Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

Course Contents (Syllabus) for

Second Year B. Tech.
(Information Technology)
Sem - III to IV

AY 2020-21

Syllabus for SY IT SEM III

Professional Core (Theory)

Title of the Course: Probability and Statistics 5MA201	L	T	P	Cr
	2	0	0	2

Pre-Requisite Courses: Engineering Maths

Textbooks:

1. Fundamental of Mathematical Statistics by Gupta and Kapoor
2. An Introduction to probability and statistics by Vijay Rohatgi

References:

Probability and Statistics for Engineers and Scientists by S.Ross

Course Objectives :

1. To understand the basic concepts of probability and statistics for mathematical estimations.
2. To study different mathematical models based on statistical.
3. To analyze statistical and fuzzy systems.

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive	
		level	Descriptor
CO1	Apply knowledge of statistical design for engineering problem.	III	Applying
CO2	Formulate few real life problems using the models.	IV	Analyzing
CO3	Solve and analyze problems for better results.	IV	Analyzing

CO-PO Mapping :

PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1												1	
CO2	2				2									
CO3					3									

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Random Variable:	**Hrs.**
Discrete random variable, Continuous random variable, probability mass function, cumulative distribution function, bivariate discrete random variable, joint probability distribution, joint distribution function of two dimensional discrete random variable.	**4**
Module 2: Probability Distribution	**Hrs.**
Gaussian distribution, Exponential distribution, Uniform distribution.	**4**
Module 3: Statistical Methods	**Hrs.**

Measure of Central tendency, Measure of dispersion, Range, Quartile deviation, Mean deviation, variance, Standard deviation, Coefficient of variance, moments, Symmetry, Skewness, Kurtosis, and Types of Kurtosis.	**5**
Module 4: Population and Sample	**Hrs.**
Introduction, Types of Characteristics: Attributes and variables, Collection and Organization of data, Population and sample, Methods of sampling.	**3**
Module 5: Exact Sampling Distribution	**Hrs.**
Chi- square distribution: definition and its properties, Student t- distribution: definition and its properties.	**4**
Module 6: Test of Hypothesis	**Hrs.**
Random samples, parameter, statistic, standard error of statistic, null and alternative hypothesis, critical region, level of significance, Types of error, large sample test, Small sample test	**6**

Module wise Measurable Students Learning Outcomes :
After the completion of the course the student should be able to:

Title of the Course: Discrete Mathematics 5IT201	L	T	P	Cr
	3	1	0	4

Pre-Requisite Courses: Fundamentals of algebra and calculus.

Textbooks:

3. C. L. Liu, D P Mohapatra, "Elements of Discrete Mathematics: A Computer Oriented Approach", TMG, 3rd Edition, 2011.
4. J.P. Tremblay &R. Manohar,"Discrete Mathematical structure with applications to computer",TMG, 1st Edition, 1997
5. Kenneth H. Rosen," Discrete Mathematics and Its Application", TMG, 7th Edition, 2011

References:

4. K.D. Joshi, "Foundation of Discrete Mathematics", 2019
5. Lipschutz, Marc Lipson ,"Discrete mathematics", Schaum'soutline series,3rd Edition, 2007

Course Objectives :

1. To impart logical thinking and its application to computer science.
2. To inculcate ability to reason and ability to present a coherent and mathematically accurate argument.
3. To present the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Discuss the fundamental mathematical concepts in Discrete Mathematics to computing concepts.	II	Understand
CO2	Apply concepts of set theory, graph theory, algebraic structures to solve a variety of problems.	III	Apply
CO3	Estimate the optimized solutions for various problems.	IV	Analyze

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1												1	
CO2	2				2									
CO3					3									

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Sets and Proposition	**Hrs.**
Introduction, Combinations of Sets, Finite and Infinite Sets, Uncountably Infinite Sets, Mathematical Induction, Principle of Inclusion and Exclusion, Multisets. Propositions, Logical Connectives, Conditional and Biconditionals, Well-Formed Formulas, Tautologies, Logical Equivalences, Theory of Inference for Statement Calculus, Predicate Calculus, The Statement Function, Variable and Quantifiers, Free and Bound Variable, Inference Theory of Predicate Calculus, Methods of Proof, Euclidean Algorithm.	**7**
Module 2: Relation and Functions	**Hrs.**
Introduction, A Relational Model for Data Bases, Properties of Binary Relation, Warshall's Algorithm, Equivalence Relation and Partition, Partial Ordering Relation and Lattices, Chain and Antichains, A Job-Scheduling Problem, Compatible Relation, Functions, Composition of Functions, Invertible Functions.	**6**
Module 3: Graphs and Planar Graphs	**Hrs.**
Introduction, Basic Terminologies, Multigraphs and Weighted Graphs, Digraphs and Relation, Representation of Graphs, Operations on Graphs, Paths and Circuits, Graph Traversal, Shortest Path in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Traveling Salesperson Problem, Factors of Graph, Planar Graph, Graph Colouring.	**7**
Module 4: Trees and Cut-Sets	**Hrs.**
Trees, Rooted Trees, Path Length in Rooted Trees, Prefix Codes, Binary Search Tree, Spanning Trees and Cut-Sets, Minimum Spanning Trees, Krushkal's Algorithm, Prim's Algorithms, Transport Network.	**7**
Module 5: Algebraic Structures	**Hrs.**
Introduction, Groups, Subgroups, Generators and Evaluation of Powers, Cosets and Lagrange's Theorem, Permutation Groups, Codes and Group Codes, Isomorphisms and Automorphisms, Homomorphisms and Normal Subgroups, Rings, Integral Domains, and Fields, Ring Homomorphisms, Polynomial Rings and Cyclic Codes.	**7**
Module 6: Boolean Algebras	**Hrs.**
Lattices and Algebraic Systems, Principle of Duality, Basic Properties of Algebraic System Defined by Lattices, Distributive and Complemented Lattices, Boolean Lattices and Boolean Algebras, Uniqueness of Finite Boolean /expressions	**6**

Module wise Measurable Students Learning Outcomes :

After the completion of the course the student should be able to:

Module 1: Understand the basics of mathematical set theory and propositions.
Module 2: Will have the concrete ability in the concepts of mathematical relation and functions.
Module 3: Identifying and solving real-world problems using graphs
Module 4: Will have a better understanding of a tree, a special type of graph.
Module 5: Apply and analyse the basics of algebraic structures like Groups and Rings.
Module 6: Analyse Boolean algebra from computing point of view.

Tutorial:

1. Problems on set theory.
2. Problems on propositional logic.
3. Problems on predicate calculus.
4. Problems on relation.
5. Problems on functions.

