NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY UTTAR PRADESH, LUCKNOW

Evaluation Scheme & Syllabus

For

Master Of Integrated Technology

Computer Science and Engineering

Second Year

(Effective from the Session: 2022-23)

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Master Of Integrated Technology
Computer Science and Engineering
EVALUATION SCHEME
SEMESTER -III

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
WEEKS COMPULSORY INDUCTION PROGRAM													
1	AMIAS0301A	Engineering Mathematics III	3	1	0	30	20	50		100		150	4
2	AMICSE0306	Discrete Structures	3	0	0	30	20	50		100		150	3
3	AMICSE0304	Digital Logic & Circuit Design	3	0	0	30	20	50		100		150	3
4	AMICSE0301	Data Structures	3	1	0	30	20	50		100		150	4
5	AMICSE0302	Object Oriented Techniques Using Java	3	0	0	30	20	50		100		150	3
6	AMICSE0305	Computer Organization & Architecture	3	0	0	30	20	50		100		150	3
7	AMICSE0354	Digital Logic & Circuit Design Lab	0	0	2				25		25	50	1
8	AMICSE0351	Data Structures Lab	0	0	2				25		25	50	1
9	AMICSE0352	Object Oriented Techniques Using Java Lab	0	0	2				25		25	50	1
10	AMICSE0359	Internship Assessment-I	0	0	2				50			50	1
11	ANC0301 / ANC0302	Cyber Security/ Environmental Science	2	0	0	30	20	50		50		100	
		GRAND TOTAL										**1100**	**24**

List of MOOCs (Coursera) Based Recommended Courses for Second Year (Semester-III)

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0023	Java Programming: Arrays, Lists, and Structured Data	Duke University	14	1
2	AMC0032	Object Oriented Programming in Java	Duke University	40	3

PLEASE NOTE:-

- **Internship (3-4 weeks) shall be conducted during summer break after semester-II and will be assessed during semester-III**
- **Compulsory Audit Courses (Non Credit - ANC0301/ANC0302)**
  - All Compulsory Audit Courses (a qualifying exam) has no credit.
  - Total and obtained marks are not added in the Grand Total.

Abbreviation Used:-

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
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Master Of Integrated Technology
Computer Science and Engineering
EVALUATION SCHEME
SEMESTER -IV

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	AMIAS0402	Engineering Mathematics IV	3	1	0	30	20	50		100		150	4
2	AMIASL0401	Technical Communication	2	1	0	30	20	50		100		150	3
3	AMICSE0405	Microprocessor	3	0	0	30	20	50		100		150	3
4	AMICSE0403A	Operating Systems	3	0	0	30	20	50		100		150	3
5	AMICSE0404	Theory of Automata and Formal Languages	3	0	0	30	20	50		100		150	3
6	AMICSE0401	Design and Analysis of Algorithm	3	1	0	30	20	50		100		150	4
7	AMICSE0455	Microprocessor Lab	0	0	2				25		25	50	1
8	AMICSE0453A	Operating Systems Lab	0	0	2				25		25	50	1
9	AMICSE0451	Design and Analysis of Algorithm Lab	0	0	2				25		25	50	1
10	AMICSE0459	Mini Project using Open Technology	0	0	2				50			50	1
11	ANC0402 / ANC0401	Environmental Science/ Cyber Security	2	0	0	30	20	50		50		100	
		GRAND TOTAL										**1100**	**24**

List of MOOCs (Coursera) Based Recommended Courses for Second Year (Semester-IV)

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0046	Algorithmic Toolbox	University of California San Diego	24	1.5
2	AMC0031	Data Structures	University of California San Diego	25	2

PLEASE NOTE:-

- **Compulsory Audit Courses (Non Credit - ANC0401/ANC0402)**
  - All Compulsory Audit Courses (a qualifying exam) has no credit.
  - Total and obtained marks are not added in the Grand Total.

Abbreviation Used:-

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

M.TECH (INT.). SECOND YEAR			
Course Code	**AMIAS0301A**	**L T P**	**Credit**
Course Title	**Engineering Mathematics-III**	**3 1 0**	**4**

Course objective: The objective of this course is to familiarize the engineers with concept of function of complex variables, Partial differential equations & their applications, Numerical techniques for various mathematical tasks and numerical aptitude. It aims to show case the students with standard concepts and tools from B. Tech to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Pre-requisites: Knowledge of Mathematics I and II of B. Tech or equivalent.

Course Contents / Syllabus

UNIT-1	**Complex Variable – Differentiation**	**8 Hours**

Limit, Continuity and differentiability, Functions of complex variable, Analytic functions, Cauchy-Riemann equations (Cartesian and Polar form), Harmonic function, Method to find Analytic functions, Conformal mapping, Mobius transformation and their properties.

UNIT-2	**Complex Variable –Integration**	**8 Hours**

Complex integrals, Contour integrals, Cauchy- Goursat theorem, Cauchy integral formula, Taylor's series, Laurent's series, Liouvilles's theorem, Singularities, Classification of Singularities, zeros of analytic functions, Residues, Methods of finding residues, Cauchy Residue theorem, Evaluation of real integrals of the type $\int_0^{2\pi} f(\sin\theta, \cos\theta)d\theta$ and $\int_{-\infty}^{\infty} f(x)dx$.

UNIT-3	**Partial Differential Equation and its Applications**	**8 Hours**

Introduction of partial differential equations, Second order linear partial differential equations with constant coefficients. Classification of second order partial differential equations, Method of separation of variables for solving partial differential equations, Solution of one- and two-dimensional wave and heat conduction equations.

UNIT-4	**Numerical Techniques**	**8 Hours**

Error analysis, Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi method and Newton-Raphson method, Interpolation: Finite differences, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals.

Solution of system of linear equations, Crout's method, Gauss- Seidel method. Numerical integration, Trapezoidal rule, Simpson's one third and three-eight rules, Solution of first order ordinary differential equations by fourth-order Runge- Kutta methods.

UNIT-5	Aptitude-III	8 Hours
Time & Work, Pipe & Cistern, Time, Speed & Distance, Boat & Stream, Sitting Arrangement, Clock & Calendar.		
Course outcome: After completion of the course, students will be able to		
CO 1	Apply the working methods of complex functions for finding analytic functions.	K3
CO 2	Apply the concepts of complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.	K3
CO 3	Apply the concept of partial differential equation to solve partial differential Equations and problems concerned with partial differential equations.	K4
CO 4	Apply the concept of numerical techniques to evaluate the zeroes of the Equation, concept of interpolation and numerical methods for various mathematical operations and tasks, such as integration, the solution of linear system of equations and the solution of differential equation.	K3
CO 5	Solve the problems of Time & Work, Pipe & Cistern, Time, Speed & Distance, Boat & Stream, Sitting Arrangement, Clock & Calendar.	K3
Text books:		
(1) B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.		
(2) B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.		
(3) R K. Jain & S R K. Iyenger , Advance Engineering Mathematics, Narosa Publishing House 2002.		
(4) E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.		
Reference Books:		
(1) Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.		
(2) Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.		
Link:		
Unit 1	https://www.youtube.com/playlist?list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL https://www.youtube.com/playlist?list=PLbMVogVj5nJS_i8vfVWJG16mPcoEKMuWT https://youtu.be/b5VUnapu-qs https://youtu.be/yV_v6zxADgY https://youtu.be/2ZBcbFhrfOg https://youtu.be/dlK0E0OG39k https://youtu.be/qjpLIlVo_6E	
Unit 2	https://youtu.be/bkzKVsIEjxk https://youtu.be/nDD16hiutdc https://youtu.be/2kyBOVfflHw https://youtu.be/uliv9TzeD6o https://youtu.be/pulsluT8Uwk https://youtu.be/VBAeogiKH2A	

	https://youtu.be/Mpmlk1H1aQo https://youtu.be/z03usEpsHRU https://youtu.be/fXybLUFmQBQ
Unit 3	https://youtu.be/kZ7Oa7iMiCs https://youtu.be/rj2Mb7JGyHk https://youtu.be/zpxe5yoB0xg https://youtu.be/MN4gUtsr0e8 https://youtu.be/GmIcbqdvIgc https://youtu.be/eSKz2N0tKaA https://youtu.be/iiTOw0JqQFc https://youtu.be/M4U-T9jsNKQ
Unit 4	https://youtu.be/QH2WL92bzLs https://youtu.be/DGmNbs5Cywo https://youtu.be/FliKUWUVrEI https://youtu.be/7eHuQXMCOvA https://youtu.be/ZkvQR3ajm3k https://youtu.be/zdyUwzOm1zw https://youtu.be/BBuV14-isyU https://youtu.be/xPr7YFSnmiQ https://youtu.be/ajJD0Df5CsY https://youtu.be/iviiGB5vxLA https://youtu.be/Ym1EUjTWMnE
Unit 5	https://www.youtube.com/playlist?list=PLFqNfk5W2ZuzjUsRqDp1Zj3S8n9yfdmN9 https://youtu.be/x3SEYdBUGaA https://youtu.be/B7sMHZj_p18 https://youtu.be/4HRLswVPOG8 https://youtu.be/aHEWcn_bPYc https://youtu.be/ePQiVq8WtL8

M.TECH (INT.). SECOND YEAR					
Course Code	**AMICSE0306**	**L**	**T**	**P**	**Credits**
Course Title	**DISCRETE STRUCTURES**	**3**	**0**	**0**	**3**

Course objective:

The subject enhances one's ability to develop logical thinking and ability to problem-solving. The objective of discrete structure is to enables students to formulate problems precisely, solve the problems, apply formal proofs techniques and explain their reasoning clearly.

Pre-requisites:

1. Basic Understanding of mathematics
2. Basic knowledge algebra.
3. Basic knowledge of mathematical notations

Course Contents / Syllabus

Unit 1	Set Theory, Relation, Function	8 Hours

Set Theory: Introduction to Sets and Elements, Types of sets, Venn Diagrams, Set Operations, Multisets, Ordered pairs. Proofs of some general Identities on sets.
Relations: Definition, Operations on relations, Pictorial Representatives of Relations, Properties of relations, Composite Relations, Recursive definition of relation, Order of relations.
Functions: Definition, Classification of functions, Operations on functions, Growth of Functions.
Combinatorics : Introduction, basic counting Techniques, Pigeonhole Principle.
Recurrence Relation & Generating function: Recursive definition of functions, Recursive Algorithms, Method of solving Recurrences.
Proof techniques: Mathematical Induction, Proof by Contradiction, Proof by Cases, Direct Proof.

Unit 2	Algebraic Structures	8 Hours

Algebraic Structures: Definition, Operation, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric Groups, Group Homomorphisms, Rings, Internal Domains, and Fields.

Unit 3	Lattices and Boolean Algebra	8 Hours

Ordered set, Posets, Hasse Diagram of partially ordered set, Lattices: Introduction, Isomorphic Ordered set, Well ordered set, Properties of Lattices, Bounded and Complemented Lattices, Distributive Lattices.
Boolean Algebra: Introduction, Axioms and Theorems of Boolean Algebra, Algebraic Manipulation of Boolean Expressions, Simplification of Boolean Functions.

