

**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						
<b>OBJECTIVES:</b> <ul style="list-style-type: none"> <li>To understand the fundamentals of graph theory</li> <li>To study the proofs related to various concepts in graphs</li> <li>To study about the different types of graphs and their properties</li> <li>To learn about the distinguishing features of various graph algorithms</li> <li>To study the applications of graphs in solving engineering problems</li> </ul>						
<b>MODULE I INTRODUCTION</b>		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.						
<b>SUGGESTED ACTIVITIES :</b> <ul style="list-style-type: none"> <li>EL: Graphs and tournaments, Graphs in real world applications</li> </ul>						
<b>SUGGESTED EVALUATION METHODS:</b> <ul style="list-style-type: none"> <li>Assignment on graphs in real world applications</li> </ul>						
<b>MODULE II EDGE GRAPH</b>		L	T	P	EL	
		3	1	0	3	
Edge Graphs and Traversability - Eccentricity Sequences and Sets – Isometry.						
<b>SUGGESTED ACTIVITIES :</b> <ul style="list-style-type: none"> <li>Graph Isometry Problems</li> </ul>						
<b>SUGGESTED EVALUATION METHODS:</b> <ul style="list-style-type: none"> <li>Tutorial problems</li> <li>Quizzes</li> </ul>						
<b>MODULE III TREES</b>		L	T	P	EL	
		3	1	0	3	
Trees -Properties- Distance and Centres - Types - Rooted and Binary Tree- Tree Enumeration- Labeled Tree - Unlabeled Tree						

<b>SUGGESTED ACTIVITIES :</b>				
<ul style="list-style-type: none"> <li>EL: Binary trees and signed trees</li> </ul>				
<b>SUGGESTED EVALUATION METHODS:</b>				
<ul style="list-style-type: none"> <li>Tutorial problems and assignment problems on generating trees with specified properties</li> </ul>				
<b>MODULE IV</b>	<b>SPANNING TREE</b>	<b>L</b>	<b>T</b>	<b>P</b>
		<b>4</b>	<b>1</b>	<b>0</b>
Spanning Tree - Fundamental Circuits- Cut Sets - Properties - Connectivity- Separability – Network Flows - 1-isomorphism, 2-isomorphism - Related Theorems				

<b>SUGGESTED ACTIVITIES :</b>				
<ul style="list-style-type: none"> <li>Concept maps to relate spanning trees with other topics</li> </ul>				
<b>SUGGESTED EVALUATION METHODS:</b>				
<ul style="list-style-type: none"> <li>Tutorial problems on proof techniques</li> <li>Assignment problems on graph connectivity</li> </ul>				
<b>MODULE V</b>	<b>PLANARITY</b>	<b>L</b>	<b>T</b>	<b>P</b>
		<b>3</b>	<b>2</b>	<b>0</b>
Planar Graph - Representation - Detection of planarity - Dual Graph - Related Theorems.				
<b>SUGGESTED ACTIVITIES :</b>				
<ul style="list-style-type: none"> <li>Identification of planar and non-planar graphs</li> </ul>				
<b>SUGGESTED EVALUATION METHODS:</b>				
<ul style="list-style-type: none"> <li>Tutorial problems on proving related theorems</li> </ul>				
<b>MODULE VI</b>	<b>DIGRAPH</b>	<b>L</b>	<b>T</b>	<b>P</b>
		<b>3</b>	<b>1</b>	<b>0</b>
Digraph - Properties - Euler Digraph – Tournament graph - Applications.				
<b>SUGGESTED ACTIVITIES :</b>				
<ul style="list-style-type: none"> <li>EL: Application of Digraph</li> </ul>				
<b>SUGGESTED EVALUATION METHODS:</b>				
<ul style="list-style-type: none"> <li>Assignment problems</li> </ul>				
<b>MODULE VII</b>	<b>GRAPH REPRESENTATION</b>	<b>L</b>	<b>T</b>	<b>P</b>
		<b>3</b>	<b>1</b>	<b>0</b>
Matrix Representation- Adjacency matrix- Incidence matrix- Circuit matrix - Cut-set matrix - Path Matrix- Properties - Related Theorems - Correlations.				
<b>SUGGESTED ACTIVITIES :</b>				
<ul style="list-style-type: none"> <li>Graph representation for different types of graphs</li> </ul>				

<b>SUGGESTED EVALUATION METHODS:</b> <ul style="list-style-type: none"> <li>Tutorial problems on comparative analysis on representation methods</li> <li>Assignment problems</li> </ul>				
<b>MODULE VIII      COLORING AND COVERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>EL</b>
	<b>4</b>	<b>2</b>	<b>0</b>	<b>3</b>
Graph Coloring - Chromatic Polynomial - Chromatic Partitioning - Matching - Covering - Related Theorems				
<b>SUGGESTED ACTIVITIES :</b> <ul style="list-style-type: none"> <li>EL: Edge coloring and example problems</li> </ul>				
<b>SUGGESTED EVALUATION METHODS:</b> <ul style="list-style-type: none"> <li>Tutorial problems to find chromatic number of special graphs</li> <li>Assignment problems on applications using matching and covering</li> </ul>				
<b>MODULE IX      GRAPH ALGORITHMS -1</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>EL</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
Graph Algorithms- Connectedness and Components- Spanning Tree - Fundamental Circuits – Cut Vertices.				
<b>SUGGESTED ACTIVITIES :</b> <ul style="list-style-type: none"> <li>Programming on related algorithms</li> </ul>				
<b>SUGGESTED EVALUATION METHODS:</b> <ul style="list-style-type: none"> <li>Demo on the programs for small applications</li> </ul>				
<b>MODULE X      GRAPH ALGORITHMS -2</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>EL</b>
	<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>
Directed Circuits- Shortest Path – Planarity Testing – Isomorphism – Any two applications overview.				
<b>SUGGESTED ACTIVITIES :</b> <ul style="list-style-type: none"> <li>Project based learning to apply suitable concepts for a small application</li> </ul>				
<b>SUGGESTED EVALUATION METHODS:</b> <ul style="list-style-type: none"> <li>Mini Project demo and evaluation</li> </ul>				
<b>OUTCOMES:</b> <b>Upon completion of the course, the students will be able to:</b> <ul style="list-style-type: none"> <li>Point out the basic concepts of graphs, and different types of graphs</li> <li>Discuss the properties, theorems and be able to prove theorems</li> <li>Apply suitable graph models and algorithms for solving engineering problems</li> <li>Analyse various representations of graphs</li> <li>Analyse graph algorithms and discuss their suitability for applications</li> </ul>				

**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", 2<sup>nd</sup> Edition, Pearson Education, 2001.
3. Diestel R, "Graph Theory", 5<sup>th</sup> Edition, Springer, 2017.

**EVALUATION METHOD TO BE USED:**

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

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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					