B.Tech Programme

COMPUTER SCIENCE AND ENGINEERING

CURRICULUM
AND
SYLLABUS (III Semester to VIII Semester)
Pondicherry University  
B.Tech - Curriculum  
Computer Science and Engineering  
Effective from 2009-2010  

I Semester

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* To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.

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* Under Pass/Fail option only and not accounted for CGPA calculation
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Electives for Sixth Semester

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2. CS E62  Network Design and Management
3. CS E63  E-Business
4. CS E64  Bio Informatics
5. CS E65  Information Theory and Coding Techniques
6. CS E66  Language  Technologies
7. CS E67  Unix Internals
8. CS E68  Data Mining and Warehousing
9. CS E69  Advanced Databases
10. CS E610 Resource  Management Techniques
11. CS E611 Agile Technologies
12. CS E612 Java Script

Electives for Seventh  Semester

1. CS E71  Software Quality Assurance and Testing
2. CS E72  Component Engineering
3. CS E73  Client Server Computing
4. CS E74  Real Time Computing and Communication
5. CS E75  Software Architecture
6. CS E76  High Speed Networks
7. CS E77  N/W Protocols
8. CS E78  Modeling and Simulation
9. CS E79  Principles of Communication
10. CS E710 Software Project Management
11. CS E711 Radio Frequency Identification Technology
12. CS E712 Rational Unified Process

Electives for Eighth Semester

1. CS E81  Intelligent Information Retrieval
2. CS E82  Soft Computing
3. CS E83  Optical Networks
4. CS E84  Mobile Computing
5. CS E85  Grid Computing
6. CS E86  Agent Technology
7. CS E87  Organizational Behavior
8. CS E88  Digital System Design using VHDL
9. CS E89  Model Driven Architecture
10. CS E810 Refactoring Techniques
MA T31 MATHEMATICS – III

UNIT I

Laplace Transform: Definitions - Laplace transform of unit impulse and step functions - Laplace transform of periodic functions - Exponential shift formula- Initial and final value theorems - Laplace transform of derivatives and integrals - Convolution theorem - Inverse Laplace transform - Methods of determining inverse Laplace transform - Solution of linear differential equations using Laplace transforms. (12 Hours)

UNIT II

Function of a Complex Variable: Functions of a complex variable - continuity, derivative and analytic function - Cauchy - Riemann equations – Necessary and sufficient conditions for analyticity - Harmonic and orthogonal properties of real and imaginary parts - Conformal mapping - Bilinear transformations. (12 Hours)

UNIT III

Complex Integration: Cauchy’s theorem - Cauchy’s integral formula - Taylor’s and Laurent series - Residue theorem - Contour integration round the unit circle and semi-circular contour. (12 Hours)

UNIT IV

Fourier Series: Dirichlet’s conditions - Expansion of periodic functions into Fourier series- Change of interval- Half-range Fourier series. (10 Hours)

UNIT V

Complex form of Fourier series - Root mean square value - Parseval’s theorem on Fourier coefficients - Harmonic analysis.

Fourier Transform: Definition and properties - Fourier Integral theorem - statement - Fourier sine transform and cosine transforms - Inverse Fourier transform. (12 Hours)
TEXT BOOKS


REFERENCES

CS T32 ELECTRONIC DEVICES AND CIRCUITS

UNIT I


UNIT II


UNIT III

Large Signal Amplifiers: Amplifier types – Class A amplifier – Series fed and transformer coupled – Class B and Class AB amplifiers – Conversion efficiency – Amplifier distortion – Class C amplifier.

UNIT IV

Feedback Amplifiers: Feedback concept, general characteristics of negative feedback amplifiers, Types of feedback, comparison of parameters.

Oscillators: Barkhausen Criterion - Hartley, Colpitts and Wein bridge oscillators, crystal oscillator - Frequency stability.

UNIT V

TEXT BOOKS


REFERENCES

UNIT I

Analysis of Electrical Circuits: Loop and mesh method of analysis Theorems - Thevenin’s and Norton’s theorem – superposition theorem - maximum power transfer theorem – Applications to DC and AC circuits.

UNIT II


UNIT III


UNIT IV

DC Machines: DC generator – construction - principle of operation - EMF equation – classification of DC generators - DC motors - Torque equation - commutation starters - Swinburne’s test - Losses and Efficiency of DC machines - Speed control applications of DC machines.

UNIT V

TEXT BOOKS


REFERENCES

CS T34 DIGITAL SYSTEM DESIGN

UNIT I

Number Systems and Boolean Algebra: Revision of RTL, DTL, $\overline{\text{I}}L$, TTL, ECL, MOS, CMOS logic families - Binary number systems and conversion - Binary arithmetic-Binary codes - Boolean algebra - Basic operations - Basic Theorems - Boolean functions-Canonical forms - Simplification of Boolean functions-Karnaugh maps - Tabulation method.

UNIT II


UNIT III


UNIT IV

Memory and Programmable Logic: Random access memory – memory decoding - error detection and correction – Read only memory – Programmable Logic Array – Programmable Array Logic. Introduction to CPLDs, FPGAs


UNIT V

Introduction to VHDL (Very High Speed Integrated Circuit Hardware Description Language): Introduction – VHDL Design flow, program structure, types and constants, functions and procedures, libraries and packages – VHDL for combinational circuits, Sequential Circuits, Registers and Counters, VHDL description for binary multiplier.
TEXT BOOK


REFERENCES

CS T35 DATA STRUCTURES

UNIT I

**Introduction:** Algorithmic notation – Programming principles – Creating programs - Analyzing programs.

**Arrays:** One dimensional array, multidimensional array, pointer arrays.

**Searching:** Linear search, Binary Search, Fibonacci search.

UNIT II

**Stacks:** Primitive operations, Application of stacks.

**Queues:** Primitive operations - Priority queues - De queues – Applications.

**Linked list:** Singly Linked List, Doubly Linked List, Circular Linked List, linked stacks, Linked queues, Applications of Linked List – Dynamic storage management – Generalized list - Garbage Collection and Compaction.

UNIT III

**Trees:** Binary tree, Terminology, Representation, Traversal, Types, Applications.

**Graph:** Terminology, Representation, Traversals – Applications - spanning trees, shortest path and Transitive closure, Topological sort.

**Sets:** Representation - Operations on sets – Applications.

UNIT IV

**Tables:** Rectangular tables - Jagged tables – Inverted tables - Symbol tables – Static tree tables - Dynamic tree tables - Hash tables.

**Sorting techniques:** Internal sorting - Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, Radix Sort.

**External sorting:** External storage devices – Sorting with tapes and disks.
UNIT V

Files: queries - Sequential organization – Index techniques.

B Trees: B Tree indexing, operations on a B Tree, Lower and upper bounds of a B Tree - B + Tree Indexing – Trie Tree Indexing.

TEXT BOOKS


REFERENCES

UNIT I


Implementation Issues: Introduction – Structured Coding techniques: single entry and single exit constructs, Efficiency consideration, Validation of single entry and single exit, Coding Style.

UNIT II

Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, Development in programming methodologies, desirable features and design issues.

Programming Language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.

UNIT III

Data types: Properties of types and objects – elementary data types – structured data types.

Abstraction: Abstract data types – encapsulation by subprograms – type definition – storage management.

UNIT IV

Sequence Control: Implicit and explicit sequence control – sequencing with arithmetic and non-arithmetic expressions – sequence control between statements. Subprograms Control: Subprogram sequence control – attributes of data control – shared data in.

UNIT V

Object Oriented Programming: The class notion - Information hiding and data abstraction using classes, derived classes and inheritance, Polymorphism, Parameterized types.

Logic Programming: Formal logical systems – PROLOG.

TEXT BOOK


REFERENCES

LIST OF EXPERIMENTS

ELECTRICAL

1. OC and SC test on transformers
2. Load test on single phase transformers
3. Load test on 3-phase transformers
4. Power measurement through two wattmeter method
5. Load test on DC shunt motor and Speed control of DC shunt motor
6. Load test on single phase induction motor
7. RLC series resonance
8. Verification of theorems (Thevenin, Norton, super position, reciprocity)

ELECTRONICS

1. VI characteristics of Semiconductor and Zener diodes
2. Application of Diodes (clippers, clampers, rectifiers)
3. Static characteristics of common emitter transistor configuration and determination of h parameters.
4. Drain characteristics of FET and determination of Drain resistance, Mutual conductance and Amplification factor.
5. V.I. Characteristics of silicon controlled rectifier and Uni-Junction transistor.
7. Class B push – pull power amplifier and to find the efficiency as a function of load.
8. Applications of Operational amplifier
   a) Adder and subtractor
   b) Integrator and differentiator
   c) Wien’s bridge oscillator and R.C Phase shift.
I. Implementation of logic circuits using gates

1. Adders/Subtractors
2. Implementation of logic functions using universal gates only
3. Design of Priority Encoder
4. Design of Mux, Demultiplexer
5. Code Converters
6. Parity Generator and Checker

II. Implementation of circuits using MSI

1. Decimal Adder
2. Binary Multiplier
3. Design of Arithmetic unit
4. Synchronous Counters
5. Asynchronous Counters
6. Universal Shift Register

III. Interface experiments with MSI

1. Design of ALU
2. Interface of ALU with Memory

IV. Implementation of logic circuits using Very High Speed Integrated Circuit Hardware Description Language

2. Sequential Circuits – Counters, Shift Registers.
CS P33 DATA STRUCTURES LABORATORY

LIST OF EXPERIMENTS

1. Searching algorithms - sequential, binary and Fibonacci search algorithms on an ordered list (any two). Compare the number of key comparisons made during the searches.
2. Sorting algorithms (any five): Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort.
4. Evaluation of arithmetic expression.
5. Queue, circular queue, priority queue, Dequeue.
7. Tree traversal techniques.
8. The graph traversal techniques.
9. Dijkstra’s algorithm to obtain the shortest paths.
10. Use of hash tables.
11. B-Tree Indexing.
UNIT I

Connectives, Statement formulae, Equivalence of Statement formulae, Functionally complete set of connectives - NAND and NOR connectives, implication, Principal conjunctive and disjunctive normal forms.

