B. Tech Computer Engineering (Theory Courses)

Syllabus

Department of Computer Engineering
Jamia Millia Islamia

List of Theory Courses

Semester 1&2		Semester 6	
Code	**Course**	**Code**	**Course**
CS-101	Fundamentals of Computing	CEN-601	Computer Graphics
Semester 3		CEN-602	Software Engineering
CEN-301	Data Structures & Programming	CEN-603	OOPS
CEN-302	Digital Logic Theory	CEN-604	Computer Network-II
CEN-303	Discrete Mathematics	CEN-605	Analysis & Design of Algorithm
CEN-304	Electronics Devices & Applications	CEN-606	Parallel & Distributed Systems
CEN-305	Mathematics-I	CEN-607	Language Processor
CEN-306	Signals & Systems	**Semester 7**	
Semester 4		CEN-701	Internet Fundamentals
CEN-401	Computer Organization	CEN-702	Management Science
CEN-402	Operating System-I	CEN-703	Language Processor-II
CEN-403	IT	CEN-704	Mobile Communication
CEN-404	Analog and Digital Communication	CEN-705	Data Mining
CEN-405	Mathematics-II (NACP)	**Semester 8**	
CEN-406	System Software	CEN-801	Advanced algorithms and current trends in computing
Semester 5		CEN-802	Artificial Intelligence
CEN-501	Computer Architecture	CEN-803	Software Project Management
CEN-502	Automata Theory	CEN-804	Distributed Processing
CEN-503	Computer Network-I		
CEN-504	Data Base System		
CEN-505	Microprocessor		
CEN-506	Operating System-II		

FUNDAMENTAL OF COMPUTING

Paper Code	**CS- 101**
Course Credits	**2**
Lectures / week	**2**
Tutorial / week	**1**
Course Description	**UNIT – I**

UNIT – I

Computer fundamentals, Bits and Bytes, CPU, Memory, Input and output devices, I/O devices, Operating system, applications software's. Number system, decimal system, Binary, octal, hexadecimal.

UNIT- II

The C character set, constants, variable, keywords, operator and expressions, decision controls, loops, case, functions, call by value and by reference, array, single dim, 2 dim, multidimensional arrays, strings, library string functions, structures, pointers and structures, dynamic memory allocation using pointers, searching and sorting, linear, binary search, bubble sort selection sort, insertion sort.

UNIT- III

OS definition, role of OS in computer system, multi programming, time sharing, multitasking, multiprocessing, symmetric and asymmetric, cluster system, real time system, client server computing, distributed OS, function of OS (user interface, GUI, program execution, I/O management, Resource management, dos fundamentals.

UNIT- IV

Network, communication models, transmission media, connection topologies, LAN, WAN, MAN, ISO-OSI model of networking, Internet, ISP, WWW, Email, URL, Web browsers, websites, intranet, extranet.

UNIT – V

DBMS, DBMS applications, Advantage of DBMS, Data abstraction, data model.

References / Text Books:	• Peter Norton, "Introduction to Computers, Tata Mc-Graw Hill. • M N Doja, "Introduction to Computers and Information Technology" • B. A. Forouzan, "Data Communication and Networking", TMH, 4th Ed., 2006. • "An Introduction to Database Systems", C.J.Date, Pearson Education. • C Programming by Yaswant Kanetkar
Computer Usage / Software Requires:	Windows Operating System, TC, DEVC++

DATA STRUCTURE

Paper Code	**CEN-301**
Course Credits	**4**
Lectures / week	**3**
Tutorial / week	**1**
Course Description	**UNIT – I**

UNIT – I

Definition of Data Structure, Types & characteristics of Data structures, Abstract Data Type (ADT), Algorithms: Algorithm Concepts, Definition of Algorithm, Objectives of algorithms, Quality of an algorithm Space complexity and Time complexity of algorithm.

Characteristics of an array, Definition of an Array, Implementation of 1-D arrays, Row and Column Major Implementations of 2-D, 3-D and n-D arrays.

Advanced concept of Pointers in C, Dynamic allocation of Memory

UNIT- II

Stack as a ADT, operations on stack, Stack implementation using array and linked list, Applications of Stack: Polish and reverse Polish notations, Recursion, Garbage collection. Queue as ADT, Operations on queue, and Types of queues: Linear Queue, Circular Queue, Priority Queue, and Double Ended Queue, Application of Queue.

UNIT- III

Concept of a Linked List, Linear Single and Double link lists, Circular Single and Double link List, Generalized Linked List, Header Linked list, Applications of Link List.

UNIT- IV

Concepts of a Tree, Tree as ADT, Definitions of n-ary, binary trees, Strictly Binary Tree, Complete Binary Tree, Weight of a

tree, Level of a node, Height/Depth of a Tree. Operations on tree, Tree Search Algorithms, Binary Search Tree, Tree traversal Algorithms, AVL Trees, Threaded binary trees, Left Threaded and Right Threaded binary search trees, Heap Tree, Expression tree, Huffman Tree.

