GOA UNIVERSITY
THIRD YEAR OF BACHELOR'S DEGREE COURSE IN COMPUTER ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER V

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
CE 5.1	Organizational Behaviour and Cyber Law	3	0	0	3	100	20+5	-	-	125
CE 5.2	Automata Language and Computation	3	0	2	3	100	20+5	-	-	125
CE 5.3	Microprocessors and Microcontrollers	3	1	2	3	100	20+5	50	-	175
CE 5.4	Computer Hardware Design	3	1	2	3	100	20+5	-	-	125
CE 5.5	Database Management system	3	1	2	3	100	20+5	50	-	175
CE 5.6	Operating Systems	3	1	2	3	100	20+5	-	-	125
	TOTAL	18	04	10	-	600	150	100	-	850

L-Lectures, T-Tutorials P-Practicals
Th-.Dur.- Duration of Theory paper
Th-Theory, S-Sessional, P-Pratical, O-Oral.

25 Sessional marks will be split as follows:

20 marks are for the Internal Test
5 marks are for continuous evaluation of Practicals/Assignments

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SEMESTER VI

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
CE 6.1	Modern Algorithm Design Foundation	3	0	0	3	100	20+5	-	-	125
CE 6.2	Object Oriented Software Engineering	3	0	2	3	100	20+5	-	-	125
CE 6.3	Artificial Intelligence	3	1	2	3	100	20+5	50	-	175
CE 6.4	Computer Graphics	3	1	2	3	100	20+5	50	-	175
CE 6.5	Device Interface and PC Maintenance	3	1	2	3	100	20+5	-	-	125
CE 6.6	Data Communications	3	1	2	3	100	20+5	-	-	125
	TOTAL	18	04	10	-	600	150	100	-	850

L-Lectures, T-Tutorials P-Practicals
Th-.Dur.- Duration of Theory paper
Th-Theory, S-Sessional, P-Pratical, O-Oral.

25 Sessional marks will be split as follows:

20 marks are for the Internal Test
5 marks are for continuous evaluation of Practicals/Assignments

Annexture – II

CE 5.1OBCL Organizational Behavior and Cyber Law

Course Objective: Organizational behavior is the systematic study and careful application of knowledge about how people act within an organization. It is becoming very important in the global economy as people with diverse backgrounds and cultural values have to work together effectively and efficiently. Cyber law describes the legal issues related to use of inter-networked information technology. While grounded in real individuals, physical computers and other electronic devices, the Internet is independent of any geographic location. Hence the laws should be fundamentally different from laws that govern geographic nations today.

Instructional Objective:
At the end of the course, the students would be familiar with the following:

- Organizational and Interpersonal Behavior
- Employee Leadership, Motivation and Appraisal
- Cyber Crimes and jurisdiction in the cyber world
- IT Contracts and Copyright Protection

Lectures per week : 3+0+0
Max. Marks for Theory paper : 100
Max. Marks for Practical : 0
Max. Marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered : 5
(At least one question from each module with two compulsory questions from any one module.)

Module 1

Fundamentals of OB (2hr)

Understanding of Organizational Behavior
Fundamentals Concepts
Nature of Organizations

Models of OB (2hr)

OB system
Models of OB
McGregor's Theory X and Theory Y
Autocratic, Custodial, Supportive and Collegial Models of OB

Communication (2hr)

Nature and Importance of Communication
The Two-Way Communication Process
Communication Barriers
Communication Symbols
Downward and Upward Communication/ Formal and Informal Communication.
Forms of Communication

Leadership (2hr)

- Meaning and Nature of Leadership
- Traits of Effective Leaders
- Leadership Behavior
- Behavioral Approaches to Leadership
- Contingency Approaches to Leadership
- Emerging Approaches to Leadership Theories

Employee Attitudes and their effects (1hr)

- Nature of Employee attitudes
  - Job Satisfaction
  - Job Involvement
- Effects of Employee attitude
- Survey Design and Follow-up

Module 2

Motivation (3hrs)

- Model of Motivation
- Motivational Drives
- Human Needs
  - Types of Needs
  - Maslow's Hierarchy of Needs
  - Hezberg's Two-Factor Theory
- Behavior Modification
- Goal Setting
- Motivational Applications
  - The Expectancy Model

Appraising and Rewarding Performance (2hr)

- Money as a means of Rewarding Employees
- Organizational Behavior and Performance Appraisal
- Economic Incentives Systems
- The Reward Pyramid

Interpersonal Behavior (2hrs)

- Nature and Levels of Conflict
- Sources of Conflict
- Effects of Conflict
- Model of Conflict
  - Participant Intentions
  - Resolution Strategies
- Transactional Analysis
  - Ego States
  - Types of Transactions
  - Benefits
- Power and Politics
- Organizational Politics

Managing Change (2 hrs)

Nature of Work Change
Three Stage in Change
Reaching a New Equilibrium
The Organizational Learning Curve for Change

Understanding Organization Development (1hr)

Foundations of OD
Characteristics of OD
OD Process
Benefits and Limitations of OD

Organizational Behavior across Cultures (1 hr)

Conditions affecting Multinational Operations
Managing an International Workforce

Module 3

Power of Arrest without Warrant under the IT Act, 2000: A Critique (1hr)

Section 80 of the IT Act, 2000
Forgetting the line between Cognizable and Non-Cognizable Offences
Necessity of Arrest without warrant from any place, public or otherwise

Cyber Crime and Criminal Justice (4 hrs)

Concept of Cyber Crime and the IT Act 2000
Hacking
Teenage web vandals
Cyber fraud and cyber cheating
Virus on the Internet
Defamation, harassment and E-mail abuse
Cyber pornography
Monetary penalties, adjudication and appeals under IT Act, 2000
Nature of cyber criminality, strategies to tackle cyber crime and trends
Criminal justice in India and Implications on Cyber crime

Contracts in the Infotech World (3 hrs)

Contracts in the Infotech world
Click-wrap and Shrink-wrap contracts
Contract formation under the Indian Contract Act, 1872
Contract formation on the Internet
Terms and Conditions of Contracts
Software product license

Jurisdiction in the Cyber World (2 hrs)

Civil law of Jurisdiction in India
Cause of action
Jurisdiction and the Information Technology Act, 2000
Place of cause of action in contractual and IPR disputes
Exclusive clauses in Contracts
Abuse of exclusive clauses
Legal principles on jurisdiction in the United States of America

