M.Sc. COMPUTER SCIENCE

SEMESTER - I

Paper Code	Paper Title	Credits	No .Of Hrs/Week Therory/Practicle	Main Exam Hrs.Thery/Practicale	Marks		Total
					IA	Theory	
HCT1.1	Computer Organization and Architecture	4	4	3	25	75	100
HCT1.2	Data Structure Using C	4	4	3	25	75	100
HCT1.3	Theory of Computation	4	4	3	25	75	100
HCT1.4	Probability and Statistics	4	4	3	25	75	100
HCP1.1	Data Structure Lab	2	3	2	10	40	50
SCT1.1	Introduction to Algorithms	4	4	3	25	75	100
SCP1.1	Algorithm Lab	2	3	2	10	40	50
	Communication Skills	2	2	2	10	40	50

M.Sc. COMPUTER SCIENCE

SEMESTER – II

Paper Code	Paper Title	Credits	No .Of Hrs/Week Therory/practicale	Main Exam Hrs.Thery/Practicale	Marks		Total
					IA	Theory	
HCT2.1	Operating System Concepts	4	4	3	25	75	100
HCT2.2	Design and Analysis of Algorithms	4	4	3	25	75	100
HCT2.3	Python Programming	4	4	3	25	75	100
HCT2.4	Linear Algebra	4	4	3	25	75	100
HCP2.1	Python Programming Lab	2	3	2	10	40	50
SCT2.1	DBMS	4	4	3	25	75	100
SCP2.1	DBMS Lab with MySQL Lab	2	2	2	10	40	50
OET	Computer Concepts and Office Automation	2	2	2	10	40	50
	Communication Skills	2	2	2	10	40	50

SEMESTER-I

HCT1.1: COMPUTER ORGANIZATIONS AND ARCHITECTURE

Total Hours: 48

Unit-I
Number Systems: Binary, Octal Hexadecimal, Number Base Conversion, Addition, Subtraction Of Binary Numbers, One's And Two's Complements, Positive And Negative Numbers, Character Codes ASCH. EBCDIC.
Boolean Algebra And Logic Gates: Axiomatic Definition Of Boolean Algebra, Basic Theorems And Properties, Boolean Functions, Canonical And Standard Forms, Logic Functions Using Gates And Design Of Combinational Circuits.

Unit-II
Simplification Of Boolean Functions: Karnaugh Maps, Product of Sums, Sum of Products, Simplification, NAND and NOR Implementation, Don't Care Condition.Combinational and Sequential Logic: Adders, Subtractors, Code, Converters, Decoder Multiplexer. Flip-Flops, Shift Registers, Counters.

Unit-III
Processor Logic Design: Processor Organization, Arithmetic Logic Unit, Design f Arithmetic And Logic Circuits, Design Of Arithmetic Logic Unit, Status Registers, Design of Shifter, Processor Unit, Design Of Accumulator.
Control Logic Design: Processor Organization, Hardware Control Micro Program Control. Control of Processor Unit. Pla Control, Micro Program Sequencer, Computer Design.

Unit- IV
Micro-Computer System Design: Microcomputer Organization, Microprocessor Organization. Instructions And Addressing Modes, Subroutines and Interrupts, Memory Organization, Input- Output Interface, Programmed Input-Output, Input-Output Processor, Input-Output Device Characteristics, Direct Memory Access (Dma).

Unit-V   :
Memory Organization: Serial Access, Random Access Memories (RAM), Read Only Memories (ROM), Virtual Memory, Cache Memory.
Introduction To 8085Assembly Language Programming: The 8085 Programming Model. Instruction Classification. Instruction Formal. How To Write, Assemble and Execute A Simple Program. Overview Of The 8085 Instruction Set.

References:
1. Digital Logic and Computer Design, Morris Mano, PHI
2. Digital Computer Fundamentals, Bartee, T.C., MC Graw Hill
3. Computer Architecture and Organization, Tanenbaum A.S., McGraw Hill
4. Computer Architecture and Organization, hayes, J.P., McGraw Hill
5. Introduction to Microprocessors, Gaonkar, Tata McGraw Hill
6.Digital Computer Electronics Malvino& Brown Shird Education, TMH

HCT1.2: DATA STRUCTURE USING C

Total Hours: 48

Unit-I
Introduction To Data Structures **08Hrs**
Basic Concepts: Introduction To Data Structures, Classification of Data Structures, Partitions On Data Structures: Searching Techniques: Linear Search and Binary Search; Sorting Techniques: Bubble Sort, Selection Sort. Insertion Sort and Comparison of Sorting Techniques.

