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| **Course Code** |  | **Discrete Mathematics** | **L** | **T** | **P** | **C** |
| **Core/elective/Supportive** | **Allied:1** | **5** | **-** | **-** | **4** |
| **Pre-requisite** | Basic knowledge in Mathematics | **Syllabus version** | **2025-28****Batch** |
| **Course Objectives** |
| * Introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.
* Introduce students to set theory, inductive reasoning, elementary and advanced counting techniques, recurrence relations and lattices.
* Introduce students to prove mathematical statements by means of inductive reasoning
 |
| **Expected Course Outcomes** |
| 1 | Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs | **K1** |
| 2 | Demonstrate an understanding of Combinatorics and lattices | **K2** |
| 3 | Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation | **K3** |
| 4 | Analyze and construct mathematical arguments that relate to the study of discrete structures | **K4** |
| 5 | Develop and model problems with the concepts and techniques of discrete mathematics. | **K5** |
| **K1–Remember K2–Understand K3–apply K4-Analyze K5–evaluate K6-Create** |
|  |
| **UNIT I** | **MATHEMATICAL LOGIC** | **15** |
| Proposition–Logical Operators–Truth Tables–Laws of Logic–Equivalences–Rules of interface–validity Arguments–Consistency of Specifications**–**Propositional Calculus– Quantifiers and universe of discourse. |
| **UNIT II** | **PROOF TECHNIQUES** | **19** |
| Introduction–Methods of proving theorems–Direct Proofs, Proof by Contraposition, Vacuous and trivial proofs, Proofs by contradiction–Mistakes in Proofs–Mathematical induction–Strong Mathematical induction–Strong mathematical induction and well ordering–Program Correctness. |
| **UNIT III** | **COMBINATORICS** | **14** |
| Basics of Counting–The Pigeon hole principle–Permutations and Combinations with and without repetition, Permutations with indistinguishable elements– distributions of objects–Generating Permutations and combinations in lexicographic order. |
| **UNIT IV** | **RECURRENCE RELATIONS** | **14** |
| Some Recurrence Relation Models–Solution of linear homogeneous recurrence relations with constant coefficients–solution of linear non- homogeneous recurrence relations by the method of Characteristic roots–Divide and conquer recurrence relations. |
| **UNIT V** | **LATTICES** | **13** |
| Lattices as partially ordered set–Properties of Lattices–Lattices as algebraic system–Sub lattices– Direct Product and Homomorphism–Some special lattices. |
| **Total Lecture Hours** | **75** |
| **Text Book(s)** |
| **1** | Kenneth H. Rosen,―Discrete Mathematics and its applications‖,McGrawHill,2011. |
| **2** |  Discrete Mathematics, J.K. Sharma, 2nd edition, 2005, Macmillan India Ltd.  |
| **3** | TremblayJ.P.andManoharR.,―Discrete and Combinatorial Mathamatics–An Introduction‖, AddisonWesley,2009 |
| **Reference Book(s)** |
| **1** | DoerrAlanandLevasseurK.,―Applied Discrete Structures for Computer Science‖,Galgotia Publications,2002. |
| **2** | BenardKolman,RobertC.BusbyandSharanRoss,―Discrete Mathematical Structures‖, Pearson Education,2014. |
|  | **Related Online Contents(MOOC,SWAYAM,NPTEL,Websites etc)** |  |
| **1** | [**https://onlinecourses.swayam2.ac.in/aic20\_sp06/preview**](https://onlinecourses.swayam2.ac.in/aic20_sp06/preview) |  |
| **2** | [**https://onlinecourses.swayam2.ac.in/arp19\_ap79/preview**](https://onlinecourses.swayam2.ac.in/arp19_ap79/preview) |  |
| **Course Designed by:** |

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |
| **CO2** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |
| **CO3** | **S** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |
| **CO4** | **S** | **S** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |
| **CO5** | **S** | **S** | **S** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |

\*S-Strong;M-Medium;L-Low

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| **Course Code** |  | **Applied Mathematics** | **L** | **T** | **P** | **C** |
| **Core/elective/Supportive** | **Allied:2** | **5** | **0** | **0** | **4** |
| **Pre-requisite** | Basic Knowledge in Mathematics | Syllabusversion | **2025-28****Batch** |  |
| **Course Objectives** |
| To introduce the concepts of Numbers, Sets, Relations, Probability and Calculus |
| **Expected Course Outcomes** |
| 1 | Demonstrate the concepts of Numbers, sets, probability and calculus | **K2** |
| 2 | Apply the learned concepts to solve various mathematical problems related to the domain | **K3** |
| 3 | Apply various laws related to logarithms and sets to solve various mathematical problems | **K4** |
| 4 | Solve problems related to calculus. | **K5** |
| **K1–Remember K2–Understand K3–apply K4-Analyze K5–evaluate K6-Create** |
|  |
| **UNIT I** | **Numbers and Numerical****Applications** | **15** |
| Numbers, Quantification and Numerical Applications-Prime Numbers, Encryptions using Prime Numbers-Binary Numbers-Complex Numbers (Preliminary idea only)-Indices, Logarithm and Antilogarithm-Laws and properties of logarithms-Simple applications of logarithm andAntilogarithm. |
| **UNIT II** | **Algebra** | **16** |
| Algebra - Sets- Types of sets-Venn diagram-De Morgan's laws-Problem solving using Venn diagram 4-Relations and types of relations-Introduction of Sequences, Series-Arithmetic and Geometric progression-Relationship between AM and GM. |
| **UNIT III** | **Relations** | **16** |
| Definition and properties of binary relations–Representing Relations – Closures of Relations – Composition of Relations – Equivalence Relations –Partitions and Covering of sets–Partial Orderings–n-array Relations and their applications.  |
| **UNIT IV** | **Functions** | **14** |
| Calculus-Introducing functions-Domain and Range of a function-Types of functions (Polynomial function; Rational function; Composite function; Logarithm function; Exponential function; Modulus function; Greatest Integer function, Sig num function – Graphical representation of functions- Concept of limits and continuity of a function-Instantaneous rates of change-Differentiation as a process of finding derivative – Derivatives of algebraic functions using Chain rule –Tangent line and equations of tangents. |
| **UNIT V** | **Probability** | **14** |
| Probability-Random experiment, sample space, events, mutually exclusive events- Independent and Dependent Events-Law of Total Probability-Bayes‘ Theorem. |
| **Total Lecture****Hours** | **75****Hours** |
| **Text Book(s)** |
| **1** | Applied Mathematics–Dan Simpson, Burning Eye books |
| **2** | Discrete Mathematics, J.K. Sharma, 2nd edition, 2005, Macmillan India Ltd. |
| **3** | Navanitham.P.A, “Business Mathematics & Statistics” Jai Publishers, Trichy-21. |
| **Reference Book(s)** |
| **2** | Applied Mathematics-Dr.HariArora,PublishingDateIs2019.PublisherIsS.k.Kataria&Sons |
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| **Course Designed by:** |

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |
| **CO2** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |
| **CO3** | **S** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |
| **CO4** | **S** | **M** | **M** | **L** | **L** | **L** | **L** | **L** | **L** | **L** |

\*S-Strong;M-Medium;L-Low