Graph: Different terminology associated with Graphs, Types of graphs – directed/undirected, connected/disconnected, cyclic/acyclic, Representation of graphs: Adjacency matrix, linked list. Graph Traversal – BFS, DPF, Graph algorithm-Warshall's, Djikastra's, Minimum Spanning Tree – Prim's and Kruskal's Algorithm.

UNIT – V

References / Text Books:	Bubble Sort, Sequential Sort, Shell Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Topology sort. Searching Algorithm- Linear Search and Binary Search
Computer Usage / Software Requires:	- Seymour Lipschutz, TMH, Scaumn Series. - Fundamentals of Data Structure inC by Horowitz, Sahni and Anderson-Freed, University Press, Second Edition. - Data Structure and Algorithm – John Beidler, Springer Practical implementation can be done on any C Compiler like gcc or Dev C++ with problems on Stack, Queue, Tree and Graph.

DISCRETE MATHEMATICS

Paper Code   CEN-303

Course Credits   4

Lectures / week   3

Tutorial / week   1

Course Description **UNIT – I**

Review of Relations, equivalence relations, partial orders relations, hash function, characteristics function. Algebraic structure: semi-groups, monoids, groups, permutation groups, isomorphism, rings, fields, integral domain; Lattice.

UNIT- II

Definition and properties of graphs, directed and undirected graphs, degree sequence, cycles, path, connectivity, adjacency matrix, incidence matrix. Complete graphs, Regular graphs, Bipartite graphs, Planar graphs. Graph Isomorphism. Euler circuit, Hamiltonian circuit. Coloring of graphs: Welch-Powell algorithm. Shortest path algorithm.

UNIT- III

Introduction to recurrence, common recurrence relations. Generalized linear homogenous and non-homogenous recurrence relations, Solving recurrence relations: Iteration method, characteristic equation method. Introduction to generating functions. Solving recurrences using generating functions. Solving simultaneous recurrence relations.

UNIT- IV

Propositional calculus, principle of inclusion and exclusion, pigeonhole principle, principle of mathematical induction, permutation and combination, recursive functions, Boolean algebra.

UNIT – V

Introduction to Linear programming problems, modeling linear programming problems. Solving linear programming problems: Graphical methods, Simplex algorithm. Dual of LPP and duality principle.

References / Text

- K. H. Rosen, Discrete Mathematics and its Applications, Seventh Edition, McGraw Hill International Editions.

Books:

- C. L. Liu, Elements of Discrete Mathematics, McGraw Hill International Editions.
- E. G. Goodaire, Discrete Mathematics with Graph Theory, Prentice-Hall of India.
- Thomas Koshy, Discrete Mathematics with Applications, Elsevier Academic Press.
- J L Mott, A Kandel, T P Baker, Discrete Mathematics for Computer Scientists & Mathematicians, Prentice-Hall of India.
- K. D. Joshi, Foundations of Discrete Mathematics, Wiley Eastern Ltd.

Computer Usage / Software Requires:

Signal and System

Paper Code	**CEN-306**
Course Credits	**4**
Lectures / week	**3**
Tutorial / week	**1**
Course Description	**UNIT – I**

REPRESENTATION OF DISCRETE AND CONTINUOUS TIME SIGNAL AND SYSTEM

Introduction of signal& classification of signal, Elementry signals, System &classification of system, order of system, Interconnection of system-series or cascade interconnection of subsystem, parallel interconnection of subsystem, series-parallel interconnection of subsystem, feedback interconnection of subsystem, Continuous time and discrete time signals. Representation and classification; continuous time and discrete time systems, representation of linear Time invariant Discrete and continuous time signals: Laplace transformation and its application in system analysis.

UNIT- II

ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS

Fourier series Representation of periodic signals; Response to periodic Signals, Fourier transform and its properties, Inverse Fourier. Transforms; frequency response function, Computation of response from the Fourier Transform; Bandwidth Concept; Analysis of Ideal Filters.

UNIT- III

Z- transform and properties, Inverse Z- Transform; Frequency response of discrete time system; Discrete Fourier transform and its properties; System analysis via DFT

UNIT- IV

Sampling, Nyquist rate and Nyquist interval ,Sampling of continuous and discrete signals in time and frequency; Digital filters and FIR and IIR structures and their Realization, FIR filters, IIR Filters.

UNIT – V

Random variables: probability distribution and density function and density functions, Uniform, Gaussian, Exponential and Poisson distributions, Statistical averages, Stochastic process, Systems with Stochastic Inputs; Auto and cross correlation functions; Power spectral density, Noise- Its types

References / Text Books:

- A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall.
- R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems -
  Continuous and Discrete", 4th edition, Prentice Hall.
- B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press.
- Douglas K. Lindner, "Introduction to Signals and Systems", Mc-Graw Hill International Edition.
- Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons(Asia) Private Limited.
- Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems", John Wiley and Sons (SEA) Private Limited.
- M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB" Tata Mc Graw Hill Edition.
- I. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
- Ashok Ambardar, "Analog and Digital Signal Processing", Second Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company).

Computer Usage / Software Requires:

 e.g. MATLAB