Unit 4	Propositional Logic	8 Hours

Propositional Logic: Introduction, Propositions and Compound Statements, Basic Logical Operations, Well-formed formula, Truth Tables, Tautology, Satisfiability, Contradiction, Algebra of Proposition, Theory of Inference.
Predicate Logic: First order predicate, Well-formed formula of Predicate, Quantifiers, Inference Theory of Predicate Logic.

Unit 5	Tree and Graph	8 Hours

Trees: Introduction to trees, application of trees.
Graphs: Definition and terminology, Representation of Graphs, Various types of Graphs, Connectivity, Isomorphism and Homeomorphism of Graphs, Planar Graphs, Euler and Hamiltonian Paths, Graph Coloring

Course outcome: After completion of this course students will be able to:

Unit 1	Apply the basic principles of sets, relations & functions and mathematical induction in computer science & engineering related problems.	K3
Unit 2	Understand the algebraic structures and its properties to solve complex problems.	K2
Unit 3	Describe lattices and its types and apply Boolean algebra to simplify digital circuit.	K2, K3
Unit 4	Infer the validity of statements and construct proofs using predicate logic formulas.	K3, K5
Unit 5	Design and use the non-linear data structure like tree and graphs to solve real world problems.	K3, K6

Text books:

1) B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, Edition 6th, 2018.

2) Liptschutz, Seymour, "Discrete Mathematics", McGraw Hill, Edition 3rd, 2017.

3) Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill, Edition 1st, 2017.

4) Liu and Mohapatra, "Elements of Discrete Mathematics", McGraw Hill.

Reference Books:

1) Deo & Narsingh, "Graph Theory With application to Engineering and Computer Science.", PHI.

2) Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi.

3) Koshy, Discrete Structures, Elsevier Pub. 2008 Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, Mc Graw-Hill, Edition 7th, 2017.

Links:

Unit 1	https://www.youtube.com/watch?v=hGtOLG3SsjI&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=9
	https://www.youtube.com/watch?v=rGcTcGFx9_s&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=10
	https://www.youtube.com/watch?v=oU60TuGHxe0&list=PL0862D1A947252D20&index=11
Unit 2	https://www.youtube.com/watch?v=M8nh83bFJAA&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=38
	https://www.youtube.com/watch?v=CjmWE-f3vEc&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=41
Unit 3	https://www.youtube.com/watch?v=c6ARWh6lVgc&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=24
	https://www.youtube.com/watch?v=QKP6sOnu1vg&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=22
Unit 4	https://www.youtube.com/watch?v=hklHg9oMkGA&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=3
	https://www.youtube.com/watch?v=ASDaXWCExzo&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=4
Unit 5	https://www.youtube.com/watch?v=AtDgXyluW-Y&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=12
	https://www.youtube.com/watch?v=cwbZUjfz_I0&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf&index=13

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0304**	**L T P**	**Credit**
Course Title	**Digital Logic &Circuit Design**	**3 0 0**	**3**

Course objective:

This course is intended to provide the students with a comprehensive understanding of the fundamental of digital logic circuit. The design of circuits and systems whose input and outputs are represented as discrete variables. These variables are commonly binary i.e.., two states in nature. Design at the circuit level is usually done with truth table and state tables. Students will be able to analyze design and implement combinational and sequential circuits.

Pre-requisites: Basics of Electronics Engineering

Course Contents / Syllabus

UNIT-I	**Digital System and Binary Numbers**	**8 Hours**

Number System and its arithmetic, Signed binary numbers, Binary codes, Cyclic codes, Hamming Code, Simplification of Boolean Expression: K-map method up to five variable, SOP and POS Simplification Don't Care Conditions, NAND and NOR implementation, Quine Mc-CluskyMethod (Tabular Method).

UNIT-II	**Combinational Logic**	**8 Hours**

Combinational Circuits: Analysis Procedure, Design Procedure,Code Converter, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders Multiplexers, Demultiplexers.

UNIT-III	**Sequential Logic and Its Applications**	**8 Hours**

Storage elements: Latches & Flip Flops, Characteristic Equations of Flip Flops,ExcitationTableof Flip Flops, Flip Flop Conversion, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson &Ring Counter.

UNIT-IV	**Synchronous & Asynchronous Sequential Circuits**	**8 Hours**

Analysis of clocked Sequential Circuits with State Machine Designing, State Reduction and Assignments, Design Procedure.

Analysis procedure of Asynchronous Sequential Circuits, Circuit with Latches, Design Procedure, Reduction of State and flow Table, Race-free State Assignment, Hazards.

UNIT-V	**Memory & Programmable Logic Devices**	**8 Hours**

Basic concepts and hierarchy of Memory, Memory Decoding, RAM: SRAM, DRAM, ROM: PROM, EPROM, Auxiliary Memories, PLDs: PLA, PAL; Circuit Implementation using ROM, PLA and PAL; CPLD and FPGA.

Course outcome: Upon completion of the course, the student will be able to:

CO 1	Apply concepts of Digital Binary System and implementation of Gates	K3
CO 2	Analyze and design of Combinational logic circuits	K4, K6

CO 3	Analyze and design of Sequential logic circuits with their applications	K4, K6
CO 4	Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits	K3
CO 5	Apply the concept of Programmable Logic devices with circuit implementation	K3

Text books:

1) M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education5th Edition.
2) David J. Comer, "Digital Logic & State Machine Design", Oxford University Press, 3rd Edition.
3) R P Jain, "Modern Digital Electronics", Tata McGraw Hill Publication, 3rd Edition.

Reference Books:

1) D P Kothari and J.S. Dhillon, "Digital Circuits and Design", Pearson Education**.**
2) A. Anand Kumar, "Fundamentals of Digital Circuits", PHI Learning Pvt. Ltd.

Links:

Unit 1	https://www.youtube.com/playlist?list=PLbRMhDVUMngfV8C6ElNAUaQQz06wEhFM5
Unit 2	https://www.youtube.com/playlist?list=PL803563859BF7ED8C
Unit 3	https://www.youtube.com/playlist?list=PLbRMhDVUMnge4gDT0vBWjCb3Lz0HnYKkX
Unit 4	https://www.youtube.com/playlist?list=PL53575D0244F058EB
Unit 5	https://www.youtube.com/playlist?list=PLbRMhDVUMngePP5JcezxImF-FzOC9wstz

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0301**	**L T P**	**Credits**
Course Title	**Data Structures**	**3 1 0**	**4**

Course objective:
Learn the basic concepts of algorithm analysis, along with implementation of linear and non-linear data structures, hashing and file structures.

Pre-requisites: Basics of C/Python programming, Identifiers, Constants, Operators, Conditional statements, Switch-case statements, Iterative statements, Functions, Structures.

Course Contents / Syllabus

UNIT-I	**Introduction to data structure, Arrays, Searching and Sorting**	**8 Hours**

Data types: Primitive and non-primitive, Types of Data Structures- Linear & Non-Linear Data Structures. Time and Space Complexity of an algorithm, Asymptotic notations (Big Oh, Big Theta and Big Omega), Abstract Data Types (ADT).

Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Application of Arrays, Sparse Matrices and their Representations.

Searching: Linear search, Binary search. Sorting: Bubble sort, Insertion sort, Selection sort, Radix Sort, Merge sort, Quick sort.

UNIT-II	**Linked lists**	**8 Hours**

Linked lists: Advantages of linked list over array, Self-referential structure, Singly Linked List, Doubly Linked List, Circular Linked List,

Operations on a Linked List: Insertion, Deletion, Traversal, Reversal, Searching, Polynomial Representation and Addition of Polynomials

UNIT-III	**Stacks and Queues**	**8 Hours**

Stacks: Primitive Stack operations: Push & Pop, Array and Linked List Implementation of Stack, Application of stack: Infix, Prefix, Postfix Expressions and their mutual conversion, Evaluation of postfix expression.

Recursion: Principles of recursion, Tail recursion, Removal of recursion, Problem solving using iteration and recursion with examples such as binary search, Fibonacci series, and Tower of Hanoi, Trade-offs between iteration and recursion.

Queues: Array and linked List implementation of queues, Operations on Queue: Create, Insert, Delete, Full and Empty, Circular queues, Dequeue and Priority Queue.

UNIT-IV	**Trees**	**8 Hours**

Basic terminology used with Tree, Binary Trees, Binary Tree Representation: Array Representation and Pointer (Linked List) Representation, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, An Extended Binary Trees.

Tree Traversal algorithms: In-order, Pre-order and Post-order. Constructing Binary Tree from given Tree Traversal, Operation of Insertion, Deletion, Searching & Modification of data in Binary

Search tree, Binary Heaps, Heap sort, Threaded Binary trees, Traversing Threaded Binary trees, AVL Tree, B-Tree.

UNIT-V	**Graphs and File Structure**	**8 Hours**

Graphs: Terminology used with Graph, Data Structure for Graph Representations: Adjacency matrices, Adjacency List.

Graph Traversal: Depth First Search and Breadth First Search. Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prim' s and Kruskal's algorithm. Transitive Closure and Shortest Path algorithms: Dijkstra Algorithm.

File Structure: Concepts of files, records and files, Sequential, Indexed and Random File Organization, indexing structure for index files, Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques, hashing for direct files, multi-Key file organization and Access Methods.

Course outcome: After completion of this course students will be able to:

CO 1	Describe the need of data structure and algorithms in problem solving and analyze Time space trade-off.	K2, K4
CO 2	Describe how arrays are represented in memory and how to use them for implementation of matrix operations, searching and sorting along with their computational efficiency.	K2, K6
CO 3	Compare and contrast the advantages and disadvantages of linked lists over arrays and implement operations on different types of linked list.	K4, K6
CO 4	Design, implement and evaluate the real-world applications using stacks, queues and non-linear data structures.	K5, K6
CO 5	Identify and develop the alternative implementations of data structures with respect to its performance to solve a real-world problem.	K1, K3, K5, K6

Text books:

1) Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python (An Indian Adaptation)", Wiley Publication

2) Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein, "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India

3) Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India.

4) Lipschutz, "Data Structures" Schaum's Outline Series, Tata McGraw-hill Education (India) Pvt. Ltd.

Reference Books:

1) Thareja, "Data Structure Using C" Oxford Higher Education.

2) AK Sharma, "Data Structure Using C", Pearson Education India.

3) P. S. Deshpandey, "C and Data structure", Wiley Dreamtech Publication.

4) R. Kruse etal, "Data Structures and Program Design in C", Pearson Education.

5) Berztiss, AT: Data structures, Theory and Practice, Academic Press.

6) Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.	
Link:	
Unit 1	https://nptel.ac.in/courses/106/106/106106127/
	https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F
	https://www.youtube.com/watch?v=4OxBvBXon5w&list=PLBF3763AF2E1C572F&index=22
	https://www.youtube.com/watch?v=cR4rxllyiCs&list=PLBF3763AF2E1C572F&index=23
Unit 2	https://nptel.ac.in/courses/106/106/106106127/
Unit 3	https://nptel.ac.in/courses/106/106/106106127/
	https://www.youtube.com/watch?v=g1USSZVWDsY&list=PLBF3763AF2E1C572F&index=2
Unit 4	https://nptel.ac.in/courses/106/106/106106127/
	https://www.youtube.com/watch?v=tORLeHHtazM&list=PLBF3763AF2E1C572F&index=6
	https://www.youtube.com/watch?v=eWeqqVpgNPg&list=PLBF3763AF2E1C572F&index=7
Unit 5	https://nptel.ac.in/courses/106/106/106106127/
	https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBF3763AF2E1C572F&index=24
	https://www.youtube.com/watch?v=hk5rQs7TQ7E&list=PLBF3763AF2E1C572F&index=25
	https://www.youtube.com/watch?v=KW0UvOW0XIo&list=PLBF3763AF2E1C572F&index=5

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0302**	**L T P**	**Credit**
Course Title	**Object Oriented Techniques using Java**	**3 0 0**	**3**

Course objective:

The objective of this course is to understand the object-oriented methodology and its techniques to design and develop conceptual models and demonstrate the standard concepts of object-oriented techniques modularity, I/O. and other standard language constructs. The basic objective of this course is to understand the fundamental concepts of object-oriented programming in Java language and also implement the Multithreading concepts, GUI based application and collection framework.

Pre-requisites:

- Student must know at least the basics of how to use a computer, and should be able to start a command line shell.
- Knowledge of basic programming concepts, as covered in 'Programming Basic" course is necessary.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Object Oriented Programming: Introduction and Features: Abstraction, Encapsulation, Polymorphism, and Inheritance.

Modeling Concepts: Introduction,Class Diagram and Object Diagram.

Control Statements: Decision Making, Looping and Branching, Argument Passing Mechanism: Command Line Argument.

UNIT-II	Basics of Java Programming	8 Hours

Class and Object: Object Reference, Constructor, Abstract Class, Interface and its uses, Defining Methods, Use of "this" and "super" keyword, Garbage Collection and finalize () Method.

Inheritance: Introduction and Types of Inheritance in Java, Constructors in Inheritance.

Polymorphism: Introduction and Types, Overloading and Overriding.

Lambda expression: Introduction and Working with Lambda Variables.

Arrays: Introduction and its Types.

UNIT-III	Packages, Exception Handling and String Handling	8 Hours

Packages: Introduction and Types, Access Protection in Packages, Import and Execution of Packages.

Exception Handling, Assertions and Localizations: Introduction and Types, Exceptions vs. Errors, Handling of Exception. Finally, Throws and Throw keyword, Multiple Catch Block, Nested Try and Finally Block, Tokenizer. Assertions and Localizations Concepts and its working.

String Handling: Introduction and Types, Operations, Immutable String, Method of String class, String Buffer and String Builder class.

UNIT-IV	**Concurrency in Java and I/O Stream**	**8 Hours**

Threads: Introduction and Types, Creating Threads, Thread Life-Cycle, Thread Priorities, Daemon Thread, Runnable Class, Synchronizing Threads.

I/O Stream: Introduction and Types, Common I/O Stream Operations, Interaction with I/O Streams Classes.

Annotations: Introduction, Custom Annotations and Applying Annotations.

UNIT-V	**GUI Programming, Generics and Collections**	**8 Hours**

GUI Programming: Introduction and Types, Swing, AWT, Components and Containers, Layout Managers and User-Defined Layout and Event Handling.

Generics and Collections: Introduction, Using Method References, Using Wrapper Class, Using Lists, Sets, Maps and Queues, Working with Generics.

Course outcome: After completion of this course students will be able to:

CO1	Identify the concepts of object-oriented programming and relationships among them needed in modeling.	K2
CO2	Demonstrate the Java programs using OOP principles and also implement the concepts of lambda expressions.	K3
CO3	Implement packages with different protection level resolving namespace collision and evaluate the error handling concepts for uninterrupted execution of Java program.	K3, K5
CO4	Implement Concurrency control, I/O Streams and Annotations concepts by using Java program.	K3
CO5	Design and develop the GUI based application, Generics and Collections in Java programming language to solve the real-world problem.	K6

Text books:

1) Herbert Schildt," Java - The Complete Reference", McGraw Hill Education 12th edition

2) Herbert Schildt," Java: A Beginner's Guide", McGraw-Hill Education 2nd edition
3) James Rumbaugh et. al, "Object Oriented Modeling and Design", PHI 2nd Edition
Reference Books:
1) Cay S. Horstmann, "Core Java Volume I – Fundamentals", Prentice Hall
2) Joshua Bloch," Effective Java", Addison Wesley
3) E Balagurusamy, "Programming with Java A Primer", TMH, 4th edition.

Link:	
Unit 1	https://www.youtube.com/watch?v=r59xYe3Vyks&list=PLS1QulWo1RIbfTjQvTdj8Y6yyq4R7g-Al
Unit 2	https://www.youtube.com/watch?v=ZHLdVRXIuC8&list=PLS1QulWo1RIbfTjQvTdj8Y6yyq4R7g-Al&index=18
Unit 3	https://www.youtube.com/watch?v=hBh_CC5y8-s
Unit 4	https://www.youtube.com/watch?v=qQVqfvs3p48
Unit 5	https://www.youtube.com/watch?v=2qWPpgALJyw

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0305**	**L T P**	**Credit**
Course Title	**Computer Organization & Architecture**	**3 0 0**	**3**

Course objective:

To understand the types of organizations, structures and functions of computer, design of arithmetic and logic unit and float point arithmetic. To understand the concepts of memory system, communication with I/O devices and interfaces.

Pre-requisites:

- Basic knowledge of computer system.
- Logic gates and their operations.

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 Hours**

Computer Organization and Architecture, Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration and it's types. Register, bus and memory transfer. Process or organization, general registers organization, stack organization and addressing modes.

UNIT-II	**ALU Unit**	**8 Hours**

Arithmetic and logic unit: Lookahead carryadder. Multiplication: Signed operand multiplication, Booth's algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic &logic unit design. IEEE Standard for Floating Point Numbers.

UNIT-III	**Control Unit**	**8Hours**

Control Unit: Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc.), micro- operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Complex Instruction Set Computer, Pipelining. Hardwire and microprogrammed control, Concept of horizontal and vertical microprogramming, Flynn's classification.

UNIT-IV	**Memory Unit**	**8Hours**

Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation, Memory Latency, Memory Bandwidth, Memory Seek Time.

UNIT-V	**Input/Output**	**8 Hours**

Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access, I/O channels and processors. Serial Communication: Synchronous & asynchronous communication.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the basic structure and operation of a digital computer system.	K1, K2
CO 2	Analyzethe design of arithmetic & logic unit and understand the fixed point and floating-point arithmetic operations.	K1, K4
CO 3	Implement control unit techniques and the concept of Pipelining	K3
CO 4	Understand the hierarchical memory system, cache memories and virtual memory.	K2

CO 5	Understand different ways of communicating with I/O devices and standard I/O interfaces.	K2

Text books:

1) M. Mano, "Computer System Architecture", 3rd Edition, Pearson Publication, 2007.
2) John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998.
3) William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventhedition,2006.

Reference Books:

1) Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint2012
2) Ray A K, Bhurchandi K M, "Advanced Microprocessors and Peripherals", TM.

Links:

Unit 1	https://www.youtube.com/watch?v=L9X7XXfHYdU&list=PLxCzCOWd7aiHMonh3G6QNKq53C6oNXGrX
Unit 2	https://www.youtube.com/watch?v=WLgXUPOjKEc
Unit 3	https://www.youtube.com/watch?v=BPhWlFIU1rc
Unit 4	https://www.youtube.com/watch?v=6R7JDkpG1Wk&list=PLrjkTql3jnm8HbdMwBYIMAd3UdstWChFH
Unit 5	https://www.youtube.com/watch?v=nxryfWg5Hm4

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0354**	**L T P**	**Credit**
Course Title	**Digital Logic & Circuit Design Lab**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.	CO1
2	Implementation of the given Boolean function using logic gates in both SOP and POS forms.	CO1
3	Implementation of 4-bit parallel adder using 7483 IC.	CO1
4	Implementation and verification of Decoder using logic gates.	CO1
5	Implementation and verification of Encoder using logic gates.	CO1
6	Implementation of 4:1 multiplexer using logic gates.	CO2
7	Implementation of 1:4 demultiplexer using logic gates.	CO2
8	Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.	CO3
9	Design, and verify the 4-bit synchronous counter.	CO4
10	Design, and verify the 4-bit asynchronous counter.	CO4
11	Implementation of Mini Project using digital integrated circuits and other components	CO5

Lab Course Outcome: Upon the completion of the course, the student will be able to

CO 1	Understand of Digital Binary System and implementation of Gates	K2, K3
CO 2	Design data selector circuits with the help of universal Gates.	K3, K4
CO 3	Design the Sequential circuits with the help of combinational circuits and feedback element.	K3, K4
CO 4	Design the counters with the help of sequential circuit and basic Gates	K3, K4
CO 5	Implement the projects using the digital ICs and electronics components.	K3, K5

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0351**	**L T P**	**Credit**
Course Title	**Data Structures Lab**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Program to create and display Linear Array	CO1
2	Program to insert a data item at any location in a linear Array	CO1
3	Program to delete a data item from a Linear Array	CO1
4	Program to implement multiplication of two matrices.	CO1
5	Program to create sparse matrix.	CO1
6	Program to implement linear search in an Array.	CO4
7	Program to implement binary search in an Array.	CO4
8	Program to implement bubble sort in a non-recursive way.	CO4
9	Program to implement selection sort in a non-recursive way.	CO4
10	Program to implement insertion sort in a non-recursive way.	CO4
11	Program to implement Merge sort in a non-recursive way.	CO4
12	Program to implement Merge sort in a recursive way.	CO4
13	Program to implement Quick sort in a recursive way.	CO4
14	Program to implement Queue Using array.	CO3
15	Program to implement Circular Queue Using array.	CO3
16	Program to implement Stack Operation using array.	CO3
17	Program to implement the Single Linked List a. Insertion b. Deletion c. Traversal d. Reversal e. Searching f. Updation g. Sorting h. Merging	CO2
18	Program to implement the doubly Linked List a. Insertion b. Deletion c. Traversal d. Reversal e. Searching f. Updation g. Merging	CO2
19	Program to implement the circularly Single Linked List a. Insertion b. Deletion c. Traversal d. Reversal e. Searching f. Updation	CO2
20	Program to implement Queue Using linked list.	CO3
21	Program to implement Circular Queue Using linked list.	CO3
22	Program to implement Priority Queue Using linked list.	CO3
23	Program to implement Stack Operation using Linked list.	CO3
24	Program to convert infix to postfix expression.	CO3

