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Syllabus Deployment

Name of Faculty: Mr. Nitin Kothari — Subject Code: 3CS1A
Subject Name: Electronic Device & Circuits — Semester: III
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES:

At the end of this course students will be able to:

- The students will have the knowledge of components of Electronics.
- The students will have the ability to analyze various Types of Diodes.
- The students will have the ability to analyze various Types of Transistors
- The student will be able to analyze and allocate performance objectives to components of Transistors, FET's.
- The students will be able to evaluate the performance of small signal amplifiers at low frequency.

Lecture No.	Unit	Topic
1	**1**	**MOBILITY & CONDUCTIVITY, CHARGE DENSITIES IN SEMICONDUCTOR**
2	1	Fermi Dirac distribution, carrier concentrations
3	1	Fermi levels in semiconductor
4	1	Generation and recombination of charges
5	1	Diffusion and continuity equation, Mass action Law
6	1	Hall effect
7	1	Junction diodes, Diode as a ckt. element
8	1	Diode load line concept
9	1	Cipping and clamping circuits
10	1	(Contd.) clipping and clamping circuits
11	1	Voltage multipliers.
12	**2**	**TRANSISTOR CHARACTERISTICS, CURRENT COMPONENTS,**
13	2	Current gains: alpha and beta.
14	2	Operating point. Hybrid model, h-parameter equivalent circuits
15	2	CE, CB and CC configuration
16	2	DC and AC analysis of CE, CC and CB amplifiers
17	2	Ebers-Moll model, Biasing & stabilization techniques
18	2	Thermal runaway, Thermal stability.
19	**3**	**SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY:** Analysis of BJT and FET
20	3	RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency.
21	3	Miller's Theorem
22	3	Cascading Transistor amplifiers, Emitter follower.
23	3	JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's.
24	3	Low frequency CS and CD JFET amplifiers.
25	3	FET as a voltage variable resistor. Source follower.

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26	**4**	**FEEDBACK AMPLIFIERS**: Classification, Feedback concept, Transfer gain with feedback,
27	4	General characteristics of negative feedback amplifiers.
28	4	Analysis of voltage series, voltage-shunt feedback amplifier
29	4	Analysis of current series, current shunt feedback amplifier
31	4	Stability criterion.
34	**5**	**OSCILLATORS:** Classification. Criterion for oscillation.
35	5	Tuned collector, Hartley oscillator
36	5	Colpitts, RC Phase shift oscillator
37	5	Wien bridge and crystal oscillators,
38	5	Astable, monostable multivibrators.
39	5	Bistable multivibrators.
40	5	Schmitt trigger.

TEXT/REFERENCE BOOKS

1. Microelectronic Circuits – Theory and Applications, Adel S Sedra, Kenneth C Smith and Arun N Chandorkar, Oxford University Press
2. Electronic Devices and Circuit Theory, Robert L Boylestad and Louis Nashelsky, Pearson India Education Services Pv Ltd.
3. Electronic Devices and Circuits, J.B. Gupta, S.K. Kataria & Sons.

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Syllabus Deployment

Name of Faculty: Mr. Sunil Choudhary — Subject Code: 3CS2A
Subject Name: Data Structures and Algorithms — Semester: III
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 41

COURSE OUTCOMES

At the end of this course students will be able to:

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks, queues, lists, trees and graphs
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures
- To understand the use of various data structures available in different problem solving

Lecture No.	Unit	Topic
1	**1**	**Stacks: Basic Stack Operations**
2	1	Representation of a Stack using Static Array and Dynamic Array
3	1	Multiple stack implementation using single array
4	1	Stack Applications: Reversing list
5	1	Factorial Calculation
6	1	Infix to postfix Transformation
7	1	Evaluating Arithmetic Expressions and
8	1	Towers of Hanoi
9	**2**	**Queues: Basic Queue Operations**
10	2	Representation of a Queue using array
11	2	Implementation of Queue Operations using Stack
12	2	Applications of Queues- Round Robin Algorithm
13	2	Circular Queues, DeQueue Priority Queues
14	**2**	**Linked Lists:Introduction**
15	2	single linked list, representation of a linked list in memory
16	2	Different Operations on a Single linked list, Reversing a single linked list,
17	2	Circular linked list, double linked list and Header linked list
18	**3**	**Searching Techniques: Sequential and binary search**
19	3	Sorting Techniques: Basic concepts
20	3	Sorting by: bubble sort
21	3	Insertion sort, selection sort
22	3	Quick sort
23	3	Heap sort
24	3	Merge sort
25	3	Radix sort and counting sorting algorithms
26	**4**	**Trees: Definition of tree, Properties of tree**
27	5	Binary Tree, Representation of Binary trees using arrays Formulation of

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		Assignment
28	4	Representation of Binary trees using linked lists
29	4	Operations on a Binary Tree
30	4	Binary Tree Traversals (recursive)
31	4	Binary search tree, B-tree
32	4	B+ tree, AVL
33	4	Threaded binary tree
34	4	AVL tree
35	**5**	**Graphs: Basic concepts, Different representations of Graphs**
36	5	Graph Traversals (BFS & DFS)
37	5	Minimum Spanning Tree(Prims &Kruskal)
38	5	Dijkstra's shortest path algorithms
39	5	Hashing: Hash function, Address calculation techniques
40	5	Common hashing functions, Double hashing
41	5	Collision resolution: Linear and Quadratic probing

TEXT/REFERENCE BOOKS

1. Data structures, Schaum Series, S. Lipshutz
2. Data Structures in C, Reema Thareja, Oxford University Press
3. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
4. Data Structures in C, Tanenbaum, Pearson

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Syllabus Deployment

Name of Faculty: Mr. Vivek Jain
Subject Code: 3CS3A
Subject: Digital Electronics
SEM: III
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- To understand and examine the structure of various number systems and its application in digital desig
- To prepare students to perform the analysis and design of various digital electronic circuits.
- Ability to identify basic requirements for a design application and propose a cost effective solution.
- The ability to understand, analyze and design various combinational circuits.
- The ability to understand, analyze and design various sequential circuits and identify timing issues in a digital design.

Lecture No.	Unit	Topic
1	**1**	**Fundamental concepts:** Number systems and codes,
2	1	Basic logic Gates and Boolean algebra
3	1	Sign & magnitude representation, Fixed point representation
4	1	Sign & magnitude representation, Fixed point representation
5	1	Complement notation, various codes & arithmetic in different codes &their inter conversion
6	1	Complement notation, various codes & arithmetic in different codes &their inter conversion
7	1	Features of logic algebra, postulates of Boolean algebra
8	1	Theorems of Boolean algebra
9	**2**	**Minimization Techniques and Logic Gates**: Principle of Duality
10	2	Boolean expression -Minimization of Boolean expressions
11	2	Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS)
12	2	Karnaugh map Minimization in SOP form
13	2	Karnaugh map Minimization in POS form
14	2	Karnaugh map Minimization with Don't care conditions
15	2	Quine - McCluskey method of minimization without Don't care conditions
16	2	Quine - McCluskey method of minimization with Don't care conditions
17	**3**	**Digital Logic Gate Characteristics:** TTL logic gate characteristics.
18	3	Theory & operation of TTL NAND gate circuitry
19	3	Open collector TTL
20	3	Three state output logic
21	3	TTL subfamilies
22	3	MOS& CMOS logic families
23	3	Realization of logic gates in RTL,ECL,DTL
24	3	Realization of logic gates in C-MOS & MOSFET
25	**4**	**Combinational Circuits:** Combinational logic circuit design

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26	4	Designing of adder, subtractor
27	4	Designing of BCD adder
28	4	Designing of encoder
29	4	Designing of decoder
30	4	Designing of BCD to 7-segment decoder
31	4	Designing of multiplexer
32	4	Designing of demultiplexer
33	**5**	**Sequential Circuits:** Latches, Flip-flops
34	5	SR, JK, D, T Flip Flop Characteristic table and equation
35	5	Master-Slave Characteristic table and equation
36	5	counters and their design, Asynchronous counters
37	5	Synchronous Up/Down counters
38	5	Programmable counters
39	5	State table and state transition diagram
40	5	sequential circuits design methodology. Registers –shift registers

TEXT/REFERENCE BOOKS

1. Modern Digital Electronics, R.P Jain, Tata McGraw-Hill Education
2. Digital Circuit & Logic Design, Morris Mano, Prentice Hall of India
3. Digital Principles & Applications, A.P.Malvino & D.P Leach, Tata McGraw-Hill Education

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Syllabus Deployment

Name of Faculty: Mr. Sunil Choudhary — Subject Code: 3CS5A
Subject Name: Linux & Shell Programming — Semester: III
Department: Department of Computer Science and Engineering

Total No. of Lectures Planned: 28

COURSE OUTCOMES

At the end of this course students will be able to:

- To learn to set permission of user, administrator, group.
- To learn working with VI Editor and gcc compiler.
- To know basic about X-window.
- To learn about basic of SHELL and BASH Shell.
- To understand about Shell programming.

Lecture No.	Unit	Topic
1	1	**INTRODUCTION**: Logging in, changing password (passwd command only)
2	1	man, xman, info commands to access on line help
3	1	Simple commands like ls, cp, mv, grep, head, tail, sort, uniq, diff, echo, date, which
4	1	whereis, whatis, who, finger w (option and variations included).
5	1	Directory commands, access permissions, changing access permissions for files and directories
6	1	hard & symbolic links. Environment and path setting.
7	2	**VI EDITOR**: Creating and editing files, features of vi,
8	2	insertion deletion, searching, substitution operations,
9	2	yank, put, delete commands, reading & writing files,
10	2	exrc file for setting parameters, advance editing techniques. vim(improved vi).
11	2	Programming utilities: Compiling & linking C, C++ programs, make utility
12	2	debugging C programs using gdb, system call.
13	3	**INTRODUCTION TO X-WINDOW SYSTEM**: x-window as client/ server system,
14	3	concept of window manager
15	3	remote computing & local displays
16	3	xinitrc file, customize X work environment and applications
17	3	customizing the fvwm window manager
18	4	**SHELL**: Meaning and purpose of shell, Introduction to types of shell
19	4	The command line, standard input and standard output, redirection
20	4	pipes, filters special characters for searching files and pathnames
21	4	Bourne Again SHell: shell script-writing and executing, command separation & grouping
22	4	redirection, directory stack manipulation,
23	4	processes, parameters & variables, keyword variables.
24	5	**SHELL PROGRAMMING**: Control structures,
25	5	the Here document, expanding NULL or USET variables

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26	5	Builtins, functions, history, aliases
27	5	job control, filename substitution.
28	5	. source code management- RCS and CVS. awk utility

TEXT/REFERENCE BOOKS

1. Ken O. Burtch, Linux Shell Scripting with Bash, Sams.
2. D. S. W. Tansley , Linux and UNIX Shell Programming, Addison-Wesly.
3. Sriranga Veeraraghavan, Sams Teach Yourself Shell Programming in 24 Hours, Sams.

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Syllabus Deployment

Name of Faculty: Mr. Gaurav Kumawat — Subject Code: 3CS5A
Subject Name: Object Oriented Programming — Semester: III
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- To understand the different programming paradigm
- To know the principles of OOPs
- Understand and apply the principles of inheritance
- Understand the principles of polymorphism
- Finally the objective of this course is to develop programming skills of undergraduate students to solve basic real world problems using objective oriented programming techniques.

Lecture No.	Unit	Topic
1.	1	Introduction to different programming paradigm,
2.	1	characteristics of OOP
3.	1	Class, Object
4.	1	data member, member function
5.	1	structures in C++, different access specifiers
6.	1	defining member function inside and outside class,
7.	1	array of objects.
8.	2	Concept of reference,
9.	2	dynamic memory allocation using
10.	2	new and delete operators
11.	2	inline functions
12.	2	function overloading
13.	2	function with default arguments
14.	2	constructors
15.	2	destructors
16.	2	friend function
17.	2	Friend and classes
18.	2	this pointer.
19.	3	Inheritance
20.	3	types of inheritance
21.	3	multiple inheritance,
22.	3	virtual base class
23.	3	function overriding
24.	3	abstract class
25.	3	pure virtual function
26.	4	Constant data member and member function
27.	4	static data member

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28.	4	static member function
29.	4	polymorphism,
30.	4	operator overloading
31.	4	dynamic binding
32.	4	virtual function
33.	5	Exception handling
34.	5	Try throw catch statmenets
35.	5	Template
36.	5	Function and class templates
37.	5	Stream class
38.	5	File handling
39.	5	File attributes and types
40.	5	Programming exercise

TEXT/REFERENCE BOOKS

1. Object Oriented Programming with C++, Balagurusamy
2. C++ : The Complete Reference, Herbert Schildt
3. How to Program C++, Dietel, Pearson
4. Mastering C++ ByK.R.Venugopal, TMH
5. Object Oriented Programming in C++ By Robert Lafore, Pearson
6. Object Oriented Design & Modelling, Rambaugh, Pearson

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Syllabus Deployment

Name of Faculty: Dr. Kirti Khurdia — Subject Code: 3CS6A
Subject Name: Adv. Engineering Mathematics — Semester: III
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 39 + Tutorial Classes

COURSE OUTCOMES

At the end of this course students will be able to:

- Student understood the optimization method and application in engineering field.
- Student able to formulate real life problem into linear programming problem and transportation proble Get the best solution which helps them in many areas.
- Student learns about the number theory, algebraic structures (group, field, ring). Its help them in codin theory , cryptography etc.
- Student able to solve Laplace transform. It is use to solve ordinary differential equation and partial differential equation.
- By using numerical analysis student find the unknown value, function, missing term from a given set c data and solve integration, differentiation, ODE by numerical method.

Lecture No.	Unit	Topic
1	**1**	**Introduction** to Engineering application of optimization
2-3	1	Statement and classification of optimization problem
1 T	1	Tutorial on representing Constraints mathematically
4-5	1	Single variable & multivariable optimization with and without constraints.
6	**2**	**Introduction** to Linear Programming
7-8	2	Formulation of Linear Programming problem (Graphical Approach)
2 T	2	Tutorial on Graphical Approach
9-10	2	General Linear Programming problem (Simplex Method)
3 T	2	Tutorial on Simplex Approach
11	2	Duality in Linear Programming.
12	2	Duality in Linear Programming & Transportation Problems.
13	2	Transportation Problems.
4 T	2	Tutorial on Duality & Transportation Problem
14	**3**	Elements of Number Theory: Divisibility and Euclid Algorithm
15	3	Primes & Sieve of Eratosthenes, testing for primes, Prime No. Theorem
5 T	3	Tutorial on Elements of Number Theory
16	3	Euler's, Fermat's Little theorems & Congruences
17	3	Chinese Remainder Theorem
18-19	3	Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field
6 T	3	Tutorial on Algebraic Structures
20	**4**	**Introduction** to LAPLACE TRANSFORM
21	4	Laplace transform with simple properties & Inverse Laplace transform
7 T	4	Tutorial on Laplace Transforms
22	4	Convolution theorem (without proof)
23	4	Solution of ordinary differential equation with constant coefficient
8 T	4	Solution to Ordinary Differential Equations (ODE)
24	4	Solving partial DE (PDE) having constant coefficient (wrt diffusion)

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25	4	Solving PDE with constant coefficient (reference to Heat conduction) and wave equation. Boundary value problems
26	4	Solving PDE with constant coefficient (reference to wave equation)
9 T	4	Discussion on Solution to Partial Differential Equations (PDE)
27	4	Boundary Value Problem
28	**5**	**Introduction** to NUMERICAL ANALYSIS
29	5	Difference operators (forward, backward, central, shift, average operator)
10 T	5	Tutorial Class on Difference Operators & relation between them
30	5	Newton & Gauss forward & backward interpolation formula: Equal intervals
31	5	Stirling's formula for central difference
11 T	5	Tutorial Class on Interpolation Formula & Stirling's Formula
32	5	Lagrange's Interpolation formula and Inverse Interpolation.
33	5	Ordinary differential equation of first order by Picard's method
12 T	5	Tutorial Class on Interpolation Formula & Picard's Method
34	5	Euler's and modified Euler's method
13 T	5	Tutorial Class on Euler's & Modified Euler's Formula
35-36	5	Milne's method and Runga-Kutta fourth order method
37-38	5	Solution of difference equation.
14 T	5	Tutorial Class on Milne's method and Runga-Kutta fourth order method

TEXT/REFERENCE BOOKS

1. Linear programming –R K Gupta
2. Aem –Dr Gokhroo
3. Statistics and ProbabilityTheory –Dhanpat Rai and Co.
4. Fundamental of mathematical statistics –Sultan Chand and sons

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Syllabus Deployment

Name of Faculty: Mr. Nitin Kothari Subject Code: 3CS7A
Subject Name: Electronics Device Lab SEM: III
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 14

COURSE OUTCOMES

At the end of this course students will be able to:

1. Study different meters and instruments for measurement of electronic quantities
2. Study the characteristics of different semiconductor devices like diode, BJT & FET experimentally
3. Design and experiment with various signal and power amplifier circuits using BJTs and FETs

Lab No.	Name of Experiment
1	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances
2	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
3	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product
4	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss & Vp
5	Application of Diode as clipper & clamper
6	Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value
7	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
8	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters
9	Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
10	Plot and study the characteristics of small signal amplifier using FET.
11	Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
12	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value
13	To plot the characteristics of UJT and UJT as relaxation.
14	To plot the characteristics of MOSFET and CMOS.

