Lecture Plan

Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa

Name of Faculty: Rohit R. Redkar	**Subject:** Mathematics	
Paper code: MAT-604 Graphs and Networks	**Program:** M.Sc.	**Division: -**
Academic year: 2025-26	**Semester:** III	**Total Lectures:** 60

Course Objectives:

This course will develop fundamental concepts in graph theory, basic definition of simple graphs, types of graph, matrix representation of graphs, isomorphism in graphs, Euler & Hamiltonian graphs, trees & their properties, spanning trees, colouring of graphs, independence number and chromatic number of simple graphs, connectivity, cut-set, directed graphs, shortest paths & maximal flows in a network.

Expected Course Outcome:

1) Learner should be able to tell relevance of graphs in different context, ranging from puzzles & games to social science/engineering/computer science.
2) Problem solving & learning algorithms is also an essential part of graph theory.

Student Learning Outcome: On completion of the course the student will have:

1. Learnt the relevance of graphs in different context, ranging from puzzles & games to social science/engineering/computer science.

2. Learnt problem solving and algorithms in graph theory.

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June	25/06/2025	28/06/2025	4	Graphs, subgraphs, , matrices and isomorphism,bipartite graphs, regular graphs,Petersen graph		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
July	30/06/2025	05/07/2025	4	Operations on graphs, degree sequences, graphic sequences, complement of graph		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	07/07/2025	12/07/2025	4	distance in graphs, walks, trails, paths, circuits, cycles,Center, periphery, eccentricity of graphs	ISA	Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	14/07/2025	19/07/2025	4	distance in graphs, Cut-vertices, bridges,non-separable graphs,blocks, classes of graphs, properties of trees		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	21/07/2025	26/07/2025	4	Minimal spanning trees, Prim's algorithm, Kruskal's algorithm, Prüfer sequence.		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
July August	28/07/2025	02/08/2025	4	Connectivity and edge-connectivity and results		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
August	04/08/2025	09/08/2025	4	Eulerian graphs, Fleury's algorithm and Hierholzer's algorithm		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	11/08/2025	16/08/2025	2 Independence Day	Hamiltonian graphs and results	ISA	Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs

	18/08/2025	23/08/2025	4	Digraphs, networks and terminologies, Results under networks		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	25/08/2025	30/08/2025	0 Chaturthi Break 26/08/25 To 01/09/25	Ford Fulkerson algorithm, Dijkstra's algorithm to find the shortest route, Planar graphs and results, Euler's formula			
September	02/09/2025	06/09/2025	2 Eid	Characterizations of planar graphs, crossing number and thickness		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	08/09/2025	13/09/2025	4	Matchings and independence in graphs, vertex cover, edge cover	ISA	Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	15/09/2025	20/09/2025	4	Domination number of a graph, independence domination number of a graph.		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
	22/09/2025	27/09/2025	4	Vertex colorings, examples and results, chromatic number		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
September October	29/09/2025	04/10/2025	4 Gandhi Jayanti / Dussehra	Edge colorings, examples and results,	ISA	Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs
October	06/10/2025	11/10/2025	4	Map colorings, Five Color Theorem		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs

	13/10/2025	18/10/2025	4	Revision		Beamer Presentation, smartboard	G. Chartrand, L. Lesniak, Graphs and Digraphs

*** Assessment Rubrics**

Component	Max Marks
ISA 1	20
ISA 2	20
ISA 3	20
Practical	Nil
Project	Nil
Semester End Exam	40