6. Problems on graph.
7. Problems on planar graphs.
8. Problems on tree, a special graph.
9. Problems on minimum spanning trees.
10. Problems on groups.
11. Problems on rings.
12. Problems on Boolean lattices.
13. Problems on Boolean algebra.

Title of the Course: Data Structures 5IT 202	L	T	P	Cr
	3	0	0	3

Pre-Requisite Courses: Programming in C including pointers and File Handling

Textbooks:

1. Richard F. Gilberg, Behrouz A. Forouzan, "*Data Structures, A Pseudocode Approach With C*", Cengage Learning, 2nd Edition, 2005
2. S. Lipschutz, "*Data Structures with C*", Schaum's Outlines Series, Tata McGraw-Hill, 1st edition, 2010
3. Narsimha Karumanchi "Data Structure and algorithms", Careermonk 5th edition, 2011

References:

1. YashavantKanetkar, "*Understanding pointers in C*", 3rdedition, BPB Publication
2. Brian W. Kernighan and Dennis M. Ritchie, "*The C Programming Language*", 2ndEdition, Prentice Hall of India

Course Objectives :

1. To improve skills for programming in a systematic way.
2. To clarify the use of recursion in program development.
3. To familiarize linear and non-linear data structures and the algorithms.

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive	
		level	Descriptor
CO1	Describethe fundamental concepts of structuring, managing and organizing the data for efficient access and manipulation.	II	Understanding
CO2	Experiment the use of linear and non-linear data structures.	III	Applying
CO3	Identify need of recursion and execute recursive algorithms.	IV	Analyzing

CO-PO Mapping :

PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2				1									
CO2		3											1	
CO3		1			2								1	

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1 : Introduction	**Hrs.**

Basic Concepts: Algorithm, Pseudo-code, ADT, Data Structure, Algorithmic Efficiency, Recursion: Direct and Indirect recursion, analysis of recursive functions e.g. Towers of Hanoi, Ackerman's function, Introduction to Painters, Arrays and Structures.	**6**
Module 2 : Linked Lists	**Hrs.**
Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as insertion, deletion, inversion, concatenation, computation of length, traversal on linked list, Representation and manipulations of polynomials using linked lists	**6**
Module 3 : Stacks and Queues	**Hrs.**
Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue using sequential and linked organization, Circular queue: representation and implementation, Application of stack for expression evaluation and for expression conversion, Backtracking, Stacks and Recursion, Priority queue Doubly Ended Queue.	**7**
Module 4 : Trees	**Hrs.**
Basic terminology, binary trees and its representation, binary tree traversals (recursive and non-recursive), operations such as copy, equal on binary tree, expression trees, General Trees, Binary Search Trees, Heaps and its operations.	**7**
Module 5 : Graphs	**Hrs.**
Terminology and Representation of graphs using adjacency matrix, adjacency list and adjacency Multi-list, Traversals Depth First and Breadth First, Minimum Spanning Tree	**5**
Module 6 : Searching & Sorting Technique	**Hrs.**
Search: Importance of searching, Sequential, Binary, Fibonacci search algorithms, Sorting: Internal and External Sorts, Insertion, Shell, Heap, Quick sort, Merge sort, Radix sort, Two-way merge sort **Hashing:** Hashing functions, overflow handling with and without chaining, open addressing: linear, quadratic, double, rehashing, Indexing Techniques: hashed indexes, Tree indexing - B-trees (concept only implementation not expected), File Handling.	**8**

Module wise Measurable Students Learning Outcomes :

After the completion of the course the student should be able to:

Module 1: Explain the logic to solve the problems and writing recursive algorithms

Module 2: Discuss the concept of linked list and use of ADTs to solve the problem

Module 3: Analyze data structures like stacks and queues

Module 4: Apply nonlinear data structure tree and its basic operations to solve engineering problems

Module 5: Identify various representations of graphs and manipulate data for real applications

Module 6: Explain and compare various searching, sorting and hashing techniques.

Title of the Course: Microprocessors 5IT203	L	T	P	Cr
	3	0	0	3

Pre-Requisite Courses: First year Information Technology Basic Electronics course.

Textbooks:

1. M. Morris Mano & Michael D. Ciletti,"Digital Design", Pearson Prentice Hall publication, 4th Edition, 2008
2. Ramesh S. Gaonkar, "Microprocessor architecture, programming & applications", New Age International publication,5th edition, 2015
3. A K Ray & K M Bhurchandi, "Advanced microprocessors & peripherals", second edition, Tata McGraw-Hill education private limited, 2nd edition, 2012.

References:

1. Floyd & Jain, "Digital fundamentals", Pearson education, eighth edition, 2007.
2. James Turley, "Advanced 80386 programming techniques", Tata McGraw-Hill, second edition, 2005.

Course Objectives :

1. To introduce the fundamental principles of logic design.
2. To demonstrate the basic building blocks and operations of 8/16/32 bit microprocessors & concept multiple processor systems.
3. To inculcate the ability to design assembly language programs.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Discuss the concepts of digital logic to design the circuits.	II	Understanding
CO2	Utilize the architecture and organization of microprocessors with instruction set to design assembly language programs.	III	Applying
CO3	Study simple memory and input/output interface	IV	Analyzing

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			2		1									
CO2		1											2	
CO3			1										1	

Assessments :

Teacher Assessment:

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ESE	50

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Course Contents:

Module 1: Digital Electronics	Hrs.
Combinational logic & sequential logic design, excitation table, state transition diagram, system design.	6
Module 2: Processor basics & 8085 microprocessor	**Hrs.**
CPU organization, Introduction to processor technology, microprocessor architecture, single chip microcomputer, microcomputer systems. The 8085 MPU, parametric considerations, internal architecture, introduction to 8085 assembly language programming, 8085 instructions.	7
Module 3: Programming techniques & interfacing	**Hrs.**
Writing assembly language programs, debugging, looping, counting, indexing, arithmetic operations related to memory, counters & delays, stacks, Interrupts, I/O (USB) interface, data communication.	7
Module 4: Introduction to 8086	**Hrs.**
Functional & architectural comparison of 8085 & 8086, programming, implementing standard programming structures in 8086, string, procedure & macros.	6
Module 5: Introduction to 80386	**Hrs.**
Features & architecture of 80836, Pin description, 80836 register set, special 80386 registers, 80386 Real mode memory segmentation, data types used in real mode, instruction format, addressing modes of 80386.	6
Module 6: 80386 Memory Segmentation	**Hrs.**
Memory management through segmentation, address translation, protection in segmentation, introduction to protected mode	7

Module wise Measurable Students Learning Outcomes :

After the completion of the course the student should be able to:

Module 1: Explain the combinational logic design & sequential logic design.