TEXT/REFERENCE BOOKS

1. Microelectronic Circuits – Theory and Applications, Adel S Sedra, Kenneth C Smith and Arun N Chandorkar, Oxford University Press.
2. Electronic Devices and Circuit Theory, Robert L Boylestad and Louis Nashelsky, Pearson India Education Services Pv Ltd.
3. Electronic Devices and Circuits, J.B. Gupta, S.K. Kataria & Sons.

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Syllabus Deployment

Name of Faculty: Mr. Rajat Mehta, Subject Code: 3CS8A
Subject Name: Data Structures Lab SEM: III
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 13

COURSE OUTCOMES

At the end of this course students will be able to:

1. Develop an ability to design basic data structures such as arrays, lists, trees, stacks, queues, binary search trees, and hash tables; incorporate data structures into the software applications.
2. Develop an ability to design various searching and sorting algorithms to understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals, and shortest paths.
3. Apply the knowledge of data structure design to reduce the complexity, improving efficiency, in complex software applications.

Lab No.	Practical
1	Write a simple C program on a 32-bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays up to 4-dimensions
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation,
5	Implement singly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Implement doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
7	Simulate a stack, queue, circular queue and dequeue using a linked list. The program should implement the basic addition, deletion and traversal operations
8	Represent a 2-variable polynomial using linked list. Use this representation to implement addition of polynomials.
9	Represent a sparse matrix using linked list. Implement addition and transposition operations using the representation
10	Implementation of binary tree with operations like addition, deletion, traversal.
11	Depth first and breadth first traversal of graphs represented using adjacency

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	matrix and list
12	Implementation of binary search in arrays and on linked Binary Search Tree
13	Implementation of different sorting algorithm like insertion, quick, heap, bubble and many more sorting algorithms.

TEXT/REFERENCE BOOKS

1. Data Structures in C, Reema Thareja, Oxford University Press
2. Data Structures using C, G. S. Baluja, Dhanpat Rai Publications.

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Syllabus Deployment

Name of Faculty: Mr. Yogendra Singh Solanki — Subject Code: 3CS9A
Subject Name: Digital Electronics Lab — SEM: III
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 10

COURSE OUTCOMES

At the end of this course students will be able to:

1. Verify the functionality of TTL ICs & understand the respective datasheet.
2. Design combinational logic circuits using TTL ICs.
3. Design sequential logic circuits using TTL ICs.

Lab No.	Practical
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gateswith 2, 3,& 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND& NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor& Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables.
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor& basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer.
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table.
9	Construct a divide by 2,4& 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos. 1-4 are to be performed on bread board only.

TEXT/REFERENCE BOOKS

1. Modern Digital Electronics, R.P Jain, Tata McGraw-Hill Education
2. Digital Circuit & Logic Design, Morris Mano, Prentice Hall of India
3. Digital Principles & Applications, A.P.Malvino & D.P Leach, Tata McGraw-Hill Education

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Syllabus Deployment

Name of Faculty: Ms. Ayushi Chaplot Subject Code: 3CS10A
Subject Name: C++ Programming Lab SEM: III
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 12

COURSE OUTCOMES

At the end of this course students will be able to:

1. Develop an ability to design software applications in object oriented paradigm this improves the concept of modular programming.
2. Develop an ability to apply concepts and underlying principles of Object Oriented Programming designing applications.
3. Apply the knowledge of object oriented design to make industrial standard complex projects.

Lab No.	Practical
1	Understand the basics of C++ library, variables, data input-output.
2	C++ program using with the concept of structures
3	Implement class and object concepts and function overloading.
4	Write programs to understand dynamic memory allocation and array of objects.
5	Program to understand different types of constructors and destructor
6	Implement friend function to access private data of a class and usage of this pointer.
7	Write programs to understand the usage of constant data member and member function, static data member and member function in a class.
8	Implement different types of inheritance, function overriding and virtual function
9	Implement Operator overloading concepts.
10	Write programs to understand function template and class template
11	Write programs to understand exception handling techniques
12	Write programs to understand file handling techniques

TEXT/REFERENCE BOOKS

1. Object Oriented Programming with C++, Balagurusamy
2. C++ : The Complete Reference, Herbert Schildt
3. How to Program C++, Dietel, Pearson
4. Mastering C++ ByK.R.Venugopal, TMH
5. Object Oriented Programming in C++ By Robert Lafore, Pearson
6. Object Oriented Design & Modelling, Rambaugh, Pearson

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Syllabus Deployment

Name of Faculty: Mr. Sunil Choudhary Subject Code: 3CS11A
Subject Name: Unix Shell Programming Lab SEM: III
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 10

COURSE OUTCOMES

At the end of this course students will be able to:

1. Develop an ability to design the Unix Operating System and the working of the built in commands available in Unix.
2. Develop an ability to write Shell script and the different usage of the commands in shell.
3. Apply the knowledge of writing shell script and Unix commands to create shell programs and applications for Linux operating system.

Lab No.	Practical
1	Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.
2	Commands related to inode, I/O redirection and piping, process control commands, mails.
3	Shell Programming: Shell script exercises based on following (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then-else-fi, nested if-else (v) Logical operators (vi) else + if equals elif, case structure (vii) while, until, for loops, use of break (viii) Metacharacters (ix) System administration: disk management and daily administration
4	Write a shell script to create a file in $USER /class/batch directory. Follow the instructions (i) Input a page profile to yourself, copy it into other existing file; (ii) Start printing file at certain line (iii) Print all the difference between two file, copy the two files at $USER/CSC/2007 directory. (iv) Print lines matching certain word pattern.
5	Write shell script for- (i) Showing the count of users logged in, (ii) Printing Column list of files in your home directory (iii) Listing your job with below normal priority (iv) Continue running your job after logging out
6	Write a shell script to change data format .Show the time taken in execution of this script
7	Write a shell script to print files names in a directory showing date of creation & serial number of the file.
8	Write a shell script to count lines, words and characters in its input(do not use wc).
9	Write a shell script to print end of a Glossary file in reverse order using Array. (Use

	awk tail)
10	Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.

TEXT/REFERENCE BOOKS

1. D. S. W. Tansley , Linux and UNIX Shell Programming, Addison-Wesly.
2. Sriranga Veeraraghavan, Sams Teach Yourself Shell Programming in 24 Hours, Sams.

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Syllabus Deployment

Name of Faculty: Mr. Yogendra Singh Solanki — Subject Code: 4CS1A
Subject Name: Microprocessor & Interfaces — Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 42

COURSE OUTCOMES

At the end of this course students will be able to:

- Students are able to list and specify the various features of microprocessor, memory and I/O devices including concepts of system bus and able to Identify the various elements of 8085 microprocessor architecture, its bus organization including control signals.
- Students are able to describe the 8085 processor addressing modes, instruction classification and function of each instruction and write the assembly language programs using 8085 instructions.
- Students are able to generate time delay in program and able to apply the concept of stack, Subroutine and Interrupt in assembly Language programming.
- Students are able to explain the concepts of memory and I/O interfacing with 8085 processor with Programmable devices.
- Students are able to understand the application of microprocessor in digital system.

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION:** Objective, scope and outcome of the course
2	**2**	**INTRODUCTION TO MICROPROCESSORS, MICROCONTROLLER.**
3	2	8085 Microprocessor Architecture
4	2	8085 Microprocessor Architecture
5	2	pin description
6	2	Bus concept and organization;
7	2	Concept of multiplexing and de-multiplexing of buses
8	2	Concept of static and dynamic RAM, type of ROM, memory map.
9	**3**	**SOFTWARE ARCHITECTURE REGISTERS AND SIGNALS**
10	3	Classification of instruction
11	3	Instruction set
12	3	Instruction set
13	3	Instruction set
14	3	addressing modes
15	3	Assembly Language Programming and Debugging, Programming Technique
16	3	Instruction Format and timing.
17	3	Instruction Format and timing.
18	**4**	**ADVANCE ASSEMBLY LANGUAGE PROGRAMMING**
19	4	Counter and time delay
20	4	types of Interrupt and their uses,
21	4	RST instructions and their uses
22	4	8259 programmable interrupt controller
23	4	8259 programmable interrupt controller
24	4	Macros, subroutine; Stack implementation and uses with examples

25	4	Memory interfacing
26	**5**	**8085 MICROPROCESSOR INTERFACING**
27	5	8255 Programmable Peripheral Interface
28	5	8255 Programmable Peripheral Interface
29	5	8254 programmable interval timer
30	5	8254 programmable interval timer
31	5	8254 programmable interval timer
32	5	Interfacing of Input/output device
33	5	8279 Key board/Display interface
34	5	8279 Key board/Display interface
35	**6**	**MICROPROCESSOR APPLICATION**
36	6	Interfacing scanned multiplexed display
37	6	Interfacing liquid crystal display
38	6	Interfacing and Matrix Keyboard,
39	6	USART 8251
40	6	USART 8251
41	6	RS232C and RS422A
42	6	Parallel interface Centronics and IEEE 488.

TEXT/REFERENCE BOOKS

1. Microprocessor Architecture, Programming & Applications, R. Gaonkar, Wiely Eastern Ltd.
2. Microprocessor & Interfacing, D. V. Hall, McGraw Hill.
3. Introduction to Microprocessors, P. Mathur, McGraw Hill Education.

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Syllabus Deployment

Name of Faculty: Dr. Payal Jain
Subject Code: 4CS2A
Subject Name: Discrete Mathematical Structures
Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 45

COURSE OUTCOMES

At the end of this course students will be able to:

- Fundamental concepts of mathematics: definitions, proofs, sets, functions.
- To understand partial orders, relations, Boolean algebra
- Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
- Demonstrate different traversal methods for trees and graphs
- Write an argument using logical notation and determine if the argument is or is not valid.

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION**: Computer Architecture
2	1	Objective, scope and outcome of the course.
3	**2**	**SET THEORY**
4	2	Set Theory continued
5	2	Introduction to relations
6	2	Equivalence relation
7	2	Functions
8	2	Functions continued
9	2	Methods of proof
10	2	Mathematical induction
11	**3**	**INTRODUCTION TO PROPOSITION**
12	3	Algebra of proposition
13	3	Tautology and contradiction
14	3	Logical equivalence
15	3	Normal forms
16	3	Universal and existential quantifiers
17	3	Finite state machine
18	3	Finite state machine continued
19	4	**POSETS**
20	4	Hasse diagram
21	4	Lattices
22	4	Permutation
23	4	Combinations

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24	**4**	**RECURRENCE RELATION**
25	4	Total solutions of recurrence relation
26	4	Generating functions
27	4	Solution by method of generating function
28	5	Introduction to algebraic structures
29	5	Properties of group
30	5	Subgroup and its properties
31	**5**	**CYCLIC GROUP**
32	5	Cosets and factor group
33	5	Permutation group
34	5	Normal subgroup
35	5	homomorphism and isomorphism
36	5	Rings and fields
37	**6**	**INTRODUCTION TO GRAPHS**
38	6	Graphs continued
39	6	P lanar graphs
40	6	Path,cycles and connected graph
41	6	Shortest path in graph
42	6	Isomorphic graphs
43	6	Eulers graph
44	6	Hamiltonian graph
45	6	Chromatic number

TEXT/REFERENCE BOOKS

1. Discrete Mathematics "Schaum's Outline " Macgraw Hills
2. Discrete Mathematics by Gokhroo

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Syllabus Deployment

Name of Faculty: Dr. Kirti Khurdia — Subject Code: 4CS3A
Subject Name: Statistics and Probability Theory — Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Students are understanding to apply concepts of probability and distributions to different problems
- Students are able to apply different probability distribution to identify and solve real life problem.
- Students are able to analyzing the pair of variable are related or not, and predict the future value by using the regression equations.
- Student use the queuing models to developing better management system and providing good services or results in their future life journey
- Students will be able to solve problems and model situations using techniques of Markov process, queuing theory.

Lecture No.	Unit	Topic
1		**INTRODUCTION**: Course Walkthrough on topics & scope.
2	**1**	Introduction & Discrete random variables, and Sample space
3	1	Events, algebra of events & Bernoulli's trials
4	1	Probability & Bayes' theorem
T 1	1	Tutorial Class on Probability & Bayes' Theorem
5	1	Random variable & their event space, probability generating function,
6	1	Expectations, moments & computations of mean time to failure
7-8	1	Bernoulli & Poisson processes.
T 2	1	Tutorial Class on 2 subtopics above
9	**2**	**DISCRETE/CONTINUOUS DISTRIBUTIONS & PROBAB. DIST./DENSITIES**
10-11	2	Binomial, Poisson & normal distribution
T 3	2	Tutorial Class on 2 subtopics above
12	2	Rectangular and exponential distribution & their PDF's
13-14	3	Moments and MGF's for above distributions.
T 4	2	Tutorial Class on 2 subtopics above
15	**3**	**INTRODUCTION TO CORRELATION & REGRESSION.**
16	3	Correlation & regression
T 5	3	Tutorial Class on subtopic above
17	3	Linear regression
18	3	Rank correlation & Method of least squares
T 6	3	Tutorial Class on 2 subtopics above
19	3	Fitting of straight lines & second degree parabola
20-21	3	Linear regression and correlation analysis
T 7	3	Tutorial Class on 2 subtopics above
22	**4**	**INTRODUCTION TO QUEUING THEORY**
23	4	Pure birth, pure death and birth-death processes
24	4	Introduction to Mathematical models for M/M/1, M/M/N, M/M/S & M/M/S/N queues.
T 8	4	Tutorial Class on 2 subtopics above
25-26	4	Mathematical models for M/M/1, M/M/N, M/M/S & M/M/S/N queues

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T 9	4	Tutorial Class on 2 subtopics above
27-28	**5**	**INTRODUCTION TO DISCRETE PARAMETER MARKOV CHAINS**
29-30	5	M/G/1 Queuing model, Discrete parameter birth-death process.
T 10	5	Tutorial Class on 2 subtopics above
31-32	1-5	Revision Classes

TEXT/REFERENCE BOOKS

1. Statistics & Probability Theory by Schaum's, TMH
2. Statistics & Probability Theory by Jain and Rawat, CBC
3. Fundamentals of Mathematical Statistics by SC Gupta and VK Kapoor, Sultanchand & Sons

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Syllabus Deployment

Name of Faculty: Ms. Kiran Acharya
Subject Code: 4CS4A
Subject Name: Software Engineering
Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able understand the basics of System development life cycle along with modeling the architecture to design a complete system.
- Apply new software models, techniques and technologies to bring out innovative and novelistic soluti for the growth of the society in all aspects and evolving into their continuous professional developmen
- Students will be able to specify requirements, controlling and behavioural modeling for designing soft applications.
- Deliver quality software products by possessing the leadership skills as an individual or contributing to the team development and demonstrating effective and modern working strategies by applying both communication and negotiation management skill.
- Students will be able to distinguish between conventional and object oriented data modeling and develop static and dynamic data models using software tool (Star UML).

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION TO SOFTWARE ENGINEERING**
2-3	1	Software life-cycle models
4-5	1	Software requirements specification
6-7	1	Verification and validation.
8	**2**	**INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT**
9	2	Software Project Management: Objectives & Resources.
10-11	2	Resources & size estimation (LOC and FP estimation).
12	2	Effort estimation
13-14	2	COCOMO estimation model
15	2	Risk analysis
16	2	Software project scheduling.
17	**3**	**INTRODUCTION TO REQUIREMENT ANALYSIS**
18-19	3	Requirement analysis tasks & Analysis principles
20-21	3	Software prototyping and specification data dictionary

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22	3	Finite State Machine (FSM) models.
23	3	Structured Analysis: Data and control flow diagrams
24	3	Control and process specification behavioral modeling
25	**4**	**INTRODUCTION** TO SOFTWARE DESIGN & ITS IMPORTANCE
26-27	4	Design fundamentals
28-29	4	Effective modular design: Data architectural and procedural design
30-31	4	Design documentation
32	**5**	**INTRODUCTION TO OBJECT ORIENTED ANALYSIS**
33	5	Object oriented Analysis Modeling
34-35	5	Object oriented Analysis Modeling & Data modeling
36-37	5	Object Oriented Design: OOD concepts
38	5	Class and object relationships & object modularization
39	5	Object modularization & Introduction to Unified Modeling Language
40	1-5	Summing-Up

TEXT/REFERENCE BOOKS

1. Software Engineering By Roger S. Pressman, TMH
2. Software Engineering Fundamental By Ali Behforooz, Frederick J Hudson, Oxford University Press
3. Software Engineering By Ian Sommerville
4. Software Engineering Concepts By Richard E. Fairley (Mcgraw-Hill)

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Syllabus Deployment

Name of Faculty: Mr. Nitin Kothari
Subject Code: 4CS5A
Subject Name: Principles of Communication
Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Analyze different type of analog modulation techniques.
- Explain various Pulse modulation techniques.
- Analyze different type of digital modulation techniques.
- Interpret line coding and pulse shaping techniques.
- Illustrate various spread-spectrum techniques.

