S.No.	Contents	Contact Hours
1.	**Formal Logic:**Statement, Symbolic Representation and Tautologies, Quantifiers, Predicator and validity, Normal form, Prepositional Logic, Predicate Logic, Logic Programming and Proof of correctors	3
2.	**Proof, Relation and Analysis of Algorithm**: Technique for theorem proving : Direct Proof, Proof by Contra position, proof by exhausting cases and proof by contradiction, Principle of mathematical induction, principle of complete induction, recursive definition, solution methods for linear, first-order recurrence relations with constant coefficients, analysis of algorithms involving recurrence rotations-recursive selection sort, binary search, quick sort, solution method for a divide-and-conquer recurrence relation.	7
3.	**Sets and Combinations**:Sets, Subsets, powersets, binary and unary operations on a set, set operations/set identities, fundamental counting principles, principle of inclusion, exclusion and pigeonhole, permutation and combination, Pascal's triangles, binomial theorem, representation of discrete structures.	8
4.	**Relation/function and matrices**:Rotations, properties of binary rotations, operation on binary rotation, closures, partial ordering, equivalence relation, properties of function, composition of function, inverse, binary and n-ary operations, characteristics of permutation function, composition of cycles, Boolean matrices, Boolean matrices multiplication.	7

5.	**Lattices & Boolean Algebra**: Lattices: definition, sublattices, direct product, homomorphism Boolean algebra: Definition, properties, isomorphic structures (in particular, structures with binary operations) subs algebra, direct product and homomorphism, Boolean function, Boolean expression, representation & minimization of Boolean function.	7
6.	Graph Theory Terminology, isomorphic graphs, Euler's formula (Proof) four color problem and the chromatic number of a graph, five color theorem. Trees terminology, directed graphs, Computer representation of graphs, Warshall's algorithms, Decision Trees, Euler path & Hamiltonian circuits, Shortest path & minimal spanning trees, Depth-first and breadth first searches, analysis of search algorithm, trees associated with DFS & BFS Connected components, in order, preorder & post order tree traversal algorithms.	8
TOTAL		**42**

11. Suggested Books

S.No.	Name of Books / Authors/ Publishers / Year of Publication/ Reprint
Text Books	

Department of Applied Mathematics, DTU
I year Syllabus(AY 2023-24)

Details of Course

Course Title	Course Structure			Pre-Requisite
	L	T	P	Nil
AM102: Mathematics II	3	1	0	

Course Objective: To impart knowledge of matrices Differential equations, Laplace transform, Fourier series & their applications.

Course Outcome (CO):

CO1	Solve the system of linear equations, interpret the eigenvalues and eigenvectors of a matrix.
CO2	Explain the concept of differential equations and evaluate various methods to solve ordinary differential equations.
CO3	Find the series solutions of differential equations using Power series and Frobenious methods.
CO4	Implement the integral transformation using the concept of Laplace transformation and apply it to solve differential equations.
CO5	Find Fourier series of a periodic function and apply it in harmonic analysis.

S. No.	Contents	Contact Hours
1.	**Linear Algebra:** Rank of a matrix, inverse of a matrix using elementary row transformations, solutions of system of linear equations, eigen values and eigen vectors of a matrix.	8
2.	**Ordinary differential equations:** Second and higher order linear differential equations with constant coefficients, General solution of homogenous and non-homogenous equations, method of variation of parameters, simultaneous Linear differential equations.	9
3	**Special Functions:** Power series method, Frobenious method, Legendre equation, Legendre Polynomials, Bessel equation, Bessel function of first Kind and their Orthogonal property.	9
4	**Laplace Transforms:** Basic properties, Laplace transform of derivatives and Integrals, Inverse Laplace transform, Differentiation and Integration of Laplace transform, Convolution theorem, Unit step function, periodic function. Applications of Laplace transform to initial and boundary value problems.	8
5	**Fourier series**: Fourier series of 2π period, Fourier series of arbitrary period, Fourier series of Even and odd functions, half range Fourier series, Harmonic Analysis.	8
	Total	**42**

25.09.23

Data Structures

S.No.	Contents	Contact Hou
1.	**Introduction:** Introduction to Algorithmic, Complexity- Time-Space Trade off. Introduction to abstract data types, design, implementation and applications. Introduction to List data structure. **Arrays and Strings:** Representation of Arrays in Memory: one dimensional, Two dimensional and Multidimensional, Accessing of elements of array, performing operations like Insertion, Deletion and Searching. Sorting elements of arrays. Strings and String Operations. **Stacks and Queues:** Introduction to data structures like Stacks and Queues. Operations on Stacks and Queues, Array representation of Stacks , Applications of Stacks : recursion, Polish expression and their compilation conversion of infix expression to prefix and postfix expression, Operations of Queues, Representations of Queues Applications of Queues, Priority queues.	8
2.	**Linked Lists:** Singly linked lists, Representation of linked list, Operations of Linked list such as Traversing, Insertion and Deletion, Searching, Applications of Linked List. Concepts of Circular linked list and Doubly linked list and their Applications. Stacks and Queues as linked list.	6
3.	**Trees:** Basic Terminology, Binary Trees and their representa search trees, various operations on Binary search trees like , searching , Insertion and Deletion , Applications of Binary search Trees , Complete Binary trees, Extended binary trees. General trees, AVL trees, Threaded trees, B- trees.	
4.	**Searching and Sorting:** Linear Search, Binary search, Interpolation Search,Insertion Sort, Quick sort, Merge sort, Heap sort, sorting on different keys, External sorting.	7
5.	**Graphs:** Terminology and Representations, Graphs & Multi-graphs, Directed Graphs, Representation of graphs and their Transversal, Spanning trees, shortest path and Transitive Closure, Activity Networks, Topological Sort and Critical Paths.	7
6.	**File Structure:** File Organization, Indexing & Hashing, Hash Functions, Collision Resolution Techniques.	6
	TOTAL	42

S.No	Content	Contact Hours
Unit 1	**Relativity:** Review of concepts of frames of reference, Michelson-Morley Experiment and its implications, Einstein's Special theory of relativity and its postulates, Lorentz transformation equations, law of addition of velocities, Concept of simultaneity, Length contraction, Time dilation, Mass variation with velocity, Concepts of energy and momentum, Mass energy relation.	8
Unit 2	**Physical Optics:** Interference: Methods of formation of coherent sources, Parallel thin films, Wedge shaped film, Newton's rings. Diffraction: Fraunhofer diffraction, Single slit, Double slit and N-slit/ grating. Polarization: Phenomenon of double refraction, Nicol Prism, Production and analysis of plane, circularly and elliptically polarized light, Optical activity, Specific rotation.	10
	Lasers and Optical Fibres:	8
Unit 3	Introduction to laser and its properties, Working principle of lasers, Spontaneous and stimulated emission, Einstein's coefficients, Ruby and He-Ne lasers. Classification of optical fibres, Core-cladding refractive index difference, Numerical aperture and pulse dispersion, V- number.	
Unit 4	**Quantum Physics:** Compton effect, Wave Particle Duality, de-Broglie relation, Davison and Germer Experiment, Postulates of Quantum Mechanics and introduction to wave function, Physical Significance of wave function- Probability density and normalization, Schrödinger wave Equation, Operators, Expectation values and eigen value equation, Particle in a Box, Concept of tunnelling.	10
Unit 5	**Semiconductor Physics:** Origin of bands, Intrinsic and extrinsic semiconductors, Concept of Fermi level, Carrier concentration in intrinsic and extrinsic semiconductors, Drift and diffusion current, Einstein Relation, Hall effect.	6