Module 2: Explain the CPU organization, the 8085 MPU, parametric considerations.

Module 3: Apply programming techniques regarding interrupts, I/O interface, serial I/O etc.

Module 4: Classify functional & architectural concepts of 8085 & 8086

Module 5: Identify and apply features & architecture of 80836

Module 6: Analyse 80386 Memory Segmentation

Title of the Course: Data Communication 5IT204	L	T	P	Cr
	2	1	0	3

Pre-Requisite Courses: Basics of communication

Textbooks:

1. William Stallings, "Data and Computer Communications", PHI, 9th Edition, 2011.
2. Behrouz A. Forouzan ,"Data communication and Networking", TMGH, 5th Edition, 2013.
3. Wayne Tomasi, ''Introduction to Data Communication and Networking'', Pearson, 2007

References:

1. Achyut S Godbole and Atul Kahate, "Data Communications and Networks", TMGH, 2nd Edition, 2008.
2. Simon Haykin ,"Digital Communication Systems", Wiley, 1st Edition,2014.
3. Simon Haykin and Michael Moher, " Introduction to Analog and Digital Communications ", Wiley, 2nd Edition 2007

Course Objectives :

1. To discuss the concepts of data communication system.
2. To instruct multiplexing and encoding schemes.
3. To impart circuit and packet switching techniques.

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Summarize the components involved in data communication system.	II	Understanding
CO2	Identify different encoding schemes.	IV	Analyzing
CO3	Discuss packet switching and circuit switching techniques	V	Evaluating

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			3											
CO2		2			1									
CO3							3		2		2			

Assessments :

Teacher Assessment:

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MSE	30
ISE 2	10
ESE	50

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MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 70-80% weightage for course content (nc last three modules) covered after MSE.

Course Contents:

Module 1: Introduction to data communication	Hrs.
Data Communications and Networking for Today's Enterprise, A Communications	3

Model, Data Communications, Networks, and The Internet-An Example Configuration.	
Module 2: Data Transmission	**Hrs.**
Data communication Concepts and Terminology: Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity. Media:- Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission	**5**
Module 3 : Encoding techniques	**Hrs.**
Digital Data- Digital Signals, Digital Data- Analog Signals, Analog Data- Digital Signals, Analog Data- Analog Signals. Digital data communication techniques:- Asynchronous and Synchronous Transmission, Types of Errors, Error Detection and Correction, Hamming Code, CRC, Checksum, Line Configurations.	**5**
Module 4 : Multiplexing	**Hrs.**
Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing, Asymmetric Digital Subscriber Line, xDSL. Spread Spectrum:- The Concept of Spread Spectrum, Frequency-Hopping Spread Spectrum, Direct Sequence Spread Spectrum, Code Division Multiple Access.	**6**
Module 5 : Telephone Network	**Hrs.**
Telephone network for data transmission, Modems, Latest telephone communication and interfacing techniques.	**3**
Module 6 : Switching techniques	**Hrs.**
Switched Communication Networks, Circuit-Switching Networks, Circuit-Switching Concepts, Soft switch Architecture, Packet-Switching Principles	**4**

Module wise Measurable Students Learning Outcomes :

After the completion of the course the student should be able to:

Module 1: Explain the fundamental concepts of data communication system.

Module 2: Distinguish between analog and digital signals and understand their characteristics.

Module 3: Study different encoding schemes

Module 4: Compare and analyze bandwidth utilization in different multiplexing techniques.

Module 5: Understand telephone network.

Module 6: Explain the principles of circuit and packet switching.

Tutorial Content:

Tutorial can be conducted as12 Assignments based on module 1 to 6

Title of the Course: C and CPP Programming 5IT205	L	T	P	Cr
	2	0	0	2

Pre-Requisite Courses:
C Programming

Textbooks:
1. E.Balguruswamy, Object Oriented Programming C++, Tata McGraw Hill, 3rd Edition,2006.
2. Bjarne Stroustrup, ―The C++ Programming language, Third edition, Pearson Education.

References:
1. Robert Laffore, "Object Oriented Programming in c++", SAMS publication, 4th Edition,2008.

Course Objectives :
1. To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs
2. To practice the fundamental programming methodologies in the C/C++ programming language via laboratory experiences

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive	
		level	Descriptor
CO1	Define the object-oriented programming approach in connection with C++	II	Understanding
CO2	Apply the concepts of object-oriented programming	III	applying
CO2	Analyze virtual and pure virtual function & complex programming situations	IV	Analyzing

CO-PO Mapping :

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1				2								
CO2		**2**			3						**2**	
CO3			3		3						**2**	**1**

Assessments :

Teacher Assessment:

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MSE	30
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ESE	50

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Course Contents:

Module 1: C++ Programming basics	**Hrs.**
What is object oriented programming? Why do we need object oriented. Programming	**2**

characteristics of object-oriented languages C and C++.Output using cout. Directives. Input with cin. Type bool. The setw manipulator. Type conversions. Returning values from functions. Reference arguments. Overloaded function. Inline function. Default arguments. Returning by reference.	
Module 2: Object and Classes :	**Hrs.**
Introduction Creating a class and objects Defining member functions inside and outside class definition Nesting of member functions Private member functions Arrays within a class Memory allocation of objects Static data members and static member functions Array of objects ,Objects as function arguments Friend functions Returning objects Constructors Types of constructor Destructors	**6**
Module 3: : : Polymorphism	**Hrs.**
Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.	**4**
Module 4 Inheritance-I	**Hrs.**
Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation: Classes within classes, inheritance and program development.	**4**
Module 5: : Inheritance-II	**Hrs.**
Multiple Inheritance, Multilevel Inheritance, Multilevel inheritance, Hybrid inheritance, Virtual Base class, Abstract classes	**4**
Module 6: Templates	**Hrs.**
Class Templates, Function templates, File read write in c++	**6**

Module wise Measurable Students Learning Outcomes :

Module 1: Explain the features of the object oriented language

Module 2: Design and apply OOP principles for effective programming

Module 3: Develop programming application using object oriented programming

Module 4: Percept the utility and applicability of OOP

Module 5: Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance

Module 6: Understand advanced features of C++ specifically stream I/O, templates

Professional Core (Lab)

Title of the Course: Data Structures Laboratory 5IT 252	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses:

Programming in C including pointers and File Handling

Textbooks:

1. Robert Kruse, C. L. Tondo, Breuce Leung, ShashiMogalla, "Data Structure & Program Design in C", Pearson, 3rd edition.
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures, A Pseudo code Approach With C", Cengage Learning, 2nd Edition, 2005
3. S. Lipschutz, "Data Structures", Schaum's Outlines Series, Tata McGraw-Hill, 2nd edition, 2000

References:

1. Yashavant Kanetkar, "Understanding pointers in C", 4th edition, BPB Publication
2. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Prentice Hall of India, 2nd edition, 1988

Course Objectives :

1. To develop skills in programming and preparing the students for advanced computer science courses.
2. To clear up the concept of ADT and to use appropriate data structure for modelling given problem.
3. To clarify concept of recursion, various searching and sorting algorithms with their performance comparisons.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Implement various data structures	III	Applying
CO2	Demonstrate the use of various data structures in application programs	III	Applying
CO3	Compare various data structures	IV	Analyzing

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1	2											
CO2				3	2									
CO3				2									2	

Lab Assessment :

There are four components of lab assessment LA1, LA2, LA3 and Lab ESE

IMP: Lab ESE is a separate head of passing

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, journal	By Course Faculty	During week 1 to week 4 submission at the end of week 5	25
LA2	Lab activities, attendance, journal	By Course Faculty	During week 5 to week 8 submission at the end of week	25

			8	
LA3	Lab activities, attendance, journal	By Course Faculty	During week 10 to week 14 submission at the end of week 14	25
Lab ESE	Lab performance and related documentation	By Course Faculty	During week 15 to week 18 submission at the end of week 18	25

Week 1 indicates starting week of the semester

Lab activities shall include performing experiments, mini-project, presentations, drawing, programming and other suitable activities as per the nature of lab course.

The experimental lab shall have typically 8-10 experiments

Course Contents:

1. Program based on structures and pointers in C
2. Program based on arrays and pointers in C
3. File handling and command line arguments
4. Implementation of recursion
5. Developing ADT for singly linked list and its applications
6. Developing ADT for Doubly linked list and its applications
7. Developing ADT for circular linked list and its applications
8. Developing ADT for stack and queue and their applications
9. Implementation of double ended queue
10. Implementation of recursive and non-recursive tree traversals
11. Binary search tree and application
12. Implementation of graph, DFS, BFS
13. Implementation of searching : linear search, binary search, Fibonacci search
14. Sorting Methods: Insertion sort, shell sort, heap sort, quick sort, merge sort, radix sort etc.
15. Implementation of hashing

Title of the Course: Microprocessors Laboratory 5IT253	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses: First year Information Technology Basic Electronics course.

Textbooks:

1. M. Morris Mano & Michael D. Ciletti,"Digital Design", Pearson Prentice Hall publication, 4th Edition, 2008
2. Ramesh S. Gaonkar, "Microprocessor architecture, programming & applications", New Age International publication,5th edition, 2015
3. A K Ray & K M Bhurchandi, "Advanced microprocessors & peripherals", second edition, Tata McGraw-Hill education private limited, 2ndedition, 2012.

References:

1. Floyd & Jain, "Digital fundamentals", Pearson education, eighth edition, 2007.
2. James Turley, "Advanced 80386 programming techniques", Tata McGraw-Hill, 2nd edition, 2005.

Course Objectives :

1. To demonstrate the fundamental principles of logic design.
2. To show & explain the basic building blocks and operations of 8/16/32 bit microprocessors & concept multiple processor systems.
3. To make students to be able to design assembly language programs.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Classify the concepts of combinational and sequential logic to design real life applications circuits & analyze it.	III	Apply
CO2	Use instruction sets & form structured microprocessor programs in assembly language.	III	Apply
CO3	Test and debug microprocessor programs.	V	Analyze

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				2										
CO2			1										2	
CO3					2				1					

Assessments :

Lab Assessment

There are four components of lab assessment LA1, LA2, LA3 and Lab ESE

IMP: Lab ESE is a separate head of passing

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, journal	By Course Faculty	During week 1 to week 4 submission at the end of week 5	25
LA2	Lab activities, attendance, journal	By Course Faculty	During week 5 to week 8 submission at the end of week 8	25
LA3	Lab activities, attendance, journal	By Course Faculty	During week 10 to week 14 submission at the end of week	25

			14	
Lab ESE	Lab performance and related documentation	By Course Faculty	During week 15 to week 18 submission at the end of week 18	25

Week 1 indicates starting week of the semester

Lab activities shall include performing experiments, mini-project, presentations, drawing, programming and other suitable activities as per the nature of lab course.

The experimental lab shall have typically 8-10 experiments

Course Contents:

List of Experiments

1. Designing of a circuit using Combinational logic.
2. Designing of a combinational circuit using MUX & DEMUX
3. Study Half Adder & Subtractor, Full Adder & Subtractor
4. Implement below addressing modes & perform Addition, subtraction of two 8 – bit Numbers with 16 – bit answer. Register addressing mode. Immediate Addressing Mode. Direct Addressing mode. Indirect Addressing mode.
5. Study 8085 kit & design a program of Block Transfer & Block Exchange.
6. Implement LHLD & DAD instruction & analyze the program of Addition & subtraction of two 16 – bit numbers.
7. Implement repetitive addition & subtraction algorithms for 8 bit multiplication & 8 bit division.
8. Assembly level program to calculate sum of series of numbers.
9. Assembly level program to find smallest & largest number from series of numbers.
10. Use subroutines & arrange a series of Numbers in ascending & descending order.
11. Design a program for Conversion HEX to Binary number.
12. Solve programs listed above using 8085 simulator.
13. Solve programs listed above using 8086 & 80386 instruction set in MASM

Title of the Course: C and CPP Programming Laboratory 5IT255	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses:

C Programming

Textbooks:

3. E.Balguruswamy, Object Oriented Programming C++, Tata McGraw Hill, 3rd Edition,2006.
4. Bjarne Stroustrup, ―The C++ Programming language, Third edition, Pearson Education.