MODULE 4

Battling Cyber Squatters and Copyright Protection in the Cyber World (4 hrs)

Concept of Domain name and reply to Cyber Squatters
Battle between freedom and control on the internet
Works in which copyright subsists and meaning of Copyright
Copyright Ownership and Assignment
License of Copyright
Copyright term and respect for foreign works
Copyright Infringement, Remedies and Offences
Copyright protection of content on the Internet, copyright notice, disclaimer and acknowledgement
Legal development in the US
Napster and its Cousins
Computer Software Piracy

Digital Signatures, Certifying Authorities and E-Governance (2 hrs)

Digital signatures
Digital Signature Certificate
Certifying Authorities and Liability in the Event of Digital Signature Compromise
E-Governance in India

The Indian Evidence Act of 1872 v/s Information Technology Act, 2000 (2 hrs)

Status of Electronic Records as Evidence
Proof and Management of Electronic Records
Proving Digital Signature
Proof of Electronic Agreements
Proving Electronic Messages
Other Amendments in the Indian Evidence Act by the IT Act

Protection of Cyber Consumers in India (2 hrs)

Are Cyber Consumers Covered Under the Consumer Protection Act?
Goods and Services
Consumer Complaints
Defect in Goods and Deficiency in Services
Restrictive and Unfair Trade Practices
Instances of Unfair Trade Practices
Relief under CPA
Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India

TEXTBOOKS

1. Organizational Behavior (Human Behavior at Work) by John W. Newstrom and Keith Davis, Tenth Edition, Tata McGraw Hill ISBN0-07-463764-9,
2. Cyber Law Simplified By Vivek Sood, Tata McGraw Hill, ISBN 0-07-043506-5

Note

Textbook (1) is for Modules I and II
Textbook (2) is for Module III and IV

CE5.2ALC AUTOMATA LANGUAGE AND COMPUTATION

Course Objectives: The major objective of this course is to introduce the student to the concepts of theory of computation in computer science. The student should acquire insights into the relationship amongst formal languages, formal grammars and automata.

Instructional Objective:
At the end of the course, the students would be familiar with the following:

- logic and set theory, functions and relations, formal languages and grammars
- finite-state automata, pushdown automata
- Turing machines, Church's Thesis, undecidability
- Recursively Enumerable Languages and Unsolvable Problems.

Lectures per week	**:**	**3+0+2**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module).

Module-1

Introduction (2hrs)
Sets, Logic, Functions, Relations, Languages
Proofs, Mathematical Induction, Recursive definitions, Structural Inductions

Regular Languages and Finite Automata (5hrs)
Regular Languages and Regular Expressions
The memory required to recognize a language
Finite Automata (DFA)
Distinguishing one string from another
Union, Intersection, and Complement

Nondeterministic and Kleene's theorem (5hrs)
NFA, Converting NFA to DFA,€-NFA ,Kleene's theorem
Converting an €-NFA to an NFA
Regular Languages
MyHill-Nerode theorem
Minimal finite Automata
The pumping lemma for regular languages
Closure properties
Decision Problem

Moore and Mealy Machine

Module 2

Context –free Grammars and Push down Automata (6hrs)
Context –Free Grammars and Languages
Derivation Trees and Ambiguity
An unambiguous CFG for algebraic Expression
Simplified forms and Normal Forms – CNF, GNF
Pumping Lemma,Closure Properties

Push Down Automata (6hrs)
DPDA
PDA corresponding to a given CFG – Top-down PDA, Bottom-up PDA
CFG corresponding to a given PDA
Closure properties of CFG

Module-3

Turing Machine and their languages (12hrs)
Turing Machine Introduction
Computing a Partial function with a Turing machine
Combining Turing machine
Variations of Turing Machine
Nondeterministic Turing Machine
Universal Turing Machine
Church-Turing Thesis

Module-4

Recursively Enumerable Languages (8hrs)
Recursively Enumerable and Recursive
Enumerating a Language
General Grammars
Unrestricted Grammars and Turing Machine
Context-Sensitive Language and Grammar
Linear Bounded Automata
Chomsky Hierarchy

Unsolvable Problems (4hrs)
A non recursive language and unsolvable Decision problems
Reducing one problem to another
The halting problem
Rice's Theorem
Closure Properties of families of languages

TEXT BOOKS

1. Introduction to languages and the theory of computation, By John C. Martin, Tata McGraw Hill
2. Introduction to Automata Theory, Languages and Computation - By Hopcraft and Ullman, Narosa Publishing House.

REFERENCE BOOKS

1. Theoretical Science - By Krishnamurthy, AWEP.
2. Theory of Computer Science - By Brady, McGraw Hill.
3. Computations, Finite and Infinite Machines - By Minsky, Prentice Hall

CE5.3MPMC MICROPROCESSOR AND MICROCONTROLLER

Course Objective: The objectives of this course are to learn the architecture and programming of 8086 family of microprocessors thoroughly and later study the newer processors, their features and how these features are used in multiuser, multitasking systems.

Instructional Objective:
The student at the end of the course will be able to:

- Write assembly language programs using 8086 instructions.
- Interface 8086 to common peripherals such as keyboards, printers etc.
- Learn the features of 80286,80386, and higher processors to meet the needs of multiuser, multitasking Systems.

Lectures per week	**:**	**3+1+2**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Practicals	**:**	**50**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

(10 Hrs)

Microprocessor 8086:
Pin diagram,
Instruction cycle,
Architecture,
Instruction Set,
Assembly Language instructions.
8086 Basic configuration in maximum mode,
System timing diagrams,
Programming with macros,
Procedures.

MODULE 2

(10 Hrs)

Use of 8086 Interrupt instructions in programming,
Developing libraries for string manipulation operations,
Input and output of integer numbers.
Introduction to multiprocessor configurations,
8087 Numeric data processor:
Numeric data processors Data types,
Its architecture,
Instruction set,
Connections with 8086 and programming with 8087 instructions.
Introduction to I/O processors.

MODULE 3

(12 Hrs)

Interfacing:
Introduction to I/O interfacing,
I/O interfacing techniques:
Memory mapped I/O ,
I/O mapped I/O,
Interfacing 8 bit ports/16 bit ports and their comparison.
Programmable Peripheral Interface (PPI) –
Basic Description of 8255,
Architecture,
Modes of operation,
Programming the 8255.
Interfacing seven segment display,
Printers, and keyboards and stepper motors.,
A/d and D/A interfaces

Programmable timer 8253/8254:
Pin descriptions,
Functional descriptions,
Block diagram,
Command word description and different operating modes .

