D Y PATIL
COLLEGE of
ENGINEERING & TECHNOLOGY
(AN AUTONOMOUS INSTITUTE)
KASABA BAWADA, KOLHAPUR

D. Y. Patil College of Engineering and Technology

Kasaba Bawada, Kolhapur

(An Autonomous Institute)

NBA Accredited

Accredited by NAAC with 'A' Grade

Structure and Syllabus of S. Y. B. Tech in Computer Science and Engineering

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Department of Computer Science and Engineering

Revised w. e. f. 2023-24

D. Y. PATIL COLLEGE OF ENGG. & TECH. ★ DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING ★ KASABA BAVADA, KOLHAPUR

Radhika

HEAD OF DEPARTMENT
Computer Science & Engineering
D. Y. Patil College of Engg. & Tech.
Kasaba Bavada, Kolhapur 416 006

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR

Teaching and Evaluation Scheme from Year 2023-24

Second Year B. Tech. Computer Science and Engineering

SEMESTER-III

Sr. No.	Course Code	Course Type	Name of the Course	Teaching Scheme per Week				Total Marks	Evaluation Scheme			
				Lecture	Tutorial	Practical	Credits		Type	Max. Marks	Min. Marks for Passing	
1	201CSL201	ESC	Software Engineering	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	201CSL202	BSC	Discrete Mathematics and Structures	3	1		4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	201CSL203	ESC	Computer Organization and Microprocessors	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
4	201CSL204	PCC	Data Structures	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	201CSP205	PCC	Programming Laboratory - I	2		4	4	100	ISE	50	20	40
									ESE-POE	50	20	
6	201CSP206	PCC	Computer Organization and Microprocessors Laboratory			2	1	25	ISE	25	10	10
7	201CSP207	PCC	Data Structures Laboratory			2	1	75	ISE	25	10	30
									ESE-POE	50	20	
8	201CSP208	HSMC	Soft Skills Laboratory			2	1	50	ISE	25	10	20
									ESE-OE	25	10	
9	201CSMC209	MC	Environmental Studies (Mandatory Course-I)	2				50	ESE	50	20	20
Total				18	1	10	20	650				260

ISE: In Semester Evaluation MSE: Mid Semester Examination ESE: End Semester Examination

Note 1: Tutorials and practical shall be conducted in batches with batch strength not exceeding 18-20 students.

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D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR

Teaching and Evaluation Scheme from Year 2023-24

Second Year B. Tech. Computer Science and Engineering

SEMESTER-IV

Sr. No.	Course Code	Course Type	Name of the Course	Teaching Scheme per Week				Total Marks	Evaluation Scheme			
				Lecture	Tutorial	Practical	Credits		Type	Max. Marks	Min. for Passing	
1	201CSL210	BSC	Statistics and Fuzzy Systems	3			3	100	ISE MSE ESE	20 30 50	20 20	40
2	201CSL211	PCC	Operating Systems	3			3	100	ISE MSE ESE	20 30 50	20 20	40
3	201CSL212	PCC	Computer Networks	3			3	100	ISE MSE ESE	20 30 50	20 20	40
4	201CSL213	PCC	Automata Theory	3	1		4	100	ISE MSE ESE	20 30 50	20 20	40
5	201CSP214	PCC	Programming Laboratory - II	2		4	4	75	ISE ESE-POE	25 50	10 20	30
6	201CSP215	PCC	Operating Systems Laboratory			2	2	25	ISE	25	10	10
7	201CSP216	PCC	Computer Networks Laboratory			2	1	75	ISE ESE-POE	25 50	10 20	30
8	201CSP217	PROJ	Project-I			2	1	75	ISE ESE-OE	25 50	10 20	30
9	201CSMC218	MC	Economics and Management (Mandatory Course-II)	2				50	ESE	50	20	20
Total				16	1	10	21	750				300

ISE: In Semester Evaluation MSE: Mid Semester Examination ESE: End Semester Examination

Note 1: Tutorials and practical shall be conducted in batches with batch strength not exceeding 18-20 students.

***** 4 to 6 week internship mandatory in summer vacation of SEM-IV or SEM-VI (Credits will be considered in VII semester)**

Raddheka

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Course Plan

Course Title : Software Engineering	
Course Code : 201CSL201	**Semester : III**
Teaching Scheme : L-T-P : 3-0-0	**Credits : 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This course contains an introduction to software engineering and discussion of the main methodologies of software engineering. Students will learn about the Software Development Life Cycle (SDLC) and different phases of software development in detail. It also contains exposure to agile processes.

Course Objectives:

1. To expose the students to basic concepts and principles of software engineering.
2. To make the students aware of the importance of SDLC in their project development.
3. To expose the students to agile processes.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C201.1	Understand systematic methodologies of SDLC.
C201.2	State SRS for their problem domain.
C201.3	Understand the planning and scheduling of software project.
C201.4	Use UML for Object Oriented Modeling
C201.5	Understand testing methods and importance of software maintenance.

Prerequisite:	Working knowledge of C programming language, Object Oriented Language.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Cos	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C201.1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C201.2	2	3	-	-	2	-	-	-	-	2	-	-	-	1	3
C201.3	2	2	-	-	3	-	-	-	-	-	3	-	-	-	2
C201.4	2	2	3	-	2	-	-	-	-	-	-	-	-	-	3
C201.5	2	2	-	-	-	-	-	-	2	2	-	-	1	-	2

Content	Hours
Unit 1: Introduction to Software and Processes Software Problem- Cost, Schedule & Quality, Scale and change, Software Processes Process and Project, Component Software Processes, SDLC, Software Development Process Modules, Project Management Process. Agile Development- XP, other Agile Process Models, Tool Set For Agile Process.	6
Unit 2: Software Requirements Analysis Introduction to Requirements Engineering. Value of a good SRS, Requirements Process, Requirements Specifications, Other Approaches for Analysis, Validation. Case study on Software requirements.	5
Unit 3: Software Planning & Scheduling Responsibilities of Software Project Manager, Project Planning, Project Scheduling, Project Staffing, People CMM, Risk Management	6
Unit 4: Software Design Basics of Software Design, Data Design, Architectural Design, Component Level Design, User Interface Design, Graphical User Interface, Object Oriented Design, Software Design Notations, Software Design Reviews, and Software design documentation. Case Study for Software Design.	6

Unit 5: Object Modelling Using UML and OO Software Development Basic OO Concepts, UML, UML Diagrams, Use Case Model, Class Diagram, Interaction Diagram, Activity Diagram, State Chart Diagram, Postscript, Patterns and Common Design Patterns	7
Unit 6: Testing Software Testing Basics, Test plan, Design of Test Case Matrix, Software Testing Strategies, Level of Testing, Testing Techniques, OO Testing, Software testing Tools, Debugging, Software Test Report and Introduction to Software Maintenance.	6

Text Books:

1. Panjkaj Jalote, "Software Engineering- A precise approach", Wiley India, (Unit 1,2)
2. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", 7th Edition, Mc Graw Hill, (Unit 1,2)
3. Rohit Khurana, "Software Engineering Principles and Practices", Vikas Publication. (Unit 3, 4,6)
4. Ugrasen Suman, "Software Engineering concept & Practices", CENANGE Learning, (Unit 6)
5. Rajib Mall, "Fundamentals of Software Engineering", PHI, Third Edition (Unit5)

Reference Books:

1. Hansvan Vliet, "Software Engineering Principles and Practice", Willey-India Edition.
2. Sommerville, "Software Engineering", Pearson Education, India.
3. P Fleeger, "Software Engineering", Pearson Education, India.

Online Resources:

https://onlinecourses.nptel.ac.in/noc21_cs13/course

- **ISE1:-**

  Each student must be given a case study to writeSRS.

- **ISE2:-**

1. Each student must study, design and draw diagram for given case study as in 1 above using appropriate Object Oriented Design Tool.
2. Students must be asked to study, demonstrate and prepare report on tools of

following types

a. Code Editing Tools

Notepad++, Sublime Text, Jedit, Atom, Visual Studio Code, Brackets, NetBeans, Eclipe, Bluefish, VIM.

b. Android development Tools

Android Studio, Android Asset Studio, AIDE, PhoneGap, Flutter, Stetho.

c. API Tools

Swagger, Postman, REST, SOAP.

d. Testing Related Tools

Jmeter, Seleniom, Cucumber, TestNG, JUnit.

e. Repository Maintaining Tools

Tortoise, Git, GitHub, Bitbucket.

Course Plan

Course Title : Discrete Mathematics and Structures	
Course Code : 201CSL202	**Semester : III**
Teaching Scheme : L-T-P : 3-1-0	**Credits : 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

The objective of this course is to teach students how to think logically and mathematically. The course stresses on mathematical reasoning and describes different ways in which mathematical problems could be solved. This Course consists of concepts of discrete mathematical structures such as Set Theory, Algebraic systems, Lattices, Graphs, and Probability etc. The topics selected in the course will support the more advanced courses in computer science programs such as areas of Automata, Computability, AI & Information Organization & Retrieval.