Lecture No.	Unit	Topic
1	1	**ANALOG MODULATION:** Concept of frequency translation.
2	1	Amplitude Modulation: Description of full AM
3	1	DSBSC, SSB and VSB in time and frequency domains
4	1	AM methods of generation & demodulation
5	1	frequency division multiplexing (FDM).
6	1	Angle Modulation: Phase and frequency modulation.
7	1	Descriptions of FM signal in time and frequency domains
8	1	FM methods of generation & demodulation
9	1	pre- emphasis & deemphasis
10	1	PLL
11	1	Numerical
12	2	**PULSE ANALOG MODULATION:** Ideal sampling, Sampling theorem
13	2	aliasing, interpolation
14	2	natural and flat top sampling in time and frequency domains.
15	2	Introduction to PAM, PWM, PPM modulation schemes.
16	2	Time division multiplexing (TDM)
17	2	Numerical
18	3	**PCM & DELTA MODULATION SYSTEMS:** Uniform and Non-uniform quantization.
19	3	PCM and delta modulation
20	3	Signal to quantization noise ratio in PCM
21	3	delta modulation.
22	3	DPCM, ADM
23	3	T1 Carrier System
24	3	Matched filter detection.
25	3	Error probability in PCM system and Numerical

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26	4	**DIGITAL MODULATION:** Baseband transmission: Line coding (RZ, NRZ), inter symbol interference (ISI), pulse shaping,
27	4	Nyquist criterion for distortion free base band transmission, raised cosine spectrum.
28	4	Pass band transmission: Geometric interpretation of signals, orthogonalization.
29	4	ASK, PSK,
31	4	FSK, QPSK
34	4	MSK modulation techniques, coherent detection and calculation of error probabilities and Numerical
35	5	**SPREAD-SPECTRUM MODULATION:** Introduction, Pseudo-Noise sequences
36	5	direct- sequence spread spectrum (DSSS) with coherent BPSK
37	5	processing gain, probability of error
38	5	frequency-hop spread spectrum (FHSS).
39	5	Application of spread spectrum: CDMA.
40	5	Numerical

TEXT/REFERENCE BOOKS

1. An Introduction to Analog and Digital Communications, Simon S. Haykin, Wiley India Edition
2. Communication Systems (Analog and Digital), Sanjay Sharma, S. K. Kataria & Sons
3. Wireless Communications: Principles and Practice, Theodore S Rappaport, Pearson

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Syllabus Deployment

Name of Faculty: Mr. Sunil Choudhary — Subject Code: 4CS6A
Subject Name: Principles of Programming Languages — Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 28

COURSE OUTCOMES

At the end of this course students will be able to:

- To provide an overview of different programming paradigms
- Improve the background for choosing appropriate programming languages for certain classes of programming problems
- Be able to differentiate programming language among in an imperative (or procedural), an object oriented, a functional, or logical programming language
- Analyzing the significance of an implementation of a programming language in a compiler or interpreter
- Increase the ability to learn new programming languages

Lecture No.	Unit	Topic
1	1	**PROGRAMMING LANGUAGE**: Definition, History, Features
2	1	Issues in Language Design: Structure and Operation of computer
3	1	Programming Paradigms. Efficiency, Regularity
4	1	Issues in Language Translation: Syntax and Semantics.
5	**2**	**SPECIFICATIONS& IMPLEMENTATION OF ELEMENTARY &STRUCTURED DATA TYPES**
6	2	Type equivalence, checking and conversion
7	2	Vectors and Arrays,
8	2	Lists, Structures
9	2	Sets, Files
10	**3**	**SEQUENCE CONTROL WITH EXPRESSION**
11	3	Conditional Statements
12	3	Loops
13	3	Subprogram definition and activation
14	3	Exception handling
15	3	simple and recursive subprogram,
16	3	subprogram environment.
17	4	**SCOPE – STATIC AND DYNAMIC**
18	4	Block structures,
19	4	Local Data and Shared Data
20	4	Parameters and Parameter Transmission
21	4	Local and Common Environments
22	4	Tasks and Shared Data
23	5	**ABSTRACT DATA TYPE**
24	5	information hiding,
25	5	encapsulation, type definition
26	5	Static and StackBased Storage management
27	5	Fixed and Variable size heap storage management

28	5	Garbage Collection.

TEXT/REFERENCE BOOKS

1. Programming languages: design and implementation, Terrence W. Pratt., Pearson
2. Programming languages: concepts and constructs, Ravi Sethi
3. Programming Language Pragmatics, Scott, ELSEVIER

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Syllabus Deployment

Name of Faculty: Mr. Yogendra Solanki — Subject Code:4CS7A
Subject Name: Microprocessor & Interfaces Lab — Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 13

COURSE OUTCOMES

At the end of this course students will be able to:

1. Write assembly language programs using instruction set of 8085 microprocessor for various applications.
2. Interface 8085 microprocessor with external peripheral boards like ADC, DC motor etc.
3. Solve the real world control problem with 8085 microprocessor

Lab No.	Practical
1.	Add the contents of memory locations XX00 &XX01 & place the result in memory location XX02.
2.	Add the 16 bit numbers stored in memory location & store the result in another memory location.
3.	Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.
4.	Write a program to swap two blocks of data stored in memory.
5.	Write a program to find the square of a number.
6.	Write a main program and a conversion subroutine to convert Binary to its equivalent BCD.
7.	Write a program to find largest & smallest number from a given array.
8.	Write a program to Sort an array in ascending & descending order.
9.	Write a program to multiply two 8 bit numbers whose result is 16 bit.
10.	Write a program of division of two 8 bit numbers.
11.	Generate square wave from SOD pin of 8085 & observe on CRO.
12.	Write a program to perform traffic light control operation.
13.	Write a program to control the speed of a motor.

TEXT/REFERENCE BOOKS

1. Microprocessor Architecture, Programming & Applications, R. Gaonkar, Wiely Eastern Ltd.

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Syllabus Deployment

Name of Faculty: Mr. Nitin Kothari — Subject Code:4CS8A
Subject Name: Communication Lab — Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 11

COURSE OUTCOMES

At the end of this course students will be able to:

1. To understand basic elements of communication system
2. Use of different modulation and demodulation techniques used in analog communication
3. Compare and contrast design issues, advantages, disadvantages and limitations of communication systems

Lab No.	Practical
1	Harmonic analysis of a square wave of modulated waveform Observe the amplitude modulated waveform and measures modulation index. Demodulation of the AM signal
2	To modulate a high frequency carrier with sinusoidal signal to obtain FM signal. Demodulation of the FM signal
3	To observe the following in a transmission line demonstrator kit : i. The propagation of pulse in non-reflecting Transmission line. ii. The effect of losses in Transmission line. iii. The resonance characteristics of al half wavelength long x-mission line.
4	To study and observe the operation of a super heterodyne receiver
5	To modulate a pulse carrier with sinusoidal signal to obtain PWM signal and demodulate it.
6	To modulate a pulse carrier with sinusoidal signal to obtain PPM signal and demodulate it
7	To observe pulse amplitude modulated waveform and its demodulation.
8	To observe the operation of a PCM encoder and decoder. To consider reason for using digital signal x-missions of analog signals.
9	Produce ASK signals, with and without carrier suppression. Examine the different processes required for demodulation in the two cases
10	To observe the FSK wave forms and demodulate the FSK signals based on the properties of (a) tuned circuits (b) on PI.L
11	To study & observe the amplitude response of automatic gain controller (AGC).

TEXT/REFERENCE BOOKS

1. An Introduction to Analog and Digital Communications, Simon S. Haykin,Wiley India Edition
2. Communication Systems (Analog and Digital), Sanjay Sharma, S. K. Kataria & Sons
3. Wireless Communications: Principles and Practice, Theodore S Rappaport, Pearson

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Syllabus Deployment

Name of Faculty: Mr. Pankaj Ameta — Subject Code:4CS9A
Subject Name: Computer Aided Software Engineering Lab — Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 12

COURSE OUTCOMES

At the end of this course students will be able to:

1. To design and implement software solutions using different tools and techniques.
2. To gain knowledge of technologies used for implementing software projects.
3. To learn working in team and develop projects under tight deadline.

S. No.	Practical	Software Recommended:
1	Course Registration System	Case Tools: Rational Suite, Win runner, Empirix Languages: C/C++/JDK, JSDK, INTERNET EXPLORER UML Front End: VB, VC++, Developer 2000, .NET Back End: Oracle, MS – Access, SQL Note: Open Source tools will be preferred.
2	Quiz System	
3	Online ticket reservation system	
4	Remote computer monitoring	
5	Students marks analyzing system	
6	Expert system to prescribe the medicines for the given symptoms	
7	Platform assignment system for the trains in a railway station	
8	Stock maintenance	
9	Student Marks Analyzing System	
10	Online Ticket Reservation System	
11	Payroll System	
12	Export System	

TEXT/REFERENCE BOOKS

1. Software Engineering By Roger S. Pressman, TMH

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Syllabus Deployment

Name of Faculty: Mr. Pankaj Ameta Subject Code:4CS10A
Subject Name: Business Entrepreneurship Development Semester: IV
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 5

COURSE OUTCOMES

At the end of this course students will be able to:

1. Have the ability to discern distinct entrepreneurial traits
2. Know the parameters to assess opportunities and constraints for new business ideas
3. Understand the systematic process to select and screen a business idea, design strategies for successful implementation of ideas
4. write a business plan

Lab No.	Practical
1	Introduction to Entrepreneurship- Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2	Entrepreneurial competencies, Leadership, Decision making, Motivation, Risk taking.
3	Business Enterprise Planning- Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4	Intellectual Property rights, Patents, Taxation- Central excise & Sales tax, VAT.
5	Government Policies for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

TEXT/REFERENCE BOOKS

1. Essentials of Entrepreneurship and Small Business management (5/ed.): Thomas W. Zimmerer, and Norman M. Scarborough. PHI
2. Entrepreneurship: Strategies and Resources, 3/E -: Marc Dollinger; Prentice Hall
3. Bringing New Technology to Market- Kathleen R. Allen, Prentice Hall
4. Entrepreneurship in Action, 2/E - Mary Coulter; Prentice Hall

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Syllabus Deployment

Name of Faculty: Mr. Sandeep Upadhyay
Subject Code: 5CS1A
Subject Name: Computer Architecture
Semester: V
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 44

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to understand basic structure of computer.
- Students will be able to understand control unit operations, will able to conceptualize instruction level parallelism.
- Students will able to perform computer arithmetic operations
- Students will be able to design memory organization that uses banks for different word size operations understand the concept of cache mapping techniques.
- Students will be able to understand the concept of I/O organization

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION:** Objective, scope and outcome of the course.
2	**1**	COMPUTER DATA REPRESENTATION
3	1	Basic computer data types,Complements, Fixed point representation
4	1	Register Transfer and Micro-operations: Floating point representation, Register Transfer language
5	1	Register Transfer, Bus and Memory Transfers
6	1	Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logical shift unit
7	1	Basic Computer Organization and Design Instruction codes
8	1	Computer registers, computer instructions, Timing and Control, Instruction cycle
9	1	Memory-Reference Instructions, Input-output and interrupt
10	1	Complete computer description
11	1	Design of Basic computer, design of Accumulator Unit
12	**1**	**PROGRAMMING THE BASIC COMPUTER**
13	1	Machine Language, Assembly Language, assembler, Program
14	1	Loops, Programming Arithmetic and logic operations
15	1	subroutines
16	1	I-O Programming
17	1	Micro programmed Control: Control Memory, Address sequencing
18	1	Micro program Example, design of control Unit
19	**2**	**CENTRAL PROCESSING UNIT**
20	2	General Register Organization, Stack Organization, Instruction format
21	2	Addressing Modes, data transfer and manipulation
22	2	Program Control, Reduced Instruction Set Computer (RISC)Pipeline
23	2	Vector Processing, Flynn's taxonomy
24	2	Parallel Processing, Pipelining

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25	2	Arithmetic Pipeline, Instruction Pipeline
26	2	RISC Pipeline
27	2	Vector Processing, Array Processors
28	**3**	**COMPUTER ARITHMETIC**
29	3	Addition and subtraction, Multiplication Algorithms , Division Algorithms
30	3	Floating Point Arithmetic operations, Decimal Arithmetic Unit
31	**4**	**MEMORY ORGANIZATION**
32	4	Memory Hierarchy
33	4	Main Memory, Auxiliary Memory
34	4	Associative Memory, Cache Memory
35	4	Virtual Memory
36	4	Characteristics of Multiprocessors
37	4	Interconnection Structures, Inter-processor Arbitration
38	4	Interprocessor Communication and Synchronization
39	4	Cache Coherence
40	4	Shared Memory Multiprocessors
41	5	Input-Output Organization
42	5	Input-Output Interface, Asynchronous Data Transfer
43	5	Modes Of Transfer, Priority Interrupt
44	5	DMA, Input-Output Processor

TEXT/REFERENCE BOOKS

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)
2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)
3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)

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Syllabus Deployment

Name of Faculty: Mr. Yogendra Singh Solanki — Subject Code: 5CS2A
Subject Name: Digital Logic Design — Semester: V
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 38

COURSE OUTCOMES

At the end of this course students will be able to:

- Understand and describe the basics of Hardware Description Languages and their use in digital logic design.
- Develop the VHDL coding for combinational logic and Sequential circuits
- Explain the synchronous Sequential logic circuits, draw the block diagram of Shift Registers
- Design of asynchronous sequential circuits
- Describe the operation of Programmable Logic Devices

Lecture No.	Unit	Topic
1	**1**	**Hardware Description Languages and their use in digital logic design.**
2	1	VHDL: Modelling Concepts, Lexical Elements & Syntax Descriptions
3	1	VHDL: Scalar Data types & Operations,
4	1	VHDL: Sequential Statements
5	1	VHDL: Composite Data Types & Operations
6	1	Basic Modelling Constructs
7	1	Case Study: VHDL Simulation of Ripple Carry, & Look Ahead carry Adders
8	**2**	**VHDL: Subprograms**
9	2	Packages & Use Clauses
10	2	Aliases, Resolved Signals
11	2	Components & Configurations
12	2	Generate Statements, Concurrent Statements
13	2	Use of VHDL in simulation and synthesis
14	**3**	**Clocked Sequential circuits.** Design steps for synchronous sequential circuits.
15	3	Design of a sequence detector
16 .	3	Moore and Mealy Machines.
17	3	Design using JK flip-flops and D flip-flops
18	3	State reduction, State assignment
19	3	Algorithmic State Charts, converting ASM charts to hardware
20	3	one-hot state assignment
21	3	Considerations of clock skew, set-up time, hold-time and other flip-flop parameters, timing constraints
22	3	Programmable Logic Devices. Read-only memory.
23	3	Boolean function implementation through ROM. PLD, PGA, PLA, PAL, FPGA
24	**4**	**Event-driven Circuits**. Design procedure for asynchronous circuits
25	4	stable and unstable states, races, race-free assignments
26	4	State reduction of incompletely specified machines
27	4	Compatibility and state reduction procedure
28	4	Hazards in combinational networks
29	4	Dynamic hazards, Function Hazards
30	4	Essential Hazards. Eliminating hazards

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31	**5**	**Field Programmable Gate Arrays**: Introduction, Logic Elements &programmability
32	5	Interconnect structures & programmability
33	5	Extended Logic Elements, SRAM.
34	5	Flash Memory & Antifuse Configuration
35	5	Case Studies of Altera Stratix
36	5	Case Studies of Xilinx Virtex-II pro
37	5	Technology Mapping for FPGA
38	5	Logic Synthesis, Lookup Table Technology Mapping

TEXT/REFERENCE BOOKS

4. Digital Logic Design, B. Holdsworth.
5. Digital Logic and Computer Design, M. Morris Mano, Pearson.
6. Fundamentals of Digital Logic with VHDL Design, Stephen D. Brown, Zvonko G. Vranesic, McGraw Hill.

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Syllabus Deployment

Name of Faculty: Ms. Juhi Gupta — Subject Code: 5CS3A
Subject Name: Telecommunication Fundamentals — Semester: V
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Analyze different transmission terminologies, transmission mediums, line coding schemes, network models and flow control techniques.
- Apply different error detection and correction techniques in data transmission.
- Acquire knowledge about different wireless standard and switching mechanisms in data link layer.
- Explain the different multiplexing & multiple access techniques.
- Ability to design different spread spectrum techniques.

