University School of Engineering and Technology

Detailed Syllabus (4th Sem)

Batch 2014

Programme : Engineering

Level : Undergraduate

Course : B.Tech.

Branch : Computer Science and Engineering

4th Semester

B.Tech.

(Computer Science and Engineering)

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : CS-2401 **L T P C**

4 0 0 4

Subject : COMPUTER ARCHITECTURE & ORGANIZATION

Credits:3

Objectives: This course aims to make the students have an understanding of the various functional units of a computer system and prepares the student to design a basic computer system.

UNIT 01 **05**

Digital Components: Encoders/ Decoders, Multiplexers, Registers, Counters, Memory Unit, Computer Arithmetic.

UNIT 02 **07**

Digital Register Transfer and Micro operations: Register transfer language & operations, arithmetic microoperations, logic microoperations, shift microoperations, arithmetic logic shift unit. Design of a complete basic computer and its working.

UNIT 03 **06**

Basic Computer Design: Instruction codes, Computer registers, Computer Instructions, Timing and control, Instruction Cycle, Memory reference instructions, Input/ Output and Interrupt, Design of basic Computer, Design of Accumulator Logic.

UNIT 04 **06**

Design of Control Unit: Control memory, design of control unit – microprogrammed, hardwired, and their comparative study.

UNIT 05 **06**

Design of Central Processing Unit: General Register Organisation, Stack Organisation, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture.

UNIT 06 **06**

Input-Output and Memory Organisation: Peripheral devices, I/O Interface, asynchronous

data transfer, modes of transfer, priority interrupt, DMA, I/O processor, serial communication. Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

UNIT 07 **06**

Advanced concepts of Computer Architecture: Concept of pipeline, Arithmetic pipeline, Instruction pipeline, RISC pipeline, vector processors and array processors. Multiprocessors and Interprocessor arbitration, communication & synchronization.

Learning Outcomes

By the end of the course a student should be able to:

1. Understand the operation of electronic logic elements
2. Analyze the organization of a computer system in terms of its main components
3. Understand and design input/output mechanisms
4. Understand the various parts of a system memory hierarchy
5. Have practical experience of prototyping digital circuits

Text Book:

1. M. Moris Mano, Computer System Architecture, Pearson Education.

References:

1. William Stallings, Computer Organisation and Architecture, Pearson Education.
2. David A Patterson, Computer Architecture, Pearson Education.
3. P. Pal Choudhri, Computer Organisation and Design, PHI.
4. J. P. Hayes, Computer System Architecture, Pearson Education.
5. Kai Hawang, Advanced Computer Architecture, Tata McGraw Hill.

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : CS-2402 **L T P C**

4 1 0 5

Subject : DESIGN & ANALYSIS OF ALGORITHM **Credits:3**

PREREQUISITES: Data Structure

Objectives: The subject will give student an insight into performance analysis, measurements and optimization of the various algorithm development techniques. The course aims to make the students able to choose one algorithm technique for any kind of problem.

UNIT 01 **06**

Introduction to Algorithms: Algorithm specifications, recursive algorithms, performance analysis, performance measurement, asymptotic analysis, recurrence equations and their solution.

UNIT 02 **06**

Trees and graph: introduction to threaded binary trees, Binary search tree AVL trees and B-trees, traversal of trees traversal of a graph (breadth-first search and depth-first search), Dijkstra's & Bellman-ford algorithm, topological sort, Bipartite graphs.

UNIT 03 **06**

Algorithmic Techniques: Algorithm design strategies, divide and conquer, merge sort, quick sort and its performance analysis, randomized quick sort, Stassen's matrix multiplication; Greedy method and its applications, knapsack problem;

UNIT 04 **08**

Dynamic programming and its performance analysis: Optimal binary search trees, 0/1 knapsack problem; Traveling salesman problem; Backtracking-queens problem,

Graph coloring, Hamiltonian cycles, sum of subset, knapsack problem; Branch and bound examples, 15-puzzle problem,

UNIT 05 **06**

String Matching: Introduction, naive string matching algorithm, rabin-karp algorithm,

string matching with finite automata, knuth-morris pratt algorithm, boyer-moore algorithm.