Course Objectives:

1. To develop logical thinking and its application to computer science.
2. To understand operations on set, relations &functions.
3. To expose the students to the concepts of algebraic structures &lattices
4. To introduce basic concepts of graph, trees and its applications.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C202.1	Write an argument using logical notation and determine if the argument is valid or invalid.
C202.2	Apply the operations of sets, use Venn diagrams to represent sets and Identify different types of binary relations on the basis of its properties.

C202.3	Identify the appropriate algebraic structure and lattice.
C202.4	Understand graph theory and apply it to computer science application.
C202.5	Solve the problems using combinations and permutations.

Prerequisite:	Mathematics - Probability theory, Set theory.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C202.1	3	2	-	1	-	-	-	-	-	-	-	-	-	-	2
C202.2	2	1	-	-	-	-	-	-	-	1	-	1	1	-	2
C202.3	2	1	-	1	-	-	-	-	-	1	-	1	-	-	3
C202.4	2	1	1	-	-	-	-	-	-	2	-	1	1	-	3
C202.5	3	-	-	-	-	-	-	-	-	-	-	1	-	-	2

Content	Hours
Unit 1: Mathematical logic Statements and Notations, Connectives – negation, Conjunction, disjunction, conditional, bi-conditional, Statement formulas and truth tables, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connective, Normal and principal normalforms,completelyparenthesizedinfixandpolishnotations,TheoryofInference for statement calculus – validity using truth table, rules of inference.	9
Unit 2: Set theory Basic concepts of set theory, Operations on sets, Ordered pairs, Cartesian Products, Relation and ordering - properties of binary relations in a set, Relation matrix and the graph of a relation, Partition and Covering of set, Equivalence relations, Composition of Binary relations, Partial ordering , POSET and Hasse diagram, Functions – types, composition of functions, Inverse functions.	9

Unit 3: Algebraic systems Algebraic systems, properties and examples, Semigroups and Monoids, properties and examples, Homomorphism of Semigroups and Monoids, Groups: Definition and examples, Subgroups and homomorphism.	6
Unit 4: Lattices and Boolean algebra Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, Special lattices. Boolean algebra definition and examples, Boolean functions, representation and minimization of Boolean functions.	5
Unit 5: Graphs Introduction to graph, Graph Terminology, Storage representation and manipulation of Graphs, PERT and related techniques, Euler and Hamilton Paths, Planar Graphs.	5
Unit 6:Permutations,Combinations and Probability theory Random Experiments, Sample space & Events, Pigeon hole principle, Permutations and Combinations, Concept of Probability Discrete Probability, Conditional Probability.	6

Text Books:

1. J. P. Tremblay & R. Manohar," Discrete Mathematical Structures with Application to Computer Science" MGH International (Unit 1 to5).
2. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", SiE Edition, Tata McGraw-Hill, 2008, ISBN 10:0-07-066913-9. (Unit6).

Reference Books:

1. Seymour Lipschutz, MarcLipson, "Discrete Mathematics", MGH Schaum'soutlines.
2. Kenneth H. Rosen,"Discrete Mathematics and its Applications" AT&T Bell Labs (mhhe.com/rosen).
3. John Schiller, Murray R. Spigel ," Probability and Statistics" MGH, Schaum'soutlines.
4. Michael Baron, "Probability and Statistics for Computer Scientists", Second Edition, CRC Press publication.

Online Resources:

1.https://nptel.ac.in/courses/111/107/111107058/

2.https://nptel.ac.in/courses/106/106/106106094/

3.https://nptel.ac.in/courses/106/106/106106183/

Term Work:

A) The tutorial session should consists of minimum 10-12 assignments .Out of which minimum 10 assignments on the topics from unit no 1 to 5 depending on the unsolved exercise problems from the text books J. P. Tremblay & R. Manohar, "Discrete Mathematical Structures with Application to Computer Science" MGH International (Unit 1 to 5). And minimum 2 assignments related to solving the examples on any of the following topics:

1. Permutations and Combinations.
2. Pigeon hole principle.
3. Discrete Probability and Conditional Probability.

B) To write programs in C language on any 2 of the following related topics.

1. Generating truth table of a statement
2. Application of bit representation of sets and operations on sets or relations.
3. Conversion of polish expressions.
4. Obtaining the path matrix, paths of different lengths.
5. Allocation of graphs.
6. PERT related techniques.

Course Plan

Course Title : Computer Organization and Microprocessors	
Course Code : 201CSL203	**Semester : III**
Teaching Scheme : L-T-P : 3-0-0	**Credits : 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

Course covers various generations of computer system. A logic design for fixed point add, subtract, multiply and divide hardware, look ahead adders and high speed multipliers are explained with the Booth multiplier recoding and carry save addition technique. Semiconductor memories including SDRAM and flash memory implementation, various memory techniques are discussed. Using these fundamental ideas, further development into application oriented processor design is studied in 8085, 8086, 80386 and80586.

Course Objectives:

1. To introduce various generation of computers, their working and basics of computer architecture.
2. To develop a knowledge of various logic designs and algorithms.
3. To make aware of basics of memory management.
4. To provide an understanding of the Architecture and Basic Programming model of microprocessor.
5. To develop knowledge about usage of instruction.
6. To introduce higher microprocess or family.

Course Plan

Course Title : Computer Organization and Microprocessors	
Course Code: 201CSL203	**Semester : III**
Teaching Scheme : L-T-P: 3-0-0	**Credits : 3**
Evaluation Scheme : ISE+MSE Marks: 20+30	**ESE Marks : 50**

Course Description:

Computer organization is concerned with the way the hardware components are connected together and the design of a basic digital computer. The concept of memory organization is introduced through the presentation of the hardware requirements for a cache and a virtual memory system. Pipelining is explained precisely which helps in creating and organizing a pipeline of instructions the processor can execute in parallel.

Course Objectives:

1. To expose students to fundamental knowledge of computer hardware and Programming.
2. To provide Basic Understanding of Arithmetic and Logic involved in CPU and Memory Organization.
3. To provide an understanding of the Architecture and Basic Programming model of microprocessor.
4. To provide basic understanding of GPU architecture and CUDA.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C203.1	Describe fundamentals of computer hardware and programming.
C203.2	Solve arithmetic operations involved in CPU and Memory Organization.
C203.3	Explain architecture and basic programming model of microprocessor.
C203.4	Describe GPU architecture and CUDA.

Prerequisite:	Computer and Programming, Fundamentals of Electrical and Electronics Engineering

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C203.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C203.2	3	2	-	-	-	-	-	-	-	-	-	1	1	-	3
C203.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C203.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2

Content	Hours
Unit 1: Basic Structure of Computers Computer Generations, Basic Operational Concepts, Dumb, Smart and Intelligent Terminals, Batch Processing, Multiprogramming and Multiuser system.	6
Unit 2: Arithmetic Unit Addition and Subtraction of Signed Numbers, Design of fast Adders, Multiplication of positive numbers, Signed Operand Multiplication: fast Multiplication, Carry-save addition, integer division, floating point number operations: IEEE 754 floating point format (32/64 bit).	8
Unit 3: Central Processing Unit Introduction, General Register Organization, Stack Organization: Register Stack, Memory Stack, Instruction format: RISC, ZERO, ONE, TWO and THREE Address Instructions. Addressing Modes, Reduced Instruction Set Computer (RISC, CISC)**,** Array Processors.	6
Unit 4: Memory Organization Memory Hierarchy, Main Memory: RAM, ROM Chips, Types of Memory: Auxiliary, Associative. Cache: Associative mapping, Direct Mapping and Set-associative. Virtual Memory: Address space and memory space, address mapping using pages.	5
Unit 5: Introduction to Microprocessors Architecture of 8085, Instruction set of 8085, Architecture of 8086, Introduction to 8051 microcontroller, Pentium Processor, Internal Structure of the Pentium, Special Registers, Memory system.	8

Unit 6: Commodity Hardware and High Performance Computing Brief History of GPU's, Architecture of GPU, and Differentiation between CPU & GPU. Advantages and disadvantages of GPU. Introduction to CUDA. Case study: 1) NVIDIA Jetson Xavier NX for embedded and edge systems.	6

Text Books:

1. Computer Fundamentals Architecture and Organization, B. Ram, New Age International.(UNIT 1)
2. Carl Hamacher, Zvonko Vranesic and Safwat Zyky, Computer organization, Tata McGraw Hill, 5th edition (2002) (UNIT 1, 2 & 3)
3. M. Morris Mano, Computer Sytem Architecture 2001.(UNIT 3 & 4)
4. Ramesh Gaonkar, Microprocessor Architecture Programming and Application with the 8085, PENRAM, 6th edition(2003) (UNIT 5)

Reference Books:

1. John D. Carpinelli, Computer Systems Organization & Architecture, Pearson Education, (20 October 2000)
2. Douglus Hall, Microprocessors and Interfacing Programming and hardware, McGraw Hill Education, 2nd Edition(30 December 1991)

Online Resources:

1. https://nptel.ac.in/cources/106/105/106105163/
2. https://onlinecources.nptel.ac.in/noc20_ee42/preview

Course Plan

Course Title : Data Structures	
Course Code : 201CSL204	**Semester : III**
Teaching Scheme : L-T-P : 3-0-0	**Credits : 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This course will introduce the fundamentals of data structures and will provide understanding of how to systematically organize data in a computer system. Also, includes topics which focus on searching and sorting techniques, linked list, tress and graphs. This course is helpful in many areas of electrical engineering, computational biology, computational finance etc. They are used in a variety of applications today including search engines (e.g., Google, Bing), social networking applications (e.g. Facebook, Twitter), embedded systems (e.g., cell phones, robots), and DNA analysis.

