CO – PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓								✓
CO2	✓	✓	✓	✓	✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6	✓	✓	✓	✓	✓							✓

CS6201	**GRAPH THEORY**	**L**	**T**	**P**	**EL**	**CREDITS**
		3	**1**	**0**	**3**	**5**

Prerequisites for the course: Discrete Mathematics

OBJECTIVES:

- To understand the fundamentals of graph theory
- To study the proofs related to various concepts in graphs
- To study about the different types of graphs and their properties
- To learn about the distinguishing features of various graph algorithms
- To study the applications of graphs in solving engineering problems

MODULE I	**INTRODUCTION**	**L**	**T**	**P**	**EL**
		4	**1**	**0**	**3**

Introduction - Graph Terminologies - Types of Graphs - Isomorphism - Isomorphic Graphs - Operations on graphs - Degree sequences - Euler graph - Hamiltonian Graph - Related theorems.

SUGGESTED ACTIVITIES :

- EL: Graphs and tournaments, Graphs in real world applications

SUGGESTED EVALUATION METHODS:

- Assignment on graphs in real world applications

MODULE II	**EDGE GRAPH**	**L**	**T**	**P**	**EL**
		3	**1**	**0**	**3**

Edge Graphs and Traversability - Eccentricity Sequences and Sets – Isometry.

SUGGESTED ACTIVITIES :

- Graph Isometry Problems

SUGGESTED EVALUATION METHODS:

- Tutorial problems
- Quizzes

MODULE III	**TREES**	**L**	**T**	**P**	**EL**
		3	**1**	**0**	**3**

Trees -Properties- Distance and Centres - Types - Rooted and Binary Tree- Tree Enumeration- Labeled Tree - Unlabeled Tree

SUGGESTED ACTIVITIES :

- EL: Binary trees and signed trees

SUGGESTED EVALUATION METHODS:

- Tutorial problems and assignment problems on generating trees with specified properties

MODULE IV SPANNING TREE	L	T	P	EL
	4	1	0	3

Spanning Tree - Fundamental Circuits- Cut Sets - Properties - Connectivity- Separability – Network Flows - 1-isomorphism, 2-isomorphism - Related Theorems

SUGGESTED ACTIVITIES :

- Concept maps to relate spanning trees with other topics

SUGGESTED EVALUATION METHODS:

- Tutorial problems on proof techniques
- Assignment problems on graph connectivity

MODULE V PLANARITY	L	T	P	EL
	3	2	0	3

Planar Graph - Representation - Detection of planarity - Dual Graph - Related Theorems.

SUGGESTED ACTIVITIES :

- Identification of planar and non-planar graphs

SUGGESTED EVALUATION METHODS:

- Tutorial problems on proving related theorems

MODULE VI DIGRAPH	L	T	P	EL
	3	1	0	3

Digraph - Properties - Euler Digraph – Tournament graph - Applications.

SUGGESTED ACTIVITIES :

- EL: Application of Digraph

SUGGESTED EVALUATION METHODS:

- Assignment problems

MODULE VII GRAPH REPRESENTATION	L	T	P	EL
	3	1	0	3

Matrix Representation- Adjacency matrix- Incidence matrix- Circuit matrix - Cut-set matrix - Path Matrix- Properties - Related Theorems - Correlations.

SUGGESTED ACTIVITIES :

- Graph representation for different types of graphs

SUGGESTED EVALUATION METHODS:

- Tutorial problems on comparative analysis on representation methods
- Assignment problems

MODULE VIII COLORING AND COVERING	**L**	**T**	**P**	**EL**
	4	**2**	**0**	**3**

Graph Coloring - Chromatic Polynomial - Chromatic Partitioning - Matching - Covering - Related Theorems

SUGGESTED ACTIVITIES :

- EL: Edge coloring and example problems

SUGGESTED EVALUATION METHODS:

- Tutorial problems to find chromatic number of special graphs
- Assignment problems on applications using matching and covering

MODULE IX GRAPH ALGORITHMS -1	**L**	**T**	**P**	**EL**
	3	**0**	**0**	**3**

Graph Algorithms- Connectedness and Components- Spanning Tree - Fundamental Circuits – Cut Vertices.

SUGGESTED ACTIVITIES :

- Programming on related algorithms

SUGGESTED EVALUATION METHODS:

- Demo on the programs for small applications

MODULE X GRAPH ALGORITHMS -2	**L**	**T**	**P**	**EL**
	4	**0**	**0**	**3**

Directed Circuits- Shortest Path – Planarity Testing – Isomorphism – Any two applications overview.

SUGGESTED ACTIVITIES :

- Project based learning to apply suitable concepts for a small application

SUGGESTED EVALUATION METHODS:

- Mini Project demo and evaluation

OUTCOMES:

Upon completion of the course, the students will be able to:

- Point out the basic concepts of graphs, and different types of graphs
- Discuss the properties, theorems and be able to prove theorems
- Apply suitable graph models and algorithms for solving engineering problems
- Analyse various representations of graphs
- Analyse graph algorithms and discuss their suitability for applications

TEXT BOOKS:

1. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", Prentice-Hall of India Pvt. Ltd, 2003.
2. S. Pirzada, “An Introduction to Graph theory”, University Press, 2012.

REFERENCES:

1. Frank Harary, “Graph Theory”, Narosa Publishing House, 2001.
2. West D. B., “Introduction to Graph Theory”, 2nd Edition, Pearson Education, 2001.
3. Diestel R, "Graph Theory", 5th Edition, Springer, 2017.

EVALUATION METHOD TO BE USED:

Category of Course	Continuous Assessment	Mid – Semester Assessment	End Semester
Theory	**40**	**20**	**40**

CO – PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓						✓			
CO2	✓	✓	✓					✓				✓
CO3	✓	✓	✓		✓			✓				✓
CO4	✓	✓	✓						✓		✓	
CO5	✓	✓	✓		✓					✓		

EC6201 SIGNALS AND SYSTEMS

OBJECTIVES:

- To understand the types of signals and systems
- To gain knowledge about understanding continuous time and discrete time signals.
- To learn time domain and frequency domain analysis of signals
- To learn the transformations from time domain to frequency domain
- To gain knowledge about the various functionalities available in signal processing software to support signal processing applications

SIGNALS AND SYSTEMS	L	T	P	EL	TOTAL CREDITS
	3	0	4	3	6

MODULE I :	L	T	P	EL
	3	0	4	3
Classification of Signals - Useful Signal models – periodic and a periodic signals, random signals, Energy & Power signals -Systems – Classification of systems				