Assignment 2&3 Additional problem statements	
1	An exclusive Ivy league party is attended by n men and n women. Each man knows exactly k women. Each women knows exactly k men. Acquaintances are mutual. Is it possible to arrange a dance so that each man dances with a different woman he knows.
	A highways department must inspect its roads for fallen trees. The adjacency matrix