Course Objectives:

1. To make the students familiar with basic data structures
2. To select appropriate data structures in computer applications.
3. To provide the students with the details of implementation of various data structures.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C204.1	Understand the basic concepts and applications of data structures as well as algorithms that operate on them.
C204.2	Compare various data structures, searching and sorting techniques and recognize the advantages and disadvantages of them.
C204.3	Understand the details of implementation of various data structures.
C204.4	Select appropriate data structures, searching and sorting techniques in computer applications.

Prerequisite:	Basic knowledge of algorithms and C programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	Pos												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C204.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C204.2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C204.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C204.4	3	3	-	-	-	-	-	-	-	-	-	-	1	-	3

Content	Hours
Unit 1. Basic of Data Structures Data structure- Definition, Types of data structures, Data Structure Operations, Algorithms: Complexity, Time and Space complexity.	4
Unit 2. Searching and Sorting Techniques Linear search, Binary search, Sentinel search, Fibonacci search, Hashing – Definition, hash functions, Collision, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort, Radix sort, Tim sort, Complexity and analysis.	7
Unit 3. Stacks and Queues Stack: Definition, operations, Array representation of stack, applications Queue: Definition, operations, Array representation of queue, applications, Circular queue, Priority queue, Deque.	7
Unit 4. Linked Lists Definition, representation, operations, implementation and applications of singly, doubly and circular linked lists. Linked representation of stack and Queue, Representation & manipulations of polynomials/sets using linked Lists, Dynamic memory management.	6
Unit 5. Trees Terminology, representation, binary tree, traversal methods, binary search tree, AVL search tree, B tree, B+ tree, Heaps- Operations and their applications, Heap sort.	8

Unit 6. Graphs Basic concept of graph theory, storage representation, graph traversal techniques- BFS and DFS, Graph representation using sparse matrix, Transpose of sparse matrix.	6

Text Books:

1. Seymour Lipschutz (MGH), Data Structures; Mc Graw Hill publications, Third Edition [1 July 2017].
2. Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft , Addison-Wesley Series, Data Structures and Algorithms;[1983].

Reference Books:

1. Jean-Paul Tremblay, Paul.G. Soresan, “An introduction to data structures with Applications” - Tata Mc-Graw Hill International Editions, 2nd edition .
2. Richard F. Gilberg and Behrouz A., Data Structures- A Pseudo code Approach with C , 2nd Edition [15 Nov.2007].
3. A. M. Tanenbaum, Y. Langsam, Data Structure using C; M. J. Augenstein, PHI publication, 2nd Edition,[1996].

Online Resources:

1. NPTEL videos: https://nptel.ac.in/courses/106/102/106102064/
2. https://cse01-iiith.vlabs.ac.in/
3. https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
4. https://ds2-iiith.vlabs.ac.in/List%20of%20experiments.html

Course Plan

Course Title : Programming Laboratory - I	
Course Code : 201CSP205	**Semester : III**
Teaching Scheme : L-T-P : 2-0-4	**Credits : 4**
Evaluation Scheme : ISE Marks : 50	**ESE-POE Marks : 50**

Course Description:

This course introduces advanced constructs in the C programming language and Object Oriented Programming. Topics include advanced C concepts such as functions, arrays, pointers, structures and OOP concepts such as Inheritance, Polymorphism, Exception handling and STL.

Course Objectives:

1. To expose the students with basic programming constructs of C language.
2. To make the students aware about the pointers and structures.
3. To learn the basics of object oriented programming
4. To apply the different OOP concepts to design the program.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C205.1	Understand programming constructs of C.
C205.2	Apply the pointers and structures to solve programming problems
C205.3	Understand the basics of object oriented programming
C205.4	Implement various programs using object oriented programming concepts.

Prerequisite:	Basic knowledge of computers

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C205.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C205.2	2	2	-	-	-	-	-	-	-	-	-	-	1	-	3
C205.3	3	-	-	-	3	-	-	-	-	-	-	-	-	-	2
C205.4	2	-	-	-	2	-	-	-	-	-	-	-	2	-	3

Content	Hours
Unit 1: Introduction to C Introduction to C, Structure of 'C' Program, Executing a 'C' program, Keywords & Identifiers, Constants, Variables, Data types, enum, typedef, Operators,programanalysisandcomplexity,Testinganddebuggingofcode,Control Statements, Formatted I/O, Arrays, Strings, Functions and Recursion.	5
Unit 2: Pointers & structures **Pointers:** What Are Pointers?, Pointer Variables, The Pointer 0perators, Pointer Expressions, Pointers and Arrays, Array of Pointers, Initializing Pointers, Pointers to Functions and structures, C's Dynamic Allocation Functions **Structures:** Structures, Arrays of Structures, Passing Structures to Functions, Structure Pointers, Unions, Macro expansion	4
Unit 3: Introduction to Object Oriented programming Basics of OOP , Features of Object Oriented Programming : Classes & Objects, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Advantages, std namespace. Class and Object: Class, Objects, Constructor & Destructor, constructor overloading, function and variable declarations within class, Inline Function, Static class member, Static Member Function, Scope resolution Operator, Passing Object to Functions, Friend functions, Friend class	4
Unit 4: Inheritance and Polymorphism Inheritance, Base class, Derived Class, Types of Inheritance: Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hybrid Inheritance ,Hierarchical Inheritance, Polymorphism: function overloading, Operator overloading, Virtual Function, Pure Virtual function.	5

Unit 5: Exception and File Handling Exception handling :- Exception handling fundamentals, try, catch, Handling Exception, File I/O : Streams, stream classes, Formatted I/O, C++ file I/O, fstream and File classes, File operations	3
Unit 6: Templates Function Template, Class Template, Generic Classes, Generic Functions, Standard Template Library (STL):-STL Container, STL Algorithm, STL iterator.	3

List of Assignments

Ass. No.	Name of Assignment	S/O	Hours
1	Implement a program using conditional statement.	O	2
2	Implement a program using looping statements.	O	2
3	Implement a program using arrays.	O	2
4	Implement a program using string.	O	2
5	Implement a program using functions.	O	2
6	Implement a program using structures and unions.	O	2
7	Implement a program using pointers and dynamic memory allocation functions.	O	2
8	Implement a program class and objects	O	2
9	Implement program to constructor and Destructor	O	2
10	Implement program using Inheritance types	O	2
11	Implement program using function overloading and operating Overloading	O	2
12	Implement program using Virtual function	O	2
13	Implement program using exception handling	O	2
14	Implement program using file I/O classes	O	2
15	Implement program using Template	O	2
16	Implement program using STL	O	2

- **S-STUDY,O-OPERATIONAL**
- **Note: The instructor may choose minimum fourteen experiments from list. However at least two assignments of each units from 2 to6.**

Text Books:

1. Herbert Schild, C the Complete Reference by, Tata McGraw Hill publication,4th Edition.
2. Brian W. Kernighan, Dennis Ritchie, The C Programming Language,2nd Edition.
3. Muhammad Ali Mazidi, Janice G. Mazidi, Rolin D. McKinlay, 8051 Microcontroller and Embedded Systems, 2nd Edition.
4. C++ by Herbert Schild, The Complete Reference, Tata McGraw Hill, 4th Edition andonwards.

Reference Books:

1. R. G. Dormey, How to solve it by computer,Prentice-Hall
2. E Balagurusamy, Programming in ANSI, McGraw, Hill publications, 7thEdition
3. Yashwant Kanitkar, Let us C, BPB publications, 16thEdition.
4. Byron Gottfried, Jitender Chhabra (Schaum's Outlines Series), Programming with C, McGraw Hill Education, 3rdedition
5. First step with Embedded Systems by Byte craftLimited.
6. Kirk Zurell, C Programming for embeddedsystems.
7. E. Balaguruswamy, Object-Oriented Programming with C++, Tata McGraw-Hill, 6thEdition

Online Resources:

1. Virtual Lab
   http://cse02-iiith.vlabs.ac.in/

Course Plan

Course Title : Computer Organization and Microprocessors Laboratory	
Course Code : 201CSP206	Semester : III
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 25	ESE Marks: Not Applicable

Course Description:

This Lab course covers hands on experience of first ever recognized computer architecture and development of combinational logic design for basic mathematical operations. Practice on development of logic for writing assembly language program in mathematical operation.

