|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NAME OF DEPARTMENT:** | | | | | | | | | | | | | | | | | | | Computer Applications | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Subject Name:** | | | | | | | | | Mathematical Foundation of Computer Science | | | | | | | | | | | | | | | | | | | | | | | | | **Subject Code:** | | | | | | | | TBI 103 | | |
|  | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | |
| **Course Name:** | | | | | | | | | BSc IT | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | |
|  | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | | |  | | | |
| **1** | **Contact Hours:** | | | | | | | | | | | 48 | | | |  | | | | | | | | | | | | | | | | | | | **L** | | 3 | | | **T** | | 0 | **P** | 0 | |
|  |  | | | | | | | | | | |  | | | |  | | | | | | | | | | | | | | | | | | |  | |  | | |  | |  |  |  | |
| **2** | **Examination Duration (Hrs):** | | | | | | | | | | | | | | | | | | | | |  | **Theory** | | | | | 0 | 3 |  | **Practical** | | | | | 0 | | 0 | |  | | | | |
|  |  | | | | | | | | | | | | | | | | | | | | |  |  | | | | |  |  |  |  | | | | |  | |  | |  | | | | |
| **3** | **Relative Weightage:** | | | | | | | | | | | | |  | | | | | **CWE:** | | | | | | | 25 | | **MTE:** | | | 25 | | **ETE:** | | | | 50 | | | |  | | | |
|  |  | | | | | | | | | | | | |  | | | | |  | | | | | |  | | |  | | |  | |  | | | |  | | | |  | | | |
| **4** | **Credits:** | | | | | | 0 | | | 3 | |  | | | | | | | | | | | | |  | | |  | | |  | |  | | | |  | | | |  | | | |
|  |  | | | | | |  | | |  | |  | | | | | | | | | | | | |  | | |  | | |  | |  | | | |  | | | |  | | | |
| **5** | **Semester:** | | | | | | | **🗸** | | | |  | | |  | | |  | | |  | | |  | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | **Autumn** | | | | | | | **Spring** | | | | | | | **Both** | | | | | | |  | | | | | | | | | | | | | | | | | |
|  |  | | | | |  | | | | | | |  | | | | | | |  | | | | | | |  | | | | | | | | | | | | | | | | | |
| **6** | **Pre-Requisite:** | | | | | | | | | | | **Basics of math, Number systems** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **7** | **Subject Area:** | | | | | | | | | | | **Mathematics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **8** | **Objective:** | | | | | | | | | | **:** To familiarize students with the Mathematical Foundation of Computer Science | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **9** | **Course Outcome:** | | | | | | | | | | | | | | A student who successfully fulfills the course requirements will be able to:   1. Explain the theoretical limits on computational solutions of undecidable and inherently complex problems 2. describe concrete examples of computationally undecidable or inherently infeasible problems from different fields 3. understand formal definitions of machine models, classical and quantum 4. prove the undecidability or complexity of a variety of problems 5. understand the issue of whether there are limits of computability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **10** | | **Details of the Course:** | | | | | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Unit No.** | | | | **CONTENT** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **CONTACT HOURS** | | | | | |
| **1** | | | | **Set Theory:** Sets representation, Types, Operations on sets, De-Morgan law, Duality of sets, Venn diagrams  Relation: Type and compositions of relations, Pictorial representation of relations, Equivalence relations, Partial ordering relation. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 10 | | | | | |
| **2** | | | | **Prepositional Logic:** Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 10 | | | | | |
| **3** | | | | **Elementary Combinatorics:** Basics of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorem, the principles of Inclusion – Exclusion. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 10 | | | | | |
| **4** | | | | **Determinant and Matrices**  **Determinant: -** Definition, properties of determinant, application of determinant (Area of triangle, area of quadilateral, solution of non-homogenous simultaneous linear equations using Cramer’s Rule).  **Matrices:** - Definition, Types of matrices, algebra of matrices, adjoint and inverse of a matrix.  Solution of simultaneous non-homogenous linear equation (Upto 3 variables) using inverse of the matrix. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 9 | | | | | |
| **5** | | | | **Differential calculus:** Real numbers and there basic properties, differentiation(simple cases),limits and continuity, simple application of differentiation(maxima and minima for one variable) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 9 | | | | | |
|  | | | | **TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **48** | | | | | |
|  | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | |
|  | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | |
| **11** | | **Suggested Books:** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | |
| **Sl. NO.** | | | **NAME OF AUTHERS/BOOKS/PUBLISHERS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **YEAR OF PUBLICATION/REPRINT** | | | | |
| **1** | | | J.K.Sharma**,** "Discrete Mathematics", Macmillan publication | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2009 | | | | |
| **2** | | | S.A.Sarkar, "Discrete Mathematics",S.Chand Publication | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2008 | | | | |
| **3** | | | Liptschutz, Seymour, "Discrete Mathematics", TMH. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2010 | | | | |
| **4** | | | Trembley, J.P. & R. Manohar, "Discrete mathematical Structure with Application to Computer Science", TMH. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2011 | | | | |
| **5** | | | Kenneth H. Rosen, "Discrete Mathematics and its applications”, TMH. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2012 | | | | |