BCA

SEM 2					
Code	**Subject**	**L**	**T**	**P**	**Credits**
3C.153	Data Structure and Algorithms	3	0	0	3
3C.154	Operating Systems	4	0	0	4
3C.155	VB.Net	3	0	0	3
3C.152	Computer Architecture	4	0	0	4
3C.182	Discrete Mathematics	4	0	0	4
40.151	Life Skills 2	2	0	0	2
	Practical/ Sessional				
3CP.153	Data Structure Lab	0	0	2	1
3CP.155	Visual Programming Lab	0	0	2	1
					22

3C.153 Data Structures and Algorithms

Unit I

Time and Space complexity of algorithms, average case and worst case analysis, asymptotic notation as a measure of algorithm complexity, O and Θ notations.

Unit II

Arrays: Representation of single and multidimensional arrays; sparse arrays -lower and upper triangular matrices and Tri -diagonal matrices. Analysis of sorting algorithms- Selection sort, Bubble sort, Insertion sort, Heap sort, Quick sort and analysis of searching algorithms – linear search and binary search. Stacks and Queues: Introduction and primitive operations on stack; Stack application: Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion from infix to postfix. Introduction and primitive operation on queues, D-queues and priority queues.

Unit III

Lists: Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion, searching, two way lists and Use of headers. Trees: Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion.

Unit IV

Multilevel indexing and B-Trees: Introduction: The invention of the B- tree; Statement of the problem; Indexing with binary search trees; Multilevel indexing, a better approach to tree indexes; B -trees: working up from the bottom; Example for creating a B -tree.

Suggested Readings:

1. ***E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Booksource Pvt. Ltd, 2003***
2. ***R. S. Salaria, "Data Structure & Algorithms", Khanna Book Publishing Co. (P) Ltd., 2002.***
3. ***P. S. Deshpande and O.G. Kakde, "C & Data Structure", Wiley Dreamtech, 1st Edition, 2003.***
4. ***Y. Langsam et. al., "Data Structures using C and C++", PHI, 1999.***
5. ***Schaum's outline series, "Data Structure", TMH, 2002***

3CP.153 Data Structures and Algorithms Lab

1. To read and display n numbers using an array.
2. To find transpose a 3 X 3 matrix.
3. To insert a number at a given location in an array.
4. To delete a number from a given location in an array.
5. To create a linked list and perform insertions a) at beginning b) at end c) before a given node d) after a given node
6. To create a linked list and perform deletions a) from beginning b) from end c) at a given node d) After a given node
7. To create a circular linked list and perform insertion at the beginning of list.
8. To create a circular linked list and perform insertion at the end of list.
9. To create a circular linked list and perform deletion from the beginning of list.
10. To create a circular linked list and perform deletion from the end of list.
11. To perform Push, Pop and Peep operations on a stack.
12. To implement a linear queue.
13. To implement a linked queue.
14. To implement a priority queue.
15. To implement a Binary Search tree and perform the following:
    a) Insert Element
    b) Preorder Traversal
16. To implement a Binary Search tree and perform the following:
    a) Insert Element
    b) Post-order Traversal
17. To search an element in an array using linear search technique.
18. To search an element in an array using binary search technique.
19. To sort an array using insertion sort algorithm.
20. To implement quick sort algorithm.

3C.154 Operating Systems

Unit I

Introduction: What is an operating system, batch systems, multiprogrammed, time-sharing systems, personal-computer systems, parallel systems, distributed systems, real-time systems?
Processes: Process Concept, Thread, design issues of thread, user space thread and kernel space thread. Usage of thread. Process states, Operation on Processes: - creation and termination. Implementation of process: - process table. Process Synchronization.

Unit II

Scheduling: Basic Concepts, preemptive and non preemptive scheduling. Scheduling Algorithms. Types of scheduling: - batch, interactive and real-time. Goals of scheduling algorithms. FCFS, SJF, RR, priority, multiple queues, three-level scheduling.
Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. Banker's algorithm.

Unit III

Memory management: Multiprogramming. Address binding (relocation), and protection. Swapping. Virtual memory: - logical versus physical address space, paging, page fault, page table and its entries, demand paging, multi level page table, TLB, its entries and working. Page replacement algorithms: LRU, optimal, NRU, FIFO, second chance, clock, NFU. Working set. What is segmentation, what are its benefits and drawbacks.

Unit IV

File system: What is file, file naming, file types(directory, regular, device), sequential access and random access files, file attributes, operations on file, hierarchical directory structure, path name(relative and absolute), operation on directories, disk layout, disk partition, file system layout, disk block allocation:-contiguous allocation linked list allocation,

I/O management: Basic principles and overall structure of I/O management subsystem, Device controllers, layers of the I/O subsystem: - interrupt handlers device driver, device independent I/O software and user space I/O software.