Course Objectives:

1. To develop a knowledge of design of combinational logic array.
2. To illustrate operations of 8085 trainer kit.
3. To demonstrate use of 8086 masm assemblers and directives

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C206.1	Illustrate structure of basic computer system.
C206.2	Construct various adders by consideration of speed, volume of data and number of address required.
C206.3	Develop logic to write a program using trainer kit.
C206.4	Develop logic to write program using development tool.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C206.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C206.2	3	3	-	-	2	-	-	-	-	-	-	-	1	-	3
C206.3	3	3	-	-	2	-	-	-	-	-	-	-	1	-	3
C206.4	2	3	-	-	2	-	-	-	-	-	-	-	1	-	3

List of Assignments

Ass. No.	Name of Assignment	S/O	Hours
1	Design of Ripple Carry Adders.	O	2
2	Design of Carry Look Ahead Adders.	O	2
3	Design of Combinational Multiplier.	O	2
4	Study of Array Processors.	S	2
5	Study of 8085 architecture and Applications.	S	2
6	Study of 8086 architecture and Applications.	S	2
7	Study of 8051 Microcontroller and Applications.	S	2
8	Write an assembly language program for addition of two 16 bit numbers using 8085.	O	2
9	Write an assembly language program for multiplication of two 16 bit numbers using 8085.	O	2
10	Write an assembly language program for addition of two 16 bit numbers using 8086.	O	2
11	Write an assembly language program for multiplication of two 16 bit numbers using 8086.	O	2
12	Write an assembly language program for adding delay into a program.	O	2
13	NVIDIA Jetson Xavier NX for Embedded and edge system.	S	2
14	Case study on GPU Processors.	S	2

- **S-STUDY, O-OPERATIONAL**
- **Note: The instructor may choose 10 experiments from experiment no. 1 to 14.**

Reference Books:

1. N. Senthil Kumar, M. Saravanan & S Jeevananthan, Microprocessors and Microcontrollers,Oxford University Press, Second Edition (17 August 2016).
2. Ramesh Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, Penram International Publishing, Fifth Edition (1 December 2000)

Online Resources:

1. Virtual Lab- https://cse.iitkgp.ac.in/~chitta/coldvl/comp.html

Course Plan

Course Title : Data Structures Laboratory	
Course Code : 201CSP207	**Semester : III**
Teaching Scheme : L-T-P : 0-0-2	**Credits : 1**
Evaluation Scheme : ISE Marks : 25	**ESE-POE Marks: 50**

Course Description:

The course is designed to develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures.

Course Objectives:

1. To teach the students to identify appropriate data structures.
2. To provide the students with the details of implementation of various data structures.
3. To select appropriate data structures in computer applications.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C207.1	Outline the solution to the given software problem with appropriate data structure.
C207.2	Identify appropriate data structure for specific application.
C207.3	Formulate the problem statement and implement to solve that statement.
C207.4	Choose appropriate sorting & searching algorithms

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C207.1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
C207.2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	3
C207.3	-	3	3	-	2	-	-	-	-	-	-	-	1	-	3
C207.4	3	-	2	-	-	-	-	-	-	-	-	2	-	-	3

List of Assignments			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1	Program to demonstrate various operations on Array	O	2
2	Program to perform various operations on matrix.	O	2
3	Programs to implement Searching techniques.	O	2
4	Programs to implement Sorting techniques.	O	2
5	Programs to implement Stack using array and Linked List.	O	2
6	Programs to implement Queue using array and Linked List.	O	2
7	Programs to implement various operations on Singly & Doubly Linked List.	O	2
8	Programs to implement Binary Tree & BST.	O	2
9	Program to implement Binary Search Tree.	O	2
10	Case Study on A) AVL Tree B) B Tree C) B+ Tree	S	2
11	Programs to implement BFS & DFS.	O	2

- **S-STUDY,O-OPERATIONAL**
- **Note: The instructor should take all 11 experiments from list.**

Text Books:

1. Data Structures using C – Seymour Lipschutz (MGH), Mc Graw Hill publications, Revised 1st Edition. [1 July2017]
2. C- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein, Data Structure using; PHI publications, 2nd Edition,[2017].

Reference Books:

1. Ellis Horowitz, S. Sahni, D. Mehta, Fundamentals of Data Structures in C++, Galgotia Book Source, New Delhi 1995 ISBN16782928.
2. Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures with Applications, Tata Mc-Graw Hill International Editions, 2nd edition 1984,ISBN-0-07-462471-7.

Online Resources:

1. Virtual Lab:https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
2. NPTEL videos:https://nptel.ac.in/courses/106/102/106102064/

Course Plan

Course Title : Soft Skills Laboratory	
Course Code : 201CSP208	**Semester : III**
Teaching Scheme : L-T-P : 0-0-2	**Credits : 1**
Evaluation Scheme : ISE Marks: 25	**ESE-OE Marks : 25**

Course Description:

Soft Skills are Behavioral and interpersonal skills that characterize a person's relationships with other people. Soft skills provide students with a strong conceptual and practical framework to build, develop and manage teams. They play an important role in the development of the students' overall personality, thereby enhancing their career prospects. This course provides effective use of Soft Skills, Business Correspondence, Presentations, Team building, Leadership, Time management, Group discussions, Interviews, Inter-personal Skills and Professional Skills for overall development of student.

Course Objectives:

1. To create an awareness about importance of Soft Skills among an engineering students.
2. Become self-confident individuals by mastering Inter-personal Skills, Team management Skills and Leadership Skills.
3. Develop overall personalities to function effectively in different circumstances.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C208.1	Develop Behavioral and Business writing skills.
C208.2	Demonstrate Adaptability and self-development techniques.
C208.3	Develop Teamwork and Leadership Skills.
C208.4	Apply Time Management and Stress Management Skills.
C208.5	Apply Professional Skills and etiquettes effectively being an Engineer.

Prerequisite:	Basic Communication and Writing Skills in English.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

COs	POs												PSOs		BT
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C208.1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	6
C208.2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	3
C208.3	-	-	-	-	-	-	-	-	2	2	-	-	-	-	6
C208.4	-	-	-	-	-	-	-	-	2	-	-	-	-	-	3
C208.5	-	-	-	-	-	-	-	2	-	-	-	-	-	-	3

Contents	Hours
Unit 1: Soft Skills and Adaptability Importance of Soft Skills, Business Communication, Interpersonal Communication, Listening & Comprehending. **Adaptability:** Curiosity, Problem Solving, Self- management, Self- motivation, Self-Development.	4
Unit 2: Behavioral Skills Confidence Improvement, Positive Attitude, Positive Thinking, Empathy, Emotional Intelligence, Emotional Quotient. **Interpersonal Skills:** Negotiations, Social Skills, Assertive Skills.	4
Unit 3: Teamwork and Leadership Skills Team building and leadership, Evolution of groups into teams, Team Development Stages, Collaboration, Cooperation, Coordination, Idea exchange, Role of Team leader, Group Dynamics,EmergenceofLeadership,CorporateCulture,LeadershipStyles,LeadershipTrends.	4
Unit 4: Business Correspondence Principles of clear writing, Writing Proposals, Project Synopsis, Technical Paper Writing, Applications and requests, Positive and Negative responses to requests, Organizing meetings, Cover Letter, Functional and Chronological Resumes, Professional Correspondence.	4
Unit 5: Stress and Time Management Stress in Today‘s Time, Positive Stress, Negative Stress, Types of Stressors, Reasons and Effects, The four A's of Stress Management, Approaches: Action-oriented, Emotion-oriented and Acceptance-oriented. Time Management, Time Management Techniques.	4

Unit 6: Professionalism Goal Setting, Developing Work Ethics, Professional Work Attitudes, Marketing and Business Presentations. **Technology Etiquette:** Business etiquette, Telephone etiquette, E-mail etiquette, Interview Etiquette, Meeting etiquette.	4

Text Books:

1. Krishna Mohan and Meera Banerji- Developing Communication Skills by MacMillan India Ltd.,Delhi
2. Barun K. Mitra- Personality Development & Soft Skills, Oxford Publishers, Third Impression, 2017.

Reference Books:

1. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall ofIndia.
2. Simon Sweeney—English for Business Communication, Cambridge University Press, ISBN13:978-0521754507.
3. Shalini Verma- Development of Life Skills and Professional Practice, First Edition; Sultan Chand (G/L) & Company, 2014.
4. Priyadarshi Patnaik- Group Discussions and Interview Skills, Cambridge University Press.

List of Assignments

Ass. No.	Name of Assignment	S/O	Hours
1	Role Play and Drama Play	O	2
2	Attitude Activity	O	2
3	Emotional Intelligence and Emotional Quotient Test Activity	O	2
4	Leadership and Team Building Activity	O	2
5	Group Discussion Activity	O	2
6	Debate Activity	O	2
7	Business Presentation Skills	O	2
8	Functional and Chronological Resume writing	O	2
9	Professional Correspondence	O	2
10	Stress Management Activity	O	2

11	Time Management Activity	O	2
12	Professional Etiquettes	S	2
13	Interview Activity	O	2

- **S-STUDY,O-OPERATIONAL**
- **Note: The instructor may choose minimum 10 Sessions from Session No.1 to 13.**

Term work:

1. Various activities to be taken based on assignments like self introduction, role play, group discussions, presentations and team activity etc.
2. Multiple set of activity based assignments can be prepared to allow multiple skills exposure for team building, value sharing, leadership and role play.
3. Faculty may arrange one or more sessions from following: yoga and meditation, stress management, relaxation exercises and fitness exercises. Time management and personal planning sessions.
4. Continuous assessment of laboratory work is to be done based on overall performance and lab assignment performance of the student.