Lecture No.	Unit	Topic
1	**1**	Data Transmission: Terminology, Frequency, spectrum, bandwidth
2	1	Analog and digital transmission, Transmission impairments
3	1	Channel capacity, Transmission Media.
4	1	Wireless Transmission: Antenna and antenna gain
5	1	Network Reference Models (OSI/ISO and TCP/IP) Physical Layer: Line Encoding Schemes. Concept of bit period
6	1	Effect of clock skew, Synchronous and Asynchronous communication.
7	1	Data Link Layer: Functions of data link layer and design issues
8	1	Flow Control: Flow control in loss less and lossy channels using
9	1	Stop-and-wait, sliding window protocols. Performance of protocols used for flow control
10	**2**	Error Control Coding: Error Detection, Two Dimensional Parity Checks, and Internet Checksum
11	2	Polynomial Codes, Standardized polynomial codes, error detecting capability of a polynomial codes
12	2	Linear codes, performance of linear codes, error detection & correction using linear codes
13	2	Data Link Control: HDLC & PPP including frame structures
14	2	MAC sublayer: Channel Allocation Problem
15	2	Pure and slotted Aloha, CSMA, CSMA/CD, collision free multiple access
16	2	Throughput analysis of pure and slotted Aloha
17	2	Ethernet Performance
18	3	Wireless LAN: Hidden node and Exposed node Problems
19	3	RTS/CTS based protocol, 802.11 Architecture
20	3	Protocol stack, Physical layer, MAC Sublayer
21	3	Bluetooth Architecture and Protocol Stack
22	3	Data Link Layer Switching: Bridges (Transparent, Learning and Spanning Tree), Virtual LANs
23	**4**	Multiplexing: Frequency division, time division (Synchronous and statistical)multiplexing. ADSL, DS1 and DS3 carriers

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24	4	Multiplexing: Frequency division, time division (Synchronous and statistical)multiplexing. ADSL, DS1 and DS3 carriers
25	4	Multiple Accesses: TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency
26	4	Multiple Accesses: TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency
27	4	TDMA Superframe structure, Frame acquisition and synchronization, Slip rate in digital terrestrial networks
28	4	TDMA Superframe structure, Frame acquisition and synchronization, Slip rate in digital terrestrial networks
29	4	Switching: Qualitative description of Space division, time division and space-time space division switching.
30	4	Switching: Qualitative description of Space division, time division and space-time space division switching.
31	**5**	Spread Spectrum Techniques: Direct sequence(DSSS) & frequency hopping(FHSS)
32	5	Spread Spectrum Techniques: Direct sequence(DSSS) & frequency hopping(FHSS)
33	5	Performance consideration in DSSS & FHSS
34	5	Performance consideration in DSSS & FHSS
35	5	Code division Multiple access (CDMA): frequency & channel specifications
36	5	Code division Multiple access (CDMA): frequency & channel specifications
37	5	Forward & reverse CDMA channel, pseudo noise(PN) sequences, m-sequenc
38	5	Gold sequence, orthogonal code, gold sequences
39	5	Gold sequence, orthogonal code, gold sequences
40	5	IMT-2000, WCDM

TEXT/REFERENCE BOOKS

1. Data and computer communication, Stallings,8th ed. Pearson.
2. Digital Satellite Communications, Tri.T.Ha, 2/e, Tata McGraw Hill.
3. COMMUNICATION NETWORKS, Alberto Leon-Garcia, Indra Widjaja, 2nd ed., TMH

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Syllabus Deployment

Name of Faculty: Ms. Kiran Acharya
Subject Code: 5CS4A
Subject Name: Database Management System
SEM: V
Department: Department of Computer Science Engineering
Total No. of Lectures Planned: 48

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will have a broad understanding of database concepts and database management system software and also have a high-level understanding of major DBMS components and their function.
- Students will be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
- Students will be familiar with the relational database theory, and be able to write relational algebra expressions for queries.
- Students will be able to Identify Structure Query Language statements used in creation and manipulati of Database. Students will be able to write SQL commands in a relational DBMS.
- Students will be able to understand the concept of database normalization and students can construct normalized databases for various applications.

Lecture No.	Unit	Topic
1	1	Introduction: Objective, scope and outcome of the course
2	2	Overview and History of DBMS. File System v/s DBMS
3	2	Advantage of DBMS Describing and Storing Data in a DBMS
4	2	Queries in DBMS and Structure of a DBMS
5	2	Overview of Data Design Entities, Attributes and Entity Sets
6	2	Relationship and Relationship Sets
7	2	Key Constraints, Participation Constraints, Weak Entities
8	2	Design ER Model - Entity v/s Attribute, Entity vs Relationship
9	2	Design ER Model - Binary vs Ternary Relationship and Aggregation v/s ternary
10	2	Relationship Conceptual Design for a Large Enterprise
11	2	Class Hierarchies, Aggregation, Conceptual Data Base
12	2	Introduction of Relationship Algebra Selection and Projection
13	2	Set Operations in Relation Algebra, Renaming, Division, Relation Calculus
14	2	Expressive Power of Algebra and Calculus
15	2	Introduction of SQL Query and form of SQL query
16	2	Union, and Intersection and Except Operation in SQL
17	2	Nested Queries, Correlated Nested Queries
18	2	Set-Comparison Operations, Aggregate Operators, Null Values
19	2	Joins in relational algebra and SQL

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20	2	Example of JOINS
21	2	Embedded SQL, Dynamic SQL, ODBC and JDBC
22	2	Triggers and Active Databases
23	**3**	Introductions to Schema Refinement, Functional Dependencies
24	3	Example of Functional Dependency
25	3	Types of Normal Form 1NF, 2NF
26	3	3NF, BCNF
27	3	4NF and 5 NF, Decomposition into BCNF Decomposition into 3-NF
28	3	Practice of Normal Form
29	3	Practice of Normal Form
30	**4**	Transaction introduction and Property of Transaction, Transaction State
31	4	Serializability, Types of serializability
32	4	Conflict serializability and its example
33	4	View serializability and its example
34	4	Conflict Equivalent
35	4	View Equivalent
36	4	Recoverable Schedules, Cascadeless Schedules
37	**6**	Concurrency Introduction, Lock-based protocols
38	5	Timestamp-based protocols, Validation-based protocols
39	5	Deadlock handling, Condition of Deadlock
40	5	Example of Deadlock handling
41	5	Database failure introduction, Introduction of Recovery Schemes
42	5	Shadow Paging and Log-based Recovery
43	5	Recovery with Concurrent transactions.
44	5	SQL Query
45	5	SQL Query
46		Example of important topics of DBMS
47		Example of important topics of DBMS
48		Example of important topics of DBMS

TEXT/REFERENCE BOOKS

1. H.f. Korth and Silberschatz: Database Systems Concepts, McGraw Hill
2. Almasri and S.B. Navathe: Fundamentals of Database Systems,
3. C.J. Date: Data Base Design, Addison Wesley
4. Hansen and Hansen : DBM and Design, PHI

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Syllabus Deployment

Name of Faculty: Mr. Gaurav Kumawat
Subject Code: 5CS5A
Subject Name: Operating Systems
Semester: V
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 36

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to understand operating system and process concept.
- Students will be able to analyze Scheduling algorithms and formulate solutions for critical section problem
- Students will be able to describe deadlock, Methods for handling deadlocks and memory management strategies
- Students will be able to gain the knowledge of virtual memory
- Students will be able to understand various file and disk management strategies.

Lecture No.	Unit	Topic
1.	1	**Introduction to OS**
2.	2	History of Operating systems:
3.	2	Structure and operations;
4.	2	processes and files
5.	2	Processor management
6.	2	inter process communication
7.	2	mutual exclusion
8.	2	Semaphores
9.	2	wait and signal procedures,
10.	2	process scheduling
11.	2	process scheduling and algorithms,
12.	2	critical section
13.	2	threads, multithreading
14.	3	Memory management: contiguous memory allocation
15.	3	virtual memory
16.	3	Paging
17.	3	page table structure,
18.	3	demand paging
19.	3	page replacement policies
20.	3	thrashing,
21.	3	Segmentation
22.	4	Deadlock: Shared resources
23.	4	resource allocation and scheduling
24.	4	resource graph models
25.	4	deadlock detection
26.	4	deadlock avoidance

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27.	4	deadlock prevention algorithms
28.	4	Device management: devices and their characteristics
29.	4	device drivers
30.	4	device handling
31.	4	disk scheduling algorithms and policies
32.	5	File management: file concept, types and structures
33.	5	directory structure
34.	5	access methods and matrices
35.	5	file security
36.	5	user authentication

TEXT/REFERENCE BOOKS

1. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall.
4. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.

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Syllabus Deployment

Name of Faculty: Ms. Harshita Shreemali
Subject Code: 5CS6.1A
Subject Name: Advance Data Structure
Semester: V
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 35

COURSE OUTCOMES

At the end of this course students will be able to:

1. Ability to understand types of Balanced Trees and their operations.
2. Ability to understand concepts and operations of Heaps.
3. Ability to understand graph terminology and its various algorithms to solve engineering problems.
4. Ability to understand parallel processing using sorter and merger networks.
5. Ability to understand mathematical theorems used in data structures

Lecture No.	Unit	Topic
1	**1**	**ADVANCED TREES**
2	**1**	Definitions, Operations on Weight Balanced Trees
3	1	2-3 Trees
4	1	Red- Black Trees
5	1	Dynamic Order Statistics
6	1	Interval Tree; Dictionaries
7	**2**	**MERGEABLE HEAPS**
8	2	Mergeable Heap Operations
9	2	Binomial Trees
10	2	Implementing Binomial Heaps and its Operations
11	2	2-3-4. Trees and 2-3-4 Heaps
12	2	Amortization analysis and Potential Function of Fibonacci Heap
13	2	Implementing Fibonacci Heap
14	**3**	**GRAPH THEORY DEFINITIONS**
15	4	Definitions of Isomorphic Components
16	4	Circuits, Fundamental Circuits, Cut-sets
17	4	Cut- Vertices Planer and Dual graphs
18	4	Spanning Trees, Kuratovski's two Graphs
19	**3**	**GRAPH THEORY ALGORITHMS**
20	3	Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph,
21	3	Breadth First and Depth First Search
22	3	Topological Sort, Strongly Connected Components and Articulation Point
23	3	Single Min-Cut Max-Flow theorem of Network Flows
24	3	Ford-Fulkerson Max Flow Algorithms
25	**4**	**SORTING NETWORK**
26	4	Comparison network, zero-one principle
27	4	Bitonic sorting and merging network sorter
28	4	Priority Queues and Concatenable Queues using 2-3 Trees
29	4	Operations on Disjoint sets and its union-find problem, Implementing Sets
30	**5**	NUMBER THEORITIC ALGORITHM
31	5	Number theoretic notions, Division theorem,
32	5	GCD, recursion, Modular arithmetic

33	5	Solving Modular Linear equation
34	5	Chinese Remainder Theorem
35	5	Computation of Discrete Logarithms, primality Testing and Integer Factorization.

TEXT/REFERENCE BOOKS

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley
4. Brassard : Fundamental of Algorithmic, PHI.

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Syllabus Deployment

Name of Faculty: Ms. Ayushi Chaplot
Subject Code: 5CS7A
Subject Name: Database Lab
Semester: V
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 12

COURSE OUTCOMES

At the end of this course students will be able to:

1. Apply the knowledge to design efficient database system for a commercial application
2. Apply the knowledge to write efficient queries to reduce query processing time in database
3. Develop an ability to work with different databases. Such as MySQL and Oracle it also opens the opportunity for the research in the Big Data Retrieval area.

Lab No.	Practical
1.	Design a Database and create required tables. For e.g. Bank, College Database
2.	Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3.	Write a SQL statement for implementing ALTER,UPDATE and DELETE.
4.	Write the queries to implement the joins.
5.	Write the query for implementing the following functions: MAX (), MIN (), AVG () and COUNT ().
6.	Write the query to implement the concept of Integrity constrains.
7.	Write the query to create the views.
8.	Perform the queries for triggers
9.	Perform the following operation for demonstrating the insertion , updation and deletion
10.	Using the referential integrity constraints.
11.	Write the query for creating the users and their role.
12.	Project

TEXT/REFERENCE BOOKS

1. Ivan Bayross, SQL, PL/SQL, BPB Publications
2. Vikram Vaswani, MySQL The Complete Reference, McGraw Hill
3. Korth and Silberschatz: Database Systems Concepts, McGraw Hill

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Syllabus Deployment

Name of Faculty: Ms. Kiran Acharya
Subject Code: 5CS8A
Subject Name: System Design in UML Lab
Semester: V
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 8

COURSE OUTCOMES

At the end of this course students will be able to:

1. Develop an ability to understand the need of modeling the complex real world system as well as software systems
2. Develop an ability to design different UML diagrams for the software systems to reduce the complexity and for better understanding the software.
3. Develop an ability to work with latest tools and techniques to design UML diagrams like Rational Rose

Lab No.	Practical
1.	Capture a business process model.
2.	The User Interaction or Use Case Model - describes the boundary and interaction between the system and users. Corresponds in some respects to a requirements model.
3.	The Interaction or Communication Model - describes how objects in the system will interact with each other to get work done.
4.	The State or Dynamic Model - State charts describe the states or conditions that classes assume over time. Activity graphs describe the workflows the system will implement.
5.	The Logical or Class Model - describes the classes and objects that will make up the system.
6.	The Physical Component Model - describes the software (and sometimes hardware components) that make up the system.
7.	The Physical Deployment Model - describes the physical architecture and the deployment of components on that hardware architecture.
8.	prepare necessary documents using UML and implement a system like washing machine controller, air conditioner controller

TEXT/REFERENCE BOOKS

1. The Unified Modeling Language Reference Manual, James Rumbaugh
2. UML A Beginner's Guide, Jason T. Roff
3. UML IN A NUTSHELL A Desktop Quick Reference, O'REILLY

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Syllabus Deployment

Name of Faculty: Ms. Shipra Maheshwari — Subject Code: 5CS9A
Subject Name: Operating Systems Simulation Lab — Semester: V
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 12

COURSE OUTCOMES

At the end of this course students will be able to:

1. Develop an ability to understand the basic need and basic functions of operating systems.
2. Apply knowledge of the algorithms to Understand & simulate strategies used in Linux & Windows operating systems and also used for implementing the tasks performed by the operating systems.
3. It would help the graduate in their professional career to develop aptitude for carrying out research in the area of operating system.

Lab No.	Practical
1.	MOSS INTRO AND WRITE PROGRAMS USING THE FOLLOWING SYSTEM CALLS OF UNIX OPERATING SYSTEM: FORK, EXEC, GETPID, EXIT, WAIT, CLOSE
2.	WRITE C PROGRAMS TO SIMULATE UNIX COMMANDS LIKE LS, GREP, ETC.
3.	SIMULATION OF SCHEDULING ALGORITHM
4.	PROGRAM FOR FCFS AND SJF CPU SCHEDULING ALGORITHM
5.	PROGRAM FOR PRIORITY SCHEDULING
6.	SIMULATION OF DEADLOCK ALGORITHMS
7.	PROGRAM FOR DEADLOCK DETECTION (BANKERS ALGO)
8.	SIMULATION OF MEMORY MANAGEMENT
9.	PROGRAM FOR FIRST FIT ALGORITHM
10.	PROGRAM FOR FIFO PAGE REPLACEMENT ALGORITHM
11.	SIMULATION OF FILE SYSTEM
12.	C PROGRAM FOR FILE OPERATIONS

TEXT/REFERENCE BOOKS

1. Achyut S Godbole: Operating Systems, Tata McGraw Hill
2. Tanenbaum: Modern Operating System, Prentice Hall.
3. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
4. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.

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Syllabus Deployment

Name of Faculty: Ms. Juhi Gupta
Subject Code: 5CS10A
Subject Name: Digital Hardware Design Lab
Semester: V
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 15

COURSE OUTCOMES

At the end of this course students will be able to:

1. Simulate combinational and sequential circuit using VHDL code.
2. Implement FSM on FPGA Board.
3. Implement logical circuits on FPGA Board.
4. Implement Sequential circuits on FPGA Board.

Lab No.	Practical
1.	VHDL Code for Decoders
2.	VHDL Code for encoders
3.	VHDL Code for Code Converters
4.	VHDL Code for Combinational Circuits
5.	VHDL Code for Combinational Circuits
6.	VHDL Code for Flip Flops
7.	VHDL Code for Counter
8.	VHDL Code for Shift Register
9.	VHDL Code for Mealy type FSMs
10.	VHDL Code for Moore type FSMs
11.	VHDL Code for Mealy Machines
12.	VHDL Code for Moore Machines
13.	VHDL Code for VHDL Codes for FSM
14.	VHDL Code for Serial Adder
15.	VHDL Code for Vending Machine

TEXT/REFERENCE BOOKS

1. Digital Logic with VHDL Design, Brown, TMH.(2007).
2. VHDL for Engineers, Short, Pearson. (2011).
3. VHDL (Text BOOK Binding), Douglas L. Perry, TMH (2002).
4. VHDL , A design oriented Approach, S S Limaye, TMH (2008).

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Syllabus Deployment

Name of Faculty: Mr. Sandeep Upadhyay
Subject Code:6CS1A
Subject Name: Computer Networks
Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Independently understand basics about computer networks, different routing algorithms and congestio control techniques in network layer.
- Understand and explain basic taxonomy and terminology of the internetworking, sub netting, IP protocol (IPV4 and IPV6), network layer protocols and routing to mobile hosts and IP.
- Identify the different elements of transport protocols and principles of reliable data transfer.
- Enumerate the transport layer in the internet, TCP congestion control, TCP Timer management, TCP Transmission Policy.
- Get familiar with the application layer, www, DNS and P2P file sharing.