Suggested Readings:

1. ***Operating Systems, Galvin, John Wiley***
2. ***Operating Systems , Milankovic, TMH***
3. ***An Introduction to Operating System, Bhatt,PHI***
4. ***Modern Operating System, Tannenbaum,PHI***
5. ***Guide to Operating Systems, Palmer, VIKAS***

3C.155 VB.NET Technology

Unit I

Introduction to .NET framework, Common Language Runtime, .NET Framework Class Library, Need of .NET, familiarization with visual studio .NET IDE, The editor, Solution Explorer, Properties window, output window and command window, Toolbox

Unit II

Different .NET Languages, Variables and constant, operators, Conditional Statement and looping statement, String functions, Math functions, formatting data, goto statement

Unit 3

Array, Functions, Sub procedures, Recursion, OOP Concept, Advantages of OOP, Creating object instances in VB.Net, TypeName and TypeOf, Building own classes, Constructor

Unit 4

Windows forms: Anchor and dock properties, Taborder menu, MDI form, Context menus, Color dialog, Font dialog, File dialog boxes, Adding controls at runtime

Suggested Readings:

1. ***Programming VB.Net: A guide for experienced programmers, Gary Cornell and Jonathan Morrison, a press.***
2. ***Microsoft Visual Basic .NET Step by Step, Michael Halvorson, Microsoft Press***

3CP.155 Visual Programming Lab Syllabus

1. Program to accept a character from console and check the case of the character.
2. Program to accept any character from keyboard and display whether it isVowel or not.
3. Program to implement a calculator.
4. Program to input a number and check whether the number is Armstrong or not.
5. Program to find prime number between range of start number and end number.
6. To display Fibonacci series up to nth term
7. Program to print the multiplication table from 2 to 10
8. Design a digital watch using timer control.
9. Develop a VB.Net application to perform timer based quiz of 10 questions.
10. Program to find the greatest among two numbers.
11. Program to determine whether a person is eligible to vote or not.
12. Develop a program to illustrate picture box and image list box
13. Program to Illustrate color dialog, font dialog, and open file dialog
14. Develop a menu based VB.Net application to implement a text editor with cut, copy, paste, save and close operations.
15. Program to read and print the details of a student using class and objects
16. Program to implement the concept of MDI form
17. Program to find the sum of digits of a number. Use the concept of function for it.
18. To sort the elements of an array.
19. Program to add controls during runtime
20. Program to implement the concept of constructor

3C.152 Computer Architecture

Unit I

Basic Computer Organizations and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control.

Unit II

Basic Computer Organizations and Design: Instruction Cycle, Memory – Reference Instructions, Register reference instructions, Input -Output Instructions,Design of Accumulator Logic Shift Unit.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes.

Unit III

Computer Arithmetic: Introduction, Multiplication Algorithms, Division Algorithms, for fixed Point-members. Input - Output Organization: Peripheral Devices, Input-Output Interfaces, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA).

Unit IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Suggested Readings:

1. ***Morris Mano, Computer System Architecture, 3rd Edition, Prentice -Hall of India Private Limited, 1999.***
2. ***WIliam Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall of India Private Limited, 2001***
3. ***Harry & Jordan, Comput er Systems Design & Architecture, Addison Wesley, Delhi, 2000.***
4. ***Malvino, "Digital Computer Electronics: An Introduction to Microcomputers", McGraw Hill, 1993.***

3C.182 Discrete Mathematics

Unit I

Sets: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

Unit II

Relations And Functions: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

Unit III

Partial Order Relations And Lattices: Partial Order Sets, Representation of POSETS using Hasse diagram, Chains. Mathematical Logic: Truth Tables, logical Connectives, Basic logical operations, Conjunction, Disjunction and Negation, Logical Connectives.

Unit IV

Graphs: Introduction to graphs, graphs terminology and representation, path, cycle and connectivity, subgraphs, types of graphs, connected and disconnected graphs, Introduction of Trees, spanning tree, Kruskal's Algorithm for minimal spanning tree, Matrix representation of graph, Incidence and adjacency matrix.

Suggested Readings:

1. ***Kolman, Busby and Ross, "Discrete Mathematical Structure", PHI, 1996.***
2. ***H.K. Dass, "Advanced Engineering Mathematics"; S.Chand & Co., 9th Revised Ed.,2001.***
3. ***S.K. Sarkar, "Discrete Math's"; S. Chand & Co., 2000***

40.151 Life Skills-II

Unit I

Advance Grammar

Analysis of sentences, Transformation of Sentences, Synthesis of Sentences , Correct usage, Structures

Unit II

Advance Writing Skills

Reading Passages& Understanding Texts
Paragraph Writing; Story Writing

Unit III

Letter Writing

Business letter, Complain letter, Letter to the Editor, Enquiry letter, Social letter

Unit IV

Vocabulary

Idioms and Phrases, Commonly Confused word, Word Exercise, Sentence Formation

Suggested Readings:

- ***Hewings, Martin. 1999. Advanced English Grammar; A Self-Study Reference and Practice Book for South Asian Students. Reprint 2003. Cambridge University Press. New Delhi***
- ***M.A.Pink&S.E.Thomas. English Grammar Composition & Effective Business Communication; S.Chand Publishing***
- ***Prof.P.N.Kharu, Dr.Varinder Gandhi. Communicative Skills in English; Laxmi Publication Pvt Ltd***
- ***ShaliniYadav. Communication Techniques; Laxmi publications Pvt Ltd***
- ***Sasikumar.V and P.V. Dhamija. 1993. Spoken English: A Self-Learning Guide to Conversation Practice; 34th Reprint. Tata McGraw-Hill. New Delhi***