Online Resources:

1. Virtual Lab:https://ve-iitg.vlabs.ac.in/Communication%20Skill.html

Course Plan

Course Title: Environmental Studies (Mandatory Course-I)	
Course Code: 201CSMC209	**Semester: III**
Teaching Scheme: L-T-P : 2-0-0	**Credits: No Credits**
Evaluation Scheme: Not Applicable	**ESE Marks: 50**

Course Description:

Environmental Studies course enhance a student's knowledge in a variety of currently relevant topics related to environmental awareness and pollution. The course aims to identify environmental problems, come-up with suitable solutions and create awareness for a hygienic and eco-friendly environmental.

Course Objectives:

1. Recognize the structure and functions of ecosystems with their importance.
2. Understand the environmental and social problems with global concern.
3. Understand the importance of environmental management for its protection.
4. Acquire problem solving skills through visits to different locations, identifying the environmental problems, proposing the solution models and exhibiting to the society and government authorities.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C209.1	Understand the importance of ecosystem and biodiversity in view of its conservation.
C209.2	Understand the concept of hazardous waste and to promote healthier environment.
C209.3	Explain the importance of environmental management through pollution control boards.
C209.4	Propose solutions for problems related with environmental well beings through location visits and model exhibitions.

Prerequisite:	Understanding of Environmental Education course.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C209.1	-	-	-	-	-	1	3	2	-	-	-	-	-	-	2
C209.2	-	-	-	-	-	1	2	-	-	-	-	-	-	-	2
C209.3	-	-	-	-	-	1	3	-	1	1	-	-	-	-	2
C209.4	-	-	-	-	-	2	3	1	1	1	-	-	-	-	3

Content	Hours
Unit 1.Ecology and Biodiversity Definition, types, importance and examples of ecology, types of community relationships: Symbiosis, predation and competition. Ecosystem: structure and functions, biotic and abiotic components, energy flows, ecological succession, food chain, food web & ecological pyramid, types of ecosystems, degradation of ecosystems and its impact. Biodiversity hotspots: Western ghats, eastern Himalayas, threats to biodiversity and conservation of biodiversity, environmental ethics.	8
Unit 2.Environment and Health Air Pollution, water pollution. E-waste, waste minimization technology, Plastic waste, Population growth of the world and reduced health content of the environment, energy crisis, biofuels, Occupational health hazards, Concept of Carbon footprint.	7
Unit 3.Environmental Management Role of Central Pollution Control Board (CPCB) and Maharashtra Pollution Control Board (MPCB) in environmental protection of India. Concept of sustainability, ISO Certification.	5
Unit 4.Field Work Visit to a local area for documentation of environmental assets- River/forest/grassland/hill/mountain OR Visit to a local polluted site-Urban/Rural/Industrial/Agricultural OR Study of common plants, insects, birds OR	5

Study of simple ecosystems- Ponds, Lakes, Rivers, Hill slopes etc.	

Text Books:

1. Trivedi R.K. and P.K Goel, Introduction to Air Pollution, Tech-science Publications.
2. Mhaskar A.K, Matter Hazardous, Techno-Science Publication.

Reference Books:

1. Bharucha, Erach, The Biodiversity of India, Mapin Publishing Pvt.Ltd., Ahmedabad 380013, India.
2. Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay.
3. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I &II, Environmental Media.
4. Miller T.G.Jr., Environmental Science, Wadsworth Publications Co.
5. Sharma B.K., Environmental Chemistry, Gokel Publ. House, Meerut.

Course Plan

Course Title: Statistics and Fuzzy Systems	
Course Code: 201CSL210	**Semester: IV**
Teaching Scheme: L-T-P: 3-0-0	**Credits: 3**
Evaluation Scheme: ISE+MSE: 20+30	**ESE Marks: 50**

Course Objectives:

1. To develop mathematical skills and enhance thinking power of students.
2. To understand use of concepts of stataistics, measures of dispersion
3. To learn the fundamental theory of testing hypothesis and sample tests
4. To learn the concepts of correlation, regression and curve fitting
5. To understand the fundamentals of fuzzy logics

Course Outcomes:

Upon successful completion of this course, the students will be able to:

C210.1	Apply the knowledge to study the data given with respect to dispersion and measure of central tendency
C210.2	Understand tests for hypothesis and its significance
C210.3	Describe the statistical data numerically by using correlation and regression
C210.4	Solve basic problems in probability theory, including problems involving the Binomial, Poisson, and Normal distributions.
C210.5	Understand the fundamental concepts of fuzzy sets, knowledge representation of fuzzy rules and fuzzy logics.
C210.6	Apply arithmetic operations on fuzzy number such as Addition and Multiplication

Prerequisite	Probability

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C210.1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
C210.2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
C210.3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
C210.4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
C210.5	3	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C210.6	3	2	-	-	-	-	-	-	-	-	-	-	-	-	2

Content	Hours
Unit 1 Frequency distribution and measure of central Tendency Frequency distribution, Continuous frequency distribution, Graphical representation of a Frequency distribution- Histogram, frequency polygon, Measure of central tendency- Arithmetic mean, median and mode , Range, Quartile deviation, Mean deviation, Standard deviation.	6
Unit 2 Testing of hypothesis Introduction, Statistical hypothesis (Simple and Composite), Null hypothesis, Alternative hypothesis, Critical region, Type I and Type II errors, Level of significance, Test for goodness of fit of chi square distribution.	6
Unit 3 Correlation and Regression Introduction, Types of correlation**,** Karl Pearson's coefficient of correlation**,** Interpretation of the coefficients of corrections**,** Computation of coefficient of correlation for ungroup data, Lines of regression , Calculations of equations of the lines of regression.	6
Unit 4 Probability Distribution Functions Introduction, Elementary theory of probability, Random variables., Discrete probability distribution, Continuous probability distribution, Binomial distribution, Poisson distribution, Normal distribution.	6
Unit 5 Introduction to Fuzzy sets Crisp **s**et and Fuzzy set**,** Basic concepts of fuzzy sets**,** Basic operations on fuzzy sets**,** Properties of fuzzy sets.	6
Unit 6 Fuzzy Arithmetic Fuzzy numbers, Fuzzy cardinality, Arithmetic Operations on Fuzzy numbers, Solutions of Fuzzy equations of type A + X = B and A.X = B.	6

Text Books:

1. Douglas C Montgomery, George C Runger, Applied statistics and Probability for Engineers, WileyAsiaStudentEdition,4th Edition,2007,ISBN:978-81-265-2315[Unit1–4]
2. Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication, New Delhi) [Unit 1,3-6]
3. FuzzySets and FuzzyLogic: Theoryand Applications, by George J. Klir and Bo Yuan (PrenticeHall of IndiaPrivate Limited). [Unit5,6]

Reference Books

1. Advance Engineering Mathematics by Erwin Kreyszig(WileyIndia.)
2. Higher Engineering Mathematics, by B.V. Ramana (Tata McGraw Hill Education Private Limited,Delhi)
3. Richard I Levin, David S Rubin, Statistics for Management, Prentice Hall India, 7th Edition, 1997, ISBN:9780134762920.

Course Plan

Course Title : Operating Systems	
Course Code : 201CSL211	**Semester : IV**
Teaching Scheme : L-T-P : 3-0-0	**Credits : 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This course provides comprehensive overview of computer operating systems. It covers the foundation components, classical internal algorithms and structures of operating systems, including process scheduling, memory management and IO management.

Course Objectives:

1. To learn the basic concepts of operating system, services and operations in the operating system.
2. To expose the students to various functions of the operating system and their usage.
3. To make the students understand process management, memory management and I/O device Management.
4. To provide knowledge to the students about the fundamental architecture of Linux.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C211.1	Understand the structure, functions and services of an operating system.
C211.2	Describe the methods of process management, process synchronization and deadlocks.
C211.3	Demonstrate the various memory management techniques in effective execution of programs.
C211.4	Analyze the process scheduling, file system and I/O management techniques.

Prerequisite:	Fundamental knowledge of computer, C programming, Data Structures.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	**POs**												**PSOs**		**BTL**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	1	2	
C211.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C211.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1
C211.3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C211.4	2	3	-	-	-	-	-	-	-	-	-	-	-	-	4

Content	**Hours**
Unit 1. Introduction Evolution of operating systems, Types of operating systems, Different views of the operating system, The journey of a command execution, Overview of design and implementation of operating systems..	5
Unit 2. Process Management & Synchronization Process Concept, Operations on Processes, Interprocess Communication, Threads, Process Synchronization - Race Conditions, Critical Sections, Synchronization Approaches, Classic Process Synchronization Problems, Semaphores, Monitors.	6
Unit 3. Process Scheduling & Deadlock Scheduling Terminology and Concepts, Non-preemptive Scheduling Policies, Preemptive Scheduling Policies, Process Scheduling - Case Studies, Deadlocks - Deadlocks in Resource Allocation, Handling Deadlocks, Deadlock Detection and Resolution, Deadlock Prevention, Deadlock Avoidance.	7
Unit 4. Memory Management Managing the Memory Hierarchy, Static and Dynamic Memory Allocation, Memory Allocation to a Process, Contiguous Memory Allocation, Noncontiguous Memory Allocation, Paging, Segmentation, Virtual Memory- Demand Paging, Page Replacement Policies.	6
Unit 5. File Systems and I/O Management Overview of File Processing, Files and File Operations, Fundamental File Organizations and Access Methods, Directories, Layers of the Input-Output Control System, Overview of I/O Organization, I/O Devices, Device Drivers.	7
Unit 6. Linux Operating System (Case Study) History, Design Principles, Kernel Module, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Interprocess Communication, Network Structure, Security.	5

Text Books:

1. Milan Milenkovic, Operating systems concepts and design, McGRAW-Hill, 2nd edition. [Unit 1]
2. Silberschatz, Galvin, Gagne, Operating system concept, Wiley India, 8th edition.[Unit 2,3, 6]
3. Dhananjay M Dhamdhere, Operating systems - A Concept Based approach, Mc-Graw Hill, 3rd Edition. [Unit 4, 5]

Reference Books:

1. William Stallings, Operating Systems: Internals and Design Principles, Pearson,7thedition
2. Andrew S. Tanenbaum, Modern Operating Systems, Pearson Education International, 4th edition.
3. Achyut S. Godbole, Operating System with case studies in UNIX, Netware and Windows NT, TMGH.