8051 USART :
Features of synchronous and asynchronous communications,
Pin configurations,
Functional configurations,
Operational descriptions,
Applications.

Introduction and overview of the following chips 8259, 8237, 8279.

MODULE 4

(12 Hrs)

System Design:
Design of 8086 using Memory chips and simple I/O devices using interfaces.

Microprocessor 80286 and 80386:
Brief features,
Architecture,
Memory management system,
Task switching protection etc. in 80286.
Review processors from 80486,
Pentium and RISC family processors.

Introduction to Microcontrollers:
Control oriented microcontroller 8051,
Pin descriptions,
Design considerations,
Types of memory,
Basic registers,
Addressing modes,
Interrupts,
Serial communication timers,
Description of TMOD SFR, TCON SFR

TEXT BOOKS

1. Microprocessors and Interfacing: Programming and Hardware, - By Douglas V. Hall, TMH., Revised Second Edition
2. Microprocessor Systems: The 8086/8088 family architecture programming and design – By Liu and Gibson, PHI
3. Microcontrollers –hardware ,architecture, programming- By Kenneth Ayala ,Second edition

REFERENCE BOOKS

1. Microprocessor and Microcomputer Based Systems – By M. Rafiquzzaman, PHI.
2. The Intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, and Pentium pro processor Architecture, Programming and Interfacing - By Barry B. Brey, PHI
3. Microprocessor – Abhishek Yadav , University Science Press , Laxmi Publications Pvt Ltd

CE5.4CHD COMPUTER HARDWARE DESIGN

Course Objective: The objective of this course is to involve the students in the design of a wide variety of Digital Hardware Systems through the use of a register transfer level hardware description language. They learn the technologies used in VLSI systems which make possible the design of potentially fast digital circuits that are extremely economical in terms of space, power requirements and cost.

Instructional Objective:
At the end of the course, the student will be able to:

- Write Control sequences using AHPL (a hardware programming Language)
- Translate control sequences to control unit hardware.
- Design Digital Systems.

Lectures per week	**:**	**3+1+2**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction to Computer Hardware Design (2 hrs)
Design methodology:
System design
The Register Level
The Processor Level

Architecture of a representative 32 bit processor (2 hrs)
Levels of description
Registers and Memory
Single Address Instructions
Two Address Instructions
Branch Instructions, Stacks and Subroutines
Shift and Miscellaneous Instructions

System building blocks (2 hrs)
Introduction
Logic Elements
Speed, Delay and Fanout in Logic Circuits
Flip-flops and Register Memory
Random Access Memory
Direct Access Storage
Sequential Access Storage
Read Only Memory

Design Conventions (4 hrs)
Introduction
Register transfers
Busing
Inter System Busing
Sequencing of control
Electronic Realization of control unit
The conditional transfer

MODULE 2

Study of AHPL
Introduction to a Hardware Programming Language (AHPL) (4 hrs)
Introduction
Operand Conventions
AHPL Operators
AHPL Modules
AHPL Statements
Using Combinational Logic Units
Combinational Logic Unit Descriptions
Handling of Memory Arrays in AHPL
A Timing refinement

Machine Organization and hardware programs (4 hrs)
Introduction
Basic Organization Of RIC
Register Transfers
Fetch and Address Cycles
Execute Cycles for Addressed Instructions
Register Only Instructions
Branch commands
Special Purpose Instructions

Hardware realizations (3 hrs)
Introduction
Starting, Stopping And Resetting
Hardware Compilers

MODULE 3

Micro Programmed Control
Microprogramming (4 hrs)
Introduction
Controlling the Microprogram
A Microprogrammable RIC
Flags And Special Bits
Microcoding
An Assembly Language for Microprograms

High speed addition (3 hrs)
Introduction
Ripple- Carry Adder
The Minimum Delay Adder
The Carry Look-Ahead Principle
Group Carry Look-Ahead
Section Carry Look-Ahead
CL Unit Description of Look-Ahead
Multiplication and division (2 hrs)
Signed Multiplication
Division

Floating Point arithmetic. (2 hrs)
Introduction
Notation and Format
Floating Point Addition and Subtraction
Floating Point Multiplication and Division
Hardware Organization Floating Point Arithmetic

MODULE 4

Introduction to VLSI Design
Introduction to MOS Technology (3 hrs)
Introduction to Integrated Circuit Technology
Basic MOS Transistors
Enhancement/depletion Mode Transistor Action
nMOS Fabrication
CMOS Fabrication

Electrical properties of MOS (4 hrs)
Drain to Source Current v/s voltage Relationships
Aspects of MOS transistor threshold voltage
MOS transistor transconductance & o/p conductance
MOS transistor figure of merit
The Pass Transistor
The nMOS Inverter
The CMOS Inverter

MOS circuit design process. (4 hrs)
MOS Layers
Stick Diagrams
nMOS Design Style
CMOS Design style
Design Rules and Layout
General Observations on Design Rules
Layout Diagrams

TEXT BOOKS

1. Digital Systems, Hardware Organization and Design - By Hill and Peterson, John Wiley & Sons. Third Edition, ISBN 0-471-85936-2
2. Computer Architecture and Organization - By J. P. Hayes, McGraw Hill, Third Edition ISBN 0-07-027355-3
3. Basic VLSI Design- By Douglas Pucknell, PHI, Third Edition ISBN 81-203-0986-3

REFERENCE BOOKS

1. Computer Engineering and Hardware Design-By Morris Mano PHI. ISBN 0-162710-4
2. Principles of CMOS VLSI Design - By Niel Weste & Kamran Eshraghian, Addision Wesley Second Edition ISBN 81-7808-222-5

CE 5.5DBMS DATABASE MANAGEMENT SYSTEM

Course Objective: This course introduces Database Management System (DBMS) which is computer software designed for the purpose of managing databases. It is a collection of programs that enables you to store, modify, and extract information from a database. The students will learn Database concepts, Data Models, various approaches to Database Design, Relational Model, Optimization principles and Control.

Instructional Objective:
At the end of the course the student will be able to:

- Understand the key concepts and terminology of RDBMS
- Learn the basics of database modeling.
- Understand database design and normalization techniques.
- Implement access to the data using various techniques.
- Know the strategies and methods for query processing, optimization, database transaction processing and security.

