JAWAHARLAL NEHRU
TECHNOLOGICAL UNIVERSITY ANANTAPUR

III Year B.Tech. CSE II Sem

Sl.No	Course Code	Subject	L	T	P	Credits
1.	9A05601	Object Oriented Analysis and Design	4	0	0	4
2.	9A05602	Unix Internals	4	0	0	4
3.	9A05603	Optimizing Techniques	4	0	0	4
4.	9A04602	Microprocessors and Micro Controllers	4	0	0	4
5.	9A05604	Distributed Systems	4	0	0	4
6.	9A05605	Artificial Intelligence	4	0	0	4
7.	9A19501	Microprocessors and Interfacing Lab	0	0	3	2
8.	9A05606	UNIX Internals Lab	0	0	3	2
		contact periods/week	24	00	06	
			Total/Week 30			
Total Credits (6 Theory + 2 Labs)						28

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(9A05601) OBJECT ORIENTED ANALYSIS and DESIGN
(Common to CSE, CSSE, IT)

UNIT I
Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II
Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.
Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT III
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT IV
Basic Behavioral Modeling-I: Interactions, Interaction diagrams.

UNIT V
Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT VI
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT VII
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT VIII
Case Study: The Unified Library application.

TEXT BOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.

REFERENCES:

1. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
2. Modeling Software Systems Using UML2, Pascal Roques, WILEY- Dreamtech India Pvt. Ltd.
3. Object Oriented Analysis and Design, Atul Kahate, The McGraw-Hill Companies.
4. Object-Oriented Analysis and Design with the Unified Process, John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.
5. Learning UML 2.0, Russ Miles and Kim Hamilton, O'Reilly, SPD.
6. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.
7. UML and C++, R.C.Lee and W.M.Tepfenhart, PHI.
8. Object Oriented Analysis,Design and Implementation, B.Dathan and S.Ramnath, Universities Press.
9. OODesign with UML and Java, K.Barclay, J.Savage, Elsevier.
10. Mark Priestley: Practical Object-Oriented Design with UML, TMH.

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(9A05602) UNIX INTERNALS

UNIT I
General Overview of the System**:** System structure, User perspective, Operating system services, Assumptions about hardware. Introduction to the Kernel: Architecture of the UNIX operating system, Introduction to system concepts, Kernel data structures, System administration.

UNIT II
The Buffer Cache**:** Buffer Headers, Structure of the buffer pool, Scenarios for retrieval of a buffer, Reading and writing disk blocks, Advantages and disadvantages of the buffer cache.

UNIT III
Internal Representation of Files: Inodes, Structure of a regular file, Directories, Conversion of a path name to an Inode, Super block, Inode assignment to a new file, Allocation of disk blocks, Other file types.

UNIT IV
System Calls for the File System: Open, Read, Write, File and record locking, Adjusting the position of file I/O, Close, File creation, Creation of special files, Change directory and change root, Change owner and change mode, Stat and Fstat, Pipes, Dup, Mount and Unmounting file sytems, Link, Unlink, File system abstractions, File system maintenance.

UNIT V
Structure of Processes: Process states and transitions, Layout of system memory, Context of a process, Saving the context of a process, Manipulation of the process address space, Sleep.

UNIT VI
Process Control: Process creation, Signals, Process termination, Awaiting process termination, Invoking other programs, User ID of a process, Changing the size of a process, The shell, System boot and the init process.

UNIT VII
Process Scheduling and Time: Process Scheduling, System calls for time, Clock. Memory Management Policies: Swapping, Demand paging, Hybrid system with swapping and demand paging.

UNIT VIII
I/O Subsystem: Driver interfaces, Disk drivers, Terminal drivers, Streams. Interprocess Communication: Process tracing, System V IPC, Network communications, Sockets.

TEXT BOOKS:
1. The Design of the Unix Operating System, Maurice J. Bach, Prentice Hall of India, 1991.