Online Resources:

1. https://nptel.ac.in/courses/106/105/106105214/#
2. https://nptel.ac.in/courses/106/102/106102132/
3. https://www.cse.iitb.ac.in/~mythili/os/

Course Plan

Course Title: Computer Networks	
Course Code: 201CSL212	**Semester: IV**
Teaching Scheme: L-T-P: 3-0-0	**Credits: 3**
Evaluation Scheme: ISE + MSE Marks: 20 + 30	**ESE Marks: 50**

Course Description:

This course provides a comprehensive introduction to computer networks and networking aspects which will be of help to all Computer Science Engineering Streams. Course includes computer networking fundamentals, network layered architectures, descriptive study of different layers of networking models, network protocols and tools.

Course Objectives:

1. To perceive fundamental concepts of Computer Networks
2. To understand layered architecture and basic networking protocols
3. To understand the transport layer, application layer protocols & socket interface.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

C212.1	Describe the concepts of Computer Networks and Network layered architecture.
C212.2	Understand the protocols, algorithms and the addressing model used in networking.
C212.3	Learn and understand various networking protocols and communication problems
C212.4	Learn and implement communication using various transport and application protocols

Prerequisite:	Basic knowledge of computers

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C212.1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	2
C212.2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	2
C212.3	2	3	2	-	-	-	-	-	-	-	-	-	1	-	2
C212.4	2	2	-	-	-	-	-	-	-	-	-	-	2	-	3

Content	Hours
Unit 1. Introduction to Computer Network: Data communication, Modes of data transfer, network topology, network types, protocols and standards, circuit switching and packet switching, transmission media, Overview of OSI layer Model and TCP/IP protocol model, Addressing, IEEE 802.3 Ethernet	7
Unit 2. Data Link Layer: Design issues for Data Link Layers, framing methods, Error control: detection and correction, Flow control, Elementary Data Link protocols, Sliding window protocols- Go back n, Selective repeat.	6
Unit 3.IPv4 Addressing: IPv4 Addresses: Introduction, Classful Addressing, two level addressing, Subnetting and Super netting, Classless Addressing, Designing subnets, special addresses, Introduction to IPv6-Address space, representation- abbreviations, Address categories.	6
Unit 4. IPv4 Datagram Introduction, Datagram, Options, Checksum. ARP Protocol, ICMP Protocol Routing and Congestion Control techniques: shortest path, Link state, flooding, Congestion prevention policies, Load Shedding, Jitter Control	6
Unit 5. Transport Layer: The Transport layer services, UDP: Process to Process communication, User Datagram Format, Operation and uses of UDP. TCP: TCP Services and Features, TCP segment format, TCP Connections, TCP Options, TCP Timers	6
Unit 6. Application Layer: Introduction to Application Protocols: DNS, FTP, DHCP, Telnet, HTTP.	5

Text Books:

1. Behrouz A. Forouzen, TCP/IP protocol Suit, Tata Mag. Hill, 4thEd.

Reference Books:

1. Andrew S. Tanenbaum (PHI), Computer Networks
2. W. Richard Stevens (PHI), Unix Network Programming
3. Richard Stevens, G. Gabrani (Pearson Education.), TCP/IP Illustrated, the Protocols, Vol. I – W.
4. Computer Networking: A Top down approach , James F. Kurose, Keith W. Ross, Pearson
5. D. E. Comer (Pearson Ed.), Internetworking with TCP/IP, Vol. I Principles, Protocols, and Architectures.
6. D. E. Comer, David L. Stevens (Pearson Ed.), Internetworking with TCP/IP, Vol. III, Client-Server Programming and Application (2ndEd.)

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs18/preview
2. https://www.udemy.com/topic/computer-network/
3. https://www.netacad.com.

Course Plan

Course Title: Automata Theory	
Course Code: 201CSL213	**Semester: IV**
Teaching Scheme: L-T-P : 3-1-0	**Credits: 4**
Evaluation Scheme: ISE + MSE Marks: 20 + 30	**ESE Marks: 50**

Course Description:

Automata theory is the theory of Computer Science which deals with the study of abstract machines and automata, as well as the computational problems that can be solved using them. This course introduces the fundamental concepts of Finite Automata, Regular Languages, Grammar for formal languages, Pushdown Automata and Turing Machines. Automata theory is important because it allows scientists to understand how machines solve problems. Learning how to design automatons helps to improve the logical thinking capability of the student.

Course Objectives:

1. To expose the students to the mathematical foundations of computation, the theory of formal languages and grammars.
2. To analyze and design finite automata, pushdown automata, grammar for formal languages & Turing machines.
3. Tostrengthenthestudents'abilitytocarryoutformalandhigherstudiesincomputerscience.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C213.1	Explain and identify types of formal languages and their acceptors
C213.2	Design grammars , Parsers and recognizers for different formal languages
C213.3	Construct finite state machines and corresponding regular expressions
C213.4	State and justify theorems in Automata Theory

Prerequisite:	Discrete Mathematical Structures

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C213.1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	2
C213.2	3	2	1	-	-	-	-	-	-	2	-	1	1	-	3
C213.3	3	1	1	-	-	-	-	-	-	1	-	1	1	-	3
C213.4	3	1	-	1	-	-	-	-	-	-	-	-	-	-	3

Content	Hours
Unit 1. Regular Languages and Finite Automata Regular Expressions and Regular Languages, Finite Automata, Union, Intersection &Complement of Regular Languages, Applications of FA. Introduction to Output producing FAs: Mealy and Moore machine	7
Unit 2. Non determinism and Kleene's Theorem Nondeterministic finite automata, NFA with null transition, Equivalence of FA's, Kleene's Theorem Part I along with its proof, Kleene's Theorem Part II only introduction to statement, Minimal State Finite Automata	7
Unit 3. Context Free Grammar Definition, Types of Grammar (Chomsky Hierarchy), Derivation trees and ambiguity, Union, Concatenation and Kleene *'s of CFLs to construct Grammar, Simplified Forms and Normal Forms i.e., Converting CFG to CNF, Introduction to GNF,BNF	6
Unit 4. Push Down Automata and Parsing Definition and Examples of Pushdown Automata, Applications of PDA, Deterministic PDA,NPDA,EquivalenceofCFG's&PDA's,Top-downparsing,Bottom-upparsing.	6
Unit 5. Context Free Languages CFL's and non CFL's, Pumping Lemma for Regular language and CFL, Properties of CFL: Union, Concatenation and Kleene *'s of CFLs, intersections and complements of CFLs	3
Unit 6. Turing Machines Definition, TM as language acceptors, combining Turing Machines, Computing partial function with a TM, Variants of TM and Universal TM, Applications of Turing Machine.	7

Term work:

- It should consist of minimum 10 assignments based on topics of syllabus which are included in exercise problems from the textbooks or reference books.
- Carry out any 8 assignments from assignment no. 1 to 11 listed below.
- Assignment no. 12 and 13 are compulsory.
- Assignments can be given on the basis of following guidelines:

List of assignments			
Ass. No.	**Name of assignment**	**O/S**	**Hour**
1	Examples on Regular Languages and writing regular expressions	O	1
2	Designing DFAs and Extended Transition function of DFA	O	1
3	Designing NFA, NFA-null and corresponding extended transition function	O	1
4	Problems on equivalence of FAs and union, intersection and complements of DFAs	O	1
5	Designing NFA- null using Kleene's Theorem Part I	O	1
6	Minimal state DFA and Examples	O	1
7	Writing grammar for given formal language, problems on left most and right most derivation along with parse tree, ambiguous grammar	O	1
8	Simplified Forms and Normal Forms: Examples on converting CFG to CNF	O	1
9	Examples on designing DPDA for the given language.	O	1
10	Parser: Examples on constructing top-down parser and bottom-up parser for the given Grammar	O	1

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Text Books:

1. John C. Martin, Introduction to Languages & the Theory of Computations - (Tata MGH 3rd Edition)

Reference Books:

1. John E. Hopecraft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation - (Pearson Edition)
2. Michael Sipser, Introduction to theory of Computations - (Thomson Books/Cole)
3. Vivek Kulkarni, Theory of Computation.