Lectures per week : 3+1+2
Max. Marks for Theory paper : 100
Max. Marks for Practical : 50
Max. Marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered : 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

(10 Hours)

Introduction
General Introduction to database systems;
Database-DBMS distinction,
Approaches to building a database
Implications of the Database Approach

Data Modeling
Data models, Schemas and Instances
Three-schema architecture of a database
Database Languages and Interfaces

E/R Model
Conceptual data modeling - motivation,
Entities, Entity types,
Various types of attributes,
Relationships, Relationship types,
E/R diagram notation,

Extended ER Diagram
Examples.

MODULE 2

(12 Hours)

Relational Data Model

Concept of relations, Schema-instance distinction,
Keys, referential integrity and foreign keys.

Relational Algebra Operators

Selection, Projection, Cross product,
Various types of joins, Division, Example queries,
Tuple Relational Calculus
Domain relational Calculus
Converting the database specification in E/R notation to the relational schema.

SQL

Introduction

Data definition in SQL,
Table, key and foreign key definitions,
Update behaviors.

Querying in SQL

Basic select- from- where block and its semantics,
Nested queries - correlated and uncorrelated,
Notion of aggregation,
Aggregation functions group by and having clauses,
Embedded SQL.

Views

Specification of views in SQL
Embedded SQL & Dynamic SQL

Security mechanism with related Commands.

Other Relational languages:

QBE (Query-By-Example)

Relational Database Design:

Pitfalls
Functional dependencies
Closure of set of FD's
Closure of attribute set
Canonical cover
Keys

MODULE 3

(12Hours)

Dependencies and Normal forms

Importance of a good schema design,
Problems encountered with bad schema designs,
Motivation for normal forms
Normal Forms: 1NF, 2NF, 3NF and BCNF
Domain key Normal form DKNF
Multi-valued dependencies and 4NF
Join dependencies and definition of 5NF

Query Processing

Measures of query cost selection
Translating SQL queries into Relational algebra
Sorting
Join
Nested Loop Join
Block Nested Loop Join
Merge Join
Hybrid-Hash Join

Using Heuristics in Query Optimization

Query tree
Query graph
Converting query trees into Query evaluation plan

MODULE 4

(10 Hrs)

Transaction processing and Error recovery

Concepts of transaction processing
ACID properties
Schedules and Recoverability
Serializability of Schedules

Concurrency Control

Concurrency control
Locking based protocols for CC

Text Books:

1. Fundamentals of Database Systems – By Elmasri & Navathe, Third Edition, Addison Wesley
2. Database System Concepts, Abraham Silberschatz, Henry F. Korth, Third Edition, Mc Graw Hill

Reference Books:

1. An Introduction to Data Base Systems Pearson Education, C. J. Date, Addison Wesley
2. An Introduction to Database Concepts, Desai B, Galgotia

CE5.6OS OPERATING SYSTEM

Course Objective: The Operating System is a program that acts as an intermediary between a computer user and the computer hardware. The primary aims of an operating system are resource management, scheduling and access control. This course aims to describe the fundamental concepts behind operating systems, and examine the ways in which its design goals can be achieved.

Instructional Objective:
At the end of the course, the students should know:

- The fundamental concepts of operating systems, its evolution and various architectures.
- The terminologies associated with operating system concepts such as processes, threads, concurrency control, synchronization, CPU scheduling and semaphores.
- The general concepts and algorithms used in process management, deadlock handling, memory management, file systems, I/O systems and security.
- Implementation specific issues based on the Linux and Windows Operating Systems.

Lectures per week	**:**	**3+1+2**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction (1Hr)
What is an Operating System?
Types of Operating Systems

Process management (9 Hrs)
Processes
Process description and control
What is a process?
Process description
Unix SVR4 process management

Threads
Processes and threads.
Microkernels
Windows Threads
Linux Process and Thread management

CPU Scheduling
Basic Concepts
Scheduling Criteria
Scheduling Algorithms
FCFS
SJF
SRTF / SRTN
Priority Scheduling
Round Robin Scheduling
Multilevel Queue Scheduling
Multilevel Feedback Queue Scheduling
Fair Share Scheduling
Multiprocessor Scheduling
Real – Time Scheduling
Linux Scheduling
Unix SVR4 Scheduling
Windows Scheduling

Mutual Exclusion & Synchronization
Principles of Concurrency
Mutual Exclusion hardware support
Semaphores
Producer – Consumer problem
Readers – Writers problem
Dining philosophers Problem
(solution using semaphores)
Critical regions and conditional critical regions
Monitors
Dining philosophers Problem
(Solution using monitors)
Message Passing
Unix concurrency mechanics
Linux Kernel Concurrency Mechanics
Windows Concurrency mechanics

MODULE 2

Deadlocks (3 Hrs)
System model
Deadlock characterization
Methods for handling deadlocks
Deadlock Prevention
Deadlock Avoidance
Deadlock Detection
Recovery from deadlock

Memory Management (4Hrs)
Background
Logical v/s Physical address space
Swapping
Contiguous allocation
Paging
Basic method
Structure of the page table
Multilevel paging
Inverted page table
Shared pages
Segmentations
Protection & Sharing
Fragmentations

Virtual Memory (4Hrs)
Demand Paging
Operating system software
Fetch policy
Placement Policy
Replacement Policy
Resident set management
Cleaning Policy
Load control
Thrashing
Unix Memory Management
Linux Memory Management
Windows Memory Management

MODULE 3

File System Interface (3Hrs)
File Concept
Access methods
Directory Structure
Unix File Management
Linux File Management
Windows File Management

I/O Systems (4Hrs)
I/O Hardware
Application I/O Interface
Kernel I/O subsystem
Operating system design issues
Unix SVR4 I/O
Linux I/O
Windows I/O

Secondary Storage structure (3Hrs)
Disk structure
Disk scheduling
Disk management
Swap – Space management

MODULE 4

Security (3Hrs)
Security threats
Protection
Intruders
Malicious software
Windows security

Linux Commands (7 Hrs)
Shell Programming in UNIX/LINUX
Getting Started
Understanding the Unix commands
General purpose utilities
The file system
Handling ordinary files
Basic file attributes
The Shell
Simple Filters
Filters using regular expressions
Essential Shell Programming