References:

2. Robert Laffore, "Object Oriented Programming in c++", SAMS publication, 4th Edition,2008.

Course Objectives :

3. To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs..
4. To practice the fundamental programming methodologies in the C/C++ programming language via laboratory experiences

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive	
		level	Descriptor
CO1	Define the object-oriented programming approach in connection with C++	II	Understanding
CO2	Apply the concepts of object-oriented programming	III	applying
CO2	Analyze virtual and pure virtual function & complex programming situations	IV	Analyzing

CO-PO Mapping :

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1				2								
CO2		**2**			3						**2**	
CO3			3		3						**2**	**1**

Assessments :

Lab Assessment

There are four components of lab assessment LA1, LA2, LA3 and Lab ESE

IMP: Lab ESE is a separate head of passing

Assessment	**Based on**	**Conducted by**	**Conduction and Submission**	**Marks**	**Marks**
LA1	Lab activities, attendance, journal	By Course Faculty	During week 1 to week 4 submission at the end of week 5	25	
LA2	Lab activities, attendance, journal	By Course Faculty	During week 5 to week 8 submission at the end of week 8	25	
LA3	Lab activities, attendance, journal	By Course Faculty	During week 10 to week 14 submission at the end of week 14	25	
Lab ESE	Lab performance and related documentation	By Course Faculty	During week 15 to week 18 submission at the end of week 18	25	

Week 1 indicates starting week of the semester
Lab activities shall include performing experiments, mini-project, presentations, drawing, programming and other suitable activities as per the nature of lab course.
The experimental lab shall have typically 8-10 experiments

Course Content (Lab):
Assignment List:

1. Program on input/output stream
2. Program on class and objects.
3. Program on Inline/Friend functions.
4. Program on Constructor/Destructors.
5. Program static variables/class/functions.
6. Program on polymorphism.
7. Program on different types of inheritance.
8. Program on operator overloading.
9. Program on File Operations.
10. Program on Templates.

Syllabus for SY IT SEM IV

Professional Core (Theory)

Title of the Course: Theory of Computation 5IT 221	L	T	P	Cr
	3	1	0	4

Pre-Requisite Courses: Discrete Mathematics

Textbooks:

1. John C. Martin, "Introduction to Languages & Theory of Computation", TMH, 4th Ed. 2010
2. John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computations", Pearson Edu. 3rd Ed. 2008

References:

1. J. P. Tremblay & R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH, 2008
2. Michael Sipser, "Introduction to Theory of Computations", Thomson Brooks/Cole, 3rd Ed. 2014
3. K.L.P. Mishra & N. Chandrasekaran, "Theory of Computer Science", PHI, 3rd Ed. 2006

Course Objective:

1. To discuss fundamentals of computer mathematics.
2. Todescribe grammar, languages and their relationships.
3. To impart automata designs as language descriptors and recognizers.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to:	Bloom's Cognitive level	Descriptor
CO1	Outline problem formulation with relevant solving approaches.	II	Understanding
CO2	Distinguish language based problems into suitable classes.	IV	Analyzing
CO3	Design abstract machines for language recognition and applications.	VI	Creating

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3			3									
CO2		2			1									
CO3			3										1	

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment, oral, seminar, test (surprise/declared/quiz), and group discussion.[One assessment tool per ISE. The assessment tool used for ISE 1 shall not be used for ISE 2]
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Proofs and Regular Languages	**Hrs.**
Types of Proofs, Mathematical Induction and Recursive definitions, Regular expressions & Regular languages, Operations on Regular languages.	**6**
Module 2: Finite State Machines	**Hrs.**
Deterministic Finite Automata (DFA) representation, DFA design examples, Nondeterministic finite automata (NFA), NFA with Null (^) transitions, Equivalence of DFAs, NFAs and NFA-^s. Kleene's Theorem & Proofs, Minimization of DFA.	**8**
Module 3: Grammars & Languages	**Hrs.**
Definition and Types of grammars and languages, Derivation trees and ambiguity, Context Free Languages (CFL) & Non CFL's., Union, Concatenation and Kleene's operations, Intersection and complements of CFLs, Pumping Lemma.	**6**
Module 4: Push Down Automata (PDA)	**Hrs.**
Definition, Deterministic PDA, Types of acceptance and conversions to each other, PDA design examples, CFGs & PDAs., Top-Down, & Bottom-up parsing.	**7**
Module 5: Chomsky Normal Form (CNF)	**Hrs.**
Context Free Grammar (CFG) & CNF notations, Eliminating ^ production and unit productions from a CFG, Eliminating useless variables from CFG, CNF Significance, Applications.	**4**
Module 6: Turing Machines (TM)	**Hrs.**
Models of Computation, definition of TM as Language Acceptor, Combining TMs, Turing computable functions, TM design examples, Variations in TM, nondeterministic TM, and Universal TM.	**8**

After the completion of the course the student should be able to:

Module 1: Discuss formulation of language defining symbols and their operations.
Module 2: Interpret machine abstraction prepared towards application.
Module 3: Classify languages according to grammar and operations.
Module 4: Design of PDA and its equivalences.
Module 5: Analyze and recommend language normal forms.
Module 6: Propose Turing computable functions as problem solutions.

Tutorial: Problems for solution based on:

- Mathematical Induction
- Regular Expression formulation and DFA Designs
- DFA-NFA-NFA-^ conversion, DFA Minimization
- Grammar and Language Descriptions
- CFG- PDA Designs, PDA Acceptance categories, CFG to CNF conversion
- TM numerical functions and designs

Title of the Course: Computer Architecture 5IT222	L	T	P	Cr
	2	1	--	3

Pre-Requisite Courses: Digital Electronics, Microprocessor.

Textbooks:

1. "Computer Architecture and Organization" by J. Hayes, McGraw Hill, 3rd edition, 2017
2. "Computer Organization" by C. Hamacher et. al, McGraw Hill, 5th edition, 2010

References:

1. "Computer Architecture" D. Patterson, Morgan Kaufmann, 6th edition, 2017

Course Objectives :

1. Provide fundamental knowledge of processors architecture.
2. Introduce the memory organization architecture.
3. Instruct the basic concepts of execution speedup by pipelining.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Discuss the design issues in computer architecture.	II	Understanding
CO2	Solve the problems for computer architecture optimization	III	Applying
CO3	Estimate the performance metrics for computer architecture.	V	Evaluating

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1											
CO2			2											
CO3	2	3											1	

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Machine instructions and program execution	Hrs.
Memory locations & addresses, memory operations, instructions & instruction sequencing, addressing modes, subroutines, encoding of machine instructions.	4
Module 2 Arithmetic design	**Hrs.**
Design of signed multiplication, Booth's algorithm, bit-pair recording, division, floating point numbers and operations, guard bits and rounding.	5
Module 3: Control design	**Hrs.**
Execution of a complete instruction, sequencing of control signals, micro programmed	4

control, microinstruction format, microinstruction sequencing, and bit slice concept.	
Module 4: Memory hierarchy	**Hrs.**
Computer memory organization, RAM/main/primary memories, Read-Only memories, cache memories, mapping functions, replacement algorithms, performance consideration: Multimodal memories & interleaving, hit rate & miss penalty, multilevel cache organization, virtual memories, address translation, memory management requirement.	**5**
Module 5: I/O interface	**Hrs.**
Input-output organization, I/O mapped I/O and memory mapped I/O, Direct Memory Access (DMA), interrupts and interrupts handling mechanisms, device identification, vectored interrupts, interrupt nesting, I/O interfaces, synchronous vs. asynchronous data transfer, I/O channels.	**4**
Module 6: Pipelining	**Hrs.**
Basic concepts in pipelining, data hazards, instruction hazards, influence of pipelining on instruction set, data-path & control considerations, performance considerations, and Fyn's classification of computer architectures.	**4**

Module wise Measurable Students Learning Outcomes :
After the completion of the course the student should be able to:
Module 1: Understand the use of addressing modes & basics of program execution at hardware level.
Module 2: Realize the design principles of ALU.
Module 3: Apprehend the firmware operations.
Module 4: Cognize the importance of memory hierarchy in performance optimization of the system.
Module 5: Know the I/O interface principles of the computer systems.
Module 6: Comprehend the effect of pipelining on the execution speed of the computer system.

