design, Home Page Layout, Design Concept, Study of Colours, Art & Aesthetic
Module 2
Concept of Interactive Design, Preparation of Advertisement, Magazine, Visual Reading Elements, Digital Platform, Digital Output, Basic Image Editing, Digital Photography
Module 3
Beginning: CSS, Adobe Photoshop, HTML, XHTML, Web Development (HTML, CSS), Java Script, Graphic Design, Basics of Digital Photography
Module 4
HTML5, CSS, JQuery & Responsive Web, PHP, PHP Advanced, Database s/w e.g. Mysql

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) *(2023 Pattern)*

Sem-IV

2300207: Industrial Work Study

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs./week	**Th: 02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**ESE: 50**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**--**

Course Objectives:

1. To teach students about how to measure work, optimize methods and fix pay accordingly.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Explain different method study procedures and can implement them for optimizing work approaches.
CO2: Evaluate the work content and can fix standard time for performing work.
CO3: Analyze the data through work sampling.
CO4: Design the plans for fixing incentive and wages based on performance.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-IV

2300207: Industrial Work Study

Units		
Unit 1	**Method Study** **7 hrs.**	**CO**
Purpose of work study, its objectives, procedure and applications; method study definition and basic procedure, selection of job, various recording techniques like outline process charts, flow process charts, man machine charts, two handed process charts, string diagram, flow diagram, multiple activity chart, simo, cyclographs and chrono-cyclographs; critical examination, development, installation and maintenance of improved method; principles of motion economy and their application in work design; micro motion study, memo motion study and their use in methods study.		**CO1**
Unit 2	**Work Measurement** **7 hrs.**	**CO2**
Introduction & definition, objectives and basic procedure of work measurement; application of work measurement in industries; time study: basic procedure, equipment needed, methods of measuring time, selection of jobs, breaking a job into elements; numbers of cycles to be timed; rating and methods of rating, allowances, calculation of standard time.		
Unit 3	**Work Sampling** **7 hrs.**	**CO3**
Basic procedure, design of work sampling study, conducting work sampling study and establishment of standard-time.		
Unit 4	**Job Evaluation and Incentive Schemes** **7 hrs.**	**CO4**
Starlight line, Tailor, Merrick and Gantt incentive plans, Standard data system; elemental and non-elemental predetermined motion systems, work factors system; Methods, Time Measurement (MTM), MOST		

Text Books

1. Barrnes RM; Motion and Time Study; Wiley Publications.
2. Currie RM; Work study; BIM publications.

Reference Books

1. Mynard; Hand book of Industrial Engineering.
2. Telsang, M.; Industrial Engineering and Production Management, S. Chand Publishers.
3. ILO; work-study; International Labour Organization.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

VAC102: Advanced Data Structure

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th: --**	**Theory**	**--**
Practical: 2 hrs./week	**Practical: 01**		**--**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Term work	**25**

Course Objectives: The student should be able to

1. Understand the fundamental design, analysis, and implementation of basic data structures.
2. Understand the basic concepts in the specification and analysis of programs.
3. Learn the Principles for good program design, especially the uses of data abstraction.
4. Understand the significance of algorithms in the computer field.
5. Learn various aspects of algorithm development.
6. Learn the qualities of a good solution.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Understand the basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.

CO2: Master a variety of advanced abstract data type (ADT) and data structures and their implementations.

CO3: Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc.

CO4: Apply and implement learned algorithm design techniques and data structures to solve problems.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Computer Engineering) ***(2023 Pattern)***

Sem-IV

VAC102: Advance Data Structure

Module 1	**CO**
Basic Hash Tables and Collision Resolution, Universal Families of Hash Functions, Perfect Hash Functions, Hash Trees, Extendible Hashing, Membership Testers and Bloom Filters	CO1
Module 2	CO2, CO3
Balanced Search Trees as Heaps, Array-Based Heap, Heap-Ordered Trees and Half-Ordered Trees, Leftist Heaps, Skew Heaps, Binomial Heaps, Changing Keys in Heaps, Fibonacci Heaps, Heaps of Optimal Complexity, Double-Ended Heap Structures and Multidimensional Heaps, Heap-Related Structures with Constant-Time Updates	
Module 3	CO4
Two Models of Search Trees, General Properties and Transformations, Height of a Search Tree, Basic Find, Insert, and Delete, Returning from Leaf to Root, Dealing with Nonunique Keys, Queries for the Keys in an Interval, Building Optimal Search Trees, Converting Trees into Lists, Removing a Tree	

Text Books

1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Fourth Edition, 2014, Pearson.
2. Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2009, The MIT Press

Reference Books

1. Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2018.
2. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.
3. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech (Common) ***(2023 Pattern)***

Sem-IV

Minor Project (Exit Course)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Practical:02**	**Theory**	**CIA: --**
Practical: --			**ESE: --**
		Practical	**50**
		Oral	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. develop ability for the application of fundamental principles and elementary techniques which have been learnt, in developing solutions for real life engineering problems.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Identify an open-ended problem in area of engineering.
CO2: Identify the methods and materials required for the project work.
CO3: Formulate and implement innovative ideas for social and environmental benefits.
CO4: Analyze the results to come out with concrete solutions.
CO5: Write technical report of the project apart from developing a presentation.

PROCEDURE

This subject will be offered to the students who are will to exit second year engineering and opt for UG Diploma after the 4th semester.

Minor Project is an exit course requirement wherein under the guidance of a faculty member, a student is required to do an innovative work with application of knowledge earned while undergoing various courses and laboratories in the course of study.

Minor Project envisages that a student will acquire the ability to use a wide range of the skills learned during their course of study. A student is required to carry out the project work related to Engineering, under the guidance of a faculty member and/or the supervisor of the concerned industry/institute/organization.

The individual student has to undertake the project.

Duration: Minor Project to be completed within one month duration for the respective semester/Exit Course. It is to be assessed and evaluated at the end of 4th semester.