

## CE-501: DESIGN & ANALYSIS OF ALGORITHMS

| Teaching Scheme |      |       | Examination Scheme |         |     |       |           |         |       |             |
|-----------------|------|-------|--------------------|---------|-----|-------|-----------|---------|-------|-------------|
| Lect            | Prac | Total | Theory             |         |     |       | Practical |         |       | Grand Total |
|                 |      |       | Int Ass            | Sem End |     | Total | Int Ass   | Sem End | Total |             |
|                 |      |       |                    | Marks   | Hrs |       |           |         |       |             |
| 3               | 2    | 5     | 30                 | 70      | 3   | 100   | 25        | 25      | 50    | 150         |

### Elementary Algorithmics :

Problems & instances, efficiency of algorithms, average & worst case analyses, elementary operation, reasons for analyzing efficiency.

### Asymptotic Notation:

Big 'oh' notation, other asymptotic notation, conditional asymptotic notation, asymptotic notation with several parameters, operations on asymptotic notation.

### Models Of Computation:

Random Access Machines, computational complexity of RAM programs, a stored program model, abstractions of RAM - straight-line programs, Turing Machines, relationship between Turing Machines and RAM.

### Analysis Of Algorithms:

Analyzing control structures, barometer instructions, examples of their use, average-case analysis, amortized analysis.

### Solving Recurrences:

Intelligent guesswork, homogeneous recurrences, inhomogeneous recurrences, change of variable, range transformations, asymptotic recurrences, substitution method, iteration method, recurrence trees, master method & master theorem. Example analysis of heapsort & quicksort.

### Greedy Algorithms:

General characteristics of greedy algorithms and examples, applications: Kruskal's and Prim's algorithms, shortest path problem, knapsack problem, scheduling.

### Divide And Conquer:

Characteristics, the general template, applications: binary search, merge sort, quick sort, matrix multiplication.

### Dynamic Programming:

General characteristics and examples, principle of optimality, applications: binomial coefficients, making change, knapsack problem, floyd's algorithm, chained matrix multiplication. Approach using recursion, memory functions.

### Graph Algorithms:

Depth-first search, breadth-first search, topological ordering & sorting, backtracking, application of backtracking: knapsack problem. Branch & bound, application: the assignment problem, general considerations.

### Computational Complexity:

Introduction, information-theoretic arguments: complexity and sorting, complexity and algorithmics, introduction to NP completeness, the classes P and NP, polynomial reductions, NP complete problems.

### Reference Books:

1. Brassard & Bratley, Fundamentals of Algorithmics  
Prentice Hall of India
2. Cormen, Leiserson, Rivest, Introduction to Algorithms  
Prentice Hall of India

## CE-502: OBJECT ORIENTED ANALYSIS & DESIGN

| Teaching Scheme |      |       | Examination Scheme |         |     |       |           |         |       |             |
|-----------------|------|-------|--------------------|---------|-----|-------|-----------|---------|-------|-------------|
| Lect            | Prac | Total | Theory             |         |     |       | Practical |         |       | Grand Total |
|                 |      |       | Int Ass            | Sem End |     | Total | Int Ass   | Sem End | Total |             |
|                 |      |       |                    | Marks   | Hrs |       |           |         |       |             |
| 3               | 2    | 5     | 30                 | 70      | 3   | 100   | 25        | 25      | 50    | 150         |

**Introduction:**

Overview Of OOL; Object Classes; Meta Types. Object Oriented Methodologies; The Unified Approach Modeling; Why Modeling? Static And Dynamic Models; Functional Models.

**Complexity:**

The inherent complexity of software, The structure of complex system, on designing complex systems.

**The Object Model:**

The evolution of object model, Elements of the object model, Applying the object model.

**Basic Object Modeling:**

Multiplicity. Constraints. Aggregation. Component.

**Object Modeling:**

Object. Links. Association. Inheritance. Grouping Constructs; Problems On Object Modeling; Advantages Of Object Modeling.

**Analysis:**

Problem Analysis. Problem Domain Classes. Identify Classes And Objects Of Real World Problems. Using Use Case Analysis; Recording Analysis.