Tutorial Content:

Tutorial can be conducted as12 Assignments based on module 1 to 6.

Title of the Course: Computer Network 5IT 223	L	T	P	Cr
	3	0	0	3

Pre-Requisite Courses: Data communication & Networking

Textbooks:

1. Andrew S. Tannenbaum, "Computer Networks", PHI, 5th Edition, 2013
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th Edition, Pearson Publication.
3. Behrouz A. Forouzan, "Data Communication and Networking" TMGH 4th edition., 2013

References:

1. Jochen Schiller "Mobile Communications", Pearson Education, 2nd Edition,2000
2. Theodore S. Rapport, Wireless communication (Principles and practice), Pearson Education, 2nd edition 2010
3. Dr. Sunilkumar Manavi and M. Kakkasageri, "Wireless and mobile networks concepts and protocols", Wiley publication, 2nd edition, 2016

Course Objectives :

1. To provide fundamental knowledge of Computer networks.
2. To teach transport and application layer services.
3. To introduce wireless and mobile technologies.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Explain fundamentals of computer networks	II	Understanding
CO2	Utilize functions of various layers and protocols	III	Applying
CO3	Compare wired and wireless technologies	IV	Analyzing

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1												
CO2		2	1		2									
CO3			3										2	

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Data link layer	Hrs.
Framing, error control, flow control, The Channel Allocation Problem: Static & Dynamic Allocation, Multiple Access Protocols- ALOHA, CSMA, CSMA/CD. Ethernet Cabling, Coding, MAC Protocol, Frame structure, Binary exponential Back-Off Algorithm.	7
Module 2: Network Layer	**Hrs.**
Network Layer Design issues- Packet Switching, Services to transport layer, implementation of connection oriented & connectionless services, Routing- Static &Dynamic routing, flooding, Fragmentation. Congestion Control Algorithms- Principles, Prevention Policies, Jitter & Load shedding. The Network Layer in the Internet- Address, Internet Control Protocols- SPF, BGP, IP operations, Subletting , IP4, IPv6.	7
Module 3: Transport Layer	**Hrs.**
Elements of transport protocol- Addressing, connection establishment, release,flow control, buffering, multiplexing, crash recovery. UDP, RPC, RTP.	6
Module 4: Transport Layer Protocol	**Hrs.**
TCP service model, TCP protocol, TCP segment header, TCP connection establishment, Release, congestion control in TCP, timer management.	6
Module 5: Application Layer	**Hrs.**
DNS—The Domain Name System-name space, resource records, name servers. Electronic Mail- architecture and service, user agent, message format and transfer final delivery. The World Wide Web-architecture overview, Application layer protocol: HTTP, FTP, SMTP.	7
Module 6: Wireless and Mobile Technologies	**Hrs.**
Mobile technologies: GSM/GPRS, Introduction, Fundamentals of Satellite systems, Broadband satellite Networks.	6

Module wise Measurable Students Learning Outcomes :
After the completion of the course the student should be able to:
Module 1: Explain the origin of computer network and medium of access.
Module 2: Discuss various routing, addressing system at network layer
Module 3: Classify transport layer services.
Module 4: Analyse the transport layer protocol and relative functioning.
Module 5: Describe various application layer protocols.
Module 6: Identify and apply wireless and mobile technologies.

Title of the Course: Software Engineering 5IT224	L	T	P	Cr
	3	0	0	3

Pre-Requisite Courses:
Object-oriented language

Textbooks:

1. Sommerville, "Software Engineering", Pearson Education India,New Delhi,1st Edition, 2006
2. Roger S Pressman, "Software Engineering – A Practitioner's Approach", McGraw Hill, USA, 7th Edition, 2007
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publication, 3rd Edition,2005

References:

1. Pfleeger, "Software Engineering", Pearson Education India, New Delhi, 3rd Edition,2009
2. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons Publication, 2nd Edition, 2005
3. Terry Quatrain,", Visual Modeling with Rational Rose 2002 And UML",Pearson,2006

Course Objectives :

1. To introduce software development process
2. To make able to comprehend the requirement gathering techniques using process model
3. To acquaint with object oriented design using the Unified Modeling Language (UML).

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Compare various process model for software development	II	Understanding
CO2	Apply software engineering process model to engineering problems	III	Applying
CO3	Create object oriented design for software development life cycle	VI	Creating

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2								3		3			
CO2	1	2			2									
CO3		3											2	

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Introduction & Software Processes	**Hrs.**
The S/W problem, the software Engineering Approach & Benefits. Software Process, Characteristics of a software process. Software requirements, problem Analysis, Requirements Specification. Cost estimation, project scheduling, staffing and personnel planning, Software Configuration Management plans, Quality Assurance plans, Project Monitoring Plans, Risk Management	**7**
Module 2: Software Design and Testing	**Hrs.**
Objective, Design principles, module level concepts, Design notation and specifications, Artifacts system design document & detailed design document, Structured Design methodology. Programming Practice, Metrics: Testing Fundamentals (manual and automated testing), Testing Levels, Functional testing, Structural testing, Testing object oriented Programs, Regression Testing, Types of testing tools.	**7**
Module 3: Agile Processes	**Hrs.**
Agile Methodologies, Dynamic system development, Feature-driven Design, Crystal Agile Modelling.	**5**
Module 4: Structural Modelling	**Hrs.**
Classes, Relationships, Common mechanisms. Diagrams, Class Diagrams, Interfaces, Types and Roles, Packages, Instances and Object Diagram	**7**
Module 5: Behavioral Modelling	**Hrs.**
Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams, Events and signals, State Machines, Processes and Threads, Time and space, State chart diagrams.	**6**
Module 6: Architectural Modelling	**Hrs.**
Components, Deployment, Collaboration, Patterns and Frame works, Component Diagrams and Deployment Diagrams	**7**

Module wise Measurable Students Learning Outcomes

After the completion of the course the student should be able to:

Module 1: Know the software engineering process.
Module 2: Apply the technique for software design
Module 3: Describe several agile methods for software development
Module 4: Design object oriented schema for real-time use cases
Module 5: Prepare the dynamic model using interaction diagrams
Module 6: Build software architecture using component and deployment diagram.