Online Resources:

NPTEL Videos

1. https://nptel.ac.in/courses/111/103/111103016/
2. https://nptel.ac.in/courses/106/106/106106049/

Course Plan

Course Title : Programming Laboratory - II	
Course Code : 201CSP214	**Semester : IV**
Teaching Scheme : L-T-P : 2-0-4	**Credits : 4**
Evaluation Scheme : ISE Marks : 25	**ESE- POE Marks : 50**

Course Description:

This course provides the object-oriented approach using Java programming constructs. The course includes basics of Java language programming, the different object-oriented features and packages, file handling and multithreading. This course enables the students to develop the GUI based applications using advanced features such as swing, database handling, networking and collection. This course provides the basics for developing android applications, games, and many more programming language applications in the different fields.

Course Objective:

1. To introduce the concepts of object-oriented programming using JAVA programming constructs.
2. To expose the students with the JAVA concepts using inheritance, interface, package, I/O and exception handling mechanisms.
3. To develop the problem-solving ability using GUI designing components.
4. To build the foundations of advanced java programming for application development.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C214.1	Use the java programming constructs for solving the problems with object- oriented approach.
C214.2	Develop the reliable and user -friendly application using inheritance, interface, package, I/O and exception handling mechanisms.
C214.3	Create the applications using the GUI designing components with the use of modern tools.
C214.4	Apply the knowledge of the advanced java programming concepts for developing the applications from different domains.

Prerequisite:	Basic knowledge of C programming and object-oriented programming.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C214.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
C214.2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	3
C214.3	2	2	3	-	1	-	-	-	2	-	-	-	2	-	3
C214.4	3	2	2	-	-	-	-	-	2	-	-	-	1	-	3

Content	Hours
Unit 1: Fundamental Programming in Java: The Java Buzzwords, The Java Programming Environment- JVM, JIT Compiler, Byte Code Concept, A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Array. **Objects and Classes:** Object-Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a MethodoraConstructor,Creatingandusingobjects,ControllingAccesstoClassMembers, Static Fields and Methods, this keyword	3
Unit 2: Inheritance, Interface and Package: **Inheritance:** Definition, Super classes, and Subclasses, Overriding and Hiding Methods, Polymorphism, Inheritance Hierarchies, Super keyword, Final Classes and Methods, Abstract Classes and Methods, casting, Design Hints for Inheritance, Inner Classes, garbage collection**.** **Interfaces:** Defining an Interface, Implementing an Interface, Using an Interface as a Type, Evolving Interfaces, and Default Methods. **Packages:** Class importing, Creating a Package, Naming a Package, Using Package Members, Managing Source and Class Files.	4

Unit 3: Exception and I/O Streams **Exception:** Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, Catching Multiple Exceptions, Re-throwing and Chaining Exceptions, finally clause. **I/O Streams:** Byte Stream – InputStream, OutputStream, DataInputStream, DataOutputStream, FileInputStream, FileOutputStream, Character Streams, BufferedStream, Scanner class	4
Unit 4: Graphical User Interfaces using AWT and Swing Introduction to AWT components, Frame, Applet, Introduction to the Swing, Swing components. **Layout Management:** Introduction to Layout Management, APIs for Border Layout, Flow Layout, Grid Layout **Event Handling:** Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low-Level Events in the AWT, Low-Level Event Types	6
Unit 5: Multithreading, Collections **Multithreading:** Processes and Threads, Runnable Interface and Thread Class, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Thread States, Thread Properties, Synchronization **Collections:** Collection Interfaces, Concrete Collections-List, Queue, Set, Map, the Collections Framework	4
Unit 6: , Database Programming and Networking **Database Programming:** The Design of JDBC, The Structured Query Language, Basic JDBCProgrammingConcepts,QueryExecution,ScrollableandUpdatableResultSets. **Networking:** Overview of Networking, Networking Basics, Sockets, reading from and Writing to a Socket, Writing the Server Side of a Socket	3

List of Assignment			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1	Study of JAVA basics.	S	2
2	Implementation of a problem statement using class and object.	O	2
3	Design and develop the programs for different types of inheritance	O	4
4	Implementation of stack/queue operations using Interface	O	2
5	Implementation of user defined package.	O	2
6	Implementation of any type of Exception Handling	O	2
7	Implementation of different I/O operations using console and file.	O	2
8	Implementation of program for designing the GUI using swing components.	O	4
9	Design an application using any **modern tools available for java programming** such as Eclipse IDE, NetBeans, Oracle JDeveloper, IntelliJ IDEA 13.1 etc.	O	2
10	Implementation of different types of event handling.	O	2
11	Implementation of a programs for demonstrating the different types of Layout Managers.	O	2
12	Design and develop an application for demonstration of multithreading	O	2
13	Implementation of any program using collections.	O	2
14	Implementation of different database operations using JDBC	O	2
15	Develop any application using networking.	O	2
16	Design and develop the mini project for solving the different real time problems using java language in the group of 4-5 students. Problem Statements like 1. Online quiz management system 2. Smart city project 3. Network packet sniffer 4. Email client software 5. File Compression 6. Virtual Classroom 7. Text Editor 8. Advanced Payroll System 9. Data mart Management System	O	8

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Note: The instructor may choose minimum fourteen assignments from assignment no. 1 to 16 & Experiment no. 9 and 16 are mandatory

Text Books:

1. Cay Horstmann and Gary Cornell, Core Java- Volume I Fundamentals Pearson, Eight edition (Unit 1 to Unit 4).
2. Cay Horstmann and Gary Cornell, Core Java- Volume II Advanced Features, Pearson, Eight edition(Unit 5 and Unit6).

Reference Books:

1. Herbert Schildt, JAVA-The Complete Reference, Mcgraw Hill, Ninthedition.

Online Resource:

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://java-iitd.vlabs.ac.in/List%20of%20experiments.html

Course Plan

Course Title : Operating Systems Laboratory	
Course Code : 201CSP215	**Semester : IV**
Teaching Scheme : L-T-P : 0-0-2	**Credits : 1**
Evaluation Scheme : ISE Marks : 25	**ESE Marks : Not Applicable**

Course Description:

This course aims to hands on experience on the fundamental commands, system calls and shell scripting. It teaches students about principles in the design and implementation of the operating system.

Course Objectives:

1. To give hands on exposure to Linux/UNIX commands and shell scripting.
2. To solve different process scheduling, resource allocation and memory management problems.
3. To compare the performance of various process scheduling algorithms.
4. To expose the various system calls for Linux/UNIX.

Course Outcomes (COs):

Upon successful completion of this course the student should be able to:

C215.1	Use the Linux/UNIX commands, system calls and shell scripts.
C215.2	Apply the process Scheduling Algorithms, memory allocation algorithms for the given problem.
C215.3	Analyze the performance of the various page replacements and process Scheduling Algorithms.
C215.4	Apply the process synchronization and memory management techniques.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	Pos												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C215.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
C215.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
C215.3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	4
C215.4	2	2	-	-	-	-	-	-	-	-	-	-	-	-	3

List of assignments			
Ass. No.	**Name of Assignment**	**S/O**	**CO**
1	Installation of Multi - Operating System.	O	1
2	Implement shell scripts for Linux/Unix operating systems.	O	1
3	Implement system calls using C/C++ language.	O	4
4	Implement program to stimulate Critical Section and mutual exclusion	O	1
5	Implement program to stimulate reader writer problem using semaphore.	O	1
6	Implement program to stimulate producer-consumer problem using semaphore.	O	1
7	Implement CPU scheduling algorithms.	O	3
8	Implement program to demonstrate deadlock detection approaches.	O	2,4
9	Implement program to stimulate Paging technique of memory management.	O	2,4
10	Implement page replacement algorithm.	O	2,4

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Text Books:

1. Ben Whaley, Evi Nemeth, Garth Snyder, Trent R. Hein, UNIX and Linux System Administration Handbook, Pearson Education, 4thEdition.
2. Robert Love, Linux System Programming, O'Reilly Media, 2ndEdition.
3. Matthias Kalle Dalheimer, Terry Dawson, Lar Kaufman, Matt Welsh, Running Linux, O'Reilly, 4thEdition.

Reference Books:

1. Kurt Wall, Mark Watson, and Mark Whitis, Linux Programming Unleashed ,Sams
2. Robert Love, Linux kernel development, Developer's Library, 3rd Edition

Online Resources:

4. https://nptel.ac.in/courses/106/105/106105214/#
5. https://nptel.ac.in/courses/106/102/106102132/
6. https://www.cse.iitb.ac.in/~mythili/os/

Course Plan

Course Title: Computer Networks Laboratory	
Course Code: 201CSP216	**Semester: IV**
Teaching Scheme: L-T-P: 0-0-2	**Credits: 1**
Evaluation Scheme: ISE Marks: 25	**ESE - POE Marks : 50**

Course Description:

This course provides a practical implementation of the computer networking theoretical aspects, studied during the lecture hours. Course includes computer networking fundamentals, demonstrations and implementation of network setup using networking tools & layered architectures, descriptive study of different layers of networking models, network protocols and algorithms.

Course Objectives:

1. To understand the fundamental concepts of Computer Networks.
2. To understand the different network connectivity and analyzing tools.
3. To implement the networking protocols and algorithms.
4. To implement the Client server model.