**Classes and Objects:**

The nature of object, Relationship among objects, The nature of classes, Relationship among classes, The interplay among classes and objects, On building quality classes and objects.

**Classification:**

The importance of proper classification, Identifying classes and objects, Key abstraction and mechanisms.

**The Notation:**

Elements of the notations, Class diagrams, State transition diagrams:, Object diagrams, Interaction diagrams, Module diagram, Process diagram.

**The Process:**

First principles, The micro development process, The macro development process

**Reference Books:**

1. The UML Users guide  
By Grady Booch, J. Rambaugh, Ivar Jacobson, Pearson Education
2. Object Oriented Modeling and Design  
By J. Rambaugh, etal., Pearson Education
3. Object Oriented System Development  
By Ali Bahrami, McGraw Hill.

## CE-503: COMPUTER GRAPHICS

| Teaching Scheme |      |       | Examination Scheme |         |     |       |           |         |       |             |
|-----------------|------|-------|--------------------|---------|-----|-------|-----------|---------|-------|-------------|
| Lect            | Prac | Total | Theory             |         |     |       | Practical |         |       | Grand Total |
|                 |      |       | Int Ass            | Sem End |     | Total | Int Ass   | Sem End | Total |             |
|                 |      |       |                    | Marks   | Hrs |       |           |         |       |             |
| 3               | 2    | 5     | 30                 | 70      | 3   | 100   | 25        | 25      | 50    | 150         |

**Introduction:**

What is Computer Graphics? Application of Computer Graphics, Workstation Device.

**Overview of Graphics System:**

Video Display Devices, Raster Scan System, Random Scan System, Input Devices.

**Output Primitives:**

Points and Lines, DDA Algorithm, Bresenham's Line Algorithm, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm, Filled Area Primitives,

**Attributes Of Output Primitives:**

Line Attributes, Antialiasing.

**2 D Geometric Transformations:**

Basic Transformation Matrix Representation and Homogeneous Coordinates, Composite Transformation, Reflection, Shear, Transformation Between Coordinate System, Raster Methods for Transformation.

**2 D Viewing:**

Window-to-View port Coordinate Transformation, Line Clipping Algorithms, Curve Clipping Text Clipping, Exterior Clipping.

**Structures And Hierarchical Modeling:**

Structure Concepts, Editing Structures, Basic Modeling Concepts.

**Graphical User Interfaces And Interactive Input Methods:**

Logical Classification of Input Devices, Input Functions, Virtual Reality Environment.

**3 D Concepts:**

Parallel Projection, Perspective Projection, Depth Cueing, Surface Rendering, Three-Dimensional and Stereoscopic Views

**3 D Object Representations:**

Fractal Geometry Methods

**3 D Geometric and Modeling Transformation:** Translation, Rotation, Scaling

Reflection, Shears, Composite Transformation, 3 D Transformation Functions, Modeling and Coordinates Transformations.

**3 D Viewing:**

Viewing Pipeline, Viewing Coordinates, Parallel Projections, Perspective Projection, General Parallel-Projection Transformation, General Parallel-Projection Transformation.

**Visible Surface Detection Methods:**

Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer Methods, A-Buffer Methods, Scan-Line Method.

**Color Models And Color Applications:**

Properties of Light, XYZ Color Model, CIE Color Model, RGB Color Model, YIQ Color Model, CMY Color Model, HSV Color Model, HLS Color Model, Conversion between HSV and RGB Models.

**Computer Animation:**

Morphing.