25	Program to evaluate postfix expression.	CO3
26	Program to compute factorial using tail recursion	CO3
27	Program to implement Tower of Hanoi.	CO3
28	Program implementing Addition of two polynomials via Linked Lists.	CO2
29	Program to implement binary tree using linked list a. Insertion b. Deletion c. Traversal d. Searching	CO5
30	Program to implement binary search tree using linked list a. Insertion b. Deletion c. Traversal d. Searching	CO5
31	Program to implement Heap sort in a non-recursive way	CO5
32	Program to implement Radix sort.	CO4
33	Program to implement BFS algorithm.	CO5
34	Program to implement DFS algorithm.	CO5
35	Program to implement the minimum cost spanning tree.	CO5
36	Program to implement the shortest path algorithm.	CO5

Lab Course Outcome: After completion of this course students will be able to

CO 1	Implement operations on single and multi-dimensional array.	K3
CO 2	Implement various linear data structures like single Linked-list, doubly Linked-list, Circular linked-list.	K3, K6
CO 3	Implement Stack and Queue using array and linked list.	K3
CO 4	Analyze and Implement sorting and searching algorithms.	K4, K6
CO5	Solve complex problems using non-linear data structures like tree and graph.	K6

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0352**	**L T P**	**Credit**
Course Title	**Object Oriented Techniques using Java Lab**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	**Name of Experiments**	**Q.NO. (Codetantra)**	**CO**
1.	Write a simple program in Java.	1	CO1
2.	Write a Java program to display default values of all primitive data types	2	CO1
3.	Write a Java program to understand Command line arguments.	3	CO1
4.	Write a Java program to understand if-then-else statement	5	CO1
5.	Write a Java Program to find the Factorial of a given number	6	CO1
6.	Write a Java Program to check whether the given number is Palindrome or not	7	CO1
7.	Write a JAVA program to display Fibonacci series.	8	CO1
8.	Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.	-	CO2
9.	Write a Java program to illustrate the abstract class concept	24	CO2
10.	Write a Java program to Access the instance variables by using this keyword	27	CO2
11.	Write a Java class to show the concept of static class	26	CO2
12.	Write a Java program to Access the Class members using super Keyword	20	CO2
13.	Write a JAVA program to implement Single Inheritance.	-	CO2
14.	Write a JAVA program to implement multi-level inheritance.	19	CO2
15.	Write a Java program to implement Interface	22	CO2
16.	Write a JAVA program to implement constructor and constructor overloading.	18	CO2
17.	Write a JAVA program implement method overloading and method overriding.	-	CO2
18.	Write a JAVA program to implement a user defined functional interface using lambda expressions.	-	CO2
19.	Write a program prints a multidimensional array of integers.	9	CO2
20.	Write a JAVA program to show the multiplication of two matrices using arrays.	11	CO2
21.	Write a Java program to Search an element using Linear Search	13	CO2
22.	Write a Java program to Search an element using Binary Search	14	CO2
23.	Write a Java Program to Sort elements using Insertion Sort	15	CO2
24.	Write a Java Program to Sort elements using Selection Sort - Largest element method	16	CO2
25.	Write a Java program to Sort elements using Bubble Sort	17	CO2
26.	Write a Java program to handle an Arithmetic Exception - divided by zero	33	CO3
27.	Write a program to implement user defined exception in java.	-	CO3
28.	Write a Java program to illustrate Finally block	34	CO3
29.	Write a Java program to illustrate Multiple catch blocks	35	CO3
30.	Write a Java program for creation of illustrating throw	36	CO3

31.	To implement the concept of assertions in JAVA programming language.	-	CO3
32.	To implement the concept of localization in JAVA programming language.	-	CO3
33.	Write a Java program to print the output by appending all the capital letters in the input in a string.	30	CO3
34.	Write a JAVA program to show the usage of string builder.	31	CO3
35.	Write a JAVA program to show the usage of string buffer.	32	CO3
36.	Write a JAVA program to implement even and odd thread by using Thread class and Runnable interface.	-	CO4
37.	Write a JAVA program to synchronize the threads by using Synchronize statements and Synchronize block	-	CO4
38.	To demonstrate the concept of type annotations in JAVA programming language.	-	CO4
39.	To demonstrate the concept of user defined annotations in JAVA programming language.	-	CO5
40.	Write a JAVA program to implement the concept of Generic and Collection classes.	-	CO5

Lab Course Outcome: After completion of this course students will be able to

CO1	To understand how to design and implement basic data types, command line arguments and control statements	K2
CO2	To demonstrate the Java programs using OOP principles and also implement the concepts of lambda expressions and arrays.	K3
CO3	To demonstrate, understand and use of different exceptional handling mechanisms, assertions, localizations and string handling.	K3
CO4	To solve the real time problems using multithreading and annotations concept.	K3
CO5	To design and develop collections and generic classes in JAVA programming language	K6

M.TECH (INT.). SECOND YEAR					
Course Code	**ANC0301**	**L**	**T**	**P**	**Credit**
Course Title	**Cyber Security**	**2**	**0**	**0**	**0**

Course objective:

Achieve knowledge about Security of Information system and Risk factors and examine security threats and vulnerability in various scenarios, understand concept of cryptography and encryption technique to protect the data from cyber-attackand provide protection for software and hardware.

Pre-requisites: Basics recognition in the domain of Computer Science.
Concept of network and operating system.
Commands of programming language.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Introduction to Information Systems: Types of Information Systems, Development of Information Systems, Need for Information Security, Threats to Information Systems, Information Assurance, Guidelines for Secure Password and WI-FI Security and social media and Windows Security, Security Risk Analysis, and Risk Management.

UNIT-II	Application Layer Security	8 Hours

Data Security Considerations-Backups, Archival Storage and Disposal of Data,Security Technology-Firewall, Intrusion Detection, Access Control, Security Threats -Viruses, Worms, Trojan Horse,Bombs,Trapdoors,Spoofs, E-mail Viruses, Macro Viruses, Malicious Software,Network and Denial of Services Attack, Security,Threats to E-Commerce: Electronic Payment System, e- Cash, Issues with Credit/Debit Cards.

UNIT-III	Secure System Development	8 Hours

Application Development Security, Architecture & Design,Security Issues in Hardware: Data Storage and Downloadable Devices, Mobile Protection,Security Threats involving in social media, Physical Security of IT Assets, Access Control, CCTV and Intrusion Detection Systems, Backup Security Measures.

UNIT-IV	Cryptography And Network Security	8 Hours

Public key cryptography: RSA Public Key Crypto with implementation in Python,Digital Signature Hash Functions,Public Key Distribution.

Symmetric key cryptography: DES (Data Encryption Standard), AES (Advanced Encryption Standard), Secure hash algorithm(SHA-1).

Real World Protocols: Basic Terminologies, VPN, Email Security Certificates, Transport Layer Security, TLS, IP security, DNS Security.

UNIT-V	Security Policy	8 Hours

Policy design Task, WWW Policies, Email based Policies, Policy Revaluation Process-Corporate Policies-Sample Security Policies,Publishing and Notification Requirement of the updated and new Policies.
Resent trends in security.

Course outcome: At the end of course, the student will be able to

CO 1	Analyze the cyber security needs of an organization.	K4
CO 2	Identify and examine software vulnerabilities and security solutions.	K1,K3

CO 3	Comprehend IT Assets security (hardware and Software) and performance indicators	K2
CO 4	Measure the performance and encoding strategies of security systems.	K3, K5
CO 5	Understand and apply cyber security methods and policies to enhance current scenario security.	K2, K3

Text books:

1) Charles P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security", Pearson Education India
2) V.K.Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India
3) Sarika Gupta & Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing House
4) Michael E.Whitman and Herbert J Mattord "Principle of Information Security" Cengage

Reference Books:

1) Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.
2) CHANDER, HARISH," Cyber Laws and It Protection", PHI Learning Private Limited,Delhi
3) V.K. Jain, Cryptography and Network Security, Khanna Publishing House, Delhi
4) William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010

E-books& E-Contents:

1) https://prutor.ai/welcome/
2) https://crypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf
3) https://cybermap.kaspersky.com/stats
4) https://www.fireeye.com/cyber-map/threat-map.html

Reference Links:

1) https://crypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf
2) https://cs155.stanford.edu/lectures/03-isolation.pdf
3) http://uru.ac.in/uruonlinelibrary/Cyber_Security/Cryptography_and_Network_Security.pdf

NPTEL/ Youtube/ Faculty Video Link:

1) https://www.youtube.com/watch?v=vv1ODDhXW8Q
2) https://www.youtube.com/watch?v=fQ3ESFfvchg&list=PLUtfVcb-iqn834VGI9faVXGIGSDXZMGp8
3) https://www.youtube.com/watch?v=iTVyKbDCJrA&list=PLgMDNELGJ1CbdGLyn7OrVAP-IKg-0q2U2
4) https://www.youtube.com/watch?v=1plMO7ChXMU&list=PLJ5C_6qdAvBFAuGoLC2wFGruY_E2gYtev
5) https://www.youtube.com/watch?v=_9QayISruzo

M.TECH (INT.). SECOND YEAR

Course Code	ANC0302	L T P	Credits
Course Title	Environmental Science	2 0 0	0

Course objective:

1	To help the students in realizing the inter-relationship between man and environment. and help the students in acquiring basic knowledge about environment.
2	To develop the sense of awareness among the students about environment and its various problems.
3	To create positive attitude about environment among the student.
4	To develop proper skill required for the fulfilment of the aims of environmental education and educational evaluations
5	To develop the capability of using skills to fulfil the required aims, to realise and solve environmental problems through social, political, cultural and educational processes

Pre-requisites: Basic knowledge of nature.

Course Contents / Syllabus

UNIT-I Basic Principle of Ecology — 8 Hours

Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem. Food chains and food webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems. Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles.

Basic concepts of sustainable development, SDGs, Ecosystem services, UN Decade for Ecorestoration.

UNIT-II Natural Resources and Associated Problems — 8 Hours

Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles.

Non-Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages.

UNIT-III Biodiversity Succession and Non-Renewable Energy Resources — 8 Hours

Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book.

Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance.

Succession: Concepts of succession, Types of Succession. Trends in succession. Climax and stability.

UNIT-IV Pollution and Solid Waste Management — 8 Hours

Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, Cox, CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, Soil pollution: Causes of soil pollution, Effects of soil pollution, Major sources of and effects of noise pollution on health, Radioactive and thermal pollution sources and their effects on surrounding environment.

Solid waste disposal and its effects on surrounding environment, Climate change, global warming, acid rain, ozone layer depletion.

UNIT-V Role of Community and Environmental Protection Acts — 8 Hours

Role of community, women and NGOs in environmental protection, Bioindicators and their role, Natural hazards, Chemical accidents and disasters risk management, Environmental Impact Assessment (EIA), Salient features of following Acts: a. Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972.b. Water (Prevention and control of pollution) Act, 1974.c. Air (Prevention and control of pollution) Act, 1981. Forest (Conservation) Act, 1980.d. Wetlands (Conservation and Management) Rules, 2017; e. Chemical safety and Disaster Management law. F. District Environmental Action Plan. Climate action plans.

