**Discrete Mathematics and Graph Theory : CO-PO Justification**

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| **Course Code** | **23BS1305** | **Year** | II | **Semester** | I |
| **Course Category** | PC | **Branch** | CSE | **Course Type** | Theory |
| **Credits** | 3 | **L-T-P** | 3-0-0 | **Prerequisites** | Basic Mathematics |
| **Continuous Internal Evaluation :** | 30 | **Semester End Evaluation:** | 70 | **Total Marks:** | 100 |

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| **Course Outcomes** | **Blooms Level** |
| Upon successful completion of the course, the student will be able to: |
| **CO1** | Understand the fundamental concepts of discrete mathematics and graph theory.  | L2 |
| **CO2** | Apply principles of mathematical logic and predicate calculus to solve problems and validity of logical arguments.  | L3 |
| **CO3** | Utilize the method of characteristic roots to solve recurrence relations. | L3 |
| **CO4** | Analyze properties of relations, graphs, and trees, using graph algorithms to solve complex graph theory problems.  | L4 |

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| **Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial,2:Moderate,1:Slight)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PSO1** | **PSO2** |
| **CO1** | 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** | 2 |  |  |  |  |  |  |  | 1 |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  | 1 |  |  | 2 |  |
| **CO4** |  | 3 |  |  |  |  |  |  | 1 |  |  |  |  |
| **Avg.** | 2.5 | 3 |  |  |  |  |  |  | 1 |  |  | 2 |  |

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| **CO 1** | **Understand the fundamental concepts of Discrete Mathematics and Graph Theory** |
| **PO1** | **Engineering Knowledge** Students understand the capability to analyze and model complex engineering problems using discrete structures and graph theory, which are crucial for algorithm design, network security, data mining, and improving computational efficiency in engineering. |
| **CO 2** | **Apply mathematical techniques to prove arguments/statements** |
| **PO1** | **Engineering Knowledge** **Justification:** The ability to select and apply appropriate mathematical proof techniques empowers students to validate engineering solutions, optimize algorithms, ensure data integrity, and enhance problem-solving accuracy in complex engineering fields. |
| **PO9** | **Communication****Justification:** Effective communication skills allow students to clearly present mathematical proofs and reasoning, justify engineering decisions, and work collaboratively in technical and multidisciplinary teams. |
| **CO3** | **Apply the various methods for solving different recurrence relations** |
| **PSO1** | **Apply the Knowledge of Computing Skills** **Justification:** Applying recurrence relations in software development enables students to create scalable and efficient systems, improving algorithm performance and meeting industry and societal needs. |
| **PO9** | **Communication****Justification:** Effective communication skills enable students to clearly convey the process of solving recurrence relations, justify their chosen methods, and collaborate effectively in problem-solving and algorithm development. |
| **CO4** | **Analyze various graph by their characteristics to construct a tree** |
| **PO2** | **Problem Analysis****Justification:** Enhancing problem analysis skills helps students identify graph characteristics, select appropriate tree construction methods, and develop efficient solutions for network design, routing, and data organization. |
| **PO9** | **Communication** **Justification:** Strong communication skills allow students to clearly explain graph analysis, justify their chosen tree construction methods, and collaborate effectively in problem-solving and algorithm development. |

**Course Coordinator:**

 **Module Coordinator:**

 **Program Coordinator Signature of HOD**