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION:** Objective, scope and outcome of the course.
2	**2**	**INTRODUCTORY CONCEPTS**
3	2	Network hardware, Network software, topologies
4	2	Protocols and standards
5	2	Physical Layer: Digital and Analog Signals, Periodic Analog Signals
6	2	Signal Transmission, Limitations of Data Rate, Digital Data Transmission
7	2	Performance Measures, Line Coding, Digital Modulation
8	2	Media and Digital Transmission System
9	**3**	**DATA LINK LAYER**
10	3	Error Detection and Correction, Types of Errors, Two dimensional parity check
11	3	Detection verses correction, Block Coding, Linear Block Coding, Cyclic Codes
12	3	Checksum, Standardized Polynomial Code
13	3	Error Correction Methods
14	3	Forward Error Correction, Protocols
15	3	Stop and wait, Go-back-N ARQ
16	3	Selective Repeat ARQ, Sliding window, Piggy backing
17	3	Pure ALOHA, Slotted ALOHA
18	3	CSMA/CD, CSMA/CA
19	**4**	**NETWORK LAYER**
20	4	Design issues
21	4	Routing algorithms
22	4	IPV4, IPV6, Address mapping
23	4	ARQ, RARQ
24	4	Congestion control

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25	4	Unicast, Multicast, Broadcast routing protocols
26	4	Quality of Service, Internetworking
27	**5**	**TRANSPORT LAYER**
28	5	Transport service
29	5	Elements of transport protocols
30	5	User Datagram Protocol
31	5	Transmission Control Protocol
32	5	Quality of service
33	5	Leaky Bucket and Token Bucket algorithm
34	**6**	**APPLICATION LAYER**
35	6	WWW
36	6	DNS
37	6	Multimedia, Electronic mail
38	6	FTP
39	6	HTTP, SMTP
40	6	Introduction to network security

TEXT/REFERENCE BOOKS

1. Tanenbaum; Computer Network, 4th Ed., Pearson.
2. Kurose; Computer Networking, 3rd Ed., Pearson.
3. Peterson, Davie; Computer Networks, 4rd Ed., ELSEVIER

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Syllabus Deployment

Name of Faculty: Mrs. Poornima Daye
Subject Code:6CS2A
Subject Name: Design and Analysis of Algorithms
Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to understand various asymptotic notations, its properties and use in measuring algorithm behaviour, learn about various sorting, greedy and divide and conquer approach.
- Students will able to apply various algorithms for different computing problems using dynamic programming and branch and bound techniques.
- Students will be able to design and evaluate algorithms using various algorithm design techniques for pattern matching algorithms.
- Students will be able to analyze randomized algorithms, Recite algorithms that employ randomization.
- Relate the concepts of NP Completeness for analyze and solving the complexity of real life problems.

Lecture No.	Unit	Topic
1	**1**	**REVIEW OF ALGORITHM COMPLEXITY, ORDER NOTATIONS**: Definitions and calculating complexity
2	1	Binary Search, Merge Sort
3	1	Quick sort
4	1	Strassen's matrix multiplication algorithms.
5	1	Knapsack Problem, Job Sequencing
6	1	Optimal Merge Patterns
7	1	Minimal Spanning Trees
8	1	Problem solving of Strassen Matrix
9	1	Problem solving of Knapsack
10	1	Problem solving of MST
11	**2**	**MATRIX CHAIN MULTIPLICATION**
12	2	Longest Common Subsequence
13	2	0/1 Knapsack Problem
14	2	Traveling Salesman Problem
15	2	Lower Bound Theory
16	2	Backtracking Algorithms
17	2	Queens problem
18	**3**	**NAÏVE AND RABIN KARP STRING MATCHING ALGORITHMS**
19	3	KMP Matcher and Boyer Moore Algorithms
20	3	KMP Matcher and Boyer Moore Algorithms
21	3	Formulation of Assignment
22	3	Formulation of Assignment
23	3	Quadratic Assignment Problem
24	3	Quadratic Assignment Problem

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25	**4**	**LAS VEGAS ALGORITHMS**
26	4	Monte Carlo algorithms
27	4	Randomized algorithm for Min-Cut,
28	4	Randomized algorithm for 2- SAT
29	4	Problem definition of Multicommodity flow
30	4	Problem definition of Multicommodity flow
31	4	Flow shop scheduling
32	4	Network capacity assignment problems
33	4	Network capacity assignment problems
34	**5**	**DEFINITIONS OF P, NP-HARD**
35	5	NP-Complete Problems
36	5	Decision Problems
37	5	Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem
38	5	Vertex Cover Problem
39	5	Approximation Algorithms for Vertex Cover
40	5	Set Cover Problem

TEXT/REFERENCE BOOKS

1. Horowitz and Sahani: Fundamental of Computer algorithms
2. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India
3. AhoA.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley

Additional

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Syllabus Deployment

Name of Faculty: Mr. Sunil Choudhary
Subject Name: Theory of Computation
Department: Department of Computer Science Engineering
Total No. of Lectures Planned: 50

Subject Code: 6CS3A
SEM: VI

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to analyze and design finite automata also can apply rigorously formal mathematical methods to design automata.
- Students will be able to apply formal mathematical methods to prove properties of languages; grammars also analyze and design regular Expression and grammars.
- Students will be able to develop the ability to apply the ideas about context free grammars, Derivation and ambiguity along the designing of Pushdown Automata.
- Students will be able to Construct Turing machine for different problems and argue formally about correctness on different restricted machine models of computation. They can demonstrate their understanding of key notions, such as computability, decidability, and complexity through problem solving.
- Students will be able to distinguish different computing languages and classify their respective types.

Lecture No.	Unit	Topic
1	**1**	**OBJECTIVE, SCOPE AND OUTCOME OF THE COURSE**
2	**2**	**INTRODUCTION OF BASIC MACHINE, FINITE STATE MACHINE**
3	2	Representation of FA: Transition graph, Transition matrix
4	2	Exercise of Finite automata
5	2	Types of FA: Deterministic and nondeterministic finite automation
6	2	Conversion of DFA to NFA
7	2	Minimization of finite automata
8	2	Mealy & Moore machines introduction
9	2	Conversion of Moore to Melay Machine
10	2	Conversion of Melay to Moore Machine
11	2	Introduction of Grammar: Alphabet, words, Operations, Regular sets
12	2	Relationship and conversion between Finite automata and regular expression
13	2	Relationship and conversion between Finite automata and regular expression
14	2	Relationship and conversion between regular expression and Finite automata
15	2	Relationship and conversion between regular expression and Finite automata
16	2	Closure properties of regular sets, Pumping lemma and regular sets
17	2	Myhill- Nerode theorem , Application of pumping lemma, Power of the languages
18	**3**	**INTRODUCTION OF CONTEXT FREE GRAMMARS (CFG), DERIVATION OF CFG AND CONTEXT FREE LANGUAGE**
19	3	Relationship between derivation and derivation trees
20	3	Leftmost and rightmost derivation, sentential forms
21	3	Parsing and ambiguity of CFG

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22	3	Greibach and Chomsky Normal form – 1
23	3	Greibach and Chomsky Normal form – 2
24	3	Greibach and Chomsky Normal form – 3
25	3	Problems related to CNF and GNF including membership problem
26	**4**	**INTRODUCTION OF PUSH DOWN AUTOMATA, NONDETERMINISTIC PDA**
27	4	CFL to PDA - 1
28	4	CFL to PDA – 2
29	4	PDA to CFG -1
30	4	PDA to CFG -2
31	4	Deterministic PDA and Deterministic CFL
32	4	pumping lemma for CFL's, Closure Properties and Decision properties for CFL, Deciding properties of CFL
33	**5**	**INTRODUCTION, DEFINITION OF TURING MACHINE**
34	5	Turing Machine Capabilities: Acceptors and Transducers
35	5	Design TM -1
36	5	Design TM -2
37	5	Design TM -3
38	5	Computable Languages and functions, Universal TM
39	5	Other modification, multiple tracks Turing Machine
40	5	Recursive & recursively enumerable languages, Properties of RL and REL
41	5	Introduction of Context sensitive grammars and languages,
42	5	Chomsky Hierarchy
43	**6**	**TRACTABLE AND UNTRACTABLE PROBLEMS: P, NP**
44	6	NP complete and NP hard problems
45	6	Un-decidability, examples of these problems like vertex cover problem
46	6	Hamiltonian path problem, traveling sales man problem
47		Revision of Course
48		Revision of Course
49		Revision of Course
50		Revision of Course

TEXT/REFERENCE BOOKS

1. Aho, Hopcroft and Ullman, Introduction to Automata Theory, Formal Languages and Computation, Narosa
2. Cohen, Introduction to Computer Theory, Addison Wesley.
3. Papadimitriou, Introduction to Theory of Computing, Prentice Hall.

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Syllabus Deployment

Name of Faculty: Ms. Shipra Maheshwari
Subject Code: 6CS4A
Subject Name: Computer Graphics and Multimedia
Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 47

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able understand the basics of computer graphics, different graphics systems, application of computer graphics and rasterisation of line, circle and ellipse.
- Students will be able to apply geometric transformations on graphics objects, their application in composite form, different color filling algorithm and clipping algorithm.
- Students will be able to explore visible surface detection techniques& curves.
- Students will be able to render projected objects to naturalize the scene in 2D view and use of illumination models for this& color models.
- Students will be able to explore multimedia components and animation techniques.

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION:** Objective, scope and outcome of the course
2	**2**	**BASIC OF COMPUTER GRAPHICS**
3	2	Basic of Computer Graphics
4	2	Applications of computer graphics
5	2	Display devices
6	2	Random and Raster scan systems
7	2	Graphics input devices, Graphics software and standards
8	**3**	**GRAPHICS PRIMITIVES**
9	3	Points, lines, circles and ellipses as primitives
10	3	Scan conversion algorithms for primitives
11	3	Fill area primitives including scanline ,polygon filling, inside-outside test
12	3	Boundary and flood-fill, character generation, line attributes
13	3	Area-fill attributes, character attributers.
14	3	Aliasing
15	3	Introduction to Anti Aliasing
16	**4**	**TWO DIMENSIONAL GRAPHICS**
17	4	Transformations (translation, rotation, scaling),
18	4	Matrix representation, homogeneous coordinates,
19	4	Composite transformations, reflection and shearing
20	4	Viewing pipeline and coordinates system
21	4	Window-to-viewport transformation
22	4	Clipping including point clipping
23	4	line clipping
24	4	Polygon clipping
25	**5**	**THREE DIMENSIONAL GRAPHICS**

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26	5	3D display methods, polygon surfaces, tables
27	5	Equations, meshes, curved lies and surfaces
28	5	Quadric surfaces, Spline representation
29	5	Cubic spline interpolation methods, Bazier curves and surfaces,
30	5	B-spline curves and surfaces.3D scaling
31	5	Rotation and translation, composite transformation
32	5	Viewing pipeline and coordinates
33	5	Parallel and perspective transformation
34	5	View volume and general (parallel and perspective) projection transformations
35	**6**	**ILLUMINATION AND COLOUR MODELS**
36	6	Light sources – basic illumination models – halftone patterns and dithering techniques
37	6	Properties of light – Standard primaries and chromaticity diagram
38	6	Intuitive colour concepts – RGB colour model
39	6	YIQ colour model – CMY colour model
40	6	HSV colour model – HLS colour model; Colour selection
41	**7**	**ANIMATIONS &REALISM**
42	7	Design of Animation sequences – animation function
43	**7**	Raster animation – key frame systems
44	**7**	Motion specification –morphing – tweening
45	**7**	Tiling the plane – Recursively defined curves
46	**7**	Koch curves – C curves – Dragons – space filling curves – fractals
47	**7**	Grammar based models – fractals – turtle graphics – ray tracing

TEXT/REFERENCE BOOKS

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, PrabhatAndleigh and Thakkar, PHI.
4. Multimedia Information Networking, N.K.Sharda, PHI..

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Syllabus Deployment

Name of Faculty: Mr. Vivek Jain
Subject Code: 6CS5A
Subject Name: Embedded System Design
Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Suggest design approach and requirements of embedded systems.
- Write and develop routines for interrupt programming.
- Select the criteria's of designing and implementing a real time embedded system.
- Analyse the basics of real time operating systems and different scheduling concepts.
- Comprehend various software development tools.

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION TO EMBEDDED SYSTEMS HARDWARE NEEDS**
2	1	Timing diagrams
3	1	memories (RAM, ROM, EPROM)
4	1	Tristate devices
5	1	Buses
6	1	DMA
7	1	UART and PLD's
8	1	Built-ins on the microprocessor
9	**2**	**INTERRUPTS BASICS**
10	2	Context saving, Shared data problem
11	2	Atomic and critical section
12	2	Interrupt latency. Survey of software architectures
13	2	Round Robin scheduling architecture
14	2	Function queue scheduling architecture
15	2	Function queue scheduling architecture
16	2	Use of real time operating system
17	**3**	**RTOS, TASKS, SCHEDULER**
18	3	Shared data reentrancy
19	3	Priority inversion
20	3	Mutex binary semaphore
21	3	Counting semaphore
22	3	Inter task communication: Message queue, Mailboxes and pipes
23	3	Timer functions, events
24	3	Interrupt routines in an RTOS environment
25	**4**	**EMBEDDED SYSTEM SOFTWARE DESIGN USING AN RTOS**
26	4	Embedded system software design using an RTOS
27	4	Embedded system software design using an RTOS
28	4	Hard real-time Embedded system
29	4	Soft real-time Embedded system
30	4	Task division
31	4	Need of interrupt routines

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32	4	Shared data problem
33	**5**	**EMBEDDED SOFTWARE DEVELOPMENT TOOLS**
34	5	Host and target systems
35	5	Cross compilers
36	5	Linkers, locators for embedded systems
37	5	Getting embedded software in to the target system
38	5	Debugging techniques
39	5	Testing on host machine
40	5	Instruction set emulators, Analysers. In-circuit emulators and monitors. Regional

TEXT/REFERENCE BOOKS

1. Microprocessor Architecture: Programming and Applications ith the 8085/8080A, R. S. Gaonkar ,Penram International Publishing, 1996
2. Computer Organization and Design The hardware and software interface D A Patterson and J H Hennessy ,Morgan Kaufman Publishers.
3. Microprocessors Interfacing, Douglas Hall, Tata McGraw Hill, 1991.
4. The 8051 Microcontroller, Kenneth J. Ayala, Penram International Publishing, 1996.

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Syllabus Deployment

Name of Faculty: Mrs. Kirti Dashora — Subject Code:6CS6.1A
Subject Name: Advance Topics in Operating Systems — Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 45

COURSE OUTCOMES

At the end of this course students will be able to:

- Develop an ability to understating the main concepts of Concurrency, transactions, multimedia operating systems, real time operating systems and mobile computing
- Develop an ability to understand the use of virtualization and cloud technologies
- Develop an ability to design operating system which supports database transactions, ACID properties and serializability
- To give an understanding of practical engineering issues in real-time and concurrent systems
- To discuss limitations of widely-used operating systems, introduce new design approaches to address challenges of security, robustness, and concurrency

Lecture No.	Unit	Topic
1	1	**OPERATING SYSTEM STRUCTURES – POLICIES & MECHANISM**
2	1	Structures- monolithic, layered, virtual machines, micro kernel, exokernels,
3	1	client- server model. Examples from Linux & Windows.
4	1	Threads Advance Concepts– Libraries- Pthreads win32 threads, Java threads
5	1	,
6	1	Introduction to threading issues, system calls, cancellation, signal handling, thread pool, thread specific data,
7	1	window threads, Linux threads, Solaris Threads
8	1	Message Passing System – Need of Message Passing Systems design issues, naming, synchronization
9	1	Implementation–buffering and delivery;
10	1	mailboxes; RPC & RMI Examples Systems – Linux, Windows
11	2	**FILE SYSTEM- FILE SYSTEM LAYOUTS**
12	2	file system implementation
13	2	contagious allocation, link list allocation indexed allocation, file allocation table
14	2	virtual file system, directory implementation- linear list and hash table
15	2	File System reliability and integrity I/O system: device drivers/ controllers
16	2	busses and interfaces- USB, IDE, SCSI, IEEE1394, RAID system
17	2	disk caching and buffering disk management-disk formatting
18	2	RAID Structure, boot block, bad block, swap-space management System Security: Security Problems
19	2	Program Threats, System Network Threats Cryptography as a Security Tool
20	2	User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Network
21	2	Computer Security Classifications. Overview of security in Windows.
22	3	**THE LINUX OS: UNIX VS LINUX, DESIGN PRINCIPLES,**
23	3	Kernel Structure, components Kernel Modules
24	3	Shell- usage, types; An overview of- Process Management,
25	3	Thread Management and Scheduling

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26	3	Memory Management, Process Scheduling in Linux
27	3	File System structure & implementation
28	3	I/O Management, Network File System
29	3	Inter-process Communications,
30	3	Booting and login process, security
31	4	**THE WINDOW OS**: Design Princip., Sys. Components- H/w Abstraction layer, Kernel
'32	4	Executives; Environmental Subsystems- MS-DOS Environment
33	4	16-bit Windows Environment, Win32 API, POSIX subsystem; Exception and Interrupts
34	4	An overview of-memory management, process management and thread; Process Scheduling in Windows;
35	4	File Systems: Internal Layout, recovery, Volume Management and Fault Tolerance FAT and NTFS, Security features, window registry, OS organizations
36	5	**MULTIPROCESSOR OPERATING SYSTEMS**: Architecture of Multiprocessor Sys.
37	5	Overview of Multiprocessor OS, Kernal Structure and Multiprocessing support in Linux & Windows,
38	5	Process Synchronization- Queued Lock, Spin Lock, Sleep Lock
39	5	Process Scheduling.
40	5	Multimedia Operating System- Introduction to Multimedia & Data V Compression-concepts
41	5	Common graphics file formats, common audio file formats; Video server,
42	5	Process management- real time scheduling; Multimedia file systems, Multimedia file storage mechanisms
43	5	Video sever organization
44	5	Mobile Operating System- Windows CE
45	5	Palm OS, Symbian OS, JAVA card, Multos

TEXT/REFERENCE BOOKS

1. Operating Systems Concepts, Silberschatz and Galvin.
2. Computer Systems: An Integrated Approach (CS 2200 textbook), Ramachandran and Leahy.
3. OS: Advanced Concepts, Maekawa, Oldehoeft. Addison-Wesley.
4. Distributed Systems, SapeMullender, Addison-Wesley.
5. Distributed Operating Systems, Andrew S. Tanenbaum, Prentice Hall.
6. An Introduction to Programming with Threads, Andrew Burrell

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Syllabus Deployment

Name of Faculty: Mr. Gaurav Kumawat
Subject Code: 6CS7A
Subject Name: Java Programming Lab
Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 10

COURSE OUTCOMES

At the end of this course students will be able to:

1. knowledge of the structure and model of the Java programming language, use the Java programming language for various programming technologies
2. develop software in the Java programming language, evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements
3. propose the use of certain technologies by implementing them in the Java programming language to solve the given problem
4. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems.