**Reference Books:**

1. Computer Graphic  
By D.Hearn And P.Baker
2. Graphics: Principles And Practice.  
By J.Foley, A. Van Dam, S. Feiner, and J. Hughes
3. Principles of Elements for Computer Graphics  
By David Rogers, McGraw Hill
4. Procedural elements for Computer Graphics  
By David Rogers, McGraw Hill
5. Programmer's guide to the EGA/BGA  
By Sutty and Blair, BPB publication

## CE504: COMPUTER NETWORKS

| Teaching Scheme |      |       | Examination Scheme |         |     |       |           |         |       |             |
|-----------------|------|-------|--------------------|---------|-----|-------|-----------|---------|-------|-------------|
| Lect            | Prac | Total | Theory             |         |     |       | Practical |         |       | Grand Total |
|                 |      |       | Int Ass            | Sem End |     | Total | Int Ass   | Sem End | Total |             |
|                 |      |       |                    | Marks   | Hrs |       |           |         |       |             |
| 4               | 2    | 6     | 30                 | 70      | 3   | 100   | 25        | 25      | 50    | 150         |

### OVERVIEW OF COMPUTER NETWORKS

#### What is Computer Networks?

#### Diff between networks & Distributed Systems

#### Uses of Computer Networks:

Networks for Companies, Networks for People

#### Network Categories:

Transmission Technology based, LANs, MANs, WANs, Wireless Networks, Internetworks, Service based.

#### Network Models:

Layered Tasks, Internet Model, OSI Model

#### Example Networks:

Novell Netware, The ARPANET, NSFNET, Internet, Different ways to access Internet, Gigabit Testbeds.

### PHYSICAL LAYER

#### Basics of Data Communication:

Bandwidth Limited Signals, Data Rate of a Channel, Digital Transmission, Analog Transmission

#### Transmission Media:

Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable, Fiber Optics.

#### Wireless Transmission:

Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared, Light Transmission.

#### Telephone System:

Structure of the Telephone System, Local Loop, Trunks and Multiplexing.

#### Isdn:

ISDN Service, Architecture and Interfaces, Broadband ISDN.

### Data Link Layer

#### Design Issues:

Services Provided to Network Layer, Framing, Error Control, Flow Control.

#### Error Detection & Correction:

Error-Correcting Codes, Error Detecting Codes.

#### Elementary Protocols:

Unrestricted Simplex Protocol, Stop and Wait Simplex Protocol.

#### Sliding Window Protocols:

One bit Sliding Window, Go Back n, Selective Repeat.

**Example Data Link Layer Protocol:**

HDLC

**Medium Access:**

Multiple Access Protocols, ALOHA, CSMA/CD, Collision Free Protocols

**Local Area Networks:**

Technology and Transmission Media, LAN Protocol Architecture, Bridges, Layer 2 and Layer 3 Switches, IEEE 802.3 Ethernet LAN, 802.4:Token Bus, 802.5: Token Ring. Comparison of 802.3, 802.4 and 802.5, FDDI, 802.11

**Wide Area Networks:**

Circuit Switching & Packet Switching, Switching Networks, Control Signalling, Packet Switching Principles, X.25, Frame Relay.

**Network Layer:**

Design Issues, Introduction to Routing, Virtual Circuits, Connectionless Internetworking, Tunneling, Fragmentation, IP Addressing Scheme, IP, Subnetworking, IPv6.  
ARP, RARP

**Routing Algorithms:**

Shortest Path, Flooding, Flow Based.

**Transport Layer:**

Process to Process Delivery, Client-server Paradigm, Addressing, Multiplexing and Demultiplexing, Establishing a Connection, Releasing a Connection, User Datagram Protocol, TCP: Service Model, Connection Management, Silly Window Syndrome.

**Application Layer:**

Introduction to Internet services

**Reference Books:**

1. Computer Networks  
By Andrew S. Tanenbaum. Prentice Hall India
2. Data & Computer Communications : Seventh Edition  
By William Stallings. Prentice Hall India
3. Data Communication & Networking : Third Edition  
By Behrouz A. Forouzan. Tata McGraw Hill

## CE505: COMPUTER ARCHITECTURE

| Teaching Scheme |      |       | Examination Scheme |         |     |       |           |         |       |             |
|-----------------|------|-------|--------------------|---------|-----|-------|-----------|---------|-------|-------------|
| Lect            | Prac | Total | Theory             |         |     |       | Practical |         |       | Grand Total |
|                 |      |       | Int Ass            | Sem End |     | Total | Int Ass   | Sem End | Total |             |
|                 |      |       |                    | Marks   | Hrs |       |           |         |       |             |
| 3               | 2    | 5     | 30                 | 70      | 3   | 100   | 25        | 25      | 50    | 150         |

### **Basic Computer Organization and Design:**

Instruction Codes, Computer Registers, Computer Instructions, Timing and control, Instruction cycle.