UNIT 06 **06**

NP-Hard Problem: Basic concept, decision problem, class NP hard, nondeterministic algorithms, COOK's theorem, scheduling and code generation problem, Approximation algorithms.

UNIT 07 **04**

NP Complete Problem: concept, decision problem, class NP complete, NP hard graph.

Learning Outcome:

The student learning outcomes include:

1. Ability to understand and design algorithms using greedy strategy, divide and conquer approach, dynamic programming, and max flow - min cut theory.
2. Ability to analyze asymptotic runtime complexity of algorithms including formulating recurrence relations.
3. Calculate the computational complexity
4. Implement approximation and randomized algorithms.

TEXT BOOKS:

1. Sahni, S., "Data Structures, Algorithms and Applications in C++", WCB/McGraw-Hill.

RERFERNCE BOOKS:

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C.,"Introduction to Algorithms", 2nd Ed., Prentice-Hall of India.
2. Mchugh, J.A., "Algorithmic Graph Theory", Prentice-Hall.
3. Dasgupta, S., Papadimitriou, C. and Vazirani, U., "Algorithms", Tata McGraw-Hill.

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : CS-2403 **L T P C**

4 0 0 4

Subject : Microprocessor & its Programming **Credits:4**

Course Objective

1. The objective of this course is to provide extensive knowledge of microprocessor based systems and interfacing techniques.
2. To introduce the basic concepts of microprocessor and assembly language programming.

UNIT 01 **04**

Introduction to Microprocessor : Introduction to Microprocessor, Microprocessor systems with bus organization, Microprocessor Architecture & Operations, Memory, I/O Device, Memory and I/O Operations

UNIT 02 **06**

8085 Microprocessor Architecture :8085 Microprocessor Architecture, Address, Data And Control Buses, Pin Functions, Demultiplexing of Buses, Generation Of Control Signals, Instruction Cycle, Machine Cycles, T-States, Memory Interfacing.

UNIT 03 **11**

Intel 8085 Microprocessor Instruction Set and Programming: Addressing modes of 8085. Data transfer, Arithmetic, Logical, Rotate, Branch and machine control instructions. Development of 8085 assembly language programs, time delays. Concept of stack and Instruction related to stack. 8085 interrupts, RST, RIM, SIM instructions. Subroutines and conditional call instruction

UNIT 04 **06**

Interfacing of Memory Chips & Input / Output Chips: Memory mapped I/O and I/O mapped I/O. Address decoding, interfacing of memory chips with 8085. Interfacing of input/output chips with 8085

UNIT 05 **07**

Peripherals IC and Applications: Block diagram, Pin description 8255(PPI), Block diagram, Pin description 8253(PIT). Brief description and application of 8259 PIC, 8251

USART and 8237 DMA Controller

UNIT 06 **07**

Interfacing with 8085: Interfacing of 8255(PPI) with 8085 Microprocessor. Interfacing of keyboard, display, ADC and DAC to 8255, Interfacing of 8253(PIT)&DMA with 8085 Microprocessor, interfacing of traffic light controller with 8085 microprocessor, interfacing and control of stepper motor using 8085 microprocessor

UNIT 07 **04**

Introduction advance Microprocessor: Introduction and advance features of 8086, 8088, 80186, 80286, 80386 and 80486 microprocessor, Pentium processors.

Learning Outcome

- The student will be able to analyze, specify, design, write and test assembly language programs of moderate complexity.
- Students should be able to solve basic binary math operations using the microprocessor
- To know the techniques of interfacing between the processors and peripheral devices so that they themselves can design and develop a complete microprocessor based systems (projects).