Lab No.	Practical
1.	WAP to define a student class with name, rollno, marks1, marks2 and take the data from the user and display. Also create an object reference.
2.	WAP to display the concept of method overloading. WAP to define distance class with feet and inches as instance variables, define a method add to add two objects and return an object from the method. WAP to show overloaded constructor
3.	WAP to display the nested and inner class concept. WAP to implement multilevel inheritance WAP to display how a subclass can access the constructors, methods of super class. WAP to display the concept of final variable, final method, final class. WAP to display the dynamic method dispatch concept to achieve run time polymorphism using the reference of super class.
4.	WAP to define a class with main method in some other package other than student class's package then import that package and use the student class. Also extend the class player in the other package with the student class. Show the different access protections in the same as well as different package.
5.	WAP to define an interface and implement the interface in a class. WAP to define an interface and define another interface to extend the first one. Define a class to implement the two interfaces. WAP to use try and catch to handle the run time exceptions. WAP to use the throw, throws and finally clause with try and catch clauses.
6.	WAP to display the working of main () thread with sleep () method. WAP to create a thread implementing runnable interface to display the numbers generated

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	randomly. WAP to display the information of a thread whether that is alive or not and also use join () to finish the main () thread in the last.
7.	WAP to display the use of suspend (), resume () and stop () methods in multithreading. WAP to read from and write into a file using file input output streams. Write a java program to copy content of one file to another file. WAP to count number of alphabets, vowel and constant in a file.
8.	WAP using String tokenizer class to split string in tokens. WAP to demonstrate abstract classes. WAP using Command Line Arguments. Write a java program to implement simple applet
9.	WAP to define a class extending an Applet class and write a html file to run that applet. WAP to show the life cycle of an applet using methods and run that applet in the applet viewer. WAP to pass the parameters from the applet tag to the applet and display on the applet.
10.	Project

TEXT/REFERENCE BOOKS

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education

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Syllabus Deployment

Name of Faculty: Ms. Shipra Maheshwari
Subject Code: 6CS8A
Subject Name: Computer Graphics & Multimedia Lab
SEM: VI
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 13

COURSE OUTCOMES

At the end of this course students will be able to:

1. Develop an ability to create interactive graphics applications.
2. Apply the knowledge of subject to contribute to technical problem solving by initiating a wide variety of application design and implementation skills.
3. Apply the knowledge of contemporary terminology, progress, issues, and trends to write programs that demonstrate computer graphics and animation.

Lab No.	Practical
1	Implementation of Line, Circle and ellipse attributes
2	To plot a point (pixel) on the screen
3	To draw a straight line using DDA Algorithm
4	Implementation of mid-point circle generating Algorithm
5	Implementation of ellipse generating Algorithm
6	Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear
7	Composite 2D Transformations
8	Cohen Sutherland 2D line clipping and Windowing
9	Sutherland – Hodgeman Polygon clipping Algorithm
10	Three dimensional transformations - Translation, Rotation, Scaling
11	Composite 3D transformations
12	Drawing three dimensional objects and Scenes
13	Generating Fractal images

TEXT/REFERENCE BOOKS

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.
4. Multimedia Information Networking, N.K.Sharda, PHI..

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Syllabus Deployment

Name of Faculty: Mrs. Poornima Dave — Subject Code:6CS9A
Subject Name: Design and Analysis of Algorithms Lab — Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 14

COURSE OUTCOMES

At the end of this course students will be able to:

1. Develop an ability to understand basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, and greedy.
2. Apply the knowledge of algorithms to analyze the programming problems and find the optimal solution to solve a problem.
3. To create efficient computer algorithms

Lecture No.	Practical
1	Exploring a Binary Heap: Consider a binary heap containing n numbers (the root stores the greatest number). You are given a positive integer k < n and a number x. You have to determine whether the kth largest element of the heap is greater than x or not. Your algorithm must take O(k) time. You may use O(k) extra storage
2	Merging two search trees: You are given two height balanced binary search trees T and T', storing m and n elements respectively. Every element of tree T is smaller than every element of tree T'. Every node u also stores height of the subtree rooted at it. Using this extra information how can you merge the two trees in time O(log m + log n) (preserving both the height balance and the order)?
3	Complete binary tree as an efficient data-structure: You are given an array of size n (n being a power of two). All the entries of the array are initialized to zero. You have to perform a sequence of the following online operations : 1. (i) Add(i,x) which adds x to the entry A[i]. 2. (ii) Report sum(i,j) = sum of the entries in the array from indices i to j for any 0 < i < j <= n. It can be seen easily that we can perform the first operation in O(1) time whereas the second operation may cost O(n) in worst case. Your objective is to perform these operations efficiently. Give a datastructure which will guarantee O(log n) time per operation.
4	Problems on Amortized Analysis a. Delete-min in constant time!!! Consider a binary heap of size n, the root storing the smallest element. We know that the cost of insertion of an element in the heap is O(log n) and the cost of deleting the smallest element is also O(log n). Suggest a valid potential function so that the amortized cost of insertion is O(log n) whereas amortized cost of deleting the smallest element is O(1). b. Implementing a queue by two stack c. Show how to implement a queue with two ordinary stacks so that the amortized cost of

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	each Enqueue and each Dequeue operation is O(1).
5	Computing a spanning tree having smallest value of largest edge weight: Describe an efficient algorithm that, given an undirected graph G, determines a spanning tree of G whose largest edge weight is minimum over all spanning trees of G.
6	Shortest Path Problems: i. From a subset of vertices to another subset of vertices a. Given a directed graph G(V,E), where edges have nonnegative weights. S and D are two disjoint subsets of the set of vertices. Give an O(|V| log |V| + |E|) time algorithm to find the shortest path among the set of paths possible from any node in S to any node in D. ii. Paths in Directed Acyclic Graph a. Counting the number of paths Given two nodes u,v in a directed acyclic graph G(V,E). Give an O(|E|) time algorithm to count all the paths from u to v. b. Path passing through a subset of nodes Given two nodes u,v and a set of vertices w1, w2,...,wk in a directed acyclic graph G(V,E). Give an O(|E|) time algorithm to output a path(if exists) from u to v which passes through each of the nodes w1,...,wk. If there is no such p
7	A simple problem on sorted array: Design an O(n)-time algorithm that, given a real number x and a sorted array S of n numbers, determines whether or not there exist two elements in S whose sum is exactly x .
8	Finding the decimal dominant in linear time: You are given n real numbers in an array. A number in the array is called a decimal dominant if it occurs more than n/10 times in the array. Give an O(n) time algorithm to determine if the given array has a decimal dominant.
9	Finding the first one: You are given an array of infinite length containing zeros followed by ones. How fast can you locate the first one in the array?
10	Searching for the Celebrity: Celebrity is a person whom everybody knows but he knows nobody. You have gone to a party. There are total n persons in the party. Your job is to find the celebrity in the party. You can ask questions of the form Does Mr. X know Mr. Y ?. You will get a binary answer for each such question asked. Find the celebrity by asking only O(n) questions
11	Checking the Scorpion: An n-vertex graph is a scorpion if it has a vertex of degree 1(the sting) connected to a vertex of degree two (the tail) connected to a vertex of degree n-2 (the body) connected to the other n-3 (the feet). Some of the feet may be connected to other feet. Design an algorithm that decides whether a given adjacency matrix represents a scorpion by examining only O(n) entries.
12	Endless list: You are having a pointer to the head of singly linked list.The list either terminates at null pointer or it loops back to some previous location(not necessarily to the head of the list). You have to determine whether the list loops back or ends at a null location in time proportional to the length of the list. You can use at most a constant amount of extra storage.
13	Nearest Common Ancestor: Given a rooted tree of size n. You receive a series of online queries: "Give nearest common ancestor of u, v ". Your objective is to preprocess the tree in O(n) time to get a data structure of size O(n) so that you can answer any such query in O(log n) time.
14	Searching for a friend: You are standing at a crossing from where there emerge four roads extending to infinity. Your friend is somewhere on one of the four roads. You do not know on which road he is and how far he is from you. You have to walk to your friend and the total distance traveled by you must be at most a constant times the actual distance of your friend from you. In terminology of algorithms, you should traverse O(d) distance, where d is the distance of your friend from you.

TEXT/REFERENCE BOOKS

1. Design Methods and Analysis of Algorithms, S.K.Basu, PHI.
2. Introduction to Algorithms, Thomas H. Cormen.

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Syllabus Deployment

Name of Faculty: Mr. Vivek Jain — Subject Code:6CS10A
Subject Name: Embedded System Design Lab — Semester: VI
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 9

COURSE OUTCOMES

At the end of this course students will be able to:

1. To teach the fundamentals of embedded systems.
2. To clarify the way in which circuits are designed using Microcontrollers for various applications.
3. To make the Student understand use of microcontroller in real life application
4. To give students an intuitive feeling of how microcontroller circuits operate.

Labs No.	Name of Experiment
1	Get familiar with the microcontroller kit and the development software. Try the sample programs that are supplied to get familiar with the Microcontroller.
2	a. Blink an LED which is connected to your microcontroller using the built-in timer in the microcontroller. Assume that the LED should be on for x milliseconds and off for y milliseconds; assume that these values are stored in memory locations X and Y. We should be able to change the value of x and y and rerun the program. b. Consider an alternate way to program this application. Here, the microcontroller turns the LED on and waits in a busy loop to implement a delay of x milliseconds. Then it turns the LED off and waits in a busy loop to implement a delay of y milliseconds. How do you compare these two solutions?
3	Assume that in Experiment #1, the values of x and y have been chosen to be 200 and 500 respectively. When the LED blinking program runs, pressing a key on the keyboard should generate an interrupt to the microcontroller. If the key that has been pressed is a numeric key, the value of x and y must be interchanged by the interrupt service routine. If the key that has been pressed is not a numeric key, then the LED must be turned off for 2 seconds before resuming the blinking.
4	If your microcontroller kit has an LCD interface, write a program to display a character string on the LCD. Assume that the string is stored at a location STRING and consists of alphanumeric characters. The string is nullterminated. Modify your program to scroll the displayed string from left to right.
5	Modern microcontrollers usually have an in-built Digital-to-Analog and Analogto- Digital converter. Use the built-in DAC to generate voltage waveforms such as (a) pulse train (b) triangular waveform (c) sinusoidal waveform. Observe these waveforms on an oscilloscope.
6	Your microcontroller may have a built-in temperature sensor. If not, interface an external temperature sensor to the microcontroller. Write a program to take several measurements of temperature at regular intervals and display the average temperature on the LCD display. Test if the readings change when the ambient temperature changes.

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7	Your microcontroller may have a built-in ADC. Build a voltmeter that can measure stable voltages in a certain range. The measured value must be displayed on the LCD display. Measure the same voltage using a multimeter and record the error in measurement. Tabulate the error for several values of the voltage.
8	Build a simple security device based on the microcontroller kit. Interface an external motion sensor to the microcontroller. An alarm must be generated if motion is sensed in a specified region. There must be a provision to record the time at which the intrusion was detected. Similarly, there must be a provision to turn the alarm off by pressing a key.
9	A voltage waveform v(t) is available as an input to the microcontroller. We must continuously check the waveform and record the maximum value of the waveform and display the maximum value on the LCD display. Test the program by using a DC supply to generate v(t) and varying the DC value.

TEXT/REFERENCE BOOKS

1. Microprocessor Architecture: Programming and Applications ith the 8085/8080A, R. S. Gaonkar ,Penram International Publishing, 1996
2. Computer Organization and Design The hardware and software interface D A Patterson and J H Hennessy ,Morgan Kaufman Publishers.
3. Microprocessors Interfacing, Douglas Hall, Tata McGraw Hill, 1991. The 8051 Microcontroller, Kenneth J. Ayala, Penram International Publishing, 1996.

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Syllabus Deployment

Name of Faculty: Ms. Kiran Acharya | Subject Code: 7CS1A
Subject Name: Cloud Computing | Semester: VII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 45

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to understand the fundamentals of cloud computing along with cloud computing design and challenges.
- Students will be able to use relevant software tools used in cloud computing. Student will also differentiate between Parallel and Distributed Paradigms.
- Students will be able to gain the knowledge about virtualization and its needs in cloud computing. Students will be able to use the tools available for virtualization.
- Students will be able to understand the security issues and recovery methods associated with cloud computing
- Students will be able to write case studies on the tools available for industrial purpose to deploy clouds. Students will also develop understanding about cloud computing application areas.

Lecture No.	Unit	Topic
1	**1**	**Introduction:** Objective, scope and outcome of the course.
2	**2**	**Introduction Cloud Computing**
3	2	Nutshell of cloud computing,Enabling Technology, Historical development
4	2	Vision, feature Characteristics and components of Cloud Computing
5	2	Challenges,Risks and Approaches of Migration into Cloud
6	2	Ethical Issue in Cloud Computing
7	2	Evaluating the Cloud's Business Impact and economics, Future of the cloud
8	2	Networking Support for Cloud Computing
9	2	Ubiquitous Cloud and the Internet of Things
10	**3**	**Cloud Computing Architecture**
11	3	Cloud Reference Model, Layer and Types of Clouds, Services models
12	3	Data centre Design and interconnection Network
13	3	Architectural design of Compute and Storage Clouds.
14	3	Cloud Programming and Software.
15	3	Fractures of cloud programming.
16	3	Map Reduce, Hadoop
17	3	Probabilities, Bayesian Networks.
18	3	Programming of Google App engine.
19	**4**	**Virtualization Technology**
20	4	Implementation Level of Virtualization
21	4	Virtualization Structure/Tools and Mechanisms
22	4	Hypervisor
23	4	VMware, KVM, Xen
24	4	Virtualization: of CPU, Memory, I/O Devices.

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25	4	Virtual Cluster and Resources Management
26	4	Virtualization of Server, Desktop
27	4	Virtualization of Network
28	4	Virtualization of data-centre.
29	**5**	**Securing the Cloud**
30	5	Cloud Information security fundamentals
31	5	Cloud security services, Design principles
32	5	Policy Implementation, Cloud Computing Security Challenges
33	5	Cloud Computing Security Architecture
34	5	Legal issues in cloud Computing
35	5	Data Security in Cloud
36	5	Business Continuity and Disaster Recovery
37	5	Risk Mitigation
38	5	Understanding and Identification of Threats in Cloud
39	5	SLA-Service Level Agreements, Trust Management
40	**6**	**Cloud Platforms in Industry**
41	6	Amazon web services , Google App Engine, Microsoft Azure Design
42	6	Aneka: Cloud Application Platform
43	6	Protein structure prediction
44	6	Data Analysis, Satellite Image Processing
45	6	CRM

TEXT/REFERENCE BOOKS

1. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl.
2. "The Little Book of Cloud Computing" by Lars Nielsen.
3. "Cloud Computing Explained" by John Rhoton.
4. "Cloud Computing for Programmers" by Daniele Casal.
5. "Cloud Computing For Dummies" by Judith Hurwitz.

