



Course Structure and Syllabus
for
Second Year B. Tech. Programme
(With effect from the Academic Year 2011-2012)



COMPUTER ENGINEERING

डॉ. बाबासाहेब आंबेडकर तंत्रशास्त्र विद्यापीठ, लोणेरे - रायगड
Dr. Babasaheb Ambedkar Technological University, Lonere - Raigad

Semester IV				
Code	Course of Study	L	P	C
CEIT401	Probability Statistics and Queuing Theory	4	0	8
CEIT402	Data Communication	4	0	8
CEIT403	Microprocessors and Microcontrollers	4	0	8
CEIT404	Data Structures	4	0	8
CE405	Elective-I: Information System Analysis and Design	4	0	6
ID406	History of Science and Technology*			4
CE407	Programming Laboratory III**		4	4
CE408	Programming Laboratory IV***		4	2
XC09	NSS/NCC/Sports/Arts			
Total		19	6	48

* Self Study Course (Objective University Level Common Exam.)

**Microprocessors and Microcontrollers, Data communications

CEIT401: Probability Statistics and Queuing Theory

Unit 1

[8 hrs.]

Probability Theory:

Definition of probability: classical, empirical and axiomatic approach of probability, Addition theorem of probability, Multiplication theorem of probability, Bayes' theorem of inverse probability, Properties of probabilities with proofs, Examples.

Unit 2

[8 hrs.]

Random Variable and Mathematical Expectation:

Definition of random variables, Probability distributions, Probability mass function, Probability density function, Mathematical expectation, Joint and marginal probability distributions, Properties of expectation and variance with proofs, Examples.

Unit 3

[8 hrs.]

Theoretical Probability Distributions:

Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial distributions, Properties of binomial, Poisson and normal distributions, Relation between binomial and normal distributions, Relation between Poisson and normal distributions, Importance of normal distribution, Examples.

Unit 4

[8 hrs.]

Correlation:

Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl pearson's correlation coefficient, Spearman's rank correlation, Coefficient, Properties of Karl pearson's correlation coefficient, Properties of Spearman's rank correlation coefficient, Probable errors, Examples.

Unit 5

[8 hrs.]

Linear Regression Analysis:

Introduction, Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression, Theorems on regression coefficient, Properties of regression coefficient, Examples.

Unit 6

[8 hrs.]

Queuing Theory:

Introduction, Queuing systems, The input or arrival pattern, The service pattern and service discipline , Notation, Performance measures, Little's formula, Relation between the probabilities of states, M/M/1/ ∞ systems, Examples.

Text Books:

1. S. C. Gupta, *Fundamentals of Statistics*, 46th edition, Himalaya publishing house, 2010.
2. G.V. Kumbhojkar, *Probability and Random Processes*, 14th edition, C. Jamnadas and co., 2010.
3. G. Haribaskaran, *Probability, Queuing Theory and Reliability Engineering*, 6th edition, Laxmi publications, 2010.

Reference Books:

1. Kishor S. Trivedi, *Probability, Statistics with Reliability, Queuing and Computer Science Applications*, 2nd edition, Wiley India Pvt. Ltd., 2008.

CEIT402: Data Communication

Unit 1

[8 hrs.]

Introduction:

Components of communication, Data representation, Data flow, Communication model, Network, Network topologies, Network connection, Network categories, LAN, WAN, MAN, Internet.

Network Models: Layered tasks, OSI Model – Layered architecture, Layers in OSI model TCP/IP model, Comparison.

Data and Signals:

Analog and digital data, Analog and digital signals, Periodic and non-periodic signals, Sine wave, Parameters of sine wave, Time and frequency domain, Composite signals, Bandwidth, Digital signal-bit rate, Baseband and broadband transmission, Transmission impairments, Nyquist bit rate, Shannon capacity, Performance: Throughput, Latency, Bandwidth-delay product, Jitter.

Unit 2

[8 hrs.]

Analog Transmission:

Digital to analog conversion- Amplitude shift keying, Frequency shift keying, Phase shift keying, Quadrature amplitude Modulation, Analog to analog Conversion - Amplitude modulation, Frequency modulation, Phase modulation.

Multiplexing: Need of multiplexing, Introduction, Multiplexer and demultiplexer, Frequency division multiplexing, Wavelength division multiplexing, Time division multiplexing – Statistical TDM, Synchronous TDM, Data rate management in TDM.

Unit 3

[8 hrs.]

Digital Transmission:

Digital to digital conversion, Signals element, Data element, Signal rate, Data rate, DC-component, Self synchronization, Line coding schemes - NRZ, NRZI, Bipolar AMI, Pseudo ternary, Manchester, Differential manchester. Block coding schemes - 4B/5B, 8B/10B, Scrambling –HDB3, B8ZS, Analog to digital conversion: Pulse code modulation, Delta modulation, Transmission modes- serial and parallel transmission.

Unit 4

[8 hrs.]

Transmission Media:

Guided Media – Twisted pair cable, Co-axial cable, Fiber optic cable, Performance of each, Unguided media – Radio waves, Microwaves, Infrared.