Text Book :

1. Fundamentals of Microprocessor & Microcomputers b B.Ram ,Dhanpat Rai Publications, 2005

Reference Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonkar ,Penram International .
2. Microcomputers and Microprocessors: The 8080,8085 and Z-80 Programming, Interfacing and Troubleshooting by John E. Uffenbeck.
3. Advanced Microprocessors And Peripherals by RAY, Tata McGraw-Hill Education, 2006

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : CS-2404 **L T P C**

4 0 0 4

Subject : DATA COMMUNICATION & COMPUTER NETWORKS

Credits:4

Objectives: This course aims to give students a theoretical foundation in software engineering. Students will learn about the principles and methods of software engineering, including current and emerging software engineering practices and support tools.

UNIT 01 **06**

Basics Of Data Communication

Components, Data Representation, Data Flow, Topology: Mesh, Star, Tree, Bus, Ring and Hybrid Topologies, Transmission Mode, Categories of networks: LAN, MAN and WAN. Layered Architecture, OSI Reference Model, TCP/IP Protocol Suite.

UNIT 02 **06**

Transmission Media And Communication Devices

Guided media: Twisted pair, Coaxial cable, Fiber optics, Unguided media, Transmission impairments: Attenuation, Distortion, Noise, Performance, Data rate limits: Nyquist formula, Shannon Formula, Repeaters, Bridges, Routers, Gateways.

UNIT 03 **06**

Multiplexing And Switching

Frequency division multiplexing, Wave division multiplexing, Time division multiplexing, Inverse Multiplexing, Circuit Switching: Space division, Time division, TDM bus, Packet Switching: Datagram approach, Virtual circuit approach.

UNIT 04 **06**

Error Detection / Correction And Data Link Control

Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ.

UNIT 05 **06**

Medium Access Control

Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, IEEE 802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802

Routing And Congestion Control

IP Protocol, IPv4 classful and classless addressing, subneting, Distance vector routing, Link state routing, Congestion Control: Principle, Congestion prevention policies, Leaky bucket algorithm and Token Bucket algorithm.

UNIT 06 **06**

Transport Layer Functions

Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

UNIT 07 **06**

Application Layer Protocols

World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP)

Introduction To Network Security

Privacy, Authentication, Integrity, Non-Repudiation, Private Key Cryptography, Public Key Cryptography

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:
1. Identify the different types of network topologies and protocols.

2. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

3. Identify the different types of network devices and their functions within a network

4. Design subnetting and routing mechanisms.

5. Familiarity with the basic protocols of computer networks, and how they can be used

to assist in network design and implementation.

TEXT BOOK:

1. Data Communication and networking by Behrouz A. Forouzan, Tata McGraw Hill, 2nd Edition.

REFERENCE BOOKS:

1. Computer Networks by Andrew S. Tanenbaum, Prentice Hall of India, 2nd Edition.
2. Data Communication by Stallings, Prentice Hall of India
3. Data Communication by Miller, Pearson.

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : MA-2405 **L T P C**

4 1 0 5

Subject : Discrete Structures **Credits:4**

Pre-requisites: Basic concepts of Linear Algebra, Relations and functions

Objective: The objective of Discrete Structures is to ensure the students to formulate and analyze mathematical and graphical problems, precisely, define the key terms, and draw clear and reasonable conclusions. It aims to explain the importance of Discrete Structures and its techniques to solve real life problems and provide the limitations of such techniques and the validity of the results.

UNIT 01 **06**

Sets

Roaster and Builder form of sets. Set Operations, Algebra of sets. Duality, Cardinality of finite and infinite sets, Power sets. Partitions, Cross partitions, Minsets, Maxsets. Venn Diagrams. Countable and Uncountable sets.