Unit-II
Linear Data Structures **10 Hrs**
Stacks: Primitive Operations, Implementation of Stacks Using Arrays. Applications of Stacks, Arithmetic Expression-Conversion and Evaluation; Queues: Primitive Operations; Implementation of Queues. Using Arrays. Applications of Linear Queue, Circular Queue and Double Ended Queue (Dequeue).

Unit-III
Linked Lists **12 Hrs**
Linked Lists: Introduction, Singly Linked List, Representation of A Linked List In Memory, Types of Linked Lists: Single Linked Lists Circular Linked Lists, Doubly Linked Lists; Operations On 4 Single Linked List; Applications of Linked Lists: Polynomial Representation and Sparse Matrix Manipulation.

Unit-IV
Nonlinear Data Structures **10 Hrs**
Trees: Basic Concept, Binary Tree, Binary Tree Representation, Array and Linked Representations. Binary Tree Traversal, Binary Tree Variants, Application of Trees; Graphs: Basic Concept, Graph Terminology, Graph Implementation, Graph Traversals. Application of Graphs, Priority Queues.

Unit-V **08Hrs**
Binary Search Tree and Hashing
Binary Search Trees, Properties and Operations; Balanced Search Trees: AVL Trees; Introduction To M-Way Search Trees, B Trees: Hashing and Collision: Introduction, Hash Tables, Hash Functions, Collisions, Applications of Hashing.

References:
1. S.Lipschuts. "Structures". Tata MeGraw Hill Education. 1st Edition.2018
2. D.Samanta, "Classic Data Structures". PHI Learning, 2nd Edition, 2004.

Web Refernces:
1. https://www.tutorialpoint.com/data structures algorithms/algorithms basics.hum
2.https://www.codochelconVccrtinc.ationidata-structuresand-alizorithms./prcpare
3. https://www.cs.attc1J:Ind.:-Ic.c:7/-, ,11\v',,rc/AlgAnim/dsToC..html
4.https://online-learning.htrvard.edti/cotirse/data-structures-and-algoritluns

HCT1.3: THEORY OF COMPUTATION

Total Hours: 48

Unit-I   **10Hrs**

Introduction To Finite Automata: Introduction To Finite Automata, The Central Concepts of Automata Theory.Deterministic Finite Automata. Non-Deterministic Finit Automata, An Application. Finite With Epsilon-Transitions.

Unit-II   **10 Hrs**

Regular Expressions and Languages. Properties of Regular Languages: Regular Expression, Finite Automata and Regular Expressions. Applications of Regular **Expressions, Proving** Languages Rum To Be Regular. Closure Properties of Regular Languages, Decision Properties **of** Regular Languages. Equivalence and Minimization of Automata.

Unit-III   **10 Hrs**

Context-Free Grammars and Languages: Context-Free Grammars. Parse Trees, Applications, Ambiguity In Grammars and Languages.
Pushdown Automata: Definition of The Pushdown Automata, The Languages of A Pda, Equivalence Of Pda's And Cfg's. Deterministic Pushdown Automata.

Unit –IV   **10Hrs**

Properties Of Context-Free Languages: Normal Forms For Cfgs, The Pumping Lemma For Cfgs. Closure Properties Of Cfls.

Introduction **To Turing Machines:** Problems That Computers Cannot Solve. The Turing Machine, Programming Techniques For Turing Machines, Extensions To The Basic Turing Machine, Restricted Turing, Machines, Turing Machine And Computers.

Unit- V   **08 Hrs**

Up **Decidability:** A Language That Is Not Recursively Enumerable, An Undecidable Problem That Is RE. Post's Correspondence Problem. Other Un Decidable Problems.

References:

1. J.P. Hopecroft, Rajeev Motwani. J.D. Ullman, Introduction To Automata Theory, ' Languages and Computation. II Edition. Pearson Education, 2001.
2. Introduction To Formal Languages and Automata, Peter Linz, Narosa Publ.
3. Languages & Machine An Introduction To Computer Science, Thomds A Sud Kamp, Addison Wesluy.
4. Elements Of Theory Of Computation, H.R. Lewis, Shistor H, Papadimitroce, Prentice Hall, *New* Delhi 199
5. Introduction To Language and Theory Of Computation, John Mastin TMH New Delhi,1998.
6. Theory Of Computation, Rajesh K Shukla,Cengage 1 Delmar Learning India Pvt, 1, 2009

HCT1.4: PROBABILITY AND STATISTICS

Total Hours : 48

Unit I: **8hrs**
Probability:- Sample Space and Events – Probability. The Axioms of Probability. Some Elementary Theorems. Conditional Probability. Baye's Theorem – Random Variables – Discrete and Continuous Probability Distributions.

