

Subject
Code: 02MA0402
Subject Name: GRAPH THEORY
M.Sc. Year – I (Sem: 1)

Objective: The aim of learning this course is to make learners able to solve real world problems using various techniques of Graph theory.

Credits Earned: 5 Credits

Course Outcomes: After the successful completion of the course, learners will be able to

- Understand the application of various type of graphs in real life problem.
- Identify the properties of different types of graph and their application.
- Apply theory of graphs to find the mathematical structure of given problem and hence to reach at the solution.

Pre-requisite of course: NA

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
4	2	-	5	60	30	10	25	25	150

Contents:

Unit	Topics	Contact Hours
1	Definitions of Graphs ,Types of graphs, Degree of vertex, Incidence relation, Types of vertices, Origin of graph theory	12
2	Isomorphic graphs, Multicolored cube problem, Walks, Paths and Cycles, Euler graphs, Hamiltonian cycles and paths, The traveling salesman problem	12
3	Connected acyclic graphs and fundamental cycles, Distance and centers in a tree, on counting trees, Spanning trees, Fundamental cycles, Spanning tree in a weighted graph	12
4	Cut-sets, Connectivity and separability, Planar Graphs, Kuratowski's Graphs, Geometric representation of planar graphs, Classification of planarity, Geometric dual, Incidence matrix, Sub matrix of Graph, Circuit matrix, Cut-	12

	set matrix, Path matrix and Adjacency matrix	
5	Coloring of a graph and Chromatic number, Chromatic partitioning, Chromatic polynomial, Matchings, Coverings, The multicolor problem, Shortest path algorithm, Various Applications of Graph theory.	12
	Total Hours	60

Recommended Books:

1. N. Deo, Graph Theory with applications to engineering and computer science, PHI learning private limited, 2009.
2. J. Clark and D.A. Holton, A First look at Graph Theory, Allied Publishers, New Delhi, 1995.
3. R. Gould, Graph Theory, Benjamin/Cummings, Menlo Park, 1989.
4. A. Gibbons, Algorithmic Graph Theory, Cambridge University Press, Cambridge, 1989.
5. R.J. Wilson and J.J. Watkins, Graphs: An Introductory Approach, John Wiley and Sons, New York, 1989.
6. S.A.Choudum, A First Course in Graph Theory, MacMillan India Ltd. 1987.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1. www.graphtheory.com
2. cr.yt.to/2005-261/bender2/GT.pdf
3. www.cs.columbia.edu/~sanders/graphtheory/
4. <http://www.utm.edu/departments/math/graph/>
5. <http://www.personal.kent.edu/~rmuhamma/GraphTheory/graphTheory.htm>
6. www.diestel-graph-theory.com
7. http://en.wikipedia.org/wiki/Graph_theory