TEXT BOOKS

1. The Operating System Concepts – By Silberschatz and Galvin, Wesley Publishing Co., Addison Wesley. ISBN-0-201-35251-6
2. Operating Systems – By W Stallings. Prentice Hall of India. ISBN-978-81-203-2796-2
3. UNIX – Concepts and applications – By Sumitabha Das, Tata McGraw Hill

REFERENCE BOOKS

1. Operating systems, Design and implementation – By A.S Tanenbaum,PHI.
2. Operating Systems – By Milenkovic, Tata McGraw Hill.
3. Operating Systems – By Achyut S. Godbole, Tata McGraw Hill.
4. The Design of the UNIX Operating System – By Maurice J. Bach, PHI
5. Linux Kernel Internals – By M Beck, H Bohme, M Dziadzka, U Kunitz, R Magnus, D Verworner, Addison Wesley
6. Unix System Programming using C++, Terence Chan, PHI

CE6.1MADF MODERN ALGORITHM DESIGN FOUNDATION

Course Objectives: This course teaches techniques for the design and analysis of efficient algorithms, emphasizing methods useful in practice. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems.

Instructional Objective:
At the end of the course, the students would be familiar with the following:

- Sorting; search trees, heaps, and hashing
- Divide-and-Conquer
- Greedy Method; Dynamic programming; Backtracking; Branch and Bound
- Graph algorithms; shortest paths
- Internet and Network algorithms.

Lectures per week	**:**	**3+0+0**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module).

Module 1

Introduction to analysis of algorithm (5hrs)
Design and analysis fundamentals.
Performance analysis ,space and time complexity.
Growth of function – Big-O, Omega, theta notation.
Mathematical background for algorithm analysis.
Randomized and recursive algorithm

Divide and Conquer (6hrs)
General method , Binary search, finding the min and max.
Merge sort analysis.
Quick sort, performance measurement.
Randomized version of quick sort and analysis.
Partitioned algorithm selection sort, radix sort, efficiency considerations.
Strassen's matrix multiplication.

Module 2

Greedy Method (6hrs)
General method.
Knapsack problem.
Minimum cost spanning tree- Kruskal and Prim's algorithms, performance analysis.
Single source shortest path .
Job sequencing with deadlines.
Optimal storage on tapes.

Dynamic Programming (4hrs)
The general method
Multistage graphs, all pair shortest paths, single source shortest paths
Optimal BST ,0/1 knapsack
TSP, flow shop scheduling

Module 3

Backtracking (5hrs)
The general method.
8 Queens problem , sum of subsets.
Graph coloring, Hamiltonian cycles.
Knapsack problem.
Branch and Bound (5hrs)
The method, LC search.
15 puzzle: An example.
Bounding and FIFO branch and bound .
LC branch and bound .
0/1 knapsack problem.
TP efficiency considerations

Module 4

Internet Algorithms (6hrs)
Strings and patterns matching algorithm. Tries.
Text compression.
Text similarity testing.

Network Algorithms(6hrs)
Complexity measures and models
Fundamental Distributed Algorithms
Broadcast and Unicast Routing
Multicast routing

Text Books:

1. Fundamentals of computer Algorithms by Ellis Horowitz, Sarataj Sahni, S. Rajsekaran. University Press.
2. Algorithm Design Foundation, Analysis and Internet Examples by Michael Goodrich & Roberto Tamassia,, Second Edition, Wiley student Edition.

Reference Books:

1. Introduction to Algorithms by T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, 2nd Edition, MIT Press/McGraw Hill, 2001
2. Introduction to the Design and Analysis of Algorithms by Anany V. Levitin, Pearson Education publication, Second Edition.

CE 6.2OOSE OBJECT ORIENTED SOFTWARE ENGINEERING

Course Objective: This course addresses current issues and practices in object oriented software engineering with an emphasis on the software development process. Topics covered include concepts and terminology, the software development process, software planning and management, software requirements specifications, system modeling, quality specifications, program specifications, software design approaches.

Instructional Objective:
By the end of this course, student should be able to:

- Specify a software system.
- Create an object-oriented design for it.
- Implement it with readable, reusable, modular, object-oriented techniques.
- Test for validity, correctness and completeness.
- Understand and use software project management.

Lectures per week	**:**	**3+0+2**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module).

Module 1

Introduction to Software Engineering (2 hrs)
Scope of software engineering-
Historical aspects
Economic aspects
Maintenance aspects
Specification and design aspects
Team programming aspects

The Software Process- (2 hrs)
Client, Developer and User
Phases of SDLC Life Cycle
- Requirement phase
- Specification phase
- Design phase
- Implementation phase
- Integration phase
- Maintenance phase

Software Life Cycle Models (3 hrs)

Build and Fix Model
Waterfall
Rapid Prototyping Model
Incremental Model
Extreme Programming
Synchronize and Stabilize Model
Spiral Model
Object Oriented Life Cycle Model

Software Metrics(2 hrs)
Capability Maturity Model

Estimating Duration and Cost (2 hrs)
Metrics for size of product
Techniques for cost estimation and models

Teams (2 hrs)
Team Organization
Democratic Team Approach
Classical chief Programmer Team Approach
Synchronize and Stabilize Teams

Module 2

Object Oriented Software Engineering (4hrs)

Object Oriented System Development
Object Oriented Terminology
Types of Cohesion
Types of Coupling
Data Encapsulation
Software re-usability
Portability
Interoperability
CASE tools in use for Object Oriented Software Engineering

Requirement Phase (1hr)
Techniques for Requirement Elicitation and Analysis
Metrics for Requirement Phase
Testing and CASE tools for Requirement Phase

Specification Phase (2 hrs)
Specification Document
Metrics for Specification Phase
Testing and CASE tools for Specification Phase

Analysis Phase(2 hrs)
OO Analysis
Use Case Modeling
Class Modeling
Dynamic Modeling
Testing and CASE tools for Analysis Phase

Design Phase (2 hrs)
Action oriented Design and Abstraction
DFA
Data Oriented Design
Object Oriented Design
Testing and CASE tools for Design Phase

Module 3

Software Quality Assurance (3 hrs)
Quality Concepts
Quality Movement
Software Reviews
Formal Technical Reviews
Formal Approaches to SQA
Statistical SQA
Software Reliability
SQA Plan

Software Testing (3 hrs)
Fundamentals
Test Case Designs
White Box Testing
Basic Path Testing
Control Structure Testing
Black Box Testing
Testing for specialized environment

Software Testing Strategies (2 hrs)
Strategic Approach to Software Testing
Strategic Issues
Unit Testing
Integration Testing
Validation Testing
Organizational approaches to testing,
Software testing tools- for classical engineering and object oriented engineering
Software testing standards

Object Oriented Testing (2 hrs)

Module 4

Software Project management: (10 hrs)
Managing software project
Project planning
Process planning-
Standard process
Requirement change management
Quality Planning
Risk management

Project management plan
Team structure
Communication
Team development and configuration management.
Project execution
Project monitoring and control Project Closure
Performing closure analysis,
Closure analysis report.