REFERENCES:
1. William Stallings, Operating Systems: Internals and Design Principles, Fifth Edition, Prentice Hall, 2005.
2. Understanding the LINUX Kernel, Daniel P. Bovet and Marco cesati, O'REILLY Publications, 2005

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(9A05603) OPTIMIZING TECHNIQUES
(Common to CSE, CSSE)

UNIT I
Introduction to optimization: Requirements for the Application of Optimization Methods, Applications of Optimization in Engineering, Structure of Optimization Problems, Functions of a Single Variable: Properties of Single-Variable Functions, Optimality Criteria, Region Elimination Methods, Polynomial Approximation or Point Estimation Methods.

UNIT II
Functions of a Several Variables: Optimality Criteria, Direct-Search Methods, Gradient Based Methods, Comparison of Methods and Numerical Results.

UNIT III
Linear Programming: Formulation of Linear Programming Models, Graphical Solution of Linear Programming in Two Variables, Linear Programming in Standard Form, Principles of the Simplex Method, Applications.

UNIT IV
Transportation Problems: Introduction, Optimal Solution for BFS, Unbalanced Transportation Problem, Transshipment, Assignment Problems, Hungarian Method.

UNIT V
Constrained Optimality Criteria: Equality-Constrained Problems, Lagrange Multipliers, Economic Interpretation of Lagrange Multipliers, Kuhn-Tucker Conditions, Kuhn-Tucker Theorems, Saddlepoint Conditions, Second-Order Optimality Conditions, Generalized Lagrange Multiplier Method, Generalization of Convex Functions.

UNIT VI
Transformation Methods: Penalty Concept, Algorithms, Codes, and Other Contributions, Method of Multipliers, Constrained Direct Search: Problem Preparation, Adaptations of Unconstrained Search Methods, Random-Search Methods.

UNIT VII
Quadratic Approximation Methods for Constrained Problems: Direct Quadratic Approximation, Quadratic Approximation of the Lagrangian Function, Variable Metric Methods for Constrained Optimization, Structured Problems and Algorithms: Integer Programming, Quadratic Programming, Complementary Pivot Problems, Goal Programming.

UNIT VIII
Project Management: Introduction, Critical Path Method, Critical Path Determination, Optimal Scheduling by CPM, Project Evaluation and Review Technique, Dynamic Programming: Introduction, Formulation, Recursive Relations, Continuous Cases, Discrete Cases, Forward Recursions, Linear Programming vs Dynamic Programming.

TEXT BOOKS:

1. Engineering Optimization- Methods and Applications, A. Ravindran, K. M. Ragsdell, G.V. Reklaitis, Second Edition, Wiley India Edition.
2. Introductory Operation Research- Theory and Applications, H.S. Kasana, K.D. Kumar, Springer International Edition.

REFERENCES:

1. Optimization Methods in Operations Research and Systems Analysis, K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, Third Edition, 1996.
2. Operations Research, Dr. J.K.Sharma, Mc Millan.
3. Operations Research: An Introduction, H.A. Taha, PHI Pvt. Ltd., Sixth Edition

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(9A04602) MICROPROCESSORS and MICRO CONTROLLERS
(Common to CSE, ECE, E Con E, EIE, EEE)

UNIT I
Introduction: Architecture of 8086 microprocessor, special functions of general purpose registers.8086 flag register and function of 8086 flags, addressing modes of 8086,instruction set of 8086.assembler directives, simple programs, procedures and macros.

UNIT II
Assembly Language Programming: Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT III
Architecture Of 8086 & Interfacing: Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagram, memory interfacing to 8086(static RAM and EPROM).Need for DMA.DMA data transfer method. Interfacing with 8237/8257.

UNIT IV
Programmable Interfacing Devices: 8255 PPI-various modes of operation and interfacing to 8086.interfacing keyboard, displays, 8279 stepper motor and actuators. D/A and A/D converter interfacing, Interrupt structure of 8086, Vector interrupt table. Interrupt service routines. Introduction to DOS and BIOS interrupts.8259 PIC architecture and interfacing cascading of interrupt controller and its importance.

UNIT V
Serial Data Transfer Schemes: Asynchronous and synchronous data transfer schemes.8251 USART architecture and interfacing.TTL to RS232C and RS232C to TTL conversion. Sample program of serial data transfer. Introduction to high-speed serial communications standards, USB.