Unit-II   **10hrs**
Distributions Binomial. Poisson and Normal Distributions. Related Properties. Sampling Distributions — Sampling Distribution Of Means.

UNIT III: **8hrs**
Estimation Point Estimation - Interval Estimation — Introduction To Students
T-Distribution -*Confidence* Interval For Single Mean and Single Proportion (Large and Small Samples)

Unit:IV   **14hrs**
Testing Of Hypothesis-I : Testing of Hypothesis-Introduction- Null Hypothesis-Alternative Hypothesis- Type I and Type II Errors — Critical Region. Test of Hypotheses For Single Mean
(Large and Small Samples) - Test of Hypotheses For Single Proportion (Large and Samples**)**

Testing Of Hypothesis-II: Tests of Hypotheses For Difference of Means (Large And <u>Small</u> Samples) - Tests of Hypotheses *For* Difference of ¯Proportions (Large Samples) — Introduction To Chi-Square Distribution And Goodness of Fit.

Unit V: **8hrs**
Correlation & Regression: Coefficient of Correlation- Regression Coefficient- The Lines Regression- The Rank Correlation.

References
1. Probability & Statistics. T.K.V.Iyeng.Ar, B. Krishna Gandhi Others3ed. S.Chand Co,2011
2. Probability & Statistics, D. K. Murugesan. P. Guru Swam, Led.
   Anuradlia Publications,2011
3. Probability & Statistics For Engineers, G.S.S. Bhishma Rao. 2ed,Scitech Publications.2005
4. A First Course In Probability **&** Statistics, B.L.S.Prakasa Rao, Led. World Scientific,2010
5. Fundamentals of Mathematical Statistics. S.C. Gupta, V.K.Kapoor,1 I Ed. S.Chand
6. Co.,2003
7. Probability & Statistics For Engineers. Miller. John E. Freund, Sed, Prentice Hall Of India.2010

SCT 1.1(a): Introduction to Algorithms   Total Hours : 48

Unit-I: 10 hrs
Introduction To Computer Problem Solving
Introduction, The Problem-Solving Aspect, Top- Down Design, Implementation of Algorithms, Program Verification, The Efficiency of Algorithms, The Analysis of Algorithms.

Fundamental Algorithms

Introduction, Exchange of Values of Two Variables, Counting, Summation of A Set of Numbers, Factorial Computation, Sine Function Computation, Generation of The Fibonacci Sequence, Reversing The Digits of An Integer, Base Conversion, Character To Number Conversion

Unit-II: 10hrs
Factoring Methods
Introduction, Finding The Square Root of A Number, The Smallest Division of An **Integer,** The Greatest Common Divisor of Two Integers, Generating Prime Numbers, Computing The Prime Factors of An Integer, Generation of Pseudo-Random **Numbers,** **Raising A** Number To A Large Power. Computing The Nth Fibonacci Number

Unit-III: 10hrs
Array Techniques
Introduction, Array Order Reversal, Array Counting Or Histogram Ming, **Finding The** Maximum Number In A Set, Removal of Duplicates From An Ordered Array, Partitioning An Array, Finding The Kth Smallest Element, Longest Monotone Subsequence.

Unit-IV: 10hrs
Merging, Sorting And Searching
Introduction, The Two-Way Merge, Sorting By Selection, Sorting By Exchange, Sorting By Insertion, Sorting By Diminishing Increment, Sorting By Partitioning, Binary Search.
Dynamic Data Structure Algorithms   8hrs
Introduction, Stack Operations, Queue Addition and Deletion, Linked List Search, Linked List Insertion and Deletion. Binary Tree Search, Binary Tree Insertion And Deletion.
Recursive Algorithms
Introduction, Binary Tree Traversal. Recursive Quick Sort, Towers of Hanoi Problem, Sample Generation. Combination Generation, Permutation Generation.

Reference:

1. How To Solve It By Computer By R. G. Dromey, Fifteenth Ed 2014
2. Algorithms And Data Structures: N. Wirth 1985 Oberon Version: August 2004.
3. Algorithmic Graph Theory By Alan Gibbons, Cambridge University Press.
4. Introduction To Algorithms, By T. Cormen , C. Leiserson , R. Rivest , C Stein, 3Ed. International Edition, MIT Press.2009.
5. Graph Theory : Modeling. Applications And Algorithms By Geir Agnarsson, Edition.200S.