Course outcome: After completion of this course students will be able to

CO 1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem., food chains and food webs. Ecological pyramids	K2
CO 2	Understand the different types of natural recourses like food, forest, minerals and energy and their conservation	K2
CO 3	Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation.	K2
CO 4	Understand the different types of pollution, pollutants, their sources, effects and their control methods	K3
CO 5	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K3

Text books:

1. Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.
2. Botkin, D.B and Kodler E.A., 2000, Environmental Studies: The earth as a living planet. John Wiley and Sons Inc.
3. Rao M.N. and H.V.N. Rao, 1989: Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi
4. Singh J.S., Singh S.P. and Gupta S.R., 2006, Ecology Environment and Resource Conservation, Anamaya Publishers, New Delhi.
5.Environmental Studies -Benny Joseph-Tata McgrawHill-2005
6. Environmental Studies- Dr. D.L. Manjunath, Pearson Education-2006.
7. Environmental studies- R, Rajagopalan -Oxford Pubtiotion2005.

Reference Books:

1.Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.
2.Dash, M.C. (1994), Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.
3. Sharma P. D. (1996). Environmental Biology, Rastogi Publications, Meerut.
4. Verma P.S. and V.K. Agarwal. (1985). Principles of Ecology. S. Chand and Company (Pub.), New Delhi.
5.Principles of Environmental Sciences and Engineering -P. Venugoplan Rao, Prenitice Hall of India.
6. Environmental Science and Engineering Meenakshi, Prentice Hall India.

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=T21OO0sBBfc, https://www.youtube.com/watch?v=qt8AMjKKPDohttps://www.youtube.com/watch?v=yAK-m91Nxrshttps://www.youtube.com/watch?v=ha_O-1uOWkk, https://www.youtube.com/watch?v=brF0RWJyx9w
Unit 2	https://www.youtube.com/watch?v=mOwyPENHhbc, https://www.youtube.com/watch?v=yqev1G2iy20, https://www.youtube.com/watch?v=_74S3z3IO_I, https://www.youtube.com/watch?v=jXVw6M6m2g0
Unit 3	https://www.youtube.com/watch?v=GK_vRtHJZu4, https://www.youtube.com/watch?v=b6Ua_zWDH6U, https://www.youtube.com/watch?v=7tgNamjTRkk, https://www.youtube.com/watch?v=ErATB1aMiSU, https://www.khanacademy.org/science/high-school-biology/hs-ecology/hs-human-impact-on-ecosystems/v/conservation-and-the-race-to-save-biodiversity
Unit 4	https://www.youtube.com/watch?v=7qkaz8ChelI, https://www.youtube.com/watch?v=NuQE5fKmfME, https://www.youtube.com/watch?v=9CpAjOVLHII, https://www.youtube.com/watch?v=yEci6iDkXYw, https://www.youtube.com/watch?v=yEci6iDkXYw
Unit 5	https://www.youtube.com/watch?v=ad9KhgGw5iA, https://www.youtube.com/watch?v=nW5g83NSH9M, https://www.youtube.com/watch?v=xqSZL4Ka8xo, https://www.youtube.com/watch?v=WAI-hPRoBqs, https://www.youtube.com/watch?v=o-WpeyGlV9Y, https://www.youtube.com/watch?v=EDmtawhADnY

M.TECH (INT.). SECOND YEAR

Course Code	AMIAS0402	L T P	Credit
Course Title	Engineering Mathematics-IV	3 1 0	4

Course objective:

The objective of this course is to familiarize the students with statistical techniques. It aims to present the students with standard concepts and tools at an intermediate to superior level that will provide them well towards undertaking a variety of problems in the discipline.

Pre-requisites: Knowledge of Mathematics I and II of B. Tech or equivalent

Course Contents / Syllabus

UNIT-I	Statistical Techniques-I	8 Hours

Introduction: Measures of central tendency: Mean, Median, Mode, Moment, Skewness, Kurtosis, Curve Fitting ,Method of least squares, Fitting of straight lines, Fitting of second degree parabola, Exponential curves ,Correlation and Rank correlation, Linear regression, nonlinear regression and multiple linear regression

UNIT-II	Statistical Techniques-II	8 Hours

Testing a Hypothesis, Null hypothesis, Alternative hypothesis, Level of significance, Confidence limits, p-value, Test of significance of difference of means, Z-test, t-test and Chi-square test, F-test, ANOVA: One way and Two way

Statistical Quality Control (SQC), Control Charts, Control Charts for variables (Mean and Range Charts), Control Charts for Variables (p, np and C charts).

UNIT-III	Probability and Random Variable	8 Hours

Random Variable: Definition of a Random Variable, Discrete Random Variable, Continuous Random Variable, Probability mass function, Probability Density Function, Distribution functions.

Multiple Random Variables: Joint density and distribution Function, Properties of Joint Distribution function, Marginal density Functions, Conditional Distribution and Density, Statistical Independence, Central Limit Theorem (Proof not expected).

UNIT-IV	Expectations and Probability Distribution	8 Hours

Operation on One Random Variable – Expectations: Introduction, Expected Value of a Random Variable, Mean, Variance, Moment Generating Function, Binomial, Poisson, Normal, Exponential distribution.

UNIT-V	Wavelets and applications and Aptitude-IV	8 Hours

Wavelet Transform, wavelet series. Basic wavelets (Haar/Shannon/Daubechies), orthogonal wavelets, multi-resolution analysis, reconstruction of wavelets and applications.

Number System, Permutation & Combination, Probability, Function, Data Interpretation, Syllogism.

Course outcome: After completion of the course, students will be able to

CO 1	Understand the concept of correlation, moments, skewness and kurtosis and curve fitting.	K1, K3
CO 2	Apply the concept of hypothesis testing and statistical quality control to create control charts.	K1, K3
CO 3	Remember the concept of probability to evaluate probability distributions.	K3, K4

CO 4	Understand the concept of MathematicalExpectations and Probability Distribution.	K2
CO 5	Remember the concept of Wavelet Transform and Solve the problems of Number System, Permutation & Combination, Probability, Function, Data Interpretation, Syllogism.	K3

Text books:

(1) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).

(2) S. Ross: A First Course in Probability, 6th Ed., Pearson Education India, 2002.

(3) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.

(4) HaitaoGuo, Ramesh A. Gopinath, C.S. Burrus, IVAN W AUTOR SELESNICK, JAN E AUTOR ODEGARD, SidnyBurrus.

Reference Books:

(1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

(2) T.Veerarajan : Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi.

(3) R.K. Jain and S.R.K. Iyenger: Advance Engineering Mathematics; Narosa Publishing House, New Delhi.

(4) J.N. Kapur: Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.

(5) D.N.Elhance,V. Elhance& B.M. Aggarwal: Fundamentals of Statistics; Kitab Mahal Distributers, New Delhi.

(6) Wavelet Transforms & Time-Frequency Signal Analysis by Lokenath Debnath.

Link:

Unit 1	https://youtu.be/aaQXMbpbNKw https://youtu.be/wDXMYRPup0Y https://youtu.be/m9a6rg0tNSM https://youtu.be/Qy1YAKZDA7k https://youtu.be/Qy1YAKZDA7k https://youtu.be/s94k4H6AE54 https://youtu.be/lBB4stn3exM https://youtu.be/0WejW9MiTGg https://youtu.be/QAEZOhE13Wg https://youtu.be/ddYNq1TxtM0 https://youtu.be/YciBHHeswBM
Unit 2	https://youtu.be/_Qlxt0HmuOo https://youtu.be/YSwmpAmLV2s https://youtu.be/KLnGOL_AUgA https://youtu.be/cQp_bJdxjWw https://youtu.be/geB0A7CPGaQ https://youtu.be/zmyh7nCjmsg https://youtu.be/ohquDY3fZqk https://youtu.be/izGZLnB-mEo https://youtu.be/q48uKU_KWas https://youtu.be/lZFmFuZGQTk https://youtu.be/qb3mvJ1gb9g https://youtu.be/FgEs-ZY9-tI https://youtu.be/FgEs-ZY9-tI https://youtu.be/O5qDp-SdyKQ https://youtu.be/4if0vZjnaK4

Unit 3	https://youtu.be/bhp4nVkqA9o https://youtu.be/8sJ9dFj_ydg https://youtu.be/u_x8zQvWWLk https://youtu.be/3rYYPWN_QS0 https://youtu.be/HZGCoVF3YvM https://youtu.be/z4e4E9igjIE https://youtu.be/dOr0NKyD31Q https://youtu.be/YXLVjCKVP7U https://youtu.be/l0ecMiNUZu8 https://youtu.be/Y_8latNXVt0 https://youtu.be/L0zWnBrjhng https://youtu.be/vy24j1ZJoRc https://youtu.be/5hI36fCxFxg https://youtu.be/PXWNc_6zWsY https://youtu.be/DgZLz6WnmcI https://youtu.be/C8DLKwVRQeE https://youtu.be/d_9KT2abCAY https://youtu.be/RqiqhrZE6Uk https://youtu.be/qUBlhsJpf1g
Unit 4	https://youtu.be/H2Ji-Q4MfqU https://youtu.be/TwN79BuwiMM https://youtu.be/yXsvMlqoiK4 https://youtu.be/cbmfYoepHPk https://youtu.be/gT26Y_VJmOM https://youtu.be/onFv73Btdno https://youtu.be/mYFygtQrDxc https://youtu.be/S8YrED3mf5s https://youtu.be/z5gongqrMv8
Unit 5	https://youtu.be/fYG0avmRokg https://youtu.be/fYG0avmRokg https://youtu.be/etba-RPCEmM https://youtu.be/HEUhSbD4P5c https://youtu.be/ZFQteSfxMss https://youtu.be/5kpBz5pV_8Q https://youtu.be/juJR_JDJRa0 https://youtu.be/Dsi7x-A89Mw https://youtu.be/mrCrjeqJv6U https://youtu.be/jZXHzpq-vmM https://youtu.be/KSFnfUYcxoI https://youtu.be/i72ptXTEmkk

M.TECH (INT.). SECOND YEAR

Course Code	AMIASL0401	L T P	Credit
Course Title	Technical Communication	2 1 0	3

Course objective:

1	To help the students develop communication and critical thinking skills necessary for securing a job, and succeeding in the diverse and ever-changing workplace of the twenty first century
2	To enable students to communicate effectively in English at the workplace.

Pre-requisites:

- The student must have a good degree of control over simple grammatical forms and some complex grammatical forms of English language.
- The student should be able to speak English intelligibly.