Text Books:

1. Object Oriented and Classical Software Engineering- Stephen R.Schah(TMH)
2. Software Project Management in practice- Pankaj Jalote- PEA

Reference Books:

1. Software Engineering – A practitioner's approach – by Roger S. Pressman, McGraw Hill
2. A discipline for Software Engineering – by Watts S. Humprey, Pearson Education
3. Software Engineering – by K. K. Aggarwal and Yogesh Singh, New Age Publications
4. 'Ed-Kit'- Software testing in real world. Addison Wesley 1995
5. Effective methods for software testing(second edition) John-Wiley 1999
6. Software testing techniques(2^{nd} edition) Van Nostrand Rein loud 1990
7. The art of software testing, Jon Wiley Mayers G.J.

CE 6.3AI ARTIFICIAL INTELLIGENCE

Course Objectives: Artificial Intelligence (AI) is the area of computer science focusing on creating machines that can engage on behaviors that humans consider intelligent. The course focuses on different heuristic algorithms, knowledge representation, machine learning and planning algorithms, expert system design and neural networks**.**

Instructional Objectives:
At the end of this course, the student will be able to:

- Formulate and assess problems in artificial intelligence.
- Understand several methods for representing knowledge.
- Assess the strengths and weaknesses of several AI algorithms in areas such as heuristic search, game search, logical inference, statistical inference, decision theory, planning, machine learning, neural networks, and natural language processing.

Lectures per week : 3+1+2
Max. Marks for Theory paper : 100
Max. Marks for Practical : 50
Max. Marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered : 5
(At least one question from each module with two compulsory questions from any one module.)

Module – 1

Introduction to AI and Techniques (2hrs)
Problems, Problem Spaces and Search (4hrs)
Defining the Problem
Production Systems
Problem characteristics
Production System Characteristics
Design Issues
Problem Solving (4hrs)
Heuristic Search Techniques
Hill Climbing
Best First Search, A*, OR graphs
Problem Reduction - AND-OR-Graph, AO*
Means Ends Analysis (2hrs)

Module -2

Knowledge Representation(3hrs)
Representation and Mapping
Approaches to knowledge Representation

Predicate Logic (4hrs)
Representing simple facts and logic
Representing instance and ISA relationship
Computable functions and predicates
Resolution

Symbolic Reasoning under uncertainty(3hrs)
Introduction to non-monotonic Reasoning
Logic for non-monotonic Reasoning
Weak slot and filter structures(2hrs)
Semantic nets
Frames
Strong Slot and Filter Structures (2hrs)
Conceptual dependency
Scripts

Module -3

Game Playing (2hr)
MiniMax Search Procedure
Adding alpha-beta cut offs
Planning (3hrs)
Overview
An example domain: Blocks world
Components of a planning system
Goal Stack Planning (2hrs)
Non –linear Planning
Hierarchical Planning
Introduction to natural language processing (1hrs)

Module 4

Learning (4hrs)
Inductive learning
Learning Decision Trees
Types of learning (4hrs)
Rote learning
Learning by taking advice
Learning in problem solving, Version Space
Expert Systems (2hrs)
Representing and using domain Knowledge
Expert System Shells
Knowledge Acquisition Explanation
Introduction to Neural Networks (2hrs)

Text Books:

1. Artificial Intelligence by Elaine Rich and Kevin Knight, TMH
2. Artificial Intelligence, a Modern Approach by Struart Russell and Peter Norvig,

References:

1. Artificial Intelligence: A new Synthesis by Nils J. Nillson, Harcourt Asia
2. Artificial Intelligence by Patrick Winston ,Pearson Education
3. Prolog Programming for Artificial Intelligence by Ivan Brakto, Pearson Education"
4. Decision Support Systems and Intelligent Systems by Efraim Turban "
5. George F. Luger "Artificial Intelligence : Structures and strategies for complex problem solving", Pearson education

CE 6.4CG COMPUTER GRAPHICS

Course Objectives:

- This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
- A thorough introduction to computer graphics techniques, including 3D modeling, rendering and animation. Topics cover: geometric transformations, geometric algorithms, 3D object models (surface and volume), visible surface detection algorithms, image synthesis, shading and mapping, global illumination and animation techniques
- Course material is structured to meet the needs of both designers and users of interactive computer graphics systems.

Instructional Objectives:

At the end of this course, the student will be able to:

- Describe the purpose of Computer Graphics and its applications
- Discuss picture generation procedures by examining device level algorithms and discuss various attributes that control the appearance of displayed primitives
- Describe and implement methods for performing 2-Dimentional geometric transformations.
- Describe the concept of 3-Dimentional Graphics and methods for performing 3-Dimensional geometric transformations.
- Discuss basic illumination models and surface rendering algorithms.

