CS5: Data Structures and Computer Algorithms
(4 Hours - 4 credits)

Unit I
Introduction and Overview – Introduction – Basic Terminology; Elementary Data Organization – Data Structure Operations – Complexity of Algorithms – Other Asymptotic Notations for Complexity of Algorithms.
Arrays – Introduction – Linear Arrays – Representation – on Linear Arrays in Memory – Traversing Linear Arrays – Inserting and Deleting – Sorting: Bubble Sort – Searching; Linear Search – Binary Search – Multidimensional Arrays.
Linked List – Introduction – Linked Lists – Representation of Linked Lists in Memory – Traversing a Linked List – Memory Allocation; Garbage Collection – Insertion into a Linked List – Deletion from a Linked list.

Unit II
Stack: Introduction – Stacks – Array Representation of Stacks – Linked Representation of Stacks – Recursion - Tower of Hanoi - Implementation of Recursive Procedures by Stacks - Queue –Linked Representation of Queues – D – Queue

Unit III
Trees – Introduction – Binary Trees – Representing Binary Trees in memory – Traversal Binary Tree – Traversal algorithms using Stacks – Header Nodes; Threads – Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in a Binary Search Trees. **Graphs** – Introduction – Graph Theory - Terminology – Sequential Representations of Graph – Adjacency Matrix; Path Matrix – Warshall's Algorithm; Shortest Paths.

Unit IV:
Algorithms: Introduction: What is an Algorithm? – Algorithm Specification – Performance Analysis – Divide and Conquer: General method – Binary Search – Finding the maximum and minimum – Merge Sort – Quick Sort – Selection – Strassen's Matrix Multiplication.

Unit V:
The Greedy Method: General Method – Knapsack problem – Job Sequencing with deadlines – **Minimum cost spanning trees:** Prim's Algorithm – Kruskal Algorithm – Optimal Storage on tapes – Optimal merge patterns – single source shortest path.

Text Books:
1. Data Structures – Seymour Lipschutz –Tata McGraw-Hill - 2006
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Galgotia Publications Pvt. Ltd, New Delhi

Unit I : Textbook 1 Chapter 1 (1.1 to 1.4) , Chapter 2 (2.5 , 2.6), Chapter (4.1 to 4.9), Chapter 5 (5.1 to 5.8)
Unit II : Textbook 1 Chapter 6 (6.1 to 6.4, 6.7 to 6.12)
Unit III : Textbook 1 Chapter 7 (7.1 to 7.9)
Unit IV : Textbook 2 Chapter 1 (Except 1.4), Chapter 3 (Except 3.2, 3.9)

Unit V : Textbook 2 Chapter 4 (Except 4.2, 4.6.3)

Reference Books:

1. Data Structure and Algorithm Analysis in C – Mark Allen Weiss – Second Edition, Addison Wesley publishing company, 1997.
2. C and C++ Programming Concepts and Data Structures -373 P.S.Subramanyam - BS Publications, 2013.
3. Data Structures and Algorithms- Alfred V.Aho, John E.Hopcraft and Jeffrey D.Ullman - Pearson Education - Fourteenth Impression - 2013.

CS6: Lab 5: Data Structures and Computer Algorithms
(4 Hours – 3 credits)

Section A
(Programs from Data Structures Using C)
1. Implementing Stack as an array.
2. Implementing Stack as a linked list.
3. Convert Infix expression to Postfix expression using stack.
4. Convert Infix expression to Prefix expression using Stack.
5. Implementing Queue as an Array.
6. Implement Queue as a linked list.
7. Binary tree traversals.
8. Implement Binary Search Tree.

Section B
(Programs from Computer Algorithms Using C++)
1. Linear Search
2. Binary Search
3. Bubble Sort
4. Insertion Sort
5. Merge Sort
6. Quick Sort
7. Selection Sort

Reference Book:
C and C++ Programming concepts and Data Structures, P.S.Subramanyam, BS Publications, 2013.

CS7: Digital Principles and Computer Organization
(4 Hours – 4 Credits)

Unit I:
Number Systems and Codes: Binary Number system – Binary to decimal – decimal to binary – hexa decimal – ASCII code – Excess-3 Code – Gray code.
Digital Logic: The Basic Gates – NOT, OR, AND - Universal Logic Gates – NOR, NAND.

Unit II:
Combinatorial Logic Circuits: Boolean Laws and Theorems. - Sum of Products method - Truth table to Karnaugh Map – Pairs, Quads, Octets – Don't Care

Conditions- Product-of sums method -Product-of sums Simplifications.
Data Processing Circuits: Multiplexers – Demultiplexers-1-of-16 Decoder –
BCD-to- decimal Decoders – Seven-segment Decoders – Encoders – Exclusive
OR Gates- Parity Generators and Checkers.

Unit III:
Arithmetic Circuits: Binary Addition- Binary Subtraction – 2'S Complement
Representation - 2's Complement Arithmetic – Arithmetic Building Blocks
Adder- Subtractor **Flip-Flops**-RS Flip-Flops-Gated Filp-Flops-Edge-triggered RS
Flip-Flops-Edge triggered D Flip-flops--Edge-triggered JK Flip-Flops-JK Master
Slave Flip-flops.