Course Content / Syllabus

UNIT-I — Introduction to Technical Communication and Reading — 4 Hours

- Fundamentals of technical communication
- Role of technical communication
- Reading Comprehension - central idea, tone, and intention
- Critical reading strategies

UNIT-II — Technical Writing 1 — 5 Hours

- Characteristics of technical writing; technical vocabulary, etymology
- Business letters /emails – types, format, style and language
- Notices, agenda and minutes
- Job application, CV and resume

UNIT-III — Technical Writing 2 — 5 Hours

- Technical reports – types & formats
- Structure of a report
- Technical Proposal - structure and types
- Technical/ Scientific paper writing

UNIT-IV — Public Speaking — 5 Hours

- Components of effective speaking (emphasis on voice dynamics)
- Seminar and conference presentation
- Conducting/ participating in meetings
- Appearing for a job interview
- Mobile etiquettes

UNIT-V — Manuscript Preparation — 5 Hours

- Short report writing
- Copy editing and referencing
- Developing writing style – Jargons, Abbreviations
- Ethical writing

Course outcome: At the end of the course the students will be able to Levels.

CO 1	Comprehend the fundamental principles of technical communication with special	K2

	reference to reading.	
CO 2	Write various kinds of professional correspondence.	K5
CO 3	Recognise and produce different kinds of technical documents.	K2
CO 4	Apply effective speaking skills to communicate at the workplace.	K3
CO 5	Demonstrate their understanding of various ethical concerns in written communication.	K3

Textbook:

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.

Reference Books:

1. Personality Development and Soft Skills by Barun K Mitra, Oxford Univ. Press, 2012, New Delhi.
2. Spoken English- A Manual of Speech and Phonetics by R K Bansal & J B Harrison, Orient Blackswan, 2013, New Delhi.
3. Business Correspondence and Report Writing by Prof. R C Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
4. Practical Communication: Process and Practice by L U B Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.
5. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; USA.
6. A Textbook of Scientific and Technical Writing by S D Sharma; Vikas Publication, Delhi.
7. Skills for Effective Business Communication by Michael Murphy, Harvard University, USA.
8. A Complete Guide to Write Right by Agarwal, Deepa. Scholastic, 1st edition.
9. Technical writing and communication, R S Sharma, V.P. Publication, 1st edition.
10. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0405**	**L T P**	**Credits**
Course Title	**Microprocessor**	**3 0 0**	**3**

Course objective:

The objective of this course is to understand basic concepts of Microprocessor based systems and able to do programming in Assembly Language of 8085. They will be able to learn and program Peripheral IC's.

Pre-requisites: Basic knowledge of digital logic gates

Course Contents / Syllabus

UNIT-I	8085 Microprocessor	8 Hours

Introduction to Microprocessor, Microprocessor evolutionandtypes, Microprocessorarchitectureand its operation, Logic devices for interfacing,Pin diagram and internal architecture of 8085 Microprocessor,Example of an 8085 based computer, Instructionanddataflow,timerandtimingdiagram,interruptandmachinecycle, Addressingmodes.

UNIT-II	8085 Instructions and Programming Techniques	8 Hours

Instructionsets,InstructionClassification:datatransfer operations, arithmeticoperations,logicaloperations,branchingoperations,machinecontrolandassemblerdirectives, writing assembly language programs, Programming techniques: looping, counting and indexing

UNIT-III	Code Conversion and BCD Arithmetic	8 Hours

Counter and time delays, Illustrative program: Hexadecimal counter, zero-to-nine, (module ten) counter, generating pulse waveforms, Stack, Subroutine, Restart, Conditional call and return instructions, Advance subroutine concepts, Program: BCD-to-Binary conversion, Binary-to-BCD conversion, BCD-to-Seven segment code converter, Binary-to-ASCII and ASCII-to-Binary code conversion, BCD Addition, BCD Subtraction, Introduction to Advance instructions and Application, Multiplication

UNIT-IV	Interfacing of I/O devices	8 Hours

Basic interfacing concepts,Memoryinterfacing,Interfacing output displays, Interfacing input devices, Memory mapped I/O,Interfacing keyboard and seven segment displays, The 8085 Interrupts, 8085 vector interrupts,8259 programmable interrupt controller,

UNIT-V	Programmable Peripheral IC's and 8086 Microprocessor	8 Hours

Peripheral Devices: 8255 programmable peripheral interface,8253/8254 programmable timer/counter, 8237 DMA Controller, 8251 USART and RS232C.Introduction to 8086 microprocessors: Architecture of 8086 (Pin diagram, Functional block diagram, register organization), Addressing Modes

Course outcome: After completion of the course, students will be able to

CO 1	Apply a basic concept of digital fundamentals to Microprocessor based personal computer system.	K3
CO 2	Analyze a detailed s/w & h/w structure of the Microprocessor.	K4

CO 3	Illustrate how the different peripherals (8085/8086) are interfaced with Microprocessor.	K3
CO 4	Analyze the properties of Microprocessors (8085/8086)	K4
CO 5	Evaluate the data transfer information through serial & parallel ports.	K5

Text books:

1) Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, Penram International Publication (India) Pvt. Ltd.

2) Douglas V. Hall, "Microprocessors and Interfacing", Tata McGraw Hill.

3) Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH.

Reference Books:

1) B Ram," Fundamentalsof Microprocessorsand Microcontrollers" Dhanpat Rai Publishing Co Pvt Ltd.

2) M Rafiqzzaman, "Microprocessors, Theory and Applications.

3) Aditya P Mathur Sigh, "Microprocessor, Interfacing and Applications.

4) Peter Abel, "IBM PC Assembly language and programming", Fifth Edition, Prentice Hall of India Pvt. Ltd.

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=xBYhHC8_A6o
Unit 2	https://www.youtube.com/watch?v=cNN_tTXABUA
Unit 3	https://www.youtube.com/watch?v=sLW1TptEJBQ
Unit 4	https://www.youtube.com/watch?v=9zOo4JkZgSI
Unit 5	https://www.youtube.com/watch?v=pphUIgjvqJ8

M.TECH (INT.). SECOND YEAR

Course Code	AMICSE0403A	L T P	Credits
Course Title	Operating Systems	3 0 0	3

Course objective:

The objective of the course is to provide an understanding of the basic modules and architecture of an operating system and the functions of the modules to manage, coordinate and control all the parts of the computer system. This course cover processor scheduling, deadlocks, memory management, process synchronization, system call and file system management.

Pre-requisites:

1. Basic knowledge of computer fundamentals, Data structure and Computer organization.

Course Contents / Syllabus

UNIT-I	Fundamental Concepts of Operating System	8 Hours

Introduction, Functions of Operating System, Characteristics of Operating System, Computer System Structure, Evolution of Operating Systems-Bare Machine, Single Processing, Batch Processing,Multiprogramming,Multitasking,Multithreaded,Interactive, Time sharing, Real Time System, Distributed System, Multiprocessor Systems, Multithreaded Systems, System Calls, System Programs and System Boot, Interrupt Handling, Operating System Structure- Simple structure, Layered Structure, Monolithic, Microkernel and Hybrid, System Components, Operating System Services, Case Studies: Windows, Unix and Linux.

UNIT-II	Process Management	8 Hours

Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process Address Space, Process Identification Information, Threads and their management, Types of Scheduling: Long Term Scheduling, Mid Term Scheduling, Short Term Scheduling, Pre-emptive and Non Pre-emptive Scheduling, Dispatcher, Scheduling Algorithm: FCFS, Non Pre-emptive SJF, Pre-emptive SJF, Non Pre-emptive Priority, Pre-emptive Priority, Round Robin, Multilevel Queue Scheduling and Multilevel Feedback Queue Scheduling.

UNIT-III	Deadlock and Concurrent Processing	8 Hours

Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from Deadlock,Principle of Concurrency, Process Synchronization, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Peterson's Solution, Lamport Bakery Solution, Semaphores, Test and Set Operation; Critical Section Problems and their solutions - Bound Buffer Problem, Reader-Writer Problem, Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication Models and Schemes, Process Generation.

UNIT-IV	Memory Management	8 Hours

Memory Management function, Address Binding Loading : Compile Time, Load Time and Execution Time, MMU, Types of Linking, Types of Loading, Swapping, Multiprogramming with Fixed Partitions, Multiprogramming with variable partitions, Memory Allocation: Allocation Strategies First Fit, Best Fit, and Worst Fit, Paging, Segmentation, Paged Segmentation, Virtual Memory Concepts, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms: FIFO,LRU, Optimal and LFU, Belady's Anomaly, Thrashing, Cache Memory Organization, Locality of Reference.

UNIT-V	I/O Management and Disk Scheduling	8 Hours

I/O Devices, and I/O Subsystems, I/O Buffering, I/O Ports, Disk Storage: Seek Time, Rotational Latency, Data Transfer Time, Average Access Time and Controller Time,Disk Storage Strategies, Disk Scheduling:FCFS, SSTF, SCAN, C-SCAN, LOOK and C-LOOK. Directory and Directory Structure, File System: File concept, File Access Mechanism: - Sequential Access, Direct Access and Index Access methods, File Allocation Method: Contiguous, Linked and Indexed, Free Space Management: -Bit Vector, Linked List, Grouping and Counting File System Implementation Issues, File System Protection and Security, RAID.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the fundamentals of an operating systems, functions and their structure and functions.	K1, K2
CO 2	Implement concept of process management policies, CPU Scheduling and thread management.	K5
CO 3	Understand and implement the requirement of process synchronization and apply deadlock handling algorithms.	K2, K5
CO 4	Evaluate the memory management and its allocation policies.	K5
CO 5	Understand and analyze the I/O management and File systems	K2, K4

Text books:

1) Operating System Concepts Essentials. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne.

Reference Books:

1) Operating Systems: Internals and Design Principles. William Stallings.
2) Operating System: A Design-oriented Approach. Charles Patrick Crowley.
3) Operating Systems: A Modern Perspective. Gary J. Nutt.
4) Design of the Unix Operating Systems. Maurice J. Bach.
5) Understanding the Linux Kernel, Daniel Pierre Bovet, Marco Cesati.

Link:

Unit 1	https://www.youtube.com/watch?v=783KAB-tuE4 https://www.youtube.com/watch?v=Bxx2_aQVeeg https://www.youtube.com/watch?v=ZaGGKFCLNc0 https://nptel.ac.in/courses/106/105/106105214/
Unit 2	https://www.youtube.com/watch?v=NShBeqTkXnQ https://www.youtube.com/watch?v=4hCih9eLc7M https://www.youtube.com/watch?v=9YRxhlvt9Zo
Unit 3	https://www.youtube.com/watch?v=UczJ7misUEk https://www.youtube.com/watch?v=_IxqinTs2Yo
Unit 4	https://www.youtube.com/watch?v=IwESijQs9sM https://www.youtube.com/watch?v=-orfFhvNBzY https://www.youtube.com/watch?v=2OobPx246zg&list=PL3-wYxbt4yCjpcfUDz-TgD_ainZ2K3MUZ&index=10
Unit 5	https://www.youtube.com/watch?v=AnGOeYJCv6s https://www.youtube.com/watch?v=U1Jpvni0Aak

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0404**	**L T P**	**Credits**
Course Title	**Theory of Automata and Formal Languages**	**3 0 0**	**3**

Course objective:

To teach mathematical foundations of computation including automata theory, provide the design concepts of abstract computation model of finite automata, push down automata and turing Machine and familiarize the notions of algorithm, decidability, complexity, and computability.