### **Micro programmed Control:**

Control Memory, Address sequencing, Micro program example, Design of control unit.

### **Central Processing Unit:**

Introduction, General register organization, Stack organization, Instruction formats, Addressing modes, Data Transfer and manipulation, Program control, Reduced Instruction Set Computer.

### **Pipeline And Vector Processing:**

Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, RISC pipeline, Vector processing, Array processors.

### **Input-Output Organization:**

Peripheral devices, Input-Output interface, Modes of Transfer, Priority interrupt, Direct memory access, Input-Output Processor, Serial communication.

### **Memory Organization:**

Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Memory management hardware.

### **Multiprocessors:**

Characteristics of multiprocessors, Interconnection structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache coherence.

### **Reference Books:**

1. Computer System Architecture : Third edition  
By M. Morris Mano
2. Computer Organization And Design  
By P. Pal Chaudhury
3. Computer Organization  
By Carl Hamacher

## CE506: ECONOMICS & MANAGEMENT

| Teaching Scheme |              |       | Examination Scheme |         |     |       |           |            |       |                |
|-----------------|--------------|-------|--------------------|---------|-----|-------|-----------|------------|-------|----------------|
| Lect            | Prac/<br>Tut | Total | Theory             |         |     |       | Practical |            |       | Grand<br>Total |
|                 |              |       | Int<br>Ass         | Sem End |     | Total | Int Ass   | Sem<br>End | Total |                |
|                 |              |       |                    | Marks   | Hrs |       |           |            |       |                |
| 3               | -            | 4     | 30                 | 70      | 3   | 100   | -         | -          | -     | 100            |

### Economics

#### Introduction:

Elements of Economics, Direct and Indirect Expenses, Overheads, Theory of Profit, Cost Control and Cost Reduction

#### Economics Applied To Industries:

Demand & Supply, Marginal Pricing

#### Engineering Economics:

Tools for Engineering Economics, Operational Research, Value Engineering, Value Analysis, Economic Theories, Budget and Budgetary control, Foreign Exchange and Foreign Trade

### Management

#### Introduction:

Definition of Management, The Organisation and its external environment, Social Responsibility & Ethics

#### Planning:

Planning and Controlling, Strategic Planning, Decision making, Team Work, Group Decision Making

#### Organisation:

Nature of Organisation, Entrepreneur engineering, Business Reengineering, Organisation structuring, Effective Organisation and Organisation culture

#### Human Resource Management:

Introduction to Human Resource Management, Staffing, System approach to Human Resource Management

#### Controlling & Information Technology:

The system & Process of Controlling, Control techniques and Information Technology, Introduction to E-Commerce, M-Commerce, B2B, B2C, C2B, C2C,

#### Quality Management:

Quality management and Introduction to SIX Sigma

### Reference Books:

1. Industrial Organisation & Engineering Economics  
By T. R. Banga & S. C. Sharma
2. Essentials of Management : 6<sup>th</sup> Edition  
By Harold Koontz & Heinz Weihrich
3. Engineering Management  
By Fraidon Mazda

**CE 507: Mini project-1**

| Teaching Scheme |      |       | Examination Scheme |         |     |       |           |         |       |             |    |
|-----------------|------|-------|--------------------|---------|-----|-------|-----------|---------|-------|-------------|----|
| Lect            | Prac | Total | Theory             |         |     |       | Practical |         |       | Grand Total |    |
|                 |      |       | Int Ass            | Sem End |     | Total | Int Ass   | Sem End | Total |             |    |
|                 |      |       |                    | Marks   | Hrs |       |           |         |       |             |    |
|                 | 2    | 2     |                    |         |     |       |           | 25      | 25    | 50          | 50 |

Students have to do project under guidance of faculty and have to submit their project definition and planning at the starting of the semester and evaluation is done periodically throughout the semester.