Lectures per week : 3+1+2
Max. Marks for Theory paper : 100
Max. Marks for Practical : 50
Max. Marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered : 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Overview of graphic systems (3hrs)

Video display devices
Refresh cathode ray tubes
Raster scan displays
Random scan displays
Color CRT monitors
Direct view storage tubes
Flat panel Displays
Raster scans systems
Random scan systems
Input devices
Keyboard
Mouse
Trackball and Space ball
Joystick
Image scanners
Touch panels
Light pens

Output Primitives (5 hrs)
Points and lines
Line drawing algorithms
DDA
Bresenhams line algorithm
Circle generating algorithms
Properties of circles
Midpoint circle algorithm
Ellipse generating algorithm
Properties of Ellipses
Midpoint ellipse algorithm
Filled area primitives
Scan line polygon Fill algorithm
Inside – outside tests
Scan line fill of curved boundary
Boundary fill algorithm
Flood fill algorithm
Fill area functions

Attributes of Output Primitives (3 hrs)
Line Attributes
Line type
Line width
Pen and brush options
Line color
Curve attributes
Color and grayscale levels
Color tables
Grayscales
Area fill attributes
Fill styles
Pattern fill
Soft fill
Character attributes
Text attributes
Marker attributes
Antialiasing
Super sampling straight line
Segments
Pixel-weighting masks
Area sampling straight line
Segments
Filtering techniques
Pixel phasing
Compensating for line intensity differences
Anti aliasing area boundaries

MODULE 2

Two Dimensional Geometric Transformations (2 hrs)
Basic Transformations
Translation
Rotation
Scaling
Composite transformation
Translations
Rotations
Scaling
Other transformations
Shear

Two-Dimensional Viewing(4 hrs)
The viewing pipeline
Viewing coordinate reference frame
Window to viewport coordinate transformation
2-D viewing functions
Clipping operations
Point Clipping
Line clipping
Cohen- Sutherland Line Clipping
Polygon Clipping
Sutherland Hodgeman Polygon clipping
Weiler- Atherton Polygon Clipping
Other polygon clipping algorithm
Curve clipping
Text clipping

Clipping and Windowing
Midpoint Subdivision

Graphical User Interface and Interactive Input Methods (2 hrs)T1
Input to Graphical Data
Logical classification of Input devices
Locator devices
Stroke devices
String devices
Valuator devices
Choice devices
Pick devices

Graphical Input Devices (1 hr)
Pointing and positioning Devices
The Mouse
Tablets
The Light Pen

Graphical Input Techniques (1 hr)
Introduction
Positioning Techniques
Pointing and Selection
Inking and Painting
Event Handling (1hr)
Introduction
Polling
Interrupts
The Event Queue
Light-Pen Interrupts
Input functions (1 hr)
Dragging and Fixing
Hit Detection
On-Line Character Recognizers

Raster Graphics Fundamentals(2 hr)
Introduction
Generating a Raster Image: The Frame Buffer Display
Representing a Raster Image
Scan Converting Line Drawings
Displaying Characters
Natural Images

Window and View port
World Coordinates
Screen Coordinates
Normalized Screen Coordinates
Device Coordinates

Clipping
Example of Cohen-Sutherland Clipping Method
Problems on Cohen-Sutherland Clipping Method
Example of Mid Point Method

Modelling Transformations
Problems based on all Transformations

MODULE 3

Three Dimensional Concepts(2 hrs)
3- Dimensional display methods
Parallel projections
Perspective projection
Depth cueing
Surface rendering
Exploded and cutaway views

Three Dimensional Object representations (1 hr)
Polygon surfaces
Polygon tables
Blobby objects
Three Dimensional Geometric and Modeling transformations (1 hr)
Translation
Rotation
Coordinate Axes rotations
Scaling
Reflections
Shears

Three Dimensional Viewing (1 hr)
Viewing pipeline
Viewing coordinates
Transformation from world to viewing coordinates
Projections.

A Simple Graphics Package(1 hr)
Ground Rules for a Graphics Software Design
Functional Domains
Graphic Primitives
Windowing Functions
Miscellaneous Functions

Picture Structure (1 hr)
Defining Symbols By Procedures
Display Procedures
Boxing
Advantages and Limitations of Display Procedures
Structured Display Files

Realism In The Three-Dimensional Graphics
Techniques for Achieving Realism

Curves And Surfaces (1 hr)
Shape Description Requirements
Parametric Functions
Bezier Methods
B-Spline Methods

Three-Dimensional Transformations and Perspective (1hr)
Transformations
Three-Dimensional clipping

MODULE 4

Visible - surface Detection Methods (3 hrs)
Classification of visible – surface detection algorithms
Back – Face detection
Depth buffer method
A – Buffer method
Scan – Line method
Depth Sorting method
BSP- Tree method
Area Sub-division method
Octree method

Illumination Models and Surface- Rendering Methods(2 hrs)
Light sources
Basic illumination models
Ambient light
Diffuse reflection
Specular reflection and the Phong model
Combined Diffuse and specular reflections with multiple light sources
Halftone pattern and Dithering techniques
Halftone approximations
Dithering techniques
Gouraud shading
Phong shading

Color Models and Color Applications (2 hrs)
Properties of light
Standard primaries and the Chromaticity Diagram
XYZ Color model
CIE Chromaticity Diagram
RGB color model
YIQ Color Model
CMY Color Model
HSV Color Model
HLS Color Model

Computer Animation (2 hrs)
Design of animation sequences
General computer animation functions
Raster Animations
Computer animation languages
Motion specification
Direct motion specification
Goal directed systems
Kinematics and dynamics

Display Processors (1 hr)
The simple Refresh Line-Drawing Display
Random-Scan Storage-Tube Displays
The Unbuffered High- Performance Display
The Buffered High- Performance Display
Device-Independent Graphics Systems (1 hr)
Device Independence
Graphics System Design

User Interface Design(1 hr)
Components of the User Interface
The Users Model

TEXT BOOKS

1. Computer Graphics – By Donald Hearn and M. P. Baker, Prentice Hall of India Pvt. Ltd. ISBN-81-203-0944-8. (Syllabus topics covered as per 2nd edition) T1
2. Principles of Interactive Graphics – By William Newman and Robert Sproull, Tata McGraw hill Publishing company Ltd. ISBN-0-07-463293-0 (Syllabus topics covered as per 2nd edition) T2

REFERENCE BOOKS

1. Introduction to Computer Graphics – By N. Krishnamurthy, TMH (R1)
2. Computer Graphics – By Steven Harrington, Tata McGraw Hill. (R2)
3. Compute Graphics: Principles and Practice – By Foley, Van Dam, Feiner and Hughes (R3)

CE 6.5 DEVICE INTERFACING AND PC MAINTENANCE

Course Objective: The objective of this course is to review various components of a desktop computer including input/output and other interfacing devices. After a thorough understanding of the system it enables the students to diagnose, detect and resolve practical problems in computer systems.

Instructional Objectives:

At the end of this course, the student should be able to:

- Thoroughly understand the inner workings of a computer system.
- Detect and resolve practical problems in computer devices such as mother board, processors, cache memory, RAM, ROM, different types of cards, storage media, display units, printer, input devices and other peripheral devices.

Lectures per week	**:**	**3+1+2**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module).