UNIT II

Inference calculus - Derivation process - Conditional proof - Indirect method of proof- Automatic theorem proving - Predicate calculus.

UNIT III

Partial ordering – Lattices – Properties - Lattices as algebraic system - sub lattices - Direct product and homomorphism - Special lattices - Complemented and Distributive lattices.

UNIT IV


UNIT V

Trees - properties of Trees - Pendant vertices in a Tree - Distance and Center in a Tree – rooted and binary trees - spanning trees - Fundamental Circuits - Distance between spanning trees shortest spanning trees - Kruskal algorithm.
TEXT BOOKS


REFERENCES

CS T42 MICROPROCESSORS AND MICROCONTROLLERS

UNIT I


UNIT II

Intel 8085 Interrupts and DMA: 8085 Interrupts – Software and Hardware Interrupts – 8259 Programmable Interrupt Controller - Data Transfer Techniques – Synchronous, Asynchronous and Direct Memory Access (DMA) and 8237 DMA Controller- 8253 Programmable Interval Timer.

UNIT III


UNIT IV


UNIT V

TEXT BOOKS


REFERENCE BOOKS


UNIT I

**Finite Automata and Regular Expressions:** Formal Languages and Regular expressions, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ε-moves, Equivalence of NFA and DFA, Minimization of finite automata, Two-way finite automata, Moore and Mealy machines, Applications of finite automata.

UNIT II


UNIT III

**Pushdown Automata and Parsing Algorithms:** Pushdown Automata and Context-Free Languages; Top-down parsing and Bottom-up parsing, Properties of CFL, Applications of Pumping Lemma, Closure properties of CFL and decision algorithms.

UNIT IV


UNIT V

**Introduction to Computational Complexity:** Time and Space complexity of TMs – Complexity classes – Introduction to NP-Hardness and NP-Completeness.
TEXT BOOK


REFERENCES

UNIT I

Algorithms: Definitions and notations: standard notations - asymptotic notations – worst case, best case and average case analysis; big oh, small oh, omega and theta notations; Recursive algorithms, analysis of non-recursive and recursive algorithms, solving recurrence equations, analyzing control structures.

Analysis of Sorting and Searching: Heap, shell, radix, insertion, selection and bubble sort; sequential, binary and Fibonacci search.

UNIT II


UNIT III


Basic Search and Traversal technique: Techniques for binary trees and graphs – AND/OR graphs – biconnected components – topological sorting.

UNIT IV


UNIT V

TEXTBOOK


REFERENCES

UNIT I

UNIT II

UNIT III
Introduction to JAVA – Features – Data Types –Classes, Objects and methods – Inheritance.


UNIT IV
Multithreading – Applets - JDBC database programming – Introduction to Servlets – Network Programming – RMI.

UNIT V
Byte code Interpretation - Customizing application - Data Structures - Collection classes. Activation - Object serialization -Distributed garbage collection - JINI overview.

Note: UNIT I and UNIT II have to be dealt in C++ and remaining three units are to be dealt in JAVA.
TEXT BOOKS


REFERENCES

UNIT I


UNIT II

**Micro programmed Control:** Control Memory-Address sequencing- Micro program Example – Design of control unit.

**Processor Organization:** general register organization – stack organization – instruction formats – addressing modes – data transfer and manipulation – program control.

**Computer Arithmetic:** Addition, Subtraction, Multiplication, Division algorithms- Floating point arithmetic operations- Decimal arithmetic operations.

UNIT III

**Memory Organization:** Memory hierarchy – main memory – auxiliary memory – Associate memory – Cache memory – Virtual memory.

UNIT IV


UNIT V

**Parallel Processing:** Multiple processor organizations – Symmetric Multi processors – Cache coherence and MESI protocol – Clusters – Non Uniform Memory Access – Vector Computation.
TEXT BOOKS


REFERENCES

Experiment Using 8085 Microprocessor

1. Study of 8085 Microprocessor Trainer Kit
2. 8-bit Arithmetic Operations
   (Addition, Subtraction, Multiplication and Division)
3. Block Operations
   (Move, Exchange, Compare, Insert and Delete)
4. Code Conversions
5. Digital Clock simulation
6. Moving Display
7. Printer interfacing
8. Serial Communication
9. Interrupt Programming
10. Elevator Simulation
11. Traffic Light Control

Experiments Using 8086 Microprocessor with MASM

12. Arithmetic Operations
13. Sorting and Searching

Experiments Using 8051 Microcontroller

15. Arithmetic operations
16. ADC & DAC Interfacing
17. Stepper Motor and DC Motor Interface
LIST OF EXPERIMENTS

1. Implementation of sorting algorithms with analysis of time and space complexity.
2. Implementation of searching algorithms with analysis of time and space complexity.
5. Solving problems using Dynamic Programming technique.
6. Implementation of Traversal techniques.
8. Implementation of Branch-and-Bound technique.
CS P43 OBJECT ORIENTED PROGRAMMING LANGUAGES LABORATORY

Cycle 1: Experiments to be implemented in C++
1. Classes, objects and namespaces
2. Constructors & destructors
3. Operator overloading
4. Inheritance
5. Polymorphism & Virtual functions,
6. Exception handling
7. Templates
8. I/O streams

Cycle 2: Experiments to be implemented in JAVA
9. Inheritance
10. Package and Interfaces
11. Exception Handling
12. Collections
13. Multithreaded Programming
14. Files and Sockets
15. AWT and Applets
16. Swing
17. Event Handling
18. RMI
SP P 44 PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students

1. The activities will include games and sports / extension lectures.
2. Two Hrs. / Week will be allocated for physical education in the third and fourth semesters. Minimum of 75% attendance is mandatory.
3. These activities will be monitored by the Director of Physical Education.
4. Pass /Fail will be determined on the basis of participation, attendance, and performance. If a candidate Fails, he/she has to repeat the course in the subsequent years
5. Pass in this course is mandatory for the award of degree.
CS T51 OPERATING SYSTEMS

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V


TEXT BOOKS


REFERENCES

CS T52 LANGUAGE TRANSLATORS

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V


TEXT BOOKS


REFERENCES

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V


Ring Topology - Physical Ring – Logical Ring.
TEXT BOOK

REFERENCES
CS T54 PLATFORM TECHNOLOGY

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

**J2EE**: Enterprise Edition Overview - Multi-Tier Architecture - Best Practices-Comparison between J2EE and .NET
TEXT BOOKS

UNIT I


UNIT II

**Geometric Display Primitives and Attributes:** Geometric display primitives: Points, Lines and Polygons. Point display method – Line drawing: DDA

**2D Transformations and Viewing:** Transformations - types – matrix representation – Concatenation - Scaling, Rotation, Translation, Shearing, Mirroring. Homogeneous coordinates – Window to viewport transformations.

**Windowing And Clipping:** Point, Lines, Polygons - boundary intersection methods

UNIT III


UNIT IV


UNIT V

TEXTBOOK


REFERENCES

CS T56 EMBEDDED SYSTEMS

UNIT I
**Introduction to Embedded System:** Components of Embedded System – Classification - Characteristic of embedded system- Microprocessors & Micro controllers- Introduction to embedded processors - Embedded software architectures: Simple control loop - Interrupt controlled system - Cooperative multitasking - Preemptive multitasking or multi-threading - Micro kernels and exokernels - Monolithic kernels - Exotic custom operating systems.