Course Outcomes:

Upon successful completion of this course, the students will be able to:

C216.1	Understand the Network models and its components.
C216.2	Implement framing, error control, flow control and routing algorithms
C216.3	Make use of socket programming to develop client-server programs
C216.4	Implement communication using various application protocols

Prerequisite:	Basic knowledge of computers, C / C++ Programming Language, Linux, and Windows OS

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C216.1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C216.2	2	1	2	-	-	-	-	-	-	-	-	-	-	-	3
C216.3	2	2	2	-	-	-	-	-	-	-	-	-	2	-	3
C216.4	3	1	-	-	2	-	-	-	-	-	-	-	1	-	3

List of Assignments

Ass. No.	Name of Assignment	S/O	Hours
01	Study of various Computer Networking models and connectivity devices.	S	2
02	Implementation of cross-wired cable and straight through cable using crimping tool.	O	2
03	Performing an Initial Switch Configuration using CISCO/Wireshark packet tracer.	O	2
04	Study of IP address configuration & following connectivity test tools with all its options –ifconfig, arp, traceroute, nmap, netstat and finger.	O	2
05	Implementing Framing method: Bit Stuffing.	O	2
06	Implementing Elementary data link protocol (Stop & wait protocol).	O	2
07	Implementation of Error detection/correction Code (CRC / Hamming).	O	2
08	Implementation of sliding window protocol.	O	2
09	Implement the routing algorithm (any one).	O	2
10	Programs for connection oriented (TCP) client-server using socket programming.	O	2
11	Programs for connection less (UDP) client-server using socket programming	O	2
12	Study of following DNS Tools with all its options. nslookup, dig, host and whois.	O	2
13	Configuration of DHCP using CISCO/Wireshark Packet Tracer	O	2
14	Performing TELNET Configuration using CISCO/Wireshark packet tracer.	O	2
15	Configuration of Linux/Windows Firewall	O	2

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INTRUCTIONS FOR PRACTICAL EXAMINATIONS AND TERMWORK:

*It should consist of **10-12** experiments based on the syllabus. The study experiments should consist of some practical work and observations.*

STUDENTS ACTIVITIES THAT CAN BE CONDUCTED:

1. Group-play activities for demonstration of data-link layer protocols.
2. Industrial visit to a networking-based industry.
3. Group/Individual Presentation activity after a visit to a networking-based industry or laboratory.
4. Implementation and Configuration of the FTP Client-Server model, in a group (2-5 students per group).
5. Seminar / Webinar / Workshop for students by an Industrial expert.

Text Books:

1. Behrouz A. Forouzen, TCP/IP protocol Suit, Tata Mag. Hill, 4thEd.
2. W. Richard Stevens (PHI), Unix Network Programming.
3. Kurose James F., Ross Keith W., Computer Networking: A Top-Down Approach, Sixth Edition, By Pearson.

Reference Books:

1. Andrew S. Tanenbaum (PHI), Computer Networks.
2. D. E. Comer, David L. Stevens (Pearson Ed.), Internetworking with TCP/IP, Vol. III, Client- Server Programming and Application (2ndEd.)

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs18/preview
2. https://www.netacad.com.

Course Plan

Course Title : Project-I	
Course Code : 201CSP217	**Semester : IV**
Teaching Scheme : L-T-P : 0-0-2	**Credits :1**
Evaluation Scheme : ISE Marks : 25	**ESE - OE Marks :50**

Course Description:

This course gives emphasis on a problem-based learning approach. It is a group activity / work where students have to present an idea/ solution for the problem chosen. Then requirement analysis and design specification of the system is to be developed by the students. This is followed by software implementation of the design, testing and finally demonstrate the results obtained. This course helps the students to learn how to analyze the demands of a customer and represent them in the form of software requirements specification (SRS Document) including quality requirements. Ultimately, this course enhances students programming skills and enables them to learn how to perform requirements analysis, system designing, testing, coding and report writing.

Course Objectives:

1. To formulate the problem statement.
2. To follow the SDLC model for development of project.
3. To learn the skills of team building and teamwork.
4. To develop the logical skills and use of appropriate data structures for solving the engineering problems.

Course Outcomes (COs)

Upon successful completion of this course, the students will be able to:

C217.1	Frame appropriate problem statement for real time problem.
C217.2	Organize an effective project plan with clear objectives and prepare a synopsis.
C217.3	Design the various modules of the project to provide a solution to the problem with the help of various design tools.
C217.4	Develop the proposed system using suitable development platform.
C217.5	Able to present their work and prepare their project report.

Prerequisite:	Mathematics, Data Structures, Software Engineering and knowledge of Programming language.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**12**	1	2	
C217.1	2	2	-	2	-	-	-	-	-	-	-	-	1	-	2
C217.2	2	3	-	-	-	-	-	-	-	-	-	-	1	-	3
C217.3	-	-	2	-	2	-	-	-	-	3	-	-	1	-	3
C217.4	3	-	3	-	3	-	-	-	3	3	-	3	2	-	3
C217.5	-	-	-	-	2	-	-	-	3	3	-	2	1	-	3

Course Contents:

The Project-I should be undertaken preferably by a group of 3-4 students who will jointly work and implement the project. The group will select a project with the approval from the panel and submit the name of the project with a synopsis not more than 02 to 03 pages. Project-I should consist of defining the problem and analyzing it, designing the solution and implementing it using a suitable programming language. A presentation and demonstration based on the above work is to be given by the group. The work will be jointly assessed twice in a semester by a panel of teachers of the department. A hard copy of project report of the work done is to be submitted along with the softcopy of the project during ESE.

Selection of project topics should be made from following domains:

1. Network Engineering
2. Real World applications
3. Operating Systems
4. Database Engineering
5. Multidisciplinary Environment
6. Numerical Computations

Course Plan

Course Title : Economics and Management (Mandatory Course-II)	
Course Code : 201CSMC218	**Semester : IV**
Teaching Scheme : L-T-P : 2-0-0	**Credits : No Credits**
Evaluation Scheme : Not Applicable	**ESE Marks : 50**

Course Description:

This course provides a comprehensive study of basic economic terminologies, principles and the role of ICT (Information & Communication Technologies) in modern business management. This course includes economics analysis, cost estimation, project management and value analysis including modern day tools viz. online marketplace and various search for online marketing and management.

Course Objective:

1. To get the knowledge about fundamental principles of economics.
2. To understand basic principles of cost estimation, project management and value analysis.
3. To get introduced with online marketplace for marketing and business management.
4. To understand the optimization of a Web site and SEO optimization for business communication.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

C218.1	Identify the importance of the economics for business planning.
C218.2	Understand and apply cash flow between actors and stakeholders including depreciation of asset
C218.3	Understand and apply project management techniques and value analysis.
C218.4	Identify digital channels, business tools used online business communication.

Prerequisite:	Nil

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	**POs**												**PSOs**		**BTL**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	
C218.1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	2
C218.2	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
C218.3	-	-	-	-	-	-	-	-	1	-	1	1	-	-	2
C218.4	-	-	-	-	2	-	-	-	1	2	-	-	-	-	4

Content	**Hours**
Unit 1. Introduction, Elementary Economic Analysis **Introduction:** Economics: Flow in an Economy, Law of Supply and Demand, Concept of Engineering Economics: Types of Efficiency, Definition and Scope of Engineering Economics, Elements of Costs **Frameworks and architectures:** Actors and stakeholders, Fundamental sales process, Technological elements	5
Unit 2. Present and future worth method **Present worth method:** Revenue-dominated Cash Flow Diagram, Cost-dominated Cash Flow Diagram, Examples. **Future worth method:** Revenue-dominated Cash Flow Diagram, Cost-dominated Cash Flow Diagram, Examples.	4
Unit 3. Depreciation **Introduction:** Methods of Depreciation: Straight Line Method of Depreciation, Declining Balance Method of Depreciation, Sum-of-the-Years-Digits Method of Depreciation, Sinking Fund Method of Depreciation, Service Output Method of Depreciation	3
Unit 4:Project Management and value analysis **Introduction:** Phases of Project Management, Guidelines for Network Construction, Critical Path Method (CPM), Gantt Chart/Time Chart, PERT (Project Evaluation and Review Technique) **Introduction:** When to Apply Value Analysis: Value Analysis vs. Value Engineering, Function, Aims, Value Engineering Procedure, Advantages and Application Areas. **Case study:** ERP for project management.	5

Unit 5. Online marketplace analysis & macro environment **Introduction:** situation analysis for digital marketing, the digital marketing environment, understanding customer journeys, online consumer behavior and implications for marketing, business models fore-commerce **Online macro environment:** Technological forces, economic forces, political forces, Legal forces, social forces and cultural forces	4
Unit 6. Business Communications **Digital media channels:** Introduction, search engine marketing, online public relations, e-mail marketing and mobile text messaging, social media and viral marketing, offline promotion techniques. **Case study:** Renault – An industry 4.0 Case Study	3

Text Books:

1. Engineering Economics, 13th Edition, R. Paneerselvam, PHI publication.(Unit I to IV)
2. Digital Marketing: Strategy, Implementation and Practice, 6th Edition by Dave Chaffey, Fiona Ellis-Chadwik, Pearson Education.(Unit V &VI)

Reference Books:

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