Module 1

8086 Interrupts and Interrupt Responses (3 Hrs)

Overview
An 8086 Interrupt Response Example
An 8086 Interrupt Program Example
8086 Interrupt types

8254 Software-Programmable Timer/ counter (4 Hrs)

Basic 8253 and 8254 operation
System Connections for an 8254 Timer/Counter
Initializing an 8254 Programmable Peripheral Device
8254 Counter Modes and Applications

8259A Priority Interrupt Controller: (3 Hrs)

8259A Overview and system Connections
8259A System Connections and Cascading
Initializing an 8259A

Module 2

BIOS and CMOS (4 Hrs)
Function of BIOS
CMOS set up utilities
BIOS and device drivers
Power-On self test (POST)

Motherboards (6 Hrs)
How motherboard works
Types of motherboards
Chipset varieties
Upgrading and installing motherboards
Trouble shooting motherboards

Module 3

Hard drive Technologies (4 Hrs)
How Hard drives work
Hard drive interfaces
Bios support: configuring CMOS and installing drivers
Troubleshooting Hard drive installation

Implementing Hard drives (3 Hrs)
Partitioning Hard drives
Formatting Hard drives
Maintaining and troubleshooting Hard drives

CD and DVD Media (3Hrs)
CD media
DVD media
Installing CD and DVD media Drives
Troubleshooting

Module 4

VideoT2 (4 Hrs)
CRT and LCD Displays
The video card
Installing and configuring video software
Troubleshooting video

SoundT2 (3Hrs)
How sound works in a PC
Getting the right sound card
Installing a sound card in a windows system
Troubleshooting sound

PrintersT2 (3Hrs)

Printer Technologies
The Laser printing process
Installing a printer in windows
Trouble shooting printers

Text books:

1. Microprocessors and Interfacing – Programming and Hardware
Author: Douglas V. Hall
Publishers: Tata McGraw-Hill Publishing Company Limited

2. A+ Guide to Managing and Troubleshooting PCs.
Authors: Michael Meyers, Scott Jernigan
Publishers: Tata McGraw-Hill Publishing Company Limited

Reference Book:

1. Troubleshooting, Maintaining and Repairing PCs
Author: Stephen J. Bigelow
Publishers: Tata McGraw-Hill Publishing Company Limited

2. Advanced Microprocessors and peripherals – Architecture, programming and Interfacing
Authors: Ajoy Kumar Ray, Kishor M. Bhurchandi
Publishers: Tata McGraw-Hill Publishing Company Limited

CE6.6 DC DATA COMMUNICATIONS

Course Objective: This course will focus on imparting knowledge about various components of data communications emphasizing on the physical layer and data link layer of the OSI stack. It also provides overview of computer networks .

Instructional Objectives:

At the end of the course, the student will:

- Understand the basic concepts of data communication components used at various transmission speeds.
- Identify the characteristics and analyze specific role of Data Communication technologies such as multiplexers, ISDN, ATM, wireless, satellite and fiber optic communication.
- Get an overview of 3G networks, LAN and WAN

Lectures per week	**:**	**3+0+2**
Max. Marks for Theory paper	**:**	**100**
Max. Marks for Sessionals	**:**	**20 + 5**
Duration of paper	**:**	**3 hours**
Total no. of modules	**:**	**4**
No. of questions from each module	**:**	**2**
Total no. of questions to be answered	**:**	**5**

(At least one question from each module with two compulsory questions from any one module).

MODULE 1

An overview of Data Communications (4 hrs)

The Importance of Data Communications
The First Data Communications Systems
Two-State Communications Systems
Early Communications Codes
Modern Codes
Teleprinters
Data Communications in Computing
Changes in the Industries
General Description of Data Communications Systems.

Terminal Devices (2 hrs)

PC Terminals
The Need for Speed
Data Transmission.

Messages and Transmission Channels (5 hrs)
Information as a Quantity
Bounded Medium
Unbounded Medium
Effects of Bandwidth on a Transmission Channel
Bandwidth Requirements for Signals
Carrier Systems.

MODULE 2

Asynchronous Modems and Interfaces (3 hrs)
Why Data Can't be Transmitted Directly
Solving the Problem with Modems
Analog Modulation
Interface and Signaling Standards
The RS-232 Interface
Asynchronous Modem Operations.

Synchronous Modems, Digital Transmission, and Service Units (3 hrs)
Synchronous Signaling and Standards
Typical Synchronous Components
High-Speed Modems
Access Control
Digital Transmission.

Multiplexing Techniques (1 hrs)
Sharing a Channel
Statistical Time-Division Multiplexing
Low-Speed Voice/Data Multiplexers

Fiber optic and satellite communications (4 hrs)
Introduction and Historical Perspective
Fundamentals of Fiber-Optic System
Fiber-Optic Subsystems and Components
Transmission Systems
Wavelength Division Multiplexing
Satellite Transmission System

MODULE 3

Protocols and Error Control (4 hrs)
Protocols Versus Interfaces
Elements of a Protocol
Teletypewriter Protocols
Convolutional Coding – Cyclic Redundancy Checks
Half-Duplex Protocols
Full-Duplex Protocols.

PC Communication Softwares (3 hrs)
Communication Program features
Dial-up Networking
Using Procomm Plus for Windows

WAN Architectures and Packet Networks (4 hrs)
The Open Systems Interconnect (OSI) Reference Model,
Protocol Layering,
Packet Networks,
Advantages of Packet Switching,
X.25 Packet Systems.
The X-Series of Recommended Standards.

MODULE 4

ISDN (4 hrs)
The Road to ISDN
ISDN Architecture
ISDN Implementation Standards
Growth and Adaptation of ISDN
Applications.

Asynchronous Transfer Mode (4 hrs)
Evolution
The Rationale for ATM and Its Underlying Technology
Architecture
Network Connections
The ATM Protocol Reference Model.

Wireless Transmission (3 hrs)
Mobile Wireless
Cellular Component Relationship
Internet Access
3G Networks.

TEXT BOOK

1. Understanding Data Communications by Gilbert Held, 7th Edition, Pearson Education.

REFERENCE BOOKS

1. Data Communications, Computer Networks and Open Systems by Fred Halsall, Pearson Education.
2. Data Communications and Networking by Behrouz Forouzan, Tata McGraw Hill Publications.
3. Data and Computer Communications by William Stallings, Pearson Education.