Unit IV:
Types of Registers – Serial In-Serial Out – Serial In-Parallel Out – Parallel In
Parallel Out – Ring Counter –Ripple Counter – Synchronous Counter.

Unit V:
Instruction Codes – Computer Register – Computer Instructions – Timing And
Control – Instruction Cycle. Control Memory – Address Sequencing – General
Register Organization – Stack Organization – Instruction Formats – Data Transfer and
Manipulations -Addressing Modes – Program Control.

Text Books:
1. Digital Principles and Applications – Donald P Leach, Albert Paul
Malvino, Goutam Saha, 8th edition , McGraw-Hill Education, 3rd reprint 2015.
2. Computer System Architecture, M. Morris Mano, Pearson Education,3rd Edition-
2007
Unit I : Textbook 1 Chapters 5: (5.1 to 5.9) and 2: (2.1 to 2.3)
Unit II : Textbook 1 Chapters 3: (3.1 to 3.8) and 4: (4.1 to 4.7)
Unit III : Textbook 1 Chapters 6: (6.1 to 6.8) and 8: (8.1 to 8.5,8.8)
Unit IV : Textbook 1 Chapters 9: (9.1 to 9.6) and 10: (10.1,10.3)
Unit V : Textbook 2 Chapter 5:(5.1 to 5.5) ,7:(7.1,7.2) and Chapter 8 (8.1 to 8.7)

Reference Books:
1. Digital Design, R.Anantha Natarajan, PHI Learning, 2015.
2. Principles of Digital Electronics, K.Meena, PHI Learning, 2013.
3. Digital Computer Fundamentals, Thomas C. Bartee TMH 2007.375
4. Digital Circuits and Design, S. Salivahanan and S. Arivazhagan, Vikas Publishers,
   2005.
5. Computer Organization and Architecture, V.Rajaraman and T.Radhakrishnan, PHI
   learning, 5th Print, 2015.
6. Computer Organization, Carl Hamacher Zvonko Vranesic Safwat Zaky, McGraw
   Hill Education, 5th Edition, 11th reprint, 2015.
7. Computer Organization and Architecture, Smruti Ranjan Sarangi, McGraw Hill
    Education.

AS3: Resource Management Techniques
(4 Hours – 4 Credits)
Unit I:
Development of OR: Definition of OR – Modeling - Characteristics and
Phases - Tools, Techniques & Methods - scope of OR.

Unit II:
Linear Programming Problem: Formulation - Slack & surplus variables
- Graphical solution of LPP.

Unit III:
Simplex Method: Computational Procedure - Big-M method - Concept of
duality in LPP - Definition of primal dual problems - General rules for
converting any primal into its dual.

Unit IV:
Duality Theorems: (without proof) Primal dual correspondence - Duality
and Simplex method - Mathematical formulation of assignment problem -
Method for solving assignment problem.

Unit V:
Mathematical formulation of Transportation Problem: Methods for
finding IBFS for the Transportation Problems.

Text Book:
Operations Research, S.D.Sharma, Kedar Nath Ram Nath & Co.
Unit I : Chapter-1(1.1, 1.2, 1.4,1.,1.8,1.9,1.10,1.11)
Unit II : Chapter-3 (3.1, 3.2, 3.3, 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.4,3.5)
Unit III : Chapter-5 (5.1, 5.2, 5.2.1, 5.3,5.4,5.5.4) Chapter- 7 (7.1,7.2,7.3,7.4)
Unit IV : Chapter-7 (7.5) (Statements only); 7.6, 7.7 Chapter 11(11.2,11.3,11.4)
Unit V : Chapter-12 (12.2 to 12.8)

Reference Books:
1.Operation Research, Nita H.Shah, Ravi M.Gor and Hardik soni,Prentice
Hall of India Pvt. Ltd., New Delhi 2008.
2.Operation Research, R.Sivarethinamohan, Tata McGraw Hill,
2005. 3.Operations Research – An Introduction by Hamdy
A.Taha. Ninth Edition,
Dorling Kindersley Pvt. Ltd., Noida, India, 2012.

SBS3: Lab 6: Multimedia
(2 hours - 2 Credits)
Photoshop
1. Basic tools used in Photoshop.
2. Design an image by cutting the objects from 3 files and organize them in a
single file and apply feather effects.
3. Design an image by applying mirror effect.
4. Design an image by extracting flower only from given photographic image
5. Design an image by applying Text and Transform Tool.
6. Design an image by using patch or healing brush tool to remove damaged
parts of an image.
7. Design an image by applying Color Balance to change the color of an image.
8. Design an image by applying Lighting effect Filter.
9. Design an image by applying Blending options to make a text effect.
10. Design an image by applying rainbow effect.

11. Design an image by applying text masking effect.
12. Design a college id card using any tools.
13. Design a banner for your college with images and text.

Flash
1. Basic tools used in Flash.
2. Develop a Flash application using motion tween.
3. Develop a Flash application using shape tween.
4. Develop a Flash application for ball bouncing using motion guide path.
5. Develop a Flash application for masking effect.
6. Develop a Flash application using layer based animation.
7. Develop a Flash application to represent the growing moon
8. Write action script to play and stop an animation.
9. Create an appealing animation movie of your choice combining both Motion tweening and Shape tweening. Also add appropriate sound effects.