UNIT II
**Embedded Hardware Architecture – 32 Bit Microcontrollers:** ARM 2 TDMI core based 32 Bit microcontrollers and family of processors, Register, Memory and Data transfer, Arithmetic and Logic instructions, Assembly Language, I/O operations interrupt structure, ARM cache. ARM Bus, Embedded systems with ARM. **Networks for Embedded systems:** Serial bus protocols: The CAN bus, and the USB bus, Parallel bus protocols: The PCI Bus and GPIB bus,

UNIT III

UNIT IV

UNIT V
**Study of Micro C/OS-II or Vx Works:** RTOS System Level Functions – Task Service Functions – Time Delay Functions – Memory Allocation Related Functions – Semaphore Related Functions – Mailbox Related Functions – Queue Related Functions – Case Studies of Programming with RTOS.
TEXT BOOKS

REFERENCES
LIST OF EXPERIMENTS

1. Implementation of a socket program for Echo/Ping/Talk commands.
2. Creation of a socket (TCP) between two computers and enable file transfer between them.
3. Implementation of a program for Remote Command Execution (Two M/Cs may be used).
4. Implementation of a program for CRC and Hamming code for error handling.
5. Writing a code for simulating Sliding Window Protocols.
6. Create a socket for HTTP for web page upload & Download.
7. Write a program for TCP module Implementation.(TCP services).
8. Write a program for File Transfer in client-server architecture using following methods:
   a) TCP/IP
   b) UDP
9. Write a program to implement RMI (Remote Method Invocation).
10. Implementation (using ns2/Glomosim) and Performance evaluation of the following routing protocols:
    a) Shortest path routing
    b) Flooding
    c) Link State
    d) Hierarchical
11. Broadcast/Multicast routing.
12. Implementation of ARP.
13. Study of IEEE 802.3 protocol.
14. Throughput comparison between 802.3 and 802.11.
15. Study of Key distribution and Certification schemes.
CS P52 PLATFORM TECHNOLOGY LABORATORY

Programs using C#.NET

1. Classes and Objects, Inheritance, Polymorphism
2. Interfaces, Operator Overloading, Delegates and Events
3. Exception Handling, Multi-Threading
4. Ado .NET

Program using VB .NET

5. Console & Windows Forms
6. Layout Managers & Containers
7. SDI & MDI
8. Database Controls

Application any one of the following or similar application using .NET framework

- Inventory Control
- Retail Shop Management
- Employee Information System
- Personal Assistant Program
- Students’ Information System
- Ticket Reservation System
- Hotel Management System
- Hospital Management System
LIST OF EXPERIMENTS

10. Study of basic UNIX/Linux commands.
12. Programs using the following system calls of UNIX/Linux operating system:
   fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
13. Programs using the I/O system calls of UNIX operating system:
   open, read, write, etc).
14. Simulations of UNIX/Linux commands like ls, grep, etc.
15. Simulation of processes scheduling algorithms.
17. Simulation of basic memory management schemes.
18. Simulation of virtual memory management schemes.
19. Simulation of disk scheduling algorithms
20. Simulation of file systems.
21. Develop an application using any RTOS.
HS P54 GENERAL PROFICIENCY - I

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

Aptitude: Verbal and Numerical Aptitude.
REFERENCES

CS T61 DATABASE MANAGEMENT SYSTEMS

UNIT I
Relational Databases: Relational Model – SQL – Advanced SQL – Other Relational Languages.

UNIT II

UNIT III

UNIT IV
Transaction Management: Transactions – Concurrency Control – Recovery System.

UNIT V
(Only the concepts that are covered in UNITS I to IV).
TEXT BOOK

Note: Chapters 2-8, 11 - 17, 26 - 29 (Only the portions that are relevant to the concepts covered in chapters 2 - 8 and 11 - 17) and Appendix C

REFERENCES
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCE BOOKS
UNIT I
Internet Principles and Components: History of the Internet and World Wide Web- – HTML - protocols – HTTP, SMTP, POP3, MIME, IMAP. Domain Name Server, Web Browsers and Web Servers, Dynamic HTML.,

UNIT II

UNIT III
XML and ActiveX: Anatomy of xml document - XML markup-working with elements and attributes - creating valid documents-xml objects and DOM. ActiveX controls: OLE and ActiveX -ActiveX Documents, Server side Active-X Components, ActiveX DLL and ActiveX Exe.

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCES
CS P61 DATABASE MANAGEMENT SYSTEMS LABORATORY

Experiments are to be carried out in DB2 / ORACLE and VB/ Open source DBMS package with the required front end software


2. Study of SQL: Primitive Data Types – User Defined data Types – Built-in Functions – Parts of Speech of create, alter, drop, select, insert, delete, update, commit, rollback, save point, grant, revoke.


5. Application: Design and develop any two of the following:
   - Library Information System
   - Logistics Management System
   - Students’ Information System
   - Ticket Reservation System
   - Hotel Management System
   - Hospital Management System
   - Inventory Control
   - Retail Shop Management
   - Employee Information System
   - Payroll System
   - Any other Similar System

   Clearly mention the scope of the system. Use standard tools for expressing the design of the systems.
LIST OF EXPERIMENTS

1. Creation of HTML Files
2. Working with Client Side Scripting
   2.1 VBScript
   2.2 JavaScript
3. Configuration of web servers
   3.1 Apache Web Server
   3.2 Internet Information Server (IIS)
4. Working with ActiveX Controls in web documents.
5. Experiments in Java Server Pages
   5.1 Implementing MVC Architecture using Servlets
   5.2 Data Access Programming (using ADO)
   5.3 Session and Application objects
   5.4 File System Management
6. Working with other Server Side Scripting
   6.1 Active Server Pages
   6.2 Java Servlets
   6.3 PHP
7. Experiments in Ajax Programming
8. Developing Web Services
9. Developing any E-commerce application (Mini Project)
CS P61 Mini Project using CASE Tools

The following documents for the Mini Project are to be prepared. Implementation is to be done by adopting software engineering methodology. For preparing documents and implementation the CASE tools are to be used wherever applicable. Use any open source CASE tool. Many of them are available at www.sourceforge.net. Other CASE tool, as per choice can also be used. Object oriented design approach is to be adopted. After implementation a report is to be prepared and submitted.

1. **Project Planning**: Thorough study of the problem, Identification project scope , objectives, Infrastructure and cost estimation

2. **Software requirement Analysis**: Feasibility study - Documentation of all the requirements as specified by customer in convention Software Requirement Specification-

3. **Design and Development**: Preparation of use case, collaboration or sequence, class, object, package, deployment diagrams and coding of the project.

4. **Software Testing**: Prepare test plan, perform validation testing, Coverage analysis ,memory leaks develop test case hierarchy and Site check and Site monitor.
UNIT I

UNIT II
Writing: Job Application Letter Writing – Resume Writing.

UNIT III

UNIT IV
Adapting To Corporate Life: Corporate Etiquette – Grooming and Dressing.

UNIT V
Aptitude: Verbal and numerical aptitude.
REFERENCES
UNIT I


UNIT II

**Knowledge Representation:** Approaches and issues in knowledge representation- Knowledge - Based Agent- Propositional Logic – Predicate logic – Unification – Resolution - Weak slot - filler structure – Strong slot - filler structure.

UNIT III

**Reasoning under uncertainty:** Logics of non-monotonic reasoning - Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems-Bayesian networks – Dempster - Shafer Theory - Fuzzy Logic.

UNIT IV

**Planning and Learning:** Planning with state space search - conditional planning-continuous planning - Multi-Agent planning. Forms of learning - inductive learning - Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning

UNIT V

**Advanced Topics: Game Playing:** Minimax search procedure - Adding alpha-beta cutoffs.

**Expert System:** Representation - Expert System shells - Knowledge Acquisition.

**Robotics:** Hardware - Robotic Perception – Planning - Application domains.

**Swarm Intelligent Systems** – Ant Colony System, Development, Application and Working of Ant Colony System.
TEXT BOOKS

REFERENCES
CS T72 COMPUTER HARDWARE AND TROUBLESHOOTING

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
CS T73 DISTRIBUTED COMPUTING

UNIT I


UNIT II


Naming – Names, Identifiers, and addresses – Flat Naming - Structured Naming – Attribute based Naming.

UNIT III


UNIT IV


UNIT V

Distributed File Systems – Distributed web based systems – Distributed object based systems.
TEXT BOOK


REFERENCES

LIST OF EXPERIMENTS

1. Assembling of a Personal Computer:
   a. Identifying parts of mother board, power connections and locating other
      connectors.
   b. Interconnection of disk drive units, keyboard, mouse and monitor.

2. Hard disk partitioning and OS installation:
   a. Partitioning the hard disk using FDISK/ Partition Magic/ Disk Manager
   b. Installation of Windows 98/XP/2000
   c. Installation of Linux kernel (possibly with dual boot option).

3. Study of In-Circuit Emulator:
   a. The target processor could be 8085/8088/8031 depending on the availability.
   b. Learn the different commands and their usages.

4. Study of Logic Analyser:
   a. Standalone or PC based with multiple channels depending on availability.
   b. Capture important signals and perform timing/state analysis with a known
      processor environment.

5. Circuit Tracing: Using Multimeter and continuity test mode, to trace a given circuit
   board and draw the schematic.

6. Serial Communication: To establish serial communication (RS232C) between a pair
   of PCs. The program shall be developed using C/C++/MASM with functions
   provided by BIOS and DOS interrupt services.

7. Parallel port interfacing:
   a. To interface two PCs via ECP and perform file transfer using Direct Cable
      Connection feature of Windows OS
   b. To configure the 8255 ports of a given microprocessor trainer kit and interface
      with a printer.

8. Design of I/O interface: (With a microprocessor trainer kit)
   a. To design an output port to interface a given set of discrete LEDs/ 7-segment
      LEDs.
   b. To design an input port to interface a given set of switches.
9. Troubleshooting a given microprocessor trainer kit (with faults introduced) using Logic State/Timing analyzer and Multimeter.

10. Troubleshooting a given microprocessor trainer kit (with faults introduced) using In-Circuit Emulator, Multimeter, and CRO.