Title of the Course: Java Programming 5IT225	L	T	P	Cr
	2	0	0	2

Pre-Requisite Courses: Object Oriented Programming

Textbooks:

1. Cay S. Horstmann, "Core Java Volume I Fundamentals", Prentice Hall, 11th Edition, 2018
2. Cay S. Horstmann, "Core Java Volume II Advanced Features", Prentice Hall, 11th Edition, 2019

References:

1. Herbert Schildt, "Java: The Complete Reference", McGraw Hill Education, 9th Edition, 2014
2. E. Balguruswamy, "Programming with Java: A Primer", McGraw Hill Education, 5th Edition, 2014

Course Objectives:

1. To introduce the object-oriented concepts of Java
2. To demonstrate the Java API's like multithreading and socket programming
3. To present various applications of the GUI packages of Java

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive	
		level	Descriptor
CO1	Generalize the basic knowledge of object orientation with different properties as well as different features of Java	2	Understanding
CO2	Demonstrate the concepts of socket programming and multithreading	3	Applying
CO3	Implement the application using GUI with database connectivity	3	Applying

CO-PO Mapping:

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1				2	2							
CO2					3							
CO3					2							

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1 – Fundamental Programming in Java	Hrs.
Structure of Java Program, Java programming environment-JVM, JIT Compiler, Bytecode, A simple Java program, source file declaration rules, naming conventions, objects and classes – declaring classes and objects, declaring member variables, defining methods, constructors, using objects, this keyword, final and static keyword, garbage collection	4
Module 2 – Inheritance and package	**Hrs.**
What is inheritance, types of inheritance, interfaces, super keyword, final classes and methods, packages – importing packages, naming a package, creating a package	4
Module 3 –Exception Handling and I/O	**Hrs.**
Exception handling – what is exception? dealing with errors, hierarchy of exception, types of exceptions, IO stream classes	4
Module 4 - Event Handling, AWT and Swing	**Hrs.**
Event handling – basics of event handling, AWT hierarchy, types of events, AWT components, swing components	5
Module 5 – Multithreading and Networking	**Hrs.**
Processes and threads, runnable interface, thread class, thread objects, thread states, thread priorities, socket programming. Database – design of JDBC, the structured query language, JDBC types, Driver Manager - statement, connection, result-set, Collections - collection framework	5
Module 6 – Introduction to Android	**Hrs.**
Introduction, App Resources, Core Building Components, Android Emulator, Android First App, Widget, Buttons, Custom Toast, Toggle Button, Checkbox, Radio Button, Alert Dialog Box, List View, Date Picker, Scroll View, Image Slider, Layout	4

Module wise Measurable Students Learning Outcomes:

After the completion of the course the student should be able to:

Module 1: Explain basic fundamentals of object-oriented programming

Module 2: Explain and implement interfaces and packages

Module 3: Handle exceptions in object-oriented programming language

Module 4: Design a graphical user interface for java applications

Module 5: Implement multithreading and socket programming and database connectivity for java-based applications

Module 6: Build Android Mobile App.

Professional Core (Lab)

Title of the Course: Computer Networks Lab 5IT 272	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses:

Textbooks:

1. Andrew S. Tannenbaum, "Computer Networks", PHI, 5thEdition, 2013
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", Pearson Publication, 5th Edition, 2012

References:

1. Behrouz A. Forouzan , "Data Communication and Networking" TMGH 4th edition, 2017
2. Theodore S. Rapport, Wireless communication (Principles and practice), Pearson education, 2nd Edition, 2010

Course Objectives :

1. To classify the concept of wired and wireless networks
2. To show wired and wireless network scenario in simulator
3. To make students familiar to analyse the packets in standard engineering tool.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Implement wired and wireless networks scenario	III	Applying
CO2	Demonstrate data link and network layer protocols	IV	Analyzing
CO3	Inspect packet analysis and capturing in LAN	IV	Analyzing

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2		3											1	
CO3									2				2	

Assessments :

Lab Assessment

There are four components of lab assessment LA1, LA2, LA3 and Lab ESE

IMP: Lab ESE is a separate head of passing

Assessment	Based on	Conducted by	Conduction and Submission Marks	Marks
LA1	Lab activities, attendance, journal	By Course Faculty	During week 1 to week 4 submission at the end of week 5	25
LA2	Lab activities, attendance, journal	By Course Faculty	During week 5 to week 8 submission at the end of week 8	25
LA3	Lab activities, attendance, journal	By Course Faculty	During week 10 to week 14 submission at the end of week 14	25
Lab ESE	Lab performance and related documentation	By Course Faculty	During week 15 to week 18 submission at the end of week 18	25

Week 1 indicates starting week of the semester

Lab activities shall include performing experiments, mini-project, presentations, drawing, programming and other suitable activities as per the nature of lab course.

The experimental lab shall have typically 8-10 experiments

Course Contents:

1. **Data Link layer**
    a. Analyze different network devices on data link layer and design case study for all devices
    b. Demonstrate half duplex and full duplex link in simulator and write the observations
    c. Design different computer network topologies and evaluate its performance using network simulators
2. **Network Layer and Transport layer**
    a. Demonstrate the communication through different topologies using TCP as an agent using network simulators
    b. Demonstrate the communication through different topologies using UDP as an agent using network simulators
    c. Evaluate performance of TCP and UDP with net centric computing parameters using network simulators
3. **Network Scenario Generators (NSG2/NETSim)**
    a. Create and simulate wired network scenario using NSG and configure the node
    b. Create and simulate different wireless network scenario using NSG and configure the mobile nodes

Title of the Course: Software Engineering Lab 5IT274	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses: Object oriented programming

Textbooks:

1. Sommerville, "Software Engineering", Pearson Education India,New Delhi,1st Edition, 2006
2. Roger S Pressman, "Software Engineering – A Practitioner's Approach", McGraw Hill, USA, 7th Edition, 2007
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publication, 3rd Edition,2005

References:

1. Pfleeger, "Software Engineering", Pearson Education India, New Delhi, 3rd Edition,2009
2. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons Publication, 2nd Edition, 2005
3. Terry Quatrain,", Visual Modelling with Rational Rose 2002 And UML",Pearson, 3rd Edition, 2006