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Syllabus Deployment

Name of Faculty: Mr. Sandeep Upadhyay | Subject Code: 7CS2A
Subject Name: Information Security System | Semester: VII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 32

COURSE OUTCOMES

At the end of this course students will be able to:

- Develop a basic understanding of cryptography, how it has evolved and some key encryption techniques used today, Develop an understanding of security policies.
- To master and implement different encryption algorithms
- To master fundamentals of secret and public cryptography
- Students will be able to understand message authentication protocols and hash functions.
- To master protocols for security services

Lecture No.	Unit	Topic
1	**1**	**Introduction:** Objective, scope and outcome of the course.
2	1	**Introduction to security attacks**
3	1	classical encryption techniques
4	1	Substitution ciphers and transposition ciphers
5	1	cryptanalysis, stream and block ciphers
6	1	Modern block ciphers
7	1	Block Cipher structure
8	1	Data Encryption standard (DES) with example
9	1	Design principles of block cipher
10	1	Shannon's theory of confusion and diffusion, fiestal structure
11	**2**	**AES with structure, RC6, random number generation**
12	2	S-box theory: Boolean Function, S-box design criteria
13	2	Bent functions, Propagation and nonlinearity
14	2	Construction of balanced functions, S-box design
15	**3**	**Public Key Cryptosystems with Applications**
16	3	Requirements and Cryptanalysis
17	3	RSA cryptosystem
18	3	Key Management in Public Key Cryptosystems: Distribution of Public Keys
19	3	Distribution of Secret keys using Public Key Cryptosystems. X.509
20	3	Discrete Logarithms, Diffie-Hellman Key Exchange
21	**4**	**Message Authentication and Hash Function**
22	4	Authentication requirements, authentication functions, message authentication code
23	4	Hash functions, birthday attacks, security of hash functions and MACs
24	4	MD5 message digest algorithm, Secure hash algorithm (SHA)
25	4	Remote user Authentication using symmetric and Asymmetric Authentication
26	4	Digital Signature, its properties, requirements and security, various digital signature

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		schemes
27	**5**	**Pretty Good Privacy**
28	5	IP Security: Overview, IP Security Architecture, Authentication Header
29	5	Encapsulation Security Payload in Transport and Tunnel mode with multiple security associations
30	5	Strong Password Protocols
31	5	Lamport's Hash
32	5	Encrypted Key Exchange

TEXT/REFERENCE BOOKS

1. Paul van Oorschot, Computer Security and the Internet: Tools and Jewels (2020, Springer).
2. Wenliang Du, Computer Security: A Hands-on Approach (2017, self-published). Updated May 2019.
3. Stallings and Brown, Computer Security: Principles and Practice, 3/e (2014, Prentice Hall).

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Syllabus Deployment

Name of Faculty: Ms. Deepika Veerwal | Subject Code: 7CS3A
Subject Name: Data Mining and Warehousing | Semester: VII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 38

COURSE OUTCOMES

At the end of this course students will be able to:

- Student will be able to understand introduction to data mining, pre-processing data reduction.
- Student will learn concept description and Association rule mining.
- Student can understand classification and clustering.
- Student will know Data Warehousing and its Architecture.
- Student will understand OLAP, Aggregation, Backup and Recovery

Lecture No.	Unit	Topic
1	**1**	**Overview Motivation(for Data Mining), Data Mining-Definition & Functionalities**
2	1	Data Processing, Form of Data Preprocessing
3	1	Data Cleaning: Missing Values, Noisy Data
4	1	Inconsistent Data, Data Integration and Transformation
5	1	Data Reduction:-Data Cube Aggregation, Dimensionality reduction,
6	1	Data Compression, Numerosity Reduction, Clustering
7	1	Discretization and Concept hierarchy generation
8	**2**	**Concept Description**
9	2	Definition, Data Generalization, Analytical Characterization
10	2	Analysis of attribute relevance, Mining Class comparisons
11	2	Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data
12	2	Graph Displays of Basic Statistical class Description
13	2	Mining Association Rules in Large Databases, Association rule mining
14	2	Mining Single-Dimensional Boolean Association rules from Transactional Databases
15	2	Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases
16	2	Mining Multi- Dimensional Association rules from Relational Databases
17	**3**	**What is Classification & Prediction, Issues regarding Classification and prediction**
18	3	Decision tree, Bayesian Classification
19	3	Classification by Back propagation, Multilayer feed-forward Neural Network
20	3	Back propagation Algorithm, Classification methods
21	3	K-nearest neighbor classifiers, Genetic Algorithm
22	3	Cluster Analysis: Data types in cluster analysis
23	3	Categories of clustering methods, Partitioning methods

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24	3	Hierarchical Clustering- CURE and Chameleon
25	3	Density Based Methods-DBSCAN, OPTICS.
26	3	Grid Based Methods- STING, CLIQUE
27	3	Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis
28	**4**	**Data Warehousing:**
29	4	Overview, Definition, Delivery Process
30	4	Difference between Database System and Data Warehouse
31	4	Multi Dimensional Data Model, Data Cubes
32	4	Stars, Snow Flakes, Fact Constellations, Concept hierarchy
33	4	Process Architecture, 3 Tier Architecture, Data Mining
34	**5**	**Aggregation, Historical information, Query Facility**
35	5	OLAP function and Tools. OLAP Servers
36	5	ROLAP, MOLAP, HOLAP, Data Mining interface
37	5	Security, Backup and Recovery
38	5	Tuning Data Warehouse, Testing Data Warehouse

TEXT/REFERENCE BOOKS

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Techniques – Jiawai Han and MichelineKamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

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Syllabus Deployment

Name of Faculty: Ms. Juhi Gupta
Subject Code: 7CS4A
Subject Name: Computer Aided Design for VLSI
Semester: VII
Department: Department of Computer Science Engineering
Total No. of Lectures Planned: 38

COURSE OUTCOMES

At the end of this course students will be able to:

- Establish the relation between CAD tool and digital electronic system for modeling design, analysis and verification ASIC of very large integrated circuit. (VLSI).
- Able to gain the knowledge about Boolean function and its application in Binary Decision Diagram. (BDD)
- Able to gain the knowledge about delay generation and delay elimination in digital systems.
- Able to knowledge resource sharing and binding between different electronics systems.
- After gating the complete design knowledge of VLSI students can place different VLSI designing company like Cadence, Virag Logic, Synopsis etc

Lecture No.	Unit	Topic
1	**1**	**Complexity in microelectronic circuit design and Moore's Law**
2	1	Design styles –Full custom design, standard-cell design.
3	1	Programmable Logic Devices, Field Programmable Gate Arrays, Design Stages
4	1	Computer-Aided Synthesis and Optimizations
5	1	design flow and related problems
6	**2**	**Boolean functions and its representations**
7	2	Co-factor, unite, derivatives, consensus and smoothing.
8	2	Tabular representations and Binary Decision Diagram (BDD).
9	2	OBDD, ROBDD and Bryant's reduction algorithm and ITE algorithm.
10	2	Hardware abstract models – structures and logic networks
11	2	State diagram, data-flow and sequencing graphs, hierarchical sequencing graphs
12	2	Compilation and behavioral optimizations.
13	**3**	**Architectural Synthesis** – Circuit description and problem definition
14	3	Temporal and spatial domain scheduling.
15	3	synchronization problem
16	3	Scheduling algorithms - ASAP and ALAP scheduling algorithms
17	3	Scheduling under constraints
18	3	Relative scheduling
19	3	List scheduling heuristic. Scheduling in pipelined circuits.
20	**4**	**Resource Sharing & Binding** in sequencing graphs for resource dominated circuits
21	4	Sharing of registers and busses
22	4	binding variables to registers
23	4	Two-level logic optimization principles – definitions
24	4	exact logic minimizations
25	4	Positional cube notations

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26	4	functions with multi-valued logic
27	4	List-oriented manipulations
28	**5**	**Physical Design. Floor planning** – goals and objectives.
29	5	Channel definition, I/O and power planning, Clock Planning.
30	5	Placement – goals and objectives. Placement algorithms
31	5	Iterative improvement algorithms
32	5	Simulated Annealing. Timing-driven Placement
33	5	Global routing – goals and objectives, Global routing methods
34	5	Timing driven global routing.
35	5	Detailed Routing – goals and objectives. Left-edge algorithm.
36	5	Constraints and routing graphs. Channel routing algorithms
37	5	Via minimization. Clock routing, power routing
38	5	circuit extraction and Design Rule Checking

TEXT/REFERENCE BOOKS

1. Synthesis and Optimization of Digital Circuits, Giovanni De Micheli, Tata McGraw Hill.

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Syllabus Deployment

Name of Faculty: Ms. Deepika Veerwal
Subject Code: 7CS5A
Subject Name: Compiler Construction
SEM: VII
Department: Department of Computer Science Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to learn major concepts in areas of language translation and compiler design.
- Students will be able to ability to identify, formulate, and solve computer engineering problems with proper systematic & semantic approach.
- Students will be able to Develop possible program constructs for further code generation with Type checking.
- Students will be able to learn various concepts of symbol tables, Run time environments, memory management strategy.
- Students will get the concepts of Intermediate code generation, Code optimization and Code generations.

Lecture No.	Unit	Topic
1	**1**	Introduction of Compiler, Translator, Interpreter
2	1	Phase of compiler
3	1	Introduction to one pass & Multipass compilers, Bootstrapping
4	1	Review of Finite automata
5	1	Lexical analyzer, Input, buffering,
6	1	Recognition of tokens
7	1	A lexical analyzer generator, Error handling
8	**2**	Review of Context Free Grammar, Ambiguity of grammars
9	2	Introduction to parsing: Bottom up parsing
10	2	Top down parsing techniques
11	2	Shift reduce parsing, Operator precedence parsing
12	2	Recursive descent parsing predictive parsers
13	2	LL grammars & passers error handling of LL parser
14	2	LR parsers
15	2	Construction of SLR
16	2	Conical LR & LALR parsing tables
17	2	Parsing with ambiguous grammar
18	2	Introduction of automatic parser generator: YACC error handling in LR
19	**3**	Construction of syntax trees
20	3	L-attributed definitions, Top down translation
21	3	Specification of a type checker
22	3	Intermediate code forms using postfix notation
23	3	Three address code, Representing TAC using triples and quadruples
24	3	Translation of assignment statement

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25	3	Boolean expression and control structures
26	**4**	Storage organization, Storage allocation, Strategies
27	4	Activation records, Accessing local and non-local names in a block structured
28	4	Activation records, Accessing local and non-local names in a block structured
29	4	Parameters passing, Symbol table organization
30	4	Data structures used in symbol tables
31	**5**	Definition of basic block control flow graphs
32	5	DAG representation of basic block
33	5	Advantages of DAG, Sources of optimization, Loop optimization
34	5	Idea about global data flow analysis, Loop invariant computation
35	5	Peephole optimization
36	5	Issues in design of code generator
37	5	A simple code generator, Code generation from DAG
38		Revision of Important topics
39		Problem solving
40		Problem Solving

TEXT/REFERENCE BOOKS

1. Aho, Ullman and Sethi: Compilers, Addison Wesley.
2. Holub, Compiler Design in C, PHI.

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Syllabus Deployment

Name of Faculty: Ms. Harshita Shreemali Subject Code: 7CS6.1A
Subject Name: Advanced Database Management System Semester: VII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 28

COURSE OUTCOMES

At the end of this course students will be able to:

- Basic knowledge of storing, querying and managing large amounts of data and the associated languages, tools and systems
- Evaluate and Apply Advanced Database Development Techniques
- Explain and evaluate the fundamental theories and requirements that influence the design of modern database systems
- Design & Implement Advanced Database Systems.
- To develop skills in advanced visual & conceptual modelling and database design

Lecture No.	Unit	Topic
1	**1**	**Query Processing and Optimization**
2	1	Measures of query cost
3	1	Implementation of database operations
4	1	External Sorting, Materialization vs. Pipelining
5	1	Size Estimations of various database operations
6	1	Evaluation plans
7	1	Cost-based vs. Heuristic optimization, Materialized views.
8	**2**	**Transaction Processing and Serializability**
9	2	Database Transaction and its processing
10	2	Transaction properties
11	2	Concurrent Transactions
12	2	Need of Serializability, Conflict vs. View Serializability
13	**3**	**Concurrency and Recovery**
14	3	Implementation of Concurrency
15	3	Lock-based protocols and Timestamp-based protocols,
16	3	Deadlock handling, Database Failures
17	3	Recovery Schemes: Shadow Paging and Log-based Recovery
18	3	Recovery with Concurrent transactions
19	**4**	**Database Security and Advanced SQL**
20	4	Database Integrity Constraints
21	4	Assertions and Triggers in SQL
22	4	Authorization and Authentication in SQL
23	4	Nested Subqueries, Views, and Embedded SQL
24	**5**	**Distributed Database Systems**
25	5	Data Storage in Distributed systems
26	5	Local vs. Global Transactions

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27	5	Transaction processing
28	5	Concurrency and Recovery in Distributed database systems, Distributed Query processing.

TEXT/REFERENCE BOOKS

1. "Database System Concepts" by Abraham Silberschatz and S Sudarshan.
2. "Database Management Systems" by Raghu Ramakrishnan.
3. "An Introduction to Database Systems" by Bipin Desai.
4. "Principles of Database Systems" by J D Ullman.
5. "Fundamentals of Database Systems" by R Elmasri and S Navathe

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Syllabus Deployment

Name of Faculty: Mr. Pankaj Ameta
Subject Code: 7CS7A
Subject Name: Web Development Lab
SEM: VII
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 12

COURSE OUTCOMES

At the end of this course students will be able to:

1. Design a basic web site using HTML5 and CSS3 to demonstrate responsive web design.
2. Implement dynamic web pages with validation using JavaScript objects by applying different event handling mechanism. Use AJAX Programming Technique to develop RIA
3. Develop simple web application using server side PHP programming and Database
4. Connectivity using MySQL. Build well-formed XML Document and implement Web Service using Java.

Lab No.	Practical
1	Creation of HTML Files
2	Working with Client-Side Scripting: VBScript, JavaScript
3	Configuration of web servers: Apache Web Server, Internet Information Server (IIS)
4	Working with ActiveX Controls in web documents
5	Experiments in Java Server Pages: Implementing MVC Architecture using Servlets,
6	Working with other Server-Side Scripting: Active Server Pages, Java Servlets, PHP
7	Experiments in Ajax Programming
8	Developing Web Services
9	Developing any E-commerce application (Mini Project)
10	Project Work
11	Application Development in cloud computing Environment
12	Experiment Using Open Source Tool e.g. ANEKA

TEXT/REFERENCE BOOKS

1. Dynamic HTML: The Definitive Reference (http://oreil.ly/dynamic_html) by Danny Goodman (O'Reilly)
2. PHP in a Nutshell (http://oreil.ly/PHP_nutshell) by Paul Hudson (O'Reilly)
3. MySQL in a Nutshell (http://oreil.ly/MySQL_nutshell) by Russell Dyer (O'Reilly) xviii
4. CSS:The Definitive Guide (http://oreil.ly/CSS_Definitive) by Eric A. Myer

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Syllabus Deployment

Name of Faculty: Ms. Juhi Gupta | Subject Code: 7CS8A
Subject Name: VLSI Physical Design Lab | SEM: VII
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 8

COURSE OUTCOMES

At the end of this course students will be able to:

1. Apply the constraints posed by the VLSI fabrication technology to design automation tools.
2. Adapt the design algorithms to meet the critical design parameters
3. Adapt the design algorithms to meet the critical design parameters.

Lab No.	Topic
1	**DESIGN ENTRY AND SIMULATION OF COMBINATIONAL LOGIC CIRCUITS**
	To write a Verilog code for the basic logic gates, 8 bit adder and 4bit multiplier and simulate it using Xilinx project navigator.
2	**DESIGN ENTRY AND SIMULATION OF SEQUENTIAL CIRCUITS**
	To write a Verilog code for counter and state machine and simulate it using Xilinx project navigator.
3	**SYNTHESIS OF COMBINATIONAL AND SEQUENTIAL CIRCUIT**
	To study and analyze about synthesis option available in Xilinx project navigator.
4	**PLACE & Route AND POST PLACE & Route SIMULATION**
	To study about Place and Root and Post Place and Root using Implementation option available in Xilinx project navigator.
5	**HARDWARE FUSING AND TESTING**
	To study about Hardware fusing and testing of given circuit using Xilinx project navigator.
6	**STANDARD CELL BASED DESIGN**
	To design and simulate the traffic light controller using Standard cells
	To design a CMOS layout and extract the parasitic capacitance and resistance
7	**PLACEMENT AND ROUTING, POWER AND CLOCK ROUTING AND POST PLACEMENT AND ROUTING SIMULATION**
	To change the placement and routing, power and clock routing, and post placement and routing parameters and simulate the design
8	**STATIC TIMING ANALYSIS**
	To design the given circuit and perform static timing analysis using EDA tools.

TEXT/REFERENCE BOOKS

1. Synthesis and Optimization of Digital Circuits, Giovanni De Micheli, Tata McGraw Hill.
2. Algorithms for Physical Design Automation, Naveed Shervani, Kluwer Academic, 1998.
3. Handbook of Algorithms for Physical Design Automation, Charles J Alpert, Dinesh P Mehta, Sachin S. Sapatnekar, CRC Press,2008.