11. Simulation of a given circuit using PSPICE circuit simulator.

12. Design of IC tester: To test a given digital IC. (Either a PC’s parallel port or 8255 port of a microprocessor trainer kit may be used for interfacing)

13. Floppy Disk Drive Interfacing: To interface the control signals of a given FDD and test their functionality either using a PC or a microprocessor trainer kit. (Drive Select test, Motor enable test, Track seek test, Write protect test)

14. Networking PCs: Installing NICs, configuring IP addresses, and interconnection using switches and cables.

15. Load testing of SMPS: Testing the given SMPS of a PC using a multimeter.
Distributed Computing Experiments

1. Simple exercises to learn the concept of RMI, Servlets, CORBA, COM and DCOM.
2. Finding Simple and Compound interest using RMI.
3. RMI-based implementation of Airline Reservation system.
4. Servlet-based implementation of Airline Reservation system.
5. Implementation of Mail Server.

Intelligent Computing Experiments

The following problems are to be solved using PROLOG /LISP.

1. Water Jug Problem (Using DFS and BFS).
2. Two Player Game (Using Heuristic Function).
4. AO* Algorithm.
6. Develop any Rule based system for an application of your choice.
CS P73 SEMINAR

Each one of the students will be assigned a Seminar Topic in the current and frontier areas. The student has to conduct a detailed study/survey on the assigned topic and prepare a report. The student will make an oral presentation followed by a brief question and answer session. The Seminar (presentation and report) will be evaluated by an internal assessment committee for a total of 100 marks.
CS P74 PROJECT WORK (PHASE-I)

The objective of the project is to enable the students to work in groups of not more than four members in each group on a project involving analytical, experimental, design or combination of these in the area of Computer Science and Engineering. Each project shall have a guide. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. The evaluation is based on continuous internal assessment by an internal assessment committee for 100 marks.
CS P75 INDUSTRIAL VISITS /TRAINING

During the course of study from 3rd to 7th semester each student is expected to undertake a minimum of four industrial visits or undertake a minimum of two weeks of industry/field training. The students are expected to submit a report, which shall be evaluated by an internal assessment committee at the end of seventh semester for 100 marks.
HS T81 ENGINEERING ECONOMICS AND MANAGEMENT

UNIT I

UNIT II
Introduction – Elementary Economic Analysis – Interest Formulas and their Applications - Comparisons – Present Worth Method – Future Worth Method – Annual Equivalent Method – Rate of Return Method

UNIT III

UNIT IV
Nature and Importance of Management - Development of Management Thought - Ethical and Environmental Foundations - Decision Making - Organizing and Staffing - Planning and Strategic Management – Leadership - Communicating and Controlling Managing Information

UNIT V
TEXT BOOK


REFERENCES


CS T82 HIGH PERFORMANCE COMPUTING

UNIT I


The need for parallel computers - models of computation - analyzing algorithms - expressing algorithms.

UNIT II


Basic Communication Operations: One-to-all broadcast and all-to-one reduction – all-to-all broadcast reduction – all-reduce and prefix-sum operations – scatter and gather – all-to-all personalized communication – circular shift – improving the speed of some communication operations.

UNIT III

Analytical Modeling of Parallel Programs: Sources of overhead in parallel programs – performance metrics for parallel systems – scalability of parallel systems – minimum execution time and minimum cost-optimal execution time.

Programming using the Message-Passing Paradigm: principles of message-passing programming – the building blocks – MPI – topologies and embedding – overlapping communication with computation – collective communication and computation operations – groups and communicators.

Programming Shared Address Space Platforms: Thread basics – synchronization primitives in Pthreads – controlling thread and synchronization attributes – composite synchronization constructs – tips for designing asynchronous programs – OpenMP.
UNIT IV

**Dense Matrix Algorithms**: Matrix-vector multiplication – matrix-matrix multiplication – solving a system of linear equations – FFT.


UNIT V

**Search Algorithms for Discrete Optimization Problems**: Definitions and examples, sequential search algorithms, search overhead factor, parallel depth-first search, parallel best-first search, speedup anomalies in parallel search algorithms.

**Dynamic Programming**: Overview.

TEXT BOOKS


REFERENCES

CS T83 INFORMATION SECURITY

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

TEXT BOOK


REFERENCES

Software to be used for the experiments: OpenMP, Matlab and ns2 and any programming language.

LIST OF EXPERIMENTS

1. Implementation of Dynamic Multicasting with Concurrency Control
3. Parallel implementation of Iterative Deepening A*.
4. Implementation of D* algorithm with spatial data structures.
5. Implementation of Deadlock Detection/Avoidance/Prevention in Distributed Systems.
6. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing with a menu driven program.
7. Implementation of Real-Time Scheduling over the exiting Network/Distributed Systems
8. Implement various Image Compression Algorithms.
9. Performing operations on image using any Image Editing Software.
10. Implementation of VOIP.
CS P82 PROJECT WORK (PHASE II)

Project work phase II will be an extension of the project work started in the seventh semester. On completion of the work, a project report should be prepared and submitted to the department. The project work and the report will be evaluated by an internal assessment committee for 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.
CS P83 COMPREHENSIVE VIVA-VOCE

The student will be tested for his understanding of basic principles of the core Computer Science and Engineering subjects. The internal assessment for a total of 50 marks will be made by an internal assessment committee. The committee will conduct two written examinations of objective or short questions type from all the core subjects. The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.
The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

1. Engineering Ethics – Moral issues, Ethical theories and their uses
2. Engineering as Experimentation – Code of Ethics
3. Engineer’s responsibility for safety
4. Responsibilities and rights
5. Global issues of engineering ethics

REFERENCE

UNIT I
Introduction: The system life cycle - Traditional life cycle models - The object-oriented approach - The Rational Unified Process (RUP) - The Unified Modeling Language (UML) - UML models - Introduction to the case study - Requirements for the Wheels case study system - Requirements engineering - Requirements elicitation - List of requirements for the Wheels system - Use cases - Use case diagram - Use case descriptions - Actors and actor descriptions - Use case relationships: communication association, include and extend - Boundary - Using the use case model in system development.

UNIT II
Objects and Classes: Basics – Object – classes - Relationships between classes - The class diagram - Stages in building a class diagram - Packages - Using the class diagram in system development.

UNIT III
Identifying functionality: Introduction - CRC cards and interaction diagrams - Identifying operations using the CRC card technique - Interaction diagrams - Specifying operations - Using the CRC cards and interaction diagrams in system development - State Diagrams - States and events - Constructing a state diagram - Using state diagrams in system development.

UNIT IV

UNIT V
TEXT BOOK

REFERENCES
CS E62 NETWORK DESIGN AND MANAGEMENT

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCE
CS E63 E-BUSINESS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCES
2. Bruce C. Brown, “How to Use the Internet to Advertise, Promote and Market Your Business or Website with Little or No Money”, Atlantic Publishing Company, 2006.
CS E64 BIOINFORMATICS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCE
UNIT I

UNIT II
Channel Capacity and Coding: Channel models, channel capacity, channel coding, information capacity theorem, random selection of codes. Error control coding: linear block codes and their properties, decoding of linear block code, perfect codes, haming codes, optimal linear codes and MDS codes.

UNIT III
Cyclic Codes: Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, burst error correction, fire codes, golay codes, CRC codes, circuit implementation of cyclic codes. BCH codes: minimal polynomials, generator polynomial for BCH codes, decoding of BCH codes, Reed-Solomon codes and nested codes.

UNIT IV
Convolution Codes: Tee codes and trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, generation function, matrix description of convolutional codes, viterbi decoding of convolutional codes, distance bounds for convolutional codes, turbo codes and turbo decoding.

UNIT V
Trellis Coded Modulation: Concept of coded modulation, mapping by set partitioning, Ungerboeck’s TCM design rules, TCM decoder, Performance evaluation for Additive White Gaussian Noise (AWGN) channel, TCM for fading channels.
TEXT BOOK

REFERENCES
CS E66 LANGUAGE TECHNOLOGIES

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
CS E67 UNIX INTERNALS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
CS E68 DATA MINING AND DATA WAREHOUSING

UNIT I
Data Preprocessing, Language, Architectures, Concept Description: Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

UNIT II

UNIT III
Classification and Prediction: Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT IV

UNIT V
Data Warehousing: Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation - Data Warehousing to Data Mining -Data warehousing components-building a data warehouse – mapping the data warehouse to an architecture - data extraction - cleanup- transformation tools- metadata – OLAP - Patterns and models - Data visualization principles.
**TEXT BOOKS**
1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India /Morgan Kauffman, 2001. (UNITs 1 to IV)

**REFERENCES**
CS E69 ADVANCED DATABASES

UNIT I
DBLC: Information system- SDLC- DBLC- Database Administration- Database administration
Object-Based databases and XML: Object Based Databases – XML.

UNIT II
Data Mining and Information Retrieval: Data Analysis and Mining – Information Retrieval.

UNIT III

UNIT IV
Other Topics: Advanced Application Development – Advanced Data Types and New Applications – Advanced Transaction Processing.

UNIT V
(Only the concepts that are covered in UNITs I to IV)
TEXT BOOK

REFERENCES
CS E610 RESOURCE MANAGEMENT TECHNIQUES

UNIT I

UNIT II
Inventory control: introduction-models of inventory-operations- discount-purchase inventory model-shortest limitation-purchase model-EOQ model-determination of stock level.