Course Objectives :

1. To Explain methods of capturing and visualizing software requirements
2. To comprehend the concepts and principles of software design
3. To instruct fundamentals of testing and software quality assurance.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Convert the requirements model into the design model	II	Understanding
CO2	Use software project management tools in software development life cycle	III	Applying
CO3	Rehash software component in development life cycle	IV	Analyzing

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1			3									
CO2		2									1			
CO3			3										2	

Assessments :

Lab Assessment

There are four components of lab assessment LA1, LA2, LA3 and Lab ESE

IMP: Lab ESE is a separate head of passing

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, journal	By Course Faculty	During week 1 to week 4 submission at the end of week 5	25
LA2	Lab activities, attendance, journal	By Course Faculty	During week 5 to week 8 submission at the end of week 8	25
LA3	Lab activities, attendance, journal	By Course Faculty	During week 10 to week 14 submission at the end of week 14	25
Lab ESE	Lab performance and	By Course	During week 15 to week 18	25

	related documentation	Faculty	submission at the end of week 18	

Week 1 indicates starting week of the semester
Lab activities shall include performing experiments, mini-project, presentations, drawing, programming and other suitable activities as per the nature of lab course.
The experimental lab shall have typically 8-10 experiments

Course Contents:

List of Experiments:

1. To realize the phases in software development project, overview, need, coverage of topics
2. To assign the requirement engineering tasks
3. To perform the system analysis : Requirement analysis, SRS
4. To perform the function oriented diagram : DFD and Structured chart
5. To perform the user's view analysis : Use case diagram
6. To draw the structural view diagram : Class diagram, object diagram
7. To draw the behavioral view diagram : Sequence diagram, Collaboration diagram
8. To draw the behavioral view diagram : State-chart diagram, Activity diagram
9. To draw the implementation view diagram: Component diagram
10. To draw the environmental view diagram : Deployment diagram
11. To perform various testing using the testing tool unit testing, integration testing
12. To demonstrate the performance of server and web portal using modern engineering tools

Title of the Course: Java Programming Lab 5IT275	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses: Object Oriented Programming

Textbooks:

1. Cay S. Horstmann, "Core Java Volume I Fundamentals", Prentice Hall, 11th Edition, 2018
2. Cay S. Horstmann, "Core Java Volume II Advanced Features", Prentice Hall, 11th Edition, 2019

References:

1. Herbert Schildt, "Java: The Complete Reference", McGraw Hill Education, 9th Edition, 2014
2. E. Balguruswamy, "Programming with Java: A Primer", McGraw Hill Education, 5th Edition, 2014

Course Objectives:

1. To introduce the object-oriented concepts of Java
2. To demonstrate the Java API's like multithreading and socket programming
3. To present various applications of the GUI packages of Java

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Define the basic knowledge of object orientation with different properties as well as different features of Java	II	Understanding
CO2	Demonstrate the concepts of socket programming and multithreading	III	Applying
CO3	Implement the application using GUI with database connectivity	III	Applying

CO-PO Mapping:

PO	1	2	3	4	5	6	7	8	9	10	11	12
CO1				2	2							
CO2												3
CO3					2							2

Assessments :

Lab Assessment

There are four components of lab assessment LA1, LA2, LA3 and Lab ESE

IMP: Lab ESE is a separate head of passing

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, journal	By Course Faculty	During week 1 to week 4 submission at the end of week 5	25
LA2	Lab activities, attendance, journal	By Course Faculty	During week 5 to week 8 submission at the end of week 8	25
LA3	Lab activities, attendance, journal	By Course Faculty	During week 10 to week 14 submission at the end of week 14	25

Lab ESE	Lab performance and related documentation	By Course Faculty	During week 15 to week 18 submission at the end of week 18	25

Week 1 indicates starting week of the semester
Lab activities shall include performing experiments, mini-project, presentations, drawing, programming and other suitable activities as per the nature of lab course.
The experimental lab shall have typically 8-10 experiments

Course Contents:

Course Content(Lab):

Assignment List:

1. Program on input/output stream.
2. Program on class and objects.
3. Program on Constructor/Destructors.
4. Program static variables/class/functions.
5. Program on polymorphism.
6. Program on different types of inheritance and interface.
7. Program on exception handling objects.
8. Program on multithreading.
9. Program on TCP/UDP communication.
10. Program on Swing components.
11. Program on AWT components.
12. Program on Database Connectivity and operations for data handling.
13. Program on different collections like TreeSet, Set, HashMap, ArrayList, Date,etc.
14. Program on Android App.

Title of the Course: Mini project-I 5IT276	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses: Programming Fundamentals

Textbooks: -

References: -

Course Objectives :

1. To provide guidance to select & build the ideas.
2. To help students to address real-world challenges by IT based Solution.
3. To guide students to acquaint with team spirit.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Exploit the concepts of Programming languages, tools and technologies.	III	Applying
CO2	Survey the real world challenges & try to address it.	V	Evaluate
CO3	Design project modules to report solutions to various problems.	VI	Creating

CO-PO Mapping :

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1			2								3	2
CO2											2		2	1
CO3					2					3				

Assessments :

Lab Assessment

There are four components of lab assessment LA1, LA2, LA3 and Lab ESE

IMP: Lab ESE is a separate head of passing

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, Report	By Course Faculty/Guide	During week 1 to week 4 submission at the end of week 5	25
LA2	Lab activities, attendance, Report	By Course Faculty/Guide	During week 5 to week 8 submission at the end of week 8	25
LA3	Lab activities, attendance, Report	By Course Faculty/Guide	During week 10 to week 14 submission at the end of week 14	25
Lab ESE	Lab performance and related documentation/ Report	By Course Faculty/Guide	During week 15 to week 18 submission at the end of week 18	25

Week 1 indicates starting week of the semester

Lab activities shall include performing experiments, Project/mini-project, presentations, drawing, programming and other suitable activities as per the nature of lab course.

Course Contents:

Mini-project is to be carried out in a group of maximum 3 to 5 students.
Each group will carry out mini-project on developing any application software based on following areas.

1. C/C++/Python or any equivalent language.
2. Industry Problem Statement(Sponsored Project)
3. Problem statements based on current or previously learned Technology.

Project/Mini-Project group should submit workable project at the end of second semester.
Project report (pre-defined template) should be prepared using Latex/Word and submitted along with soft copy on CD/DVD (with code, PPT, PDF, Text report document & reference material) or on online github.
Students should maintain a project log book containing weekly progress of the project.