UNIT 02 **06**

Relations and Functions

Binary relations. Properties of relations. Closure properties of relations, Equivalence relations and partitions. Diagraphs, Warshal's Algorithm, Domain and range of functions, Types of functions. Composition of functions, Hashing function. Graphical representation of functions. Inverse functions**.**

UNIT 03 **06**

Combinatorics

Review of Permutation and Combination, Mathematical Induction. Pigeon hole principle. Inclusion and Exclusion Principle. Recurrence Relations, General Solution of linear recurrence relations. Solutions by the method of substitution and generating functions

UNIT 04 **06**

Groups and Rings

Properties of binary compositions. Semi-gropus, monoid and groups. Congruent relations. Fundamental theorem of semi-group homomorphism. Quotient, cyclic, normal and dihedral groups. Lagrange theorem with proof. Fundamental theorem of group homomorphism. Direct product of groups. Symmetric group. Alternating group.

Applications of groups in coding theory. Rings. subrings, integral domains . Ideals, fields, Fundamental theorem of rings. Principal and Euclidean domain

UNIT 05 **06**

Lattice and Boolean Algebra

Posets, Hasse diagrams and lattices. Bounded and complemented lattice. Laws of Boolean algebra. Boolean expressions and functions. SOP and CSOP form. Karnaugh maps. Applications of Boolean algebra to switching circuits and logic gates

UNIT 06 **06**

Graphs

Directed and undirected graphs Homorphic and .isomorphic graphs Sub graphs.multigraphs, weighted graphs, Paths and circuits. Representation of graphs. Bipartite graphs. Euler and Hamiltonian graphs. Shortest paths (Fleury algorithm). Planar graphs.Euler theorem. Graphs coloring Applications of graphs. Dijkstra algorithm.

UNIT 07 **06**

Trees: Binary search trees and its traversals. Spanning trees. Kruskal algorithm.

Learning Outcome: On completion of the module the student should be able to:

1. develop mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
2. Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
3. Use effectively algebraic techniques to analyse basic discrete structures and algorithms.
4. Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

Text Book:

1. Elements of discrete mathematics C.L. Liu, McGraw Hill Concrete mathematics: A foundation for computer science, Ronald Graham.

Reference Books:

2. Donald Knuth and Orenpatashic, 1989, Addison- Wesley.
3. Mathematical Structure for Computer Science, Judith L. Gersting, 193. Computer Science Press.
4. Applied Discrete Structures for computer Science, Doerr and Levasseur.
5. Discrete Structures, Satinder Bal Gpupta and C.P.Gandhi. Laxmi Publications, New Delhi

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : CS 2406 **L T P C**

0 0 2 1

Subject : DESIGN AND ANALYSIS OF ALGORITHM LAB
Credits:1

Objective: The objective is to give student a first-hand experience of implementing well-known algorithms in a high-level language. To make the student able to compare the practical performance of different algorithms for the same problem.

1. Code and analyze the use of binary search to search a given element in a sorted array in ascending order.

2. Code and analyze to sort an array of integers using quick sort.

3. Code and analyze to find the majority element in an array of integers.

4. Code and analyze to sort an array of integers using Heap sort.

5. Code and analyze to sort an array of integers using Merge sort.

6. Code and analyze to sort an array of integers using Quick sort.

7. Code and analyze to find the edit distance between two character strings using dynamic programming.

8. Code and analyze to find an optimal solution to weighted interval scheduling using dynamic programming.

9. Code and analyze to find an optimal solution to matrix chain multiplication using dynamic programming.

10. Code and analyze to do a depth-first search (DFS) on an undirected graph. Implementing an application of DFS such as (i) to find the topological sort of a directed acyclic graph, OR (ii) to find a path from source to goal in a maze.

11. Code and analyze to do a breadth-first search (BFS) on an undirected graph. Implementing an application of BFS such as (i) to find connected components of an undirected graph, OR (ii) tocheck whether a given graph is bipartite.

