17HS056 APPLIED GRAPH THEORY

Course Description and Objectives:
This course is created for student to be familiar with the most fundamental Graph Theory topics and results and exposed to the techniques of proofs and analysis.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Appreciate the definition and basics of graphs along with types and their examples.
2	Understand the definition of a tree and learn its applications to fundamental circuits.
3	Know the applications of graph theory to network flows.
4	Understand the notion of planarity and coloring of a graph.
5	Relate the graph theory to the real-world problems.

Skills:

1. Be able to grasp features, properties of special graphs.
2. Discuss the concept of graph, tree, Euler graph, cut set and Combinatorics.
3. Be able to use graph theory as a modelling tool.

UNIT – I (12 hrs) :
Matchings
Matchings – Alternating Path, Augmenting Path - Matchings and coverings in Bipartite graphs, Marriage Theorem, Minimum Coverings.

UNIT –II (12 hrs) :
Perfect matchings, Tutte's Theorem, Applications, The personal Assignment problem -The optimal Assignment problem, Kuhn-Munkres Theorem.

UNIT –III (12 hrs) :
Edge Colorings
Edge Chromatic Number, Edge Coloring in Bipartite Graphs - Vizing's theorem.

UNIT –IV (12 hrs):
Applications of Matchings, The timetabling problem.
Independent sets and Cliques
Independent sets, Covering number , Edge Independence Number, Edge Covering Number - Ramsey's theorem.

UNIT –V (12 hrs):

Determination of Ramsey's Numbers – Erdos Theorem, Turan's theorem and Applications, Sehur's theorem. A Geometry problem.

Reference Books

1. Graph theory with Applications by J.A. Bondy and U.S.R. Murthy, published by Mac. Millan Press.
2. Introduction to graph theory by S. Arumugham and S. Ramachandran published by SciTech Publications, Chennai-17.
3. A text book of Discrete Mathematics by Dr. Swapan Kumar Sarkar, published by S. Chand Publishers.
4. Graph theory and combinations by H.S. Govinda Rao, published by Galgotia Publications.