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCE
CS E611 AGILE TECHNOLOGIES

UNIT I
Iterative and Evolutionary: Definition – comparison - major activities.
Agile: Basic concepts - Major activities - available agile methods.
Story: Overview-estimated hours remaining.

UNIT II
Motivation: Change on software projects – key motivation-requirement challenge –problems of water fall.
Evidence: Research and early historical – standard and though leader-business case - water fall validity.

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCE
CS E612 JAVA SCRIPT

UNIT I
Introduction: Introduction to JavaScript - JavaScript Core Features – Overview. Core Language: Data Types and Variables - Operators, Expressions, and Statements - Functions.

UNIT II

UNIT III
Using JavaScript: Controlling Windows and Frames - Handling Documents - Form Handling

UNIT IV

UNIT V
Advanced Topics: JavaScript and Embedded Object - Remote JavaScript - JavaScript and XML.
TEXT BOOK

REFERENCES
CS E71 SOFTWARE QUALITY ASSURANCE AND TESTING

UNIT I

UNIT II
Testing Strategies: White box testing techniques - Statement coverage – Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis - Black box testing techniques - Boundary value analysis – Robustness testing - Equivalence partitioning - Syntax testing - Finite state testing.

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
CS E72 COMPONENT ENGINEERING

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCES
UNIT I
Client Server Operating System: Anatomy of server program - Server needs from OS - Server Scalability - Client Anatomy - Client need from OS - Client OS trends - Server OS trends.

UNIT II

UNIT III
SQL Database Server: Stored Procedure, Triggers and Rules - Database Connectivity Solutions - ODBC – Architecture – Components of ODBC.
Data Warehouse: Elements- Warehouse Hierarchies- Replication Vs Direct Access – Mechanics of Data Replication – Cleansing and Transforming the Raw Data - EIS/DSS.
Client Server Groupware: Groupware - Component of Groupware.

UNIT IV
Client Server Transaction Processing: ACID properties - Transaction Model - TP Monitor and Operating System - TP Monitor and Transaction Management - TP Monitor Client Server interaction types - Transactional RPCs, Queues and Conversations - TP lite or TP Heavy - TP lite Vs TP Heavy.

UNIT V
Client Server with Distributed Objects: Distributed Objects and Components - From Distributed Objects to Components - CORBA-Distributed objects CORBA style - Object Management Architecture - Intergalactic ORB - Object Services - Common Facilities - Business Objects - Next Generation - COM+ - Other Component bus - COM short history - COM 101 -OLE/DCOM.
TEXT BOOK

REFERENCES
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
**TEXT BOOKS**


**REFERENCES**

CS E75 SOFTWARE ARCHITECTURE

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
CS E76 HIGH SPEED NETWORKS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
CS E77 NETWORK PROTOCOL

UNIT I

UNIT II
Presentation Layer Protocol: LPP.
Session Layer protocols: RPC, SDP, SIP.
Transport Layer protocols: TCP, UDP, RDP, and RUDP.

UNIT III

UNIT IV

UNIT V
Network Security Protocols: SSH, RADIUS, SSL, Kerberos, TLS, IPSec, Voice over IP.
TEXT BOOKS

REFERENCES
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

REFERENCES
CS E79 PRINCIPLES OF COMMUNICATION

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Antennas (Qualitative Analysis): Basic antenna operation, Definition of antenna parameters -radiation pattern, radiation resistance, directive and power gain, directivity, beam width, polarization and bandwidth - UHF and microwave antenna types - Dipole antenna, horn and its types, parabolic reflector, micro strip antenna, Yagi Uda and array antenna.

TEXT BOOKS

REFERENCE
CS E710 SOFTWARE PROJECT MANAGEMENT

UNIT I
Introduction to software project management – Stepwise: an overview of project planning - project valuation.

UNIT II
Selection of appropriate project approach - software effort estimation - activity planning.

UNIT III
Risk management – resource allocation - monitoring and control.

UNIT IV
Managing contracts - managing people and organizing teams – software quality.

UNIT V

TEXT BOOK

REFERENCES
UNIT I
**Basics:** radio waves, EIRP, communication protocol.
**The EPC global Network:** Introduction, RFID, Electronic Product Code.

UNIT II
**Components of an RFID System:** Smart labels, middleware, dipole antenna.
**Bar Codes and RFID Tags:** UPC-A, Code 39, numeric digit.

UNIT III
**Applications:** Express Pay, track and trace, Wal-Mart.
**RFID in defense applications:** Department of Defense, Military logistics, CAGE code.

UNIT IV
**Pharmaceutical Industry:** Supply Chain Management, bullwhip effect, Tesco.
**Project:** Application Software, Middleware, cross-docking.

UNIT V
**Planning a Project:** SKUDD, data element, application software.
TEXT BOOK

REFERENCES
CSE E712 RATIONAL UNIFIED PROCESS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOK

REFERENCE
UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

TEXT BOOKS


REFERENCES

CS E82 SOFT COMPUTING

UNIT I
Introduction - Soft Computing Concept Explanation - Importance of Tolerance of Imprecision and Uncertainty - Biological and Artificial Neuron - Neural Networks - Adaline - Perceptron - Back Propagation Neural Networks - Feed forward Multilayer Networks.

UNIT II
Types of Neural Networks - Competitive Learning - Kohonen Maps - CPN - ART - Neocognitron Neural Networks - Neural Networks as Associative Memories: Hopfield and Bidirectional Associative Memory.

UNIT III

UNIT IV

UNIT V
TEXT BOOKS

CS E83 OPTICAL NETWORKS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXTBOOKS

REFERENCES
CS E84 MOBILE COMPUTING

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

TEXT BOOKS


REFERENCES

CS E85 GRID COMPUTING

UNIT I


UNIT II


UNIT III


UNIT IV

Application Integration - Grid-Enabling Network Services - Managing Grid Environments.

UNIT V


TEXTBOOK


REFERENCES

CS E86 AGENT TECHNOLOGY

UNIT I

**Agents Overview:** Agent definition – agent programming paradigms – Agents Vs objects – aglets – mobile agents – agent frame works – agent reasoning.

UNIT II


UNIT III


UNIT IV

**Intelligent Software Agents:** Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications.

UNIT V

TEXT BOOKS


REFERENCES

CS E87 ORGANIZATIONAL BEHAVIOUR

UNIT I

UNIT II

UNIT III

UNIT IV
Organizational Change and Stress Management.

UNIT V
Case Studies and Current Issues in Organizational Behaviour.
TEXT BOOK

REFERENCES
UNIT I
Introduction to HDLs: Difference between HDL and other software languages – Different HDLs in vogue. Overview of digital system design using HDL.
Basic VHDL Language Elements: Identifiers, Data objects, scalar and composite data types, Operators.


UNIT II
Data Flow Modeling with examples: Concurrent signal assignment statement, Concurrent versus sequential signal assignment, Delta delays, Multiple drivers, Conditional signal assignment statement, selected signal assignment statement, concurrent assertion statement.

Structural Modeling with examples: Component declaration, Component instantiation and examples, Direct instantiation of component.

UNIT III
Subprograms and Overloading: Functions and procedures with simple examples - subprogram overloading, Operator overloading.

Packages and Libraries: Package declaration, package body, design file, design libraries, order of analysis, implicit visibility, explicit visibility, library clause and use clause.

UNIT IV
Advanced Features: Entity statements, Generate statements, Attributes, Aggregate targets, ports and their behaviour.

Model Simulation: Simulation – Writing a Test Bench for a Half and a Full adder.

UNIT V
Hardware Modeling Examples: Modeling entity interfaces, Modeling simple elements, Different styles of modeling, Modeling regular structures, Modeling delays, Modeling conditional operations, Modeling a clock divider and a pulse counter.
TEXT BOOKS


REFERENCES

UNIT - I

UNIT II

UNIT-III


UNIT-IV


UNIT-V
TEXT BOOK

CS E810 REFACTORING TECHNIQUES

UNIT-I

Refactoring, a First Example: The Starting Point.-The First Step-Decomposing and Redistributing- Conditional Logic Vs on Price Code-Final Thoughts.

Principles in Refactoring: Defining Refactoring-need-problem-Design and Performance-evolution

Bad Smells in Code: Code requiring refactoring

UNIT-II


Toward a Catalog of Refactorings: Format - References- Maturity.

Composing Methods : Extract Method- Inline-query- Explaining Variable- Split-Remove Assignment -Media Object-Substitute

Moving Features Between Objects : Moving, Hiding, removing and introducing code

UNIT -III

Organizing Data :Data related refactoring

Simplifying Conditional Expressions. Refactoring required for conditional expression

Making Method Calls Simpler. Refactoring rules for methods of objects and classes

UNIT-IV

Dealing with Generalization. Refactoring rules for inheritance involving super and subclasses,delegation

Big Refactorings : Tease Apart Inheritance.-Convert Procedural Design to Objects-Separate Domain from Presentation-Extract Hierarchy.