Pre-requisites:

- Discrete Mathematics
- Fundamental of Computer System

Course Contents / Syllabus

UNIT-I	Basic Concepts of Formal Language and Automata Theory	8 Hours

Introduction to Theory of Computation- Alphabet, Symbol, String, Formal Languages, Grammar, Derivation and Language generation by Grammar, Chomsky Hierarchy, Finite Automata, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non-Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ∈-Transition, Equivalence of NFA's with and without ∈-Transition, Finite Automata with output- Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata, Myhill-Nerode Theorem, Simulation of DFA and NFA.

UNIT-II	Regular Language and Finite Automata	8 Hours

Regular Expressions, Transition Graph, Kleen's Theorem, Finite Automata and Regular Expression-Arden's theorem, Algebraic Method Using Arden's Theorem, Regular Grammars-Right Linear and Left Linear grammars, Conversion of FA into Regular grammar and Regular grammar into FA, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma.

Decidability- Decision properties, Finite Automata and Regular Languages, Simulation of Transition Graph and Regular language.

UNIT-III	Context Free Language and Grammar	8 Hours

Context Free Grammar (CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Simplification of CFG, Normal Forms- Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Pumping Lemma for CFL, Closure properties of CFL, Decision Properties of CFL

UNIT-IV	Push Down Automata	8 Hours

Pushdown Automata- Definition, Representation, Instantaneous Description (ID), Acceptance by PDA, Nondeterministic Pushdown Automata (NPDA)- Definition, Moves, Pushdown Automata and Context Free Language, Pushdown Automata and Context Free Grammar, Two stack Pushdown Automata.

UNIT-V	Turing Machine and Undecidability	8 Hours

Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Variations of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Closure Properties of Recursive

and Recursively Enumerable Languages, Non-Recursively Enumerable and Non-Recursive Languages, Undecidability, Halting Problem, Undecidability of Halting Problem, Post's Correspondence Problem.

Course outcome: After completion of this course students will be able to:

CO 1	Design and Simplify automata for formal languages and transform non-deterministic finite automata to deterministic finite automata.	K6
CO 2	Identify the equivalence between the regular expression and finite automata and apply closure properties of formal languages to construct finite automata for complex problems.	K3
CO 3	Define grammar for context free languages and use pumping lemma to disprove a formal language being context- free.	K3
CO 4	Design pushdown automata (PDA) for context free languages and Transform the PDA to context free grammar and vice-versa.	K6
CO 5	Construct Turing Machine for recursive and recursive enumerable languages. Identify the decidable and undecidable problems.	K6

Text books:

(1) Introduction to Automata theory, Languages and Computation, J.E. Hopcraft, R. Motwani, and Ullman. 3rdedition, Pearson Education Asia.
(2) Theory of Computer Science-Automata Language and Computation, K.L.P. Mishra, and N. Chandrasekharan, 3rd Edition, PHI.
(3) An Introduction to Formal Languages and Automata, P. Linz, 6th Edition, Jones & Bartlett Learning Publication.

Reference Books:

(1) Finite Automata and Formal Languages- A simple Approach, A. M. Padma Reddy, Cengage Learning Inc.
(2) Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI.
(3) Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill.
(4) Introduction to The Theory of Computation, M Sipser, 3rd Edition, Cengage Learning Inc.

Links:

Unit I	https://nptel.ac.in/courses/106/104/106104028/Lecture 1 -10, Lecture 16, 17 18, 19 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit II	https://nptel.ac.in/courses/106/104/106104028/Lecture 11 -15 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit III	https://nptel.ac.in/courses/106/104/106104028/Lecture 20 -30 https://nptel.ac.in/courses/106/106/106106049/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit IV	https://nptel.ac.in/courses/106/104/106104028/Lecture 31 -33 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit V	https://nptel.ac.in/courses/106/104/106104028/Lecture 34-42 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory

M.TECH (INT.). SECOND YEAR

Course Code	AMICSE0401	L T P	Credits
Course Title	Design and Analysis of Algorithm	3 1 0	4

Course objective:

Analyze asymptotic performance of algorithms designed using different computational model. Study advanced data structures like Red black Tree, binomial and Fibonacci heap and learn the concept of complexity classes.

Pre-requisites: Basic knowledge of any programming language like C/C++/ Python/Java, Data Structures, Discrete Structures and Graph Theory

Course Contents / Syllabus

UNIT-I **Introduction** **8 Hours**

Algorithms, Analyzing Algorithms, Complexity of Algorithms, Amortized Analysis, Growth of Functions, Methods of solving Recurrences, Performance Measurements, Sorting and Order Statistics –Insertion Sort, Shell Sort, Heap Sort, Priority queue, Comparison of Sorting Algorithms, Sorting in Linear Time, Counting Sort, Radix Sort.

UNIT-II **Advanced Data Structures** **8 Hours**

Red-Black Trees, B – Trees, Binomial Heaps, Fibonacci Heaps.

UNIT-III **Divide and Conquer and Greedy Methods** **8 Hours**

Divide and Conquer concepts with Examples Such as Quick sort, Merge sort, Strassen's Matrix Multiplication, Convex Hull, Searching.

Greedy Methods with Examples Such as Activity Selection, Task scheduling, Knapsack, Minimum Spanning Trees – Prim's and Kruskal's Algorithms, Single Source Shortest Paths - Dijkstra's and Bellman Ford Algorithms, Huffman codes.

UNIT-IV **Dynamic Programming, Backtracking, Branch and Bound** **8 Hours**

Dynamic Programming concepts, Examples Such as All Pair Shortest Paths – Warshal's and Floyd's Algorithms, 0/1 Knapsack, Longest Common Sub Sequence, Matrix Chain Multiplication, Resource Allocation Problem.

Graph searching (BFS, DFS),Backtracking, Branch and Bound with Examples Such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of Subsets.

UNIT-V **Selected Topics** **8 Hours**

String Matching Algorithms such as Rabin-karp Matcher, Finite Automaton Matcher, KMP Matcher, Boyer Moore Matcher. Theory of NP-Completeness, Approximation Algorithms and Randomized Algorithms

Course outcome: After completion of this course students will be able to

CO 1	Analyze the asymptotic performance of algorithms and write rigorous correctness proofs for algorithms.	K4
CO 2	Use efficient data structures such as RB tree, B tree, binomial and Fibonacci heaps etc. according to the problem	K3
CO 3	Apply divide and conquer and greedy algorithm approach for solving different problems such.	K5
CO 4	Apply important algorithmic design paradigms and methods of analysis such as dynamic programming, backtracking, branch and bound.	K5
CO 5	Demonstrate tractable and intractable problems and the classes P, NP and NP-complete	K3

	problems. And also use Algorithms for solving string matching problem.	

Text books:

1) Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Printice Hall of India.
2) E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms".
3) Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education, 2008.
4) LEE "Design & Analysis of Algorithms (POD)",McGraw Hill.

Reference Books:

1. Richard E.Neapolitan "Foundations of Algorithms" Jones & Bartlett Learning.
2. Jon Kleinberg and ÉvaTardos, Algorithm Design, Pearson, 2005.
3. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
4. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997
5. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/
Unit 2	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/
Unit 3	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/
Unit 4	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/
Unit 5	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/

M.TECH (INT.). SECOND YEAR

Course Code	AMICSE0455	L T P	Credit
Course Title	Microprocessor Lab	0 0 2	1

List of Experiments:

Sr. No.	Name of Experiment	CO
1	To study 8085 microprocessor system.	CO1
2	Writeaprogramusing8085MicroprocessorforDecimal,Hexadecimaladditionandsubtractionof twoNumbers.	CO2
3	Writeaprogramusing8085Microprocessor for additionandsubtractionoftwoBCDnumbers.	CO2
4	Toperformmultiplicationanddivisionoftwo8-bit numbersusing8085.	CO3
5	Tofindthelargestandsmallestnumberinanarrayofdatausing8085instructionsset.	CO3
6	To write a program to arrange an array of data in ascending and descending order.	CO3
7	ToconvertgivenHexadecimalnumberintoitsequivalentASCIInumberandviceversausing8085instructionsset.	CO4
8	To perform interfacing of RAM chip to 8085.	CO5
9	To perform interfacing of 8255 PPI.	CO5
10	To interface 8253 programmable interval timers to 8085 and verify the operation of 8253 in six different modes.	CO5

Lab Course Outcome: After completion of the course, students will be able to

CO 1	Distinguish commands of 8085 kit.	K4
CO 2	Implement addition, subtraction of two 8-bit numbersusing8085.	K3
CO 3	Implement multiplication, divisionoftwo8-bit numbers, largest, smallest and sorting using8085.	K3
CO 4	Program HexadecimalnumberintoitsequivalentASCIInumberandviceversausing8085instructionsset.	K6
CO 5	Interface and program peripheral IC's.	K6

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0453A**	**L T P**	**Credits**
Course Title	**Operating Systems Lab**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1. Linux based Commands	**Lab1:** Execute Various types of Linux Commands (Miscellaneous, File oriented, Directory oriented) **Lab2:** Shell Programming Write a shell program, which accepts the name of a file from standard input and perform the following test on it: i. File readable ii. File writable iii. Both readable and writable	CO1
2. CPU Scheduling Algorithms	**Lab3:** Implement CPU Scheduling Algorithms: 1. FCFS 2. SJF 3. PRIORITY **Lab4:** 4. Round Robin 5. Multi-level Queue Scheduling	CO3
3. Deadlock Management	**Lab5:** Implementation of Banker's algorithm for the purpose of Deadlock Avoidance.	CO3
4. Memory Management Techniques	**Lab6:** Write a program to simulate the following contiguous memory allocation techniques: a) First fit b) Best fit c) Worst Fit **Lab7:** a) Write a Program for implementation of Contiguous memory fixed partition technique. b) Write a program for implementation of Contiguous memory variable partition technique. **Lab8:** Write a program to simulate page replacement algorithms: a) FIFO b) LRU c) Optimal	CO4
5. Disk Scheduling Techniques	**Lab9:** Write a program to simulate Disk Scheduling Algorithms: a) FCFS b) SSTF **Lab 10:** c) SCAN & C-SCAN d) Look & C-LOOK	CO5
6. Process Synchronization	**Lab11:** Write a program to simulate Producer Consumer problem	CO2

Lab Course Outcome: After completion of this course students will be able to

CO1	Gain all round knowledge of various Linux Commands.	K2

CO2	Analyze and implement Process Synchronization technique.	K4,K5
CO3	Analyze and implement CPU scheduling algorithms.	K4, K5
CO4	Analyze and implement Memory allocation and Memory management techniques.	K4, K5
CO5	Analyze and implement Disk Scheduling Policies.	K4, K5