UNIT VI
Programmable Interrupt Controllers: PIC 8259, Programming with 8259, Programmable interval timer 8253, Modes of 8253, Programming examples with 8253.

UNIT VII
8051 Microcontroller and Its Programming: Architecture of micro controller-8051 Microcontroller-internal and external memories-counters and timers-synchronous serial-cum asynchronous serial communication-interrupts. Addressing modes of 8051, Instructor set of 8051, Assembly Language Programming examples using 8051.

UNIT VIII
Advanced Microcontrollers: MCS – 96 Microcontrollers: Important Features, Pin Diagram, Internal Architecture, Memory Map, Addressing Modes, Instruction set. ARM Microcontrollers: ARM Core Architecture, Versions of ARM, Important Features.

TEXTBOOKS:

1. Advanced microprocessor and peripherals, A.K. Ray and K.M.Bhurchandi, TMH, 2000.
2. Microcontrollers, Deshmukh, Tata MC Graw Hill Edition.
3. Microcontrollers Architecture: programming, interfacing and system Design, Raj kamal, Pearson Education, 2005.

REFERENCES:

1. Microprocessors Interfacing, Douglas V.Hall, 2007.
2. The 8088 and 8086 Microprocessors, Fourth Edition, 2003, PHI .
3. Micro computer system 8066/8088 family Architecture, programming and Design, Liu and GA Gibson, PHI, Second Edition.
4. 8051 Microcontroller: Internals, Instructions, Programming and Interfacing, Subrata Ghoshal, Pearson, 2010.

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(9A05604) DISTRIBUTED SYSTEMS

UNIT I

Characterization of Distributed Systems: Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models: Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication.

UNIT II

Distributed objects and Remote Invocation: Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI. Operating System Support: Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture, case study- SUN network file systems.

UNIT III

Name Services: Introduction, Name Services and the Domain Name System, Case study of the Global Name Service, Case study of the X.500 Directory Service. Peer to Peer Systems: Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, OceanStore.

UNIT IV

Time and Global States: Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging. Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT V

Transactions and Concurrency control: Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

UNIT VI

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery, Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

UNIT VII

Security: Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos, TLS, 802.11 WiFi.

UNIT VIII

Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, Other consistency models, CORBA case study: Introduction, CORBA RMI,CORBA Services.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman and Hall/CRC, Taylor & Francis Group, 2010.

REFERENCES:

1. Distributed Computing, S.Mahajan and S.Shah, Oxford University Press.
2. Distributed Operating Systems Concepts and Design, Pradeep K.Sinha, PHI.

3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, Tata McGraw-Hill Edition.
4. Reliable Distributed Systems, K.P.Birman, Springer.
5. Distributed Systems: Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
6. Distributed Operating Systems and Algorithm Analysis,R.Chow, T.Johnson,Pearson.
7. Distributed Operating Systems, A.S.Tanenbaum, Pearson Education.

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(9A05605) ARTIFICIAL INTELLIGENCE

UNIT I

What is Artificial Intelligence: The AI Problems, The Underlying Assumption, What is an AI Technique?, The Levels of the Model, Criteria of Success, Some General References, One Final Word and Beyond. Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

UNIT II

Problem-Solving**:** Uninformed Search Strategies, Avoiding Repeated States. Informed Search and Exploration: Informed (Heuristic) Search Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Backtracking Search for CSPs.

UNIT III

Knowledge and Reasoning: Logical Agents, Knowledge–Based Agents, The Wumpus World, Logic, Propositional Logic a Very Simple Logic, Reasoning Patterns in Propositional Logic, Effective Propositional Inference, Agents Based on Propositional Logic.

UNIT IV

First-Order Logic: Representation Revisited, Syntax and Semantic of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

UNIT V

Knowledge Representation: Ontological Engineering, Categories and Objects, Actions, Situations, and Events, Mental Events and Mental Objects, The Internet Shopping World, Reasoning Systems for Categories, Reasoning with Default Information, Truth Maintenance Systems.

UNIT VI

Uncertain Knowledge and Reasoning: Uncertainty, Acting Under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use.