12. Code and analyze to find shortest paths in a graph with positive edge weights using Dijkstra's algorithm.

13. Code and analyze to find shortest paths in a graph with arbitrary edge weights using Bellman-Ford algorithm.

14. Code and analyze to find the minimum spanning tree in a weighted, undirected graph.

15. Code and analyze to find all occurrences of a pattern P in a given string S.

Learning Objective: the students will be able to:

1. Use major algorithmic techniques (divide-and-conquer, dynamic programming, linear programming, greedy paradigm, graph algorithms) and cite problems for which each technique is suitable;
2. Argue the correctness of algorithms using inductive proofs and loop invariants;
3. Evaluate and compare different algorithms using worst-, average-, and best-case analysis.

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : CS 2407 **L T P C**

0 0 2 1

Subject : Microprocessor & Programming Lab **Credits:1**

Objectives: The objective is to make the student able to write program using 8085 microprocessor based systems and interfacing techniques.

List of experiments

1. Study architecture of 8085 familiarization with its hardware, commands & operation of microprocessor kit.
2. Write a program using 8085 & verify for addition of two 8-bit numbers.
3. Write a program using 8085 & verify for addition of two 16-bit numbers. (with carry)
4. Write a program using 8085 & verify for subtraction of two 8-bit numbers. (display of barrow)
5. Write a program using 8085 & verify for subtraction of two 16-bit numbers. (display of barrow)
6. Write a program using 8085 & test for typical data: multiplication of two 8-bit numbers by bit rotation method
7. Write a program using 8085 & test for typical data division of two 8-bit numbers by repeated subtraction method
8. Write a program using 8085 for finding square-root of a number & verify.
9. Write a program using 8085 for arranging an array of numbers in descending order & verify.
10. Write a Program for generating Fibonacci series in 8085.
11. Write a program to interface ADC & DAC with 8085 & demonstrate generation of square wave.
12. Write a program to control the operation of steeper motor using 8085 and 8255 PPI.
13. Write a program to control the traffic light system using 8085 and 8255 PPI.

Learning Outcome: The student will be able to write program using 8085 microprocessor based systems and interfacing techniques.

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : CS 2408 **L T P C**

0 0 2 1

Subject : Data Communication and Computer Network Lab

Credits:1

Objectives: The objective is to make the student able to understand, define and implement data communications networks concepts

Requirement: Networking Devices, cables, connectors, Cisco Packet Tracer

1. Familiarization with networking components and devices.
2. Familiarization with transmission media and tools.
3. Preparing straight and cross cables.
4. Configuration of TCP/IP protocols.
5. Implementation of file and printer sharing.
6. Design and Simulation of the network scenarios using classful addressing.
7. Design and simulation of static routing.
8. Design and simulation of dynamic routing.
9. To install any one open source packet capture software like Wire-shark.

Learning Outcome: The student will be able to:

1. Describe, design and simulate network scenarios and routing protocols
2. Install and use open source.

4th Sem B.Tech (Computer Science and Engineering)

Subject Code : FS-2409 **L T P C**

0 0 2 1

Subject : Leadership **Credits:1**

Course Objective:

To help students to develop personal leadership skills, practice risk taking, serve as a role model, manage people, task and, facilitate group process

Unit1-Speaking **(12)**

Activities-Technical Interview, Extempore, Declamation,Presentation on famous Leaders**,** Case Studies

Unit2-Personality Development **(2)**

Activity-Qualities of leader

Unit3-Listening Skills **(1)**

Activity-Listening to speech of famous leaders

Unit4-Writing Skills **(3)**

Activity-Book review of books on famous leaders, Definition Essay

Unit5-Reading **(4)**

Activity- Reading books on famous leaders, Articles by famous leaders

Unit6-Vocabulary Enhancement **(4)**

Activity- Exercises on Synonyms& Antonyms, One word substitution

Unit7-Grammar **(2)**

Activity- Exercises based on Narration

Learning Outcome

By the end of the course the students will display the ability to practice collaboration, resolve controversy with civility, lead by example, be committed to ethical action. They will exhibit the leadership qualities.

Reference Books:

1. Vocabulary Builder- Barron's Educational Series
2. Soft Skills for Managers by Dr. T. Kalyana Chakravarthi & Dr. T. Latha Chakravarthi