UNIT -V

Refactoring, Reuse, and Reality: A Reality Check –reluctance - reality check-Resources and references-software reuse

TEXT BOOKS


REFERENCE

Pondicherry University

Infrastructure and Faculty Requirements for
B.Tech (Computer Science and Engineering)

Programme

II\textsuperscript{nd}, III\textsuperscript{rd} and IV\textsuperscript{th} Year

(With effect from 2009-2010)
Pondicherry University

Infrastructure and Faculty Requirements

B.Tech (Computer Science and Engineering) Programme

II\textsuperscript{nd}, III\textsuperscript{rd} and IV\textsuperscript{th} Year

(With effect from 2009-2010)

I. SPACE REQUIREMENTS:

(a) Class Room:

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Laboratory</th>
<th>Maximum Batch size</th>
<th>Area (Sq. m)</th>
<th>No. of Class rooms required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of class rooms required for each year</td>
<td>66</td>
<td>66</td>
<td>Round of to Next Higher Integer Number (Number students in the year of course /66)</td>
</tr>
</tbody>
</table>

(b) Laboratory:

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Laboratory+*</th>
<th>Area in Sqm for the Batch size of 33</th>
<th>Area in Sqm for the Batch size of 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lab 1/ Computing Lab1</td>
<td>110</td>
<td>73</td>
</tr>
<tr>
<td>2</td>
<td>Lab 2/ Hardware and Microprocessor Lab.</td>
<td>165</td>
<td>110</td>
</tr>
<tr>
<td>3</td>
<td>Lab 3 / Computing Lab 2</td>
<td>110</td>
<td>73</td>
</tr>
<tr>
<td>4</td>
<td>Lab 4 / Computing Lab 3</td>
<td>110</td>
<td>73</td>
</tr>
</tbody>
</table>

+A lab in the list may be arranged as more than one laboratory. In such a case that they should satisfy the area and other facility requirements that are required to conduct the laboratory courses

*All the laboratories are required from second year onwards. Year wise need of equipments is listed in section IV.

II. FACULTY REQUIREMENTS:

(a) Teaching Staff Strength:

The number of faculty members required as per AICTE norms and course curriculum

Faculty : student ratio = 1:15

Additional faculty members are required for handling the subjects of the other departments and first year as per the AICTE recommended workload.
Cadre ratio: Professor, Assistant Professor and Lecturer should be in the ratio of 1:2:6.

(b) Non-teaching Staff Strength:
Total number of non-teaching staff (includes technical & ministerial) shall be in the ratio of Teaching: Non-Teaching = 1:1.2 considering at the institute level. Each lab should have minimum of one laboratory attendant. Additionally, one senior level technical staff is required for each of the two laboratories.

(c) Faculty Qualification:
A first class B.E/B.Tech degree in Computer Science and Engineering

OR

A first Class M.E/M.Tech degree in any one of the specialization in Computer Science and Engineering

The above eligibility criteria are applicable only for the faculties who have been recruited after 30.06.2009.

III. LIBRARY REQUIREMENTS

The norms are same as that of the norms given by AICTE for the institute level. The number of books and journals that are required for B.Tech/B.E Computer Science and Engineering may be inferred from the following norms in concurrence with the requirements at the institute level.

The central library for an admission of 240 students per year will have a carpet area of 400 Sq m. At the time of establishing a technical institution with three branches, there should be a minimum of 4000 volumes in the Library distributed as below:

i. Each branch will have 250 titles with four multiple copies.

ii. In subjects like Mathematics, Humanities, Physics, Chemistry, etc. there should be total of 1000 volumes.

There should be a minimum of 12 technical journals - 6 Indian and 6 International for each branch of engineering. While this is essential for institutions offering P.G. programme, the number of International Journals may be relaxed, though preferred for those offering only U.G. Programmes.

Accordingly, the norms for the initial stock of books, yearly addition of books and the number of journals to be subscribed are as given below:

<table>
<thead>
<tr>
<th>SNo</th>
<th>Item</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Initial Stock of Books for three branches in Institution</td>
<td>4000</td>
</tr>
<tr>
<td>2.</td>
<td>a. Each Branch of Engg. (A)</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>b. Mathematics, Applied Physics, Applied Chemistry,</td>
<td>(in each branch)</td>
</tr>
<tr>
<td></td>
<td>Humanities, Social Science and Management Science (B)</td>
<td></td>
</tr>
</tbody>
</table>
3. Yearly addition of Books (Average)
   a. For (A) 1 title per student admitted to the branch
   b. For (B) 0.2 title per student admitted per year

4. Number of Tech. Journals
   a. For (A) 12 (6 National + 6 International)
   b. For (B) 12 (6 National + 6 International)

IV. **LIST OF EQUIPMENTS REQUIRED (Lab wise)**

(a) **Equipments required for the Second year**

(i) **Computing Lab I,II and III**

Each of the computing lab should have following:

<table>
<thead>
<tr>
<th></th>
<th>Batch size of 22 students</th>
<th>Batch size of 33 students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer System: Server</td>
<td>1 No.</td>
<td>1 No.</td>
</tr>
<tr>
<td>Computer systems: nodes (networked and connected with server)</td>
<td>25 No.</td>
<td>35 No.</td>
</tr>
<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 7 KVA</td>
</tr>
<tr>
<td>Printer</td>
<td>2 No.</td>
<td>3 No.</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td>Licensed Microsoft Server OS/ Linux Server OS/ Any other open source server OS / any other proprietary Server OS software with server configuration and language packages.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Microsoft client OS/ open source client OS (Unix/Linux based)/any other proprietary client OS. Depending upon the requirements of the laboratory course dual boot option</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proprietary/open source C compiler</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS office / any other open source word processor, spreadsheet and presentation software</td>
<td></td>
</tr>
</tbody>
</table>
(ii) Equipments Needed for Hardware and Microprocessor Lab:

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name of equipment/ component</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>batch of 33 students (2 per batch)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>batch of 22 students (2 per batch)</td>
</tr>
<tr>
<td>1</td>
<td>Digital IC Trainer (10 bit)</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>Multi meter</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Required Integrated Circuits</td>
<td>80 No. in each of the IC</td>
</tr>
<tr>
<td>4</td>
<td>Seven segment display</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>Assembled LED board/LEDs</td>
<td>40/200</td>
</tr>
<tr>
<td>6</td>
<td>FPGA Kit</td>
<td>17</td>
</tr>
<tr>
<td>7</td>
<td>Pentium IV (or higher) Based Computers with dual boot options of Windows 98/XP/2000 and Linux OS VHDL and FPGA software with License. (The computers in any one of the computing lab may be used)</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>8085 Trainer Kit with onboard 8255, 8253, 8279 and 8251 – 15 nos.</td>
<td>17</td>
</tr>
<tr>
<td>9</td>
<td>TASM/MAASM simulator in Desk top computers (8086 programs)</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>(The computers in any one of the computing lab may be used)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8051 trainer kit</td>
<td>17</td>
</tr>
<tr>
<td>11</td>
<td>Stepper motor interfacing module</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>DC motor interface module</td>
<td>6</td>
</tr>
<tr>
<td>13</td>
<td>Traffic light controller interfacing module</td>
<td>6</td>
</tr>
<tr>
<td>14</td>
<td>ADC, DAC interfacing module</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>Elevator interface module</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>Dot Matrix Printer</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>UPS</td>
<td>5 KVA</td>
</tr>
</tbody>
</table>
(b) **Additional equipments required for third year**

**(i) Computing Labs I,II, III**

Subject specific computer servers 3 No. (1 for each of the Lab). These servers are to be installed with Linux / UNIX /Any open source OS software /Red hat Linux/ any Proprietary Unix Clone OS software with server configuration with language packages depending upon the requirements laboratory courses.

(c) **Additional equipments required for fourth year**

**(i) Equipments Needed for Hardware and Microprocessor Lab:**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name of equipment/ component</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>batch of 33 students (2 per batch)</td>
</tr>
<tr>
<td>1</td>
<td>PC mother Board</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Disk drive units</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Key boards</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Mouse</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>monitor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>In-circuit emulator</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Logic Analyzer –PC based</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Multimeter</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>C/C++,MASM (Open source or Proprietary software) (The computers in any one of the computing lab may be used)</td>
<td>5 No each</td>
</tr>
<tr>
<td>12</td>
<td>Dot Matrix Printer</td>
<td>2 No</td>
</tr>
<tr>
<td>13</td>
<td>7 segment LED and LDs</td>
<td>10 No, 100</td>
</tr>
<tr>
<td>14</td>
<td>C.R.O</td>
<td>10</td>
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<tr>
<td>15</td>
<td>Circuit board</td>
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<tr>
<td>16</td>
<td>In-Circuit emulator</td>
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</tr>
<tr>
<td>17</td>
<td>PSPICE Circuit simulator</td>
<td>10 user License</td>
</tr>
<tr>
<td>18</td>
<td>Floppy disks Drive</td>
<td>5 No.</td>
</tr>
<tr>
<td>19</td>
<td>SMPS</td>
<td>5 No.</td>
</tr>
<tr>
<td>20</td>
<td>Required ICs</td>
<td>50 No.Each</td>
</tr>
<tr>
<td>21</td>
<td>Passive and other components (Resistor, Capacitor, Diode and Transistor)</td>
<td>50 each</td>
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<tr>
<td>Sl.No.</td>
<td>Software</td>
<td>Made available from the year</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>22</td>
<td>PAL/EPROM/PROM Programmer</td>
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</tr>
<tr>
<td>23</td>
<td>IC tester</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>Bread Boards</td>
<td>17</td>
</tr>
<tr>
<td>25</td>
<td>Network Interface cards</td>
<td>5</td>
</tr>
<tr>
<td>26</td>
<td>NS2/Glomosim/any other proprietary network simulation software</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td><em>(The computers in any one of the computing lab may be used)</em></td>
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</tr>
</tbody>
</table>