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Syllabus Deployment

Name of Faculty: Ms. Deepika Veerwal — Subject Code: 7CS9A
Subject Name: COMPILER DESIGN LAB — SEM: VII
Department: Department of Computer Science Engineering
Total No. of Labs Planned: 11

COURSE OUTCOMES

At the end of this course students will be able to:

1. Apply the knowledge to basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.
2. Develop an ability to use different types of compiler tools to meet the requirements of the realistic constraints of compilers
3. Apply the knowledge to excel himself/herself as a design engineer in any industries/R&D sector, pursue his research on the design field or face any competitive examinations in engineering

Lab No.	Practical
1	Write grammar for a fictitious language and create a lexical analyzer for the same
2	Develop a lexical analyzer to recognize a few patterns in PASCAL and C (ex: identifiers,
3	Write a program to parse using Brute force technique of Top down parsing
4	Develop on LL (1) parser (Construct parse table also).
5	Develop an operator precedence parser (Construct parse table also)
6	Develop a recursive descent parser
7	Write a program for generating for various intermediate code forms
8	Write a program to simulate Heap storage allocation strategy
9	Generate Lexical analyzer using LEX
10	Generate YACC specification for a few syntactic categories
11	Given any intermediate code form implement code optimization techniques

TEXT/REFERENCE BOOKS

1. V.V Das, Compiler Design using FLEX and YACC, PHI
2. Alfred V. Aho, Compilers Principles, Techniques and Tools, Pearson

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Syllabus Deployment

Name of Faculty: Ms. Kiran Acharya
Subject Code:8CS1A
Subject Name: Mobile Computing
Semester: VIII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 32

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to understand mobile computing and various adaptability issues in it and mobility management.
- Students will be able to learn Data Dissemination and management and mobile cache maintenance schemes.
- Students will be able to explore about middleware for application development and Service Discovery of middleware.
- Students will be able to understand about Mobile IP and TCP , database systems in mobile environment and WWW and mobility.
- Students will be able to learn AD-Hoc network and various routing protocols and algorithms .

Lecture No.	Unit	Topic
1	**1**	**MOBILE COMPUTING: DEFINITIONS, ADAPTABILITY ISSUES**
2	1	Mechanisms for adaptation and incorporating adaptations.
3	1	Mobility management
4	1	Location management principle and techniques
5	1	PCS location management Scheme.
6	**2**	**DATA DISSEMINATION AND MANAGEMENT**
7	2	Data dissemination,
8	2	Bandwidth allocation for publishing
9	2	Broadcast disk scheduling
10	**2**	Mobile cache maintenance schemes
11	2	Mobile Web Caching
12	2	Introduction to mobile middleware
13	**3**	**MIDDLEWARE FOR APPLICATION DEVELOPMENT**
14	3	Mobile agents
15	3	Service Discovery & standardization Methods
16	3	Uncast Discovery, Multicast Discovery & advertisement
17	3	Service catalogs, Garbage Collection,Eventing.
18	3	Programming of Google App engine.
19	**4**	**MOBILE IP, MOBILE TCP**
20	4	Database systems in mobile environments
21	4	World Wide Web
22	4	Hypervisor
23	4	mobility
24	**5**	**AD HOC NETWORKS**

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25	5	localization, MAC issues
26	5	Routing protocols
27	5	global state routing (GSR),
28	5	Destination sequenced distance vector routing (DSDV)
29	5	Dynamic source routing (DSR)
30	5	Ad Hoc on demand distance vector routing (AODV)
31	5	Temporary ordered routing algorithm (TORA)
32	5	QoS in Ad Hoc Networks, applications.

TEXT/REFERENCE BOOKS

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772
3. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
4. UWE Hansmann, LotherMerk, Martin S. Nicklaus, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

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Syllabus Deployment

Name of Faculty: Mr. Vivek Jain
Subject Code: 8CS2A
Subject Name: Digital Image Processing
SEM: VIII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 40

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to understand the fundamental steps involve in image processing, how image is acquired using different sensors and different color model used to represent image.
- Students will be able to apply different types of transform function on image for sharpening and smoothing in spatial as well as in frequency domain.
- Students will be able to analyze different types of noise occurs in image during transmission and able to restore the image using inverse and homomorphism algorithm.
- Students will be able to develop knowledge about different compression standards of image and how compression is achieved using various coding.
- Students will be able to differentiate between line point and edge detection, how edges and boundaries are linked and segment the image during detection process.

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION TO IMAGE PROCESSING:** Steps in image Processing
2	1	Digital Image representation, Sampling & Quantization
3	1	Sampling
4	1	Quantization
5	1	Image acquisition
6	1	Image acquisition
7	1	Color image representation
8	1	Color image representation
9	**2**	**IMAGE TRANSFORMATION & FILTERING:** Intensity transform functions,
10	2	histogram processing, Spatial filtering
11	2	Fourier transforms and its properties
12	2	Frequency domain filters
13	2	Basics of Wavelet Transforms
14	2	Colour models
15	2	Colour Transforms
16	2	Pseudo colouring
17	**3**	**IMAGE RESTORATION:** Reasons of Image degradation
18	3	Image degradation
19	3	Image restoration process
20	3	Noise Models
21	3	Noise Filters
22	3	Image degradation function
23	3	Inverse Filtering

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24	3	Homomorphism Filtering
25	**4**	**IMAGE COMPRESSION**
26	4	Coding redundancy,
27	4	Interpixel redundancy
28	4	Psychovisual redundancy
29	4	Huffman Coding
30	4	Arithmetic coding
31	4	Lossy compression techniques
32	4	JPEG Compression
33	**5**	**IMAGE SEGMENTATION & REPRESENTATION**
34	5	Point, Line and Edge Detection
35	5	Thresholding Edge
36	5	Boundary linking
37	5	Hough transforms,
38	5	Region Based Segmentation
39	5	Boundary representation
40	5	Boundary Descriptors

TEXT/REFERENCE BOOKS

1. Digital Signal and Image Processing, Tamal Bose,, 3rd ed. , John Wiley,2005.
2. Image Processing, Analysis and Machine Vision, Sonaka, Hlavac and Boyle, 3 rd ed., Cengage Learning, 2013.
3. Digital Image Processing, Pratt, 4 th ed., John Wiley,2001.
5. Image Processing, Analysis, and Machine Vision, Sonka, cengage Learning,2006.

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Syllabus Deployment

Name of Faculty: Mr. Pankaj Ameta
Subject Code:8CS3A
Subject Name: Distributed System
Semester: VIII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 45

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able to develop and apply knowledge of distributed system fundamentals, algorithms such as logical clock synchronization and distributed system architecture.
- Students will be able to gain knowledge about message communication, remote procedure call and remote method invocation (RPC and RMI).
- Students will be able to analyze load sharing and balancing algorithms and also describe Distributed file system characteristics.
- Students will be able to develop knowledge about distributed systems using various techniques for tolerating partial failures and deadlocks.
- Students will be able to explain failure recovery model in distributed system, also summarizes replicated data management.

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION**
2	1	Features of distributed systems, nodes of a distributed system
3	1	Distributed computation paradigms, Model of distributed systems
4	1	Types of Operating systems:Centralized Operating System, Network Operating Systems
5	1	Distributed Operating Systems and Cooperative Autonomous Systems
6	1	Design issues in distributed operating systems
7	1	Systems Concepts and Architectures
8	1	Distributed Computing Environment (DCE)
9	1	Notions of time and state, states and events in a distributed system
10	1	Time, clocks and event precedence
11	1	recording the state of distributed systems
12	**2**	**CONCURRENT PROCESSES AND PROGRAMMING**
13	2	Processes and Threads
14	2	Graph Models for Process Representation
15	2	Client/Server Model, Time Services, Language Mechanisms for Synchronization
16	2	Object Model Resource Servers
17	2	Characteristics of Concurrent Programming Languages (Language not included)
18	2	Inter-process Communication and Coordination
19	2	Message Passing, Request/Reply and Transaction Communication
20	2	Name and Directory services
21	2	RPC and RMI case studies
22	**3**	**DISTRIBUTED PROCESS SCHEDULING**
23	3	System Performance Model

24	3	Static Process Scheduling with Communication
25	3	Dynamic Load Sharing and Balancing
26	3	Distributed Process Implementation
27	3	Distributed File Systems
28	3	DFS Design and implementation
29	3	Transaction Service and Concurrency Control
30	3	Data and File Replication
31	3	Case studies
32	**4**	**DISTRIBUTED SHARED MEMORY**
33	4	Non-Uniform Memory Access Architectures
34	4	Memory Consistency Models, Multiprocessor Cache Systems
35	4	Distributed Shared Memory, Implementation of DSM systems
36	4	Models of Distributed Computation
37	5	Modeling a Distributed Computation,
38	5	Failures in a Distributed System
39	5	Distributed Mutual Exclusion, Election, Distributed Deadlock handling, Distributed termination detection
40	**5**	Distributed Agreement
41	5	Concept of Faults, failure and recovery, Byzantine Faults
42	5	Adversaries, Byzantine Agreement
43	5	Impossibility of Consensus and Randomized Distributed Agreement
44	5	Replicated Data Management
45	5	CORBA case study

TEXT/REFERENCE BOOKS

1. Distributed operating systems and algorithm analysis by Randy Chow and T. Johnson, Pearson
2. Operating Systems A concept based approach by DM Dhamdhere, TMH
3. Distributed Systems- concepts and Design, Coulouris G., Dollimore J, and Kindberg T., Pearson

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Syllabus Deployment

Name of Faculty: Ms. Poornima Dave
Subject Code:8CS4.2A
Subject Name: Real time System
Semester: VIII
Department: Department of Computer Science and Engineering
Total No. of Lectures Planned: 37

COURSE OUTCOMES

At the end of this course students will be able to:

- Students will be able understand the basics of Real time System, concept of tasks & timing constraints.
- Case studies of any real world software with the help of visual programming aids.
- Students will be able to explore Periodic Task scheduling and priority driven scheduling.
- Students will be able to understand a periodic task scheduling.
- Students will be able to explore resource access control & different priority ceiling protocol

Lecture No.	Unit	Topic
1	**1**	**DEFINITION, TYPICAL REAL TIME APPLICATIONS**
2	**1**	concept of tasks, types of tasks and real time systems
3	1	block diagram of RTS, and tasks parameters
4	1	Release Times, execution time, period, Deadlines, and Timing Constraints
5	1	RTS requirements
6	**2**	**REFERENCE MODELS FOR REAL TIME SYSTEMS**
7	2	processors and Resources
8	2	Temporal Parameters of Real-Time Workload
9	2	Periodic and Aperiodic Task Model
10	2	Precedence Constrains and Data Dependency, Other Types of Dependencies
11	2	Functional Parameters, Resource Parameters
12	2	Real Time Scheduling: classification of Real Time Scheduling, scheduling criteria
13	2	Performance metrics, schedulability analysis
14	2	Introduction to Clock Driven scheduling, Weighted Round Robin Approach
15	2	Priority Driven Approach
16	2	Dynamic Versus Static systems
17	2	Offline Versus Online Scheduling.
18	**3**	**PERIODIC TASKS SCHEDULING**
19	3	Clock Driven Scheduling
20	3	Priority Driven Scheduling
21	3	concept of schedulability tests
22	3	Optimality of the RM and DM algorithms
23	3	practical factors.
24	**4**	**APERIODIC TASK SCHEDULING**
25	4	assumption and approaches
26	4	server based and non-server based fixed priority scheduling algorithms

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27	4	priority exchange, extended priority exchange, slack stealing
28	4	Introduction to scheduling of flexible computations
29	**5**	**RESOURCES ACCESS CONTROL**
30	5	Assumptions on Resources and their usage
31	5	Effect of Resource Contention and Resource Access Control (RAC)
32	5	Non-preemptive Critical Sections, priority inversion problem, need of new resource
33	5	Synchronization primitives/protocols for RTS
34	5	Basic Priority-Inheritance and Priority-Ceiling Protocols
35	5	Stack Based Priority-Ceiling Protocol
36	5	Preemption Ceiling Protocol, Access Control in Multiple- Unit Resources
37	5	Controlling Concurrent Accesses to Data Objects

TEXT/REFERENCE BOOKS

1. "Real Time Systems: Theory and Practice" by R Mall
2. "Real Time Systems" by C M Krishna and K G Shin"
3. "Real Time Systems" by Jane Liu
4. "Real-Time Systems Scheduling" by MarylineChetto

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Syllabus Deployment

Name of Faculty: Mr. Sandeep Upadhyay Subject Code:8CS5A
Subject Name: Unix Network Programming & Simulation Lab Semester: VIII
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 6

COURSE OUTCOMES

At the end of this course students will be able to:

1. Understand various distributions of UNIX viz. BSD, POSIX etc.
2. Write client/server applications involving unix sockets involving TCP or UDP involving iterative or concurrent server.
3. Understand IPV4 & IPV6 interoperability issues
4. Use fork( ) system call.
5. Understand the network simulator NS2 and Simulate routing algorithm on NS2

Lab No.	Practical
1.	Write two programs in C: hello_client and hello_server • The server listens for, and accepts, a single TCP connection; it reads all the data it can from that connection, and prints it to the screen; then it closes the connection • The client connects to the server, sends the string "Hello, world!", then closes the connection
2.	Write an Echo_Client and Echo_server using TCP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.
3.	Write two programs in C: hello_client and hello_server • The server listens for, and accepts, a single UDP connection; it reads all the data it can from that connection, and prints it to the screen; then it closes the connection • The client connects to the server, sends the string "Hello, world!", then closes the connection
4.	Use fork( ) system call. • Understand the network simulator NS2 and Simulate routing algorithm on NS2
5.	Write an Echo_Client and Echo_server using UDP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.
6.	Simulate Bellman-Ford Routing algorithm in NS2

TEXT/REFERENCE BOOKS

1. W.R. Stevens, PHI/Pearson ,"Unix Network Programming".
2. W.R. Stevens, PHI/Pearson,"Unix Network Programming, Inter Process Communication", Edition 2, Volume 2,
3. W.R. Stevens, PHI/Pearson."Unix Network Programming, the Sockets Networking API", Volume 1, Edition 3

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Syllabus Deployment

Name of Faculty: Mr. Vivek Jain
Subject Code:8CS6A
Subject Name: FPGA LAB
Semester: VIII
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 10

COURSE OUTCOMES

At the end of this course students will be able to:

1. To Design simple transceiver design to make student understand Adaptive Filtering: Echo/Noise Cancellation, Least Mean Square (LMS) algorithm.
2. To make student understand Channel coding / decoding, Equalization, Simple Detection Algorithm.
3. To make student understand OFDM Prediction Algorithms, Speech Classification and Synthesis.

Lab No.	Practical
1.	Fundamental Theory Introduction to DSP architectures and programming Sampling Theory, Analog-to-Digital Converter (ADC), Digital-toAnalog Converter (DAC), and Quantization;
2.	Decimation, Interpolation, Convolution, Simple Moving Average; Periodic Signals and harmonics;
3.	Fourier Transform (DFT/FFT), Spectral Analysis, and time/spectrum representations; FIR and IIR Filters;
4.	Design (Simulation) using MATLAB/ Simulink Simulate the lab exercises using MATLAB/Simulink
5.	Implementation using pure DSP, pure FPGA and Hybrid DSP/FPGA platforms
6.	Digital Communications: On-Off- Keying (OOK), BPSK modulation, and a simple transceiver design
7.	Adaptive Filtering: Echo/Noise Cancellation,
8.	Least Mean Square (LMS) algorithm
9.	Wireless Communications: Channel coding/decoding, Equalization, Simple Detection Algorithm, OFDM
10.	Speech Processing: Prediction Algorithms, Speech Classification and Synthesis

TEXT/REFERENCE BOOKS

1. Digital Circuit & Logic Design, Morris Mano, Prentice Hall of India.
2. Digital Signal Processing: Principals, Algorithms And Applications", Proakis, Manolakis,4 th ed., Pearson Education.
3. Digital Principles & Applications, A.P.Malvino & D.P Leach, Tata McGraw-Hill Education.

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Syllabus Deployment

Name of Faculty: Mr. Vivek Jain — Subject Code:8CS7A
Subject Name: Digital Image Processing lab — Semester: VIII
Department: Department of Computer Science and Engineering
Total No. of Labs Planned: 7

COURSE OUTCOMES

At the end of this course students will be able to:

1. Able to generate different Continuous and Discrete time signals.
2. Develop image enhancement, compression and edge detection using MATLAB.
3. Develop IIR & FIR Filter using different approximation methods using MATLAB.
4. Implement algorithms for image processing on DSP Processor.

Lab No.	Practical
1.	Color image segmentation algorithm development
2.	Wavelet/vector quantization compression
3.	Deformable templates applied to skin tumor border finding
4.	Helicopter image enhancement
5.	High-speed film image enhancement
6.	Computer vision for skin tumor image evaluation
7.	New Border Images

TEXT/REFERENCE BOOKS

1. Digital Signal Processing: Principals, Algorithms and Applications", Proakis, Manolakis, 4 th ed., Pearson Education.
2. Discrete Time Signal Processing, Oppenheim, Schafer, 3 rd ed., PHI (2010).
3. Image Processing, Analysis and Machine Vision, Sonaka, Hlavac and Boyle, 3rd ed., Cengage Learning
4. Digital Signal Processing: A Modern Introduction, Ambardar, Cengage learning.
5. Image Processing, Analysis, and Machine Vision, Sonka, cengage Learning.

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