UNIT VII

Learning: Learning from Observations, Forms of Learning, Inductive Learning, Learning Decision Trees, Ensemble Learning, Why Learning Works: Computational Learning Theory, Knowledge in Learning: A Logical Formulation of Learning, Knowledge in Learning.

UNIT VIII

Statistical Learning Methods: Neural Networks. Fuzzy Logic Systems: Introduction, Crisp Sets, Fuzzy Sets, Some Fuzzy Terminology, Fuzzy Logic Control, Sugeno Style of Fuzzy Inference Processing, Fuzzy Hedges, α Cut Threshold.

TEXT BOOKS:

1. Artificial Intelligence, Third Edition, Elaine Rich, Kevin Knight and Shivashankar B Nair Tata McGraw Hill.
2. Artificial Intelligence A Modern Approach, Second Edition , Stuart Russell and Peter Norvig Pearson Education.

REFERENCES:

1. Artificial Intelligence-Structures and Strategies for Complex Problem Solving, Fifth Edition, George F. Luther, Pearson Education.
2. Introduction to Artificial Intelligence, Eugene Charniak and Drew McDermott, Pearson Education.

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I. Microprocessor 8086:

1. Introduction to MASM/TASM.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
5. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing:

1. 8259 – Interrupt Controller: Generate an interrupt using 8259 timer.
2. 8279 – Keyboard Display: Write a small program to display a string of characters.
3. 8255 – PPI: Write ALP to generate sinusoidal wave using PPI.
4. 8251 – USART: Write a program in ALP to establish Communication between two processors.

III. Microcontroller 8051

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.

Equipment required for Laboratories:

1. 8086 μP Kits
2. 8051 Micro Controller kits
3. Interfaces/peripheral subsystems
   - i) 8259 PIC
   - ii) 8279-KB/Display
   - iii) 8255 PPI
   - iv) 8251 USART
4. ADC Interface
5. DAC Interface
6. Traffic Controller Interface
7. Elevator Interface

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(9A05606) UNIX INTERNALS LAB

1. Program on process creation and Execution
   a. To display Environment variables.
   b. To implement Different types of exec functions.
2. Write a program
   a. To Opening a stream
   b. To Read and Write a stream
   c. To Position a Stream
3. Write a program to
   a. Create a file
   b. Add record to file
   c. Modify records
   d. Delete records
   e. Find status and mode value of a file
4. Write a Program that takes certain file names along the command line arguments and remove if there exists any duplicates.
5. Write a Program to find whether a file is having read, write, execute permissions and also check whether a given name is file or directory.
6. Write a program to create a chain of Processes.
7. Write a program to
   a. Create the semaphores
   b. Set values to semaphores
   c. Get the values from the semaphores
   d. Remove semaphores
8. Write a program to implement various operations on Message Queues.
9. Write a program to demonstrate
   a. Signal handling
   b. Terminal I/O
10. Perform Socket Programming Using
    a. UDP socket
    b. TCP socket
11. Write a program to
    a. Create a shared memory
    b. Write to shared memory
    c. Read from shared memory
12. Write a program to create two pipes.
13. Write a program which takes a source file name and directory name as command line argument and print a message 'YES', if the file is found in the given directory.
14. Design a directory structure that improves the efficiency of searching for pathnames by avoiding the linear search
15. Implement free disk block list with a bitmap instead of linked list.
16. Design a scheme that reduces the number of directory searches for file names by caching frequently used names.
17. Redesign getblk and brelse where the kernel follows a FIFO scheme instead of LRU.
18. Design algorithm for allocating and freeing memory page and page tables Many process can sleep on an address but the kernel may want to wakeup selected processes that receive a signal assuming that the signal mechanism can identify the particular processes, remodify the wakeup algorithm so that only one process is woken up on a sleep address instead of all the processes.

19. Implement a new system call newpgrp(PID, ngrp), that resets the process group of another process identified by the process ID PID to ngrp.
20. Implement a new system call nowait(PID) where PID identifies a child of the process issuing the call when issuing the callthe process informs the kernel that it will never wait for the child process to exit, so that the kernel can immediately cleanup the child process slot when the child dies.