(d) *The other software:*

In addition the department must have each one of the following software (with the required number of user licenses) in any one or more of the computing labs in which the respective laboratory course is conducted.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Software</th>
<th>Made available from the year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Proprietary/open source C++ compiler</td>
<td>2nd year</td>
</tr>
<tr>
<td>2</td>
<td>Java Development Kit (Latest Version)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Glomosim/Ns2 /any other network simulation software</td>
<td>2nd year</td>
</tr>
<tr>
<td>4</td>
<td>PHP and Ajax</td>
<td>3rd year</td>
</tr>
<tr>
<td>5</td>
<td>VB/VC++ / D2K/ or any other open source front end software</td>
<td>3rd year</td>
</tr>
<tr>
<td>6</td>
<td>Rational Suite/ Win Runner/Describe or equivalent</td>
<td>3rd year</td>
</tr>
<tr>
<td>7</td>
<td>Visual Basic/Open source front end software</td>
<td>3rd year</td>
</tr>
<tr>
<td>8</td>
<td>DB2 Server / ORACLE server/ SQL Server/ Open source DBMS server software</td>
<td>3rd year</td>
</tr>
<tr>
<td>10</td>
<td>J2ME, J2SE</td>
<td>3rd year</td>
</tr>
<tr>
<td>11</td>
<td>CORBA Framework</td>
<td>4th year</td>
</tr>
<tr>
<td>12</td>
<td>Open source or Proprietary LISP and PROLOG Compiler</td>
<td>4th year</td>
</tr>
<tr>
<td>13</td>
<td>OpenMP, Matlab and NS2</td>
<td>4th year</td>
</tr>
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V. LIST OF EQUIPMENTS REQUIRED (Lab course wise)

Third Semester

Digital Laboratory:

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name of equipment/ component</th>
<th>Quantity Required</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>batch of 33 students (2 per batch)</td>
</tr>
<tr>
<td>1</td>
<td>Digital IC Trainer (10 bit)</td>
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</tr>
<tr>
<td>2</td>
<td>Multi meter</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Required Integrated Circuits</td>
<td>80 No. in each of the IC</td>
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<tr>
<td>4</td>
<td>Seven segment display</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>Assembled LED board/LEDs</td>
<td>40/200</td>
</tr>
<tr>
<td>6</td>
<td>FPGA Kit</td>
<td>17</td>
</tr>
<tr>
<td>7</td>
<td>Computers with Pentium IV or above processor with  VHSICHDL and FPGA software with License.</td>
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Data Structures Laboratory

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<tr>
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<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer System : Server</td>
<td>1 No.</td>
<td>1 No.</td>
</tr>
<tr>
<td>Computer systems: node</td>
<td>25 No.</td>
<td>35 No.</td>
</tr>
<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
</tr>
<tr>
<td>Printer</td>
<td>2 No.</td>
<td>3 No.</td>
</tr>
<tr>
<td>Server 1</td>
<td>1 No.</td>
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<tr>
<td><strong>Software</strong></td>
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</tr>
<tr>
<td>User License required</td>
<td>Minimum 22 No.</td>
<td>33 No.</td>
</tr>
<tr>
<td>for software (proprietary)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Microsoft Server OS/ Linux Server OS/ UNIX Server OS/Any open source server OS / any Proprietary Server OS software</td>
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<td></td>
</tr>
<tr>
<td>2. Proprietary/ open source client OS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Borland C Compiler / Microsoft C compiler/ any open source C compiler/ any Proprietary C compiler</td>
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### IVth Semester

**Microprocessors and Microcontrollers Laboratory**

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<td></td>
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<tr>
<td>1</td>
<td>8085 Trainer Kit with onboard 8255, 8253, 8279 and 8251 – 15 nos.</td>
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<td>2</td>
<td>TASM/MASM simulator in Desk top computers (8086 programs)</td>
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<tr>
<td></td>
<td>(computers in Computing Laboratories may be utilized)</td>
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</tr>
<tr>
<td>3</td>
<td>8051 trainer kit</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Stepper motor interfacing module</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>DC motor interface module</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Traffic light controller interfacing module</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>ADC, DAC interfacing module</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Elevator interface module</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Dot Matrix Printer</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>UPS</td>
<td>5 KVA</td>
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**Design and Analysis of Algorithms Laboratory**

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<tr>
<td><strong>Hardware</strong></td>
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<tr>
<td>Computer System :</td>
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<td>1 No.</td>
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<tr>
<td>Server</td>
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<td></td>
</tr>
<tr>
<td>Computer systems:</td>
<td>25 No.</td>
<td>35 No.</td>
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<tr>
<td>node</td>
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<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
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<td>3 No.</td>
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<tr>
<td>User License required</td>
<td>22 No.</td>
<td>33 No.</td>
</tr>
<tr>
<td>for software (proprietary)</td>
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<td></td>
</tr>
<tr>
<td>Software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Microsoft Server OS/ Linux Server OS/ UNIX Server OS/Any open source server OS / any Proprietary Server OS software</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Proprietary/ open source client OS</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Borland C or C++ compiler / Microsoft C or C++ compiler / any open source C or C++ compiler / any Proprietary C or C++ compiler /</td>
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### Object Oriented Programming Languages Laboratory

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<tr>
<td><strong>Hardware</strong></td>
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<tr>
<td>Computer System :</td>
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<td>1 No.</td>
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<tr>
<td>Server</td>
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<tr>
<td>Computer systems:</td>
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<td>35 No.</td>
</tr>
<tr>
<td>node</td>
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<td></td>
</tr>
<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
</tr>
<tr>
<td>Printer</td>
<td>2 No.</td>
<td>3 No.</td>
</tr>
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<td><strong>Software</strong></td>
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<tr>
<td>User License</td>
<td>22 No.</td>
<td>33 No.</td>
</tr>
<tr>
<td>required for software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(proprietary)</td>
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<td></td>
</tr>
<tr>
<td>Software</td>
<td>1. Microsoft Server OS/</td>
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</tr>
<tr>
<td></td>
<td>Linux Server OS/ UNIX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Server OS/ Any open</td>
<td></td>
</tr>
<tr>
<td></td>
<td>source server OS / any</td>
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</tr>
<tr>
<td></td>
<td>Proprietary Server OS</td>
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</tr>
<tr>
<td></td>
<td>software</td>
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</tr>
<tr>
<td></td>
<td>2. Proprietary/ open</td>
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</tr>
<tr>
<td></td>
<td>source client OS</td>
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</tr>
<tr>
<td></td>
<td>Compatible with server OS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Borland C++ Compiler /</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Microsoft C ++compiler/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>any open source C++</td>
<td></td>
</tr>
<tr>
<td></td>
<td>compiler/ any other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proprietary C++ compiler</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Java development Kit</td>
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</tr>
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<td>(Latest Version)</td>
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### Vth semester

### Computer Networks Laboratory

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<tr>
<td><strong>Hardware</strong></td>
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<tr>
<td>Computer System :</td>
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<td>1 No.</td>
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<tr>
<td>Server</td>
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<tr>
<td>Computer systems:</td>
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<td>35 No.</td>
</tr>
<tr>
<td>node</td>
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</tr>
<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
</tr>
<tr>
<td>Printer</td>
<td>2 No.</td>
<td>3 No.</td>
</tr>
<tr>
<td><strong>Software</strong></td>
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</tr>
<tr>
<td>User License</td>
<td>22 No.</td>
<td>33 No.</td>
</tr>
<tr>
<td>required for software</td>
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<td></td>
</tr>
<tr>
<td>(proprietary)</td>
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<td></td>
</tr>
<tr>
<td>Software</td>
<td>1. Microsoft Server OS/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Linux Server OS/ UNIX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Server OS/ Any open</td>
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</tr>
<tr>
<td></td>
<td>source server OS / any</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proprietary Server OS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>software</td>
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</tr>
<tr>
<td></td>
<td>2. Microsoft Windows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Client OS and or open</td>
<td></td>
</tr>
<tr>
<td></td>
<td>source client OS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>compatible with server OS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and with dual boot option</td>
<td></td>
</tr>
</tbody>
</table>
3. Java Development Kit (Latest Version)
4. Glomosim/Ns2 /any other network simulation software
5. open source/ Proprietary C and C++ Compiler
6. J2ME, J2SE
7. Apache Web Server, Internet Information Server (IIS)

### Platform Technology Laboratory

<table>
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<tr>
<th></th>
<th>Batch size of 22 students</th>
<th>Batch size of 33 students</th>
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<tbody>
<tr>
<td><strong>Hardware</strong></td>
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</tr>
<tr>
<td>Computer System: Server</td>
<td>1 No.</td>
<td>1 No.</td>
</tr>
<tr>
<td>Computer systems: node</td>
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<td>35 No.</td>
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<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
</tr>
<tr>
<td>Printer</td>
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<td>3 No.</td>
</tr>
<tr>
<td><strong>Software</strong></td>
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</tr>
<tr>
<td>User License required for software (proprietary)</td>
<td>22 No.</td>
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</tr>
<tr>
<td>Software</td>
<td>1. Microsoft Server OS</td>
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<tr>
<td></td>
<td>2. Proprietary/ open source client OS</td>
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### Operating Systems Laboratory