Introduction to fiber optics: Nature of light, Fiber characteristics, Sources and detectors , Connectors and splices.

Unit 5

[8 hrs.]

Error Detection and Correction:

Introduction: Types of errors, Redundancy, Detection versus correction, Forward error correction and retransmission, Modular arithmetic, Block Coding : error detection, error correction, Hamming distance, Minimum hamming distance, Linear block codes, Cyclic Codes : Cyclic Redundancy check, Hardware

implementation, Polynomials, Cyclic code analysis, Checksum : Concept, One's component, Internet checksum.

Unit 6

[8 hrs.]

Multiple Access:

Random Access Protocol: ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled access: Reservation, Polling, Token passing, Channelization: FDMA, TDMA, CDMA.

Cellular Phones and Satellite Networks:

Frequency reuse principle, roaming, Three generations, Satellite networks: Orbits, GEO, MEO, LEO satellite.

Text Books:

1. Schweber, *Data Communication*, 1st edition, Tata McGraw Hill publication, 2009.
2. Behrouz Forouzan, *Data Communications and Networking*, 4th edition, Tata McGraw Hill publication, 2010.
3. Stalling, *Data Communications and Computer Network*, PHI publication.

CEIT403: Microprocessors and Microcontrollers

Unit 1

[8 hrs.]

Architecture of Microprocessors:

General definitions of mini computers, Microprocessors, Micro controllers and digital signal processors. Overview of 8085 microprocessor, Overview of 8086 microprocessor, Signals and pins of 8086 microprocessor.

Unit 2

[8 hrs.]

Assembly language of 8086:

Description of Instructions, Assembly directives, Assembly software programs with algorithms.

Unit 3

[8 hrs.]

Interfacing with 8086:

Interfacing with RAMs, ROMs along with the explanation of timing diagrams, Interfacing with peripheral ICs like 8255, 8254, 8279, 8259, 8259 etc., Interfacing with key boards, LEDs, LCDs, ADCs, and DACs etc.

Coprocessor 8087 : Architecture of 8087, interfacing with 8086. Data types, Instructions and programming.

Unit 4

[8 hrs.]

Architecture of Micro controllers:

Overview of the architecture of 8051 microcontroller, Overview of the architecture of 8096 16 bit microcontroller.

Assembly language of 8051: Description of Instructions, Assembly directives, Assembly software programs with Algorithms.

Unit 5

[8 hrs.]

Interfacing with 8051:

Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs, Interfacing with DACs, etc.

Unit 6

[8 hrs.]

High end processors:

Introduction to 80386 and 80486.

Text Books:

1. Douglas Hall, *8086 Microprocessor, Architecture and Programming*, PHI publication.
2. Muhammad Ali Mazidi, *The 8051 Microcontrollers & Embedded System*, Pearson Education India publication.
3. Turley, *Advanced 80386 Programming*, McGraw Hill publication.

Reference Books:

1. Liu, Gibson, *Microcomputer system – The 8086/8088 Family*, PHI publication.
2. John F.Uffenbeck, *The 8086/8088 Family Design, Programming and Interfacing*, PHI publication.
3. Intel 8086, 80386, 80486 manuals.
4. A. K. Ray and K. M. Bhurchandi, *Advanced Microprocessors and Peripherals*, Tata McGraw Hill publication.

CEIT404: Data Structures

Unit 1

[8 Hrs]

Introduction:

Data, Data types, Data structure, Abstract Data Type (ADT), representation of Information, characteristics of algorithm, program, analyzing programs, time and space complexity, Big 'O' and 'Ω' notation, best average and worst cases.

Unit 2

[8 Hrs]

Arrays:

Concept of sequential organization, linear and non-linear data structure, storage representation, array processing sparse matrices, transpose of sparse matrices.

Unit 3

[8 Hrs]

Linked Lists:

Concept of linked organization, singly and doubly linked list and dynamic storage management, circular linked list, operations such as insertion, deletion, concatenation, traversal of linked list, dynamic memory management, garbage collection.

Unit 4

[8 Hrs]

Stacks and Queues:

Introduction, stack and queue as ADT, representation and implementation of stack and queue using sequential and linked allocation, Circular queue and its implementation, Application of stack for expression evaluation and expression conversion, recursion, priority queue.

Unit 5

[8 Hrs]

Trees and Graphs:

Basic terminology, binary trees and its representation, insertion and deletion of nodes in binary tree, binary search tree and its traversal, threaded binary tree, Heap, Balanced Trees. Terminology and representation of graphs using adjacency matrix, Warshall's algorithm.

Unit 6

[8 Hrs]

Searching and Sorting:

Sequential, binary searching, skip lists – dictionaries, linear list representation, skip list representation, operations – insertion, deletion and searching. Insertion sort, selection sort, radix sort. File handling.

Text Books:

1. Mark Allen Weiss, *Data structures and algorithms analysis in C++*, Second edition, Pearson

Education.