M.TECH (INT.). SECOND YEAR			
Course Code	**AMICSE0451**	**L T P**	**Credit**
Course Title	**Design and Analysis of Algorithm Lab**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Program for Recursive Binary & Linear Search.	CO1, CO2
2	Program for Heap Sort.	CO1
3	Program for Merge Sort.	CO2
4	Program for Insertion Sort.	CO1
5	Program for Quick Sort.	CO2
6	Program to implement Knapsack Problem using Greedy Solution.	CO3
7	Program for 0/1 knapsack.	CO4
8	Program for LCS.	CO4
9	Program for BFS and DFS.	CO1
10	Programto implement Dijkstra's Algorithm.	CO4
11	Program to find Minimum Spanning Tree using Kruskal's Algorithm.	CO3
12	Program to implement N Queen Problem using Backtracking.	CO4

Lab Course Outcome: After completion of this course students will be able to

CO 1	Implement algorithm to solve problems by iterative approach.	K3
CO 2	Implement algorithm to solve problems by divide and conquer approach.	K3
CO 3	Implement algorithm to solve problems by Greedy algorithm approach.	K3
CO 4	Implement algorithm to solve problems by Dynamic programming, backtracking, branch and bound approach.	K3

M.TECH (INT.). SECOND YEAR

Course Code	ANC0402	L T P	Credits
Course Title	Environmental Science	2 0 0	0

Course objective:

1	To help the students in realizing the inter-relationship between man and environment. and help the students in acquiring basic knowledge about environment.
2	To develop the sense of awareness among the students about environment and its various problems.
3	To create positive attitude about environment among the student.
4	To develop proper skill required for the fulfilment of the aims of environmental education and educational evaluations
5	To develop the capability of using skills to fulfil the required aims, to realise and solve environmental problems through social, political, cultural and educational processes

Pre-requisites: Basic knowledge of nature.

Course Contents / Syllabus

UNIT-I Basic Principle of Ecology — 8 Hours

Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem. Food chains and food webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems. Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles.

Basic concepts of sustainable development, SDGs, Ecosystem services, UN Decade for Ecorestoration.

UNIT-II Natural Resources and Associated Problems — 8 Hours

Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles.

Non-Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages.

UNIT-III Biodiversity Succession and Non-Renewable Energy Resources — 8 Hours

Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book.

Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance.

Succession: Concepts of succession, Types of Succession. Trends in succession. Climax and stability.

UNIT-IV Pollution and Solid Waste Management — 8 Hours

Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, Cox, CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, Soil pollution: Causes of soil pollution, Effects of soil pollution, Major sources of and effects of noise pollution on health, Radioactive and thermal pollution sources and their effects on surrounding environment.

Solid waste disposal and its effects on surrounding environment, Climate change, global warming, acid rain, ozone layer depletion.

UNIT-V Role of Community and Environmental Protection Acts — 8 Hours

Role of community, women and NGOs in environmental protection, Bioindicators and their role, Natural hazards, Chemical accidents and disasters risk management, Environmental Impact Assessment (EIA), Salient features of following Acts: a. Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972.b. Water (Prevention and control of pollution) Act, 1974.c. Air (Prevention and control of pollution) Act, 1981. Forest (Conservation) Act, 1980.d. Wetlands (Conservation and Management) Rules, 2017; e. Chemical safety and Disaster Management law. F. District Environmental Action Plan. Climate action plans.

Course outcome: After completion of this course students will be able to

CO 1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem., food chains and food webs. Ecological pyramids	K2
CO 2	Understand the different types of natural recourses like food, forest, minerals and energy and their conservation	K2
CO 3	Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation.	K2
CO 4	Understand the different types of pollution, pollutants, their sources, effects and their control methods	K3
CO 5	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K3

Text books:

1. Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.
2. Botkin, D.B and Kodler E.A., 2000, Environmental Studies: The earth as a living planet. John Wiley and Sons Inc.
3. Rao M.N. and H.V.N. Rao, 1989: Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi
4. Singh J.S., Singh S.P. and Gupta S.R., 2006, Ecology Environment and Resource Conservation, Anamaya Publishers, New Delhi.
5.Environmental Studies -Benny Joseph-Tata McgrawHill-2005
6. Environmental Studies- Dr. D.L. Manjunath, Pearson Education-2006.
7. Environmental studies- R, Rajagopalan -Oxford Pubtiotion2005.

Reference Books:

1.Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.
2.Dash, M.C. (1994), Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.
3. Sharma P. D. (1996). Environmental Biology, Rastogi Publications, Meerut.
4. Verma P.S. and V.K. Agarwal. (1985). Principles of Ecology. S. Chand and Company (Pub.), New Delhi.
5.Principles of Environmental Sciences and Engineering -P. Venugoplan Rao, Prenitice Hall of India.
6. Environmental Science and Engineering Meenakshi, Prentice Hall India.

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=T21OO0sBBfc, https://www.youtube.com/watch?v=qt8AMjKKPDohttps://www.youtube.com/watch?v=yAK-m91Nxrshttps://www.youtube.com/watch?v=ha_O-1uOWkk, https://www.youtube.com/watch?v=brF0RWJyx9w
Unit 2	https://www.youtube.com/watch?v=mOwyPENHhbc, https://www.youtube.com/watch?v=yqev1G2iy20, https://www.youtube.com/watch?v=_74S3z3IO_I, https://www.youtube.com/watch?v=jXVw6M6m2g0
Unit 3	https://www.youtube.com/watch?v=GK_vRtHJZu4, https://www.youtube.com/watch?v=b6Ua_zWDH6U, https://www.youtube.com/watch?v=7tgNamjTRkk, https://www.youtube.com/watch?v=ErATB1aMiSU, https://www.khanacademy.org/science/high-school-biology/hs-ecology/hs-human-impact-on-ecosystems/v/conservation-and-the-race-to-save-biodiversity
Unit 4	https://www.youtube.com/watch?v=7qkaz8ChelI, https://www.youtube.com/watch?v=NuQE5fKmfME, https://www.youtube.com/watch?v=9CpAjOVLHII, https://www.youtube.com/watch?v=yEci6iDkXYw, https://www.youtube.com/watch?v=yEci6iDkXYw
Unit 5	https://www.youtube.com/watch?v=ad9KhgGw5iA, https://www.youtube.com/watch?v=nW5g83NSH9M, https://www.youtube.com/watch?v=xqSZL4Ka8xo, https://www.youtube.com/watch?v=WAI-hPRoBqs, https://www.youtube.com/watch?v=o-WpeyGlV9Y, https://www.youtube.com/watch?v=EDmtawhADnY

M.TECH (INT.). SECOND YEAR					
Course Code	**ANC0401**	**L**	**T**	**P**	**Credit**
Course Title	**Cyber Security**	**2**	**0**	**0**	**0**

Course objective:

Achieve knowledge about Security of Information system and Risk factors and examine security threats and vulnerability in various scenarios, understand concept of cryptography and encryption technique to protect the data from cyber-attackand provide protection for software and hardware.

Pre-requisites: Basics recognition in the domain of Computer Science.
Concept of network and operating system.
Commands of programming language.

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 Hours**

Introduction to Information Systems: Types of Information Systems, Development of Information Systems, Need for Information Security, Threats to Information Systems, Information Assurance, Guidelines for Secure Password and WI-FI Security and social media and Windows Security, Security Risk Analysis, and Risk Management.

UNIT-II	**Application Layer Security**	**8 Hours**

Data Security Considerations-Backups, Archival Storage and Disposal of Data,Security Technology-Firewall, Intrusion Detection, Access Control, Security Threats -Viruses, Worms, Trojan Horse,Bombs,Trapdoors,Spoofs, E-mail Viruses, Macro Viruses, Malicious Software,Network and Denial of Services Attack, Security,Threats to E-Commerce: Electronic Payment System, e- Cash, Issues with Credit/Debit Cards.

UNIT-III	**Secure System Development**	**8 Hours**

Application Development Security, Architecture & Design,Security Issues in Hardware: Data Storage and Downloadable Devices, Mobile Protection,Security Threats involving in social media, Physical Security of IT Assets, Access Control, CCTV and Intrusion Detection Systems, Backup Security Measures.

UNIT-IV	**Cryptography And Network Security**	**8 Hours**

Public key cryptography: RSA Public Key Crypto with implementation in Python,Digital Signature Hash Functions,Public Key Distribution.

Symmetric key cryptography: DES (Data Encryption Standard), AES (Advanced Encryption Standard), Secure hash algorithm(SHA-1).

Real World Protocols: Basic Terminologies, VPN, Email Security Certificates, Transport Layer Security, TLS, IP security, DNS Security.

UNIT-V	**Security Policy**	**8 Hours**

Policy design Task, WWW Policies, Email based Policies, Policy Revaluation Process-Corporate Policies-Sample Security Policies,Publishing and Notification Requirement of the updated and new Policies.
Resent trends in security.

Course outcome: At the end of course, the student will be able to

CO 1	Analyze the cyber security needs of an organization.	K4
CO 2	Identify and examine software vulnerabilities and security solutions.	K1,K3

CO 3	Comprehend IT Assets security (hardware and Software) and performance indicators	K2
CO 4	Measure the performance and encoding strategies of security systems.	K3, K5
CO 5	Understand and apply cyber security methods and policies to enhance current scenario security.	K2, K3

Text books:

5) Charles P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security", Pearson Education India
6) V.K.Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India
7) Sarika Gupta & Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing House
8) Michael E.Whitman and Herbert J Mattord "Principle of Information Security" Cengage

Reference Books:

5) Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.
6) CHANDER, HARISH," Cyber Laws and It Protection", PHI Learning Private Limited,Delhi
7) V.K. Jain, Cryptography and Network Security, Khanna Publishing House, Delhi
8) William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010

E-books& E-Contents:

5) https://prutor.ai/welcome/
6) https://crypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf
7) https://cybermap.kaspersky.com/stats
8) https://www.fireeye.com/cyber-map/threat-map.html

Reference Links:

4) https://crypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf
5) https://cs155.stanford.edu/lectures/03-isolation.pdf
6) http://uru.ac.in/uruonlinelibrary/Cyber_Security/Cryptography_and_Network_Security.pdf

NPTEL/ Youtube/ Faculty Video Link:

6) https://www.youtube.com/watch?v=vv1ODDhXW8Q
7) https://www.youtube.com/watch?v=fQ3ESFfvchg&list=PLUtfVcb-iqn834VGI9faVXGIGSDXZMGp8
8) https://www.youtube.com/watch?v=iTVyKbDCJrA&list=PLgMDNELGJ1CbdGLyn7OrVAP-IKg-0q2U2
9) https://www.youtube.com/watch?v=1plMO7ChXMU&list=PLJ5C_6qdAvBFAuGoLC2wFGruY_E2gYtev
10) https://www.youtube.com/watch?v=_9QayISruzo