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<td><strong>Hardware</strong></td>
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<tr>
<td>Computer System: Server</td>
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<td>1 No.</td>
</tr>
<tr>
<td>Computer systems: node</td>
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<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
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<tr>
<td>Printer</td>
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<td>3 No.</td>
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<tr>
<td><strong>Software</strong></td>
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<td>User License required for software</td>
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### Database Management Systems Laboratory

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<td>Server</td>
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<tr>
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<td>35 No.</td>
</tr>
<tr>
<td>node</td>
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<td></td>
</tr>
<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
</tr>
<tr>
<td>Printer</td>
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<td>3 No.</td>
</tr>
<tr>
<td><strong>Software</strong></td>
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<td></td>
</tr>
<tr>
<td>User License</td>
<td>22 No.</td>
<td>33 No.</td>
</tr>
<tr>
<td>required for software</td>
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<td></td>
</tr>
<tr>
<td>(proprietary)</td>
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<td></td>
</tr>
<tr>
<td>1. Microsoft Server OS/ Linux Server OS/ UNIX Server OS/Any open source server OS / any Proprietary Server OS software</td>
<td></td>
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</tr>
<tr>
<td>2. Proprietary/ open source client OS compatible with OS</td>
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</tr>
<tr>
<td>3. DB2 Server / ORACLE server/ SQL Server/ Open source DBMS server software</td>
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</tr>
<tr>
<td>4. Visual Basic/Open source front end software</td>
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### Web Technology Laboratory

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<tr>
<td>Computer systems:</td>
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<td>35 No.</td>
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<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
</tr>
<tr>
<td>Printer</td>
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<td>3 No.</td>
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<td><strong>Software</strong></td>
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<tr>
<td>User License</td>
<td>22 No.</td>
<td>33 No.</td>
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<tr>
<td>(proprietary)</td>
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<td></td>
</tr>
<tr>
<td>1. Microsoft Server OS/ Linux Server OS/ UNIX Server OS/Any open source server OS / any Proprietary Server OS software</td>
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</tr>
<tr>
<td>2. Proprietary/ open source client OS compatible with OS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. DB2 Server / ORACLE server/ SQL Server/ Open source DBMS server software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Visual Basic/Open source front end software</td>
<td></td>
<td></td>
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</tbody>
</table>
| Software (proprietary) | 1. Microsoft Server OS/ Linux Server OS/ UNIX Server OS/Any open source server OS / any Proprietary Server OS software  
2. Proprietary/ open source client OS  Compatible with server OS (Xp is compulsory) XAMP server (to run PHP)  
3. Borland C++ Compiler / Microsoft C ++compiler/ any open source C++ compiler/ any other Proprietary C++ compiler  
4. Java development Kit (Latest Version)  
5. Apache Web Server, Internet Information Server (IIS)  
6. PHP  
7. Ajax |

<table>
<thead>
<tr>
<th>Mini Project using CASE Tools</th>
<th>Batch size of 22 students</th>
<th>Batch size of 33 students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer System: Server</td>
<td>1 No.</td>
<td>1 No.</td>
</tr>
<tr>
<td>Computer systems: node</td>
<td>25 No.</td>
<td>35 No.</td>
</tr>
<tr>
<td>UPS</td>
<td>Minimum of 5 KVA</td>
<td>Minimum of 6 KVA</td>
</tr>
<tr>
<td>Printer</td>
<td>2 No.</td>
<td>3 No.</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User License required for software (proprietary)</td>
<td>22 No.</td>
<td>33 No.</td>
</tr>
</tbody>
</table>
| Software                     | 1. Microsoft Server OS/ Linux Server OS/ UNIX Server OS/Any open source server OS / any Proprietary Server OS software  
2. Proprietary/ open source client OS  Compatible with server OS  
3. Borland C++ Compiler / Microsoft C ++compiler/ any open source C++ compiler/ any other Proprietary C++ compiler  
4. Java development Kit (Latest Version)  
5. Rational Suite/ Win Runner/Describe or equivalent  
6. JDK, JSDK  
7. VB/VC++ / D2K/ or any other open source front end software  
8. Oracle/MySQL/ an other open source or proprietary software or equivalent |

<table>
<thead>
<tr>
<th>Distributed and Intelligent Computing Laboratory</th>
<th>Batch size of 22 students</th>
<th>Batch size of 33 students</th>
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</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
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<tr>
<td>Sl. No.</td>
<td>Equipment</td>
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<tr>
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<td>--------------------------------------------------------------------------</td>
<td>-----------</td>
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<tr>
<td>1</td>
<td>Computer with client OS (Proprietary/Open source) and Microsoft Office/</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>any other open source office package.</td>
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</tr>
<tr>
<td>2</td>
<td>Multimedia Projector</td>
<td>2 No.</td>
</tr>
</tbody>
</table>

**Project Work - Phase I & CS P81 Project Work - Phase II**

<table>
<thead>
<tr>
<th></th>
<th>Batch size of 22 students</th>
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<td>Computer System :</td>
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<td>1 No.</td>
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<td>Server</td>
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<td>3 No.</td>
</tr>
<tr>
<td><strong>Software</strong></td>
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<tr>
<td>User License required</td>
<td>22 No.</td>
<td>33 No.</td>
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<tr>
<td>for software (proprietary)</td>
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</tr>
<tr>
<td>1. Microsoft Server OS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Proprietary/ open source client OS</td>
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<td></td>
</tr>
<tr>
<td>4. CORBA Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Java Development Kit (Latest Version)</td>
<td></td>
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</tr>
<tr>
<td>6. Open source or Proprietary LISP and PROLOG Compiler</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Borland C++ Compiler / Microsoft C ++compiler/ any open source C++ compiler/ any other Proprietary C++ compiler
4. Java development Kit (Latest Version)
5. Rational Suite/ Win Runner/Describe or equivalent
6. JDK, JSDK
7. VB/VC++ / D2K/ or any other open source front end software
8. Oracle/MySQL/ an other open source or proprietary software or equivalent
9. Java development Kit (Latest Version)
10. Apache Web Server, Internet Information Server (IIS)
11. PHP and Ajax
12. Ajax

### HARDWARE AND TROUBLESHOOTING LABORATORY

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name of equipment/ component</th>
<th>Quantity Required</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>batch of 33 students (2 per batch)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>batch of 22 students (2 per batch)</td>
</tr>
<tr>
<td>1</td>
<td>PC mother Board</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Disk drive units</td>
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<tr>
<td>3</td>
<td>Key boards</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Mouse</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Monitor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pentium IV (or higher) Based Computers with dual boot options of Windows 98/XP/2000 and Linux OS C (computers in Computing Laboratories may be utilized)</td>
<td>17 number with license for OS</td>
</tr>
<tr>
<td>7</td>
<td>In-circuit emulator</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Logic Analyzer –PC based</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Multimeter</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>C/C++,MASM (Open source or Proprietary software)</td>
<td>5 No each</td>
</tr>
<tr>
<td>11</td>
<td>8031/ 8085 Microprocessor Kit</td>
<td>5 No</td>
</tr>
<tr>
<td>12</td>
<td>Dot Matrix Printer</td>
<td>2 No</td>
</tr>
<tr>
<td>13</td>
<td>7 segment LED and LDs</td>
<td>10 No, 100</td>
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<td>14</td>
<td>C.R.O</td>
<td>10</td>
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<tr>
<td>No.</td>
<td>Item Description</td>
<td>Quantity</td>
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<tr>
<td>15</td>
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<tr>
<td>16</td>
<td>In-Circuit emulator</td>
<td>3 No.</td>
</tr>
<tr>
<td>17</td>
<td>PSPICE Circuit simulator</td>
<td>10 user License</td>
</tr>
<tr>
<td>18</td>
<td>Floppy disks Drive</td>
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</tr>
<tr>
<td>19</td>
<td>SMPS</td>
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</tr>
<tr>
<td>20</td>
<td>Required ICs</td>
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<tr>
<td>21</td>
<td>Passive and other components (Resistor, Capacitor, Diode, and Transistor)</td>
<td>50 each</td>
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<tr>
<td>22</td>
<td>PAL/EPROM/PROM Programmer</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>IC tester</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>Bread Boards</td>
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<tr>
<td>25</td>
<td>Network Interface cards</td>
<td>5</td>
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<tr>
<td>26</td>
<td>Digital Multimeter</td>
<td>6</td>
</tr>
<tr>
<td>27</td>
<td>NS2/Glomosim/any other preparatory network simulation software</td>
<td>17</td>
</tr>
</tbody>
</table>

### Advanced Computing Laboratory

<table>
<thead>
<tr>
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<td></td>
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</tr>
<tr>
<td></td>
<td>4. Borland C C Compiler / Microsoft C compiler/ any open source C compiler/ any other Proprietary C compiler</td>
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<tr>
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</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>5.</td>
<td>Java development Kit (Latest Version)</td>
</tr>
<tr>
<td>6.</td>
<td>OpenMP, Matlab and NS2</td>
</tr>
</tbody>
</table>