Semester	
Course	**Minor – ARTIFICIAL INTELLIGENCE**
Paper Code	
Paper Title	**Mathematical Techniques and Data Visualization**
No. of Credits	**4**
Theory/ Practical / Composite	**Composite**
Minimum no. of preparatory hours per week a student have to devote	**5**
Number of Modules	One
Syllabus	1. Propositional Calculus: Propositions, Logical Connectives and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Algebra of Propositions, Propositional Functions, Quantifiers, Equivalences and Inference Theory 2. Graph Theory: Definition of Graph, Graph Terminologies, Finite and Infinite graphs. Directed and undirected graphs, Labelled graphs, Degree, Isolated vertex, Pendant vertex. Null graphs. Walks: Paths and circuits. Connected and disconnected graphs, Representation of Graphs, Dijkstra's shortest Path Algorithm, Breadth First Search Algorithm, Depth First Search Algorithm Problems, Spanning tree algorithms. 3. Dynamic Programming: Bellman's principle of optimality, Make change algorithm, Shortest-path algorithms **Practical**: Fundamentals: Overview of spreadsheet, formatting various elements of spreadsheet. Basics of charts and graphs: chart elements (title, subtitle, X-axis, Y-axis, Z-axis, display grids, legend), chart creation (selecting data series, selecting chart type, selecting chart components Introductory charts and graphs: column chart, bar graph, pie chart, area chart, scatter plot, line graph, cylinder chart, cone chart, pyramid chart. Advanced charts and graphs: dynamic map, Gantt chart, variance chart, stacked chart, line chart (revisited), funnel chart, bar chart (revisited), progress circle chart, histogram chart.

Learning Outcomes	After completing this course, students will be able to: 1. Understand the fundamental concepts of propositional calculus, including logical connectives, truth tables, equivalences and inference theory. 2. Apply key graph theory concepts to model and solve problems using different types of graphs, algorithms for shortest paths, spanning trees and graph traversals. 3. Utilize dynamic programming techniques to solve optimization problems. 4. Develop proficiency in spreadsheet fundamentals, including formatting, data organization and the creation of various types of charts and graphs for data visualization. 5. Analyze and construct advanced charts and graphs to represent complex datasets effectively, including dynamic maps, Gantt charts, and progress visualizations.	
Reading / Reference List	1. Discrete Mathematics and its Applications by Kenneth H. Rosen. 2. Introduction to Graph Theory by Douglas B. West. 3. Discrete Mathematics: Schaum's Outlines Series, Seymour Lipschutz 4. Graph Theory With Applications To Engineering And Computer Science, Narsingh Deo, PHI 5. Introduction to Algorithms, Thomas H. Cormen	
Evaluation	Theory CIA: 12 Attendance: 3 Semester Exam: 45	Practical CA: 38 Attendance: 2
Paper Structure for Theory Semester Exam	Answer 3 out of 5 of 15 marks each	