REVISED SYLLABUS

M.Sc(Comp. Sc.) I semester Syllabus w.e.f. 2024-25 onwards

HCT1.1	Computer Organizations And Architecture	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks	Term end exam: 80 marks	Exam duration: 03 hrs		

Course Outcomes (COs): At the end of the course, students will be able to:

- Summarize the concepts of Number system, Boolean algebra and Logic gates
- Experiment on Simplification of Boolean functions and Sequential Circuits.
- Prepare an architectural logic and control design for the processor.
- Describe the basic concepts of microprocessors.
- Discuss the structure of memory and its components.

Unit-I10 Hrs

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-II10 Hrs

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

Unit-III12Hrs

Processor Logic Design: Processor Organization, Arithmetic Logic Unit, Design of 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- IV10 Hrs

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-V10 Hrs

Memory Organization: Serial Access, Random Access Memories (RAM), Read Only Memories (ROM), Virtual Memory, Cache Memory.

P K Sharma

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	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks	Exam duration: 03 hrs	

Course Outcomes (COs): At the end of the course, students will be able to:

- Understand about Introduction and Classification of Data Structures, Analyze an algorithm for searching and sorting techniques in terms of time complexity
- Analyze the operations on Stack, Queues, Lists, Trees, Graphs and Hashing.

Unit-I **10 Hrs**

Introduction to Data Structures: Introduction To Data Structures, Classification of Data Structures, PartitionsOn Data Structures: Searching Techniques: Linear Search and Binary Search; Sorting Techniques:Bubble Sort, Selection Sort. Insertion Sort and Comparison of Sorting Techniques.

Unit-II **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 **12 Hrs**

Linked Lists: Introduction, Singly Linked List, Representation of A Linked List In Memory,Types ofLinked Lists: Single Linked Lists Circular Linked Lists, Doubly Linked Lists; Operations On4 Single Linked List; Applications of Linked Lists: Polynomial Representation and Sparse Matrix Manipulation.

Unit-IV **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. Applicationof Graphs, Priority Queues.

Unit-V **10 Hrs**

Binary Search Trees, Properties and Operations; Balanced Search Trees: AVL Trees; Introduction toM-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.
3. Data Structures, Algorithms and Applications in C++, S. Sahni, 2nd edition, Universities Press Orient Lognman Pvt., Ltd.
4. Data Structures and Algorithms in C++, Michael T. Goodrich, R. Tamassia and Mount Wileystudent edition, John Wiley and Sons.
5. Data Structure and Algorithms Analysis in C++, Mark Allen Weiss, Person Education, Ltd.,Second Edition.

Web References:

1. https://www.tutorialpoint.com/data structures algorithms/algorithms basics.hum
2. .https://www.codochelconVcertinc.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

HCT1.1	**Theory of Computation**	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks	Exam duration: 03 hrs	

Course Outcomes (COs): At the end of the course, students will be able to

- Understand concept of Automata theory.
- Apply regular expression on real time problem.
- Use Context-Free Grammars for the real time requirements.
- Discuss on Normal forms and Turing machine.
- Describe recursive enumerable approach for the real time problems.

Unit-I **10Hrs**

Introduction to Finite Automata: IntroductiontoFinite Automata, the Central Concepts ofAutomata Theory. Deterministic Finite Automata. Non-Deterministic Finite Automata, an Application. Finite with Epsilon-Transitions.

Unit-II **12 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 ofRegular 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 OfPda's And Cfg's. Deterministic Pushdown Automata.

Unit –IV **10Hrs**
Properties of Context-Free Languages: NormalForms forCfgs, thePumping Lemma ForCfgs. Closure Properties Of Cfls.**IntroductionTo Turing Machines:**Problems That Computers Cannot Solve. The Turing Machine, Programming Techniques For Turing Machines,ExtensionsTo The Basic Turing Machine, Restricted Turing, Machines, Turing MachineAnd Computers.

Unit- V10 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 toFormal Languages and Automata,Peter Linz, Narosa Publ.
3. Languages &Machine an Introduction toComputer Science, Thomds A Sud Kamp,Addison Wesluy.
4. Elements Of Theory OfComputation, H.R. Lewis, Shistor H, Papadimitroce, Prentice Hall,*New* Delhi 199
5. Introduction ToLanguage and Theory OfComputation, John Mastin TMH New Delhi,1998.
6. Theory of Computation, Rajesh KShukla,Cengage1Delmar Learning India Pvt, 1, 2009

HCT1.4	**Probability and Statistics**	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks	Exam duration: 03 hrs	

Course Outcomes (COs): At the end of the course, students will be able to

- Explain the probability theory and its theorems.
- Compute the probability density function for the distributions
- Understand about Estimation Point, Testing of Hypothesis, correlation and regression

Unit-I **10 Hrs**
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 **10Hrs**

Estimation Point Estimation- Interval Estimation — Introduction to Students T-Distribution -*Confidence*Interval forSingle Mean and Single Proportion (Large and Small Samples)

Unit:IV **12Hrs**

Testing Of Hypothesis-I: Testingof Hypothesis-Introduction- Null Hypothesis-Alternative Hypothesis- Type I and Type II Errors — Critical Region. Test of Hypotheses forSingle Mean (Large and Small Samples) - Test of Hypotheses forSingle Proportion (Large and Samples)

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

Unit V: **10Hrs**

Correlation &Regression: Coefficient of Correlation- Regression Coefficient- The Lines Regression- The RankCorrelation.

References

1. Probability &Statistics. T.K.V.Iyeng.Ar, B. Krishna GandhiOthers3ed. S.Chand Co,2011
2. Probability &Statistics, D. K. Murugesan. P. Guru Swam, Led. Anuradlia Publications,2011
3. Probability &Statistics ForEngineers, 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.ChandCo.,2003
6. Probability &Statistics ForEngineers. Miller. John E. Freund, Sed, Prentice Hall OfIndia

SCT1.1(a)	**Introduction to algorithm**	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks		Exam duration: 03 hrs

Course Outcomes (COs): At the end of the course, students will be able to:

- Analyze an algorithm for searching and sorting techniques in terms of time complexity
- Use stacks, linear lists, Trees and queues.
- Describe representation and functions of arrays.

Unit-I: **10 Hrs**

Introduction toComputer 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

REVISED SYLLABUS

Unit-II: **12Hrs**

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 K^{th}Smallest Element, Longest Monotone Subsequence.

Unit-IV: **10Hrs**

Merging, Sorting andSearching

Introduction, theTwo-Way Merge, Sorting By Selection, Sorting By Exchange, Sorting By Insertion, Sorting By Diminishing Increment, Sorting By Partitioning, Binary Search.

Unit-V: **10 Hrs**

Dynamic Data Structure Algorithms

Introduction, Stack Operations, Queue Addition and Deletion, Linked List Search, Linked List Insertion and Deletion. Binary Tree Search, Binary Tree Insertion andDeletion.

Recursive Algorithms

Introduction, Binary Tree Traversal. Recursive Quick Sort, Towers of Hanoi Problem, Sample Generation. Combination Generation, Permutation Generation.

References:

1. How To Solve It By Computer By R. G. Dromey, Fifteenth Ed 2014
2. Algorithms AndData Structures: N. Wirth 1985 Oberon Version: August 2004.
3. Algorithmic Graph Theory ByAlan 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 AndAlgorithms By GeirAgnarsson, Edition.200S.