2. S. Lipschutz, *Data Structures*, McGraw Hill Pub.
3. Y. Langsm, M. Augenstin, A. Tanenbaum, *Data Structure using C and C++*, Pearsons Education Asia Pub.
4. Trembley and Sorenson, *Introduction to Data Structures*, PHI Pub.

Reference Books:

1. E. Horowitz, S. Sahani, *Data Structure and Algorithms*, Galgotia Pub.
2. Thomas Cormen, *Introduction to Algorithms*, PHI.

CE405: Information System Analysis and Design (Elective-I)

Unit 1

[08 Hrs]

Introduction to Information System Development: What is System Analysis and Design?, Business System concepts, Categories of Information systems, System development Strategies. **Managing the application development portfolio:** How system projects have begun, Managing project review and selection, Preliminary investigation, Selecting the project development strategies.

Unit 2

[08 Hrs]

Tools for determining system requirement: What is requirements determination?, Fact finding techniques, Tools for documenting procedure and decision.

Unit 3

[08 Hrs]

Structured Analysis development strategies: Structured Analysis, Developing Data flow diagrams. Computer Aided Systems Tools: Role of Tools, Categories of automated Tools, CASE Tools, Benefits of CASE.

Unit 4

[08 Hrs]

The Analysis to design transitions: Specifying Application requirements, Objectives in designing Information systems, What features must be designed?

Design of computer output: How to identify computer Output needs, How to present information, Designing printed output, Designing visual concerns guide input design, Capturing data for input, Input validation.

Unit 5

[08 Hrs]

Design of online dialogue: How is online different?, What is an interface, Designing dialogue, Dialogue strategy, Data entry dialogues.

Design of files and use of auxiliary storage devices: Basic file terminology, Data Structure Diagrams, Types of files, Methods of file organization.

Unit 6

[08 Hrs]

Systems Engineering and Quality assurance: Design objectives, Program structure charts, Design of software, Managing quality assurance, Managing testing practices.

Managing system implementation: Training, Conversion, post implementation review. **Managing information systems development:** Estimation and management of development time, Estimation, Personnel and development management.

Hardware and Software selection: Hardware selection, Software Selection.

Text Book:

1. James A. Senn, “ Analysis and Design of Information Systems”, Second Edition, TMH.

Reference Books:

1. Elias M. Award, “System Analysis and Design”, Second Edition, Galgotia Publishing Ltd.
2. Hoffer J. A., “Modern Systems Analysis & Design”, Third Edition, Tata Mcgraw Hill publication.
3. Kendall & Kendall, “Systems Analysis and Design”, Eighth Edition, Prentice Hall publication.

CE407: Programming Laboratory III

Data Structures Lab

List of Experiments:

1. Search Operation on linear array data structure.
 - i) To find particular items location using linear search algorithm
 - ii) Insertion and linear search algorithm.
 - iii) Binary search algorithm.
2. Insertion and deletion operations on linear array.
3. Sorting i) Bubble Sort ii) Insertion Sort iii) Quick Sort iv) Selection Sort iv) Heap Sort
4. Creation and display linked list using pointer.
5. Insertion Operation on linked list using pointer: at beginning, given location, end.

6. Deletion in linked list using pointer: at beginning, given location, end.
7. Implementation of doubly linked list using pointer.
8. Tower of Hanoi problem.
9. Traversing of tree using pointer: preorder, postorder and inorder traversal.
10. To traverse graph using Breadth First Search and Depth First Search techniques.
11. Implementation of searching algorithms.
12. Implementation of File handling concepts.

CE408: Programming Laboratory IV

Data Communications Lab

List of experiments:

1. Study of Frequency Modulation and Demodulation.
2. Study of Sampling (Pulse Amplitude Modulation).
3. Study of Frequency Division Multiplexing and Demultiplexing.
4. Study of Time Division Multiplexing and Demultiplexing
5. Packet Transmission.
6. Study of Stop and Wait protocol.
7. Study of Sliding Window protocol.
 - (a) Go Back n
 - (b) Selective Repeat
8. Study of ALOHA and CSMA.
9. Study of CSMA/CD.
10. Study of token passing access method.

Microprocessors and Microcontrollers Lab

List of experiments:

1. Study of MASM/TASM.
2. Write an assembly language program to perform 8 bit, 16 bit addition.
3. Write an assembly language program to perform 8 bit, 16 bit subtraction.
4. Write an assembly language program to perform negative result subtraction.
5. Write an assembly language program to perform 8 bit, 16 bit Multiplication.
6. Write an assembly language program to perform 16 bit by 8 bit division
7. Write an assembly language program to check whether entered number is even or odd.
8. Write an assembly language program to calculate average of temperatures.
9. Write an assembly language program to perform sum of digits for 2, 3 digits numbers.
10. Write an assembly language program to perform conversion from two ASCII no's to packed BCD.
11. Write an assembly language program to perform conversion from BCD to Hex.
12. Write an assembly language program to add inflation factor using array.
13. Write an assembly language program to add profit to price array.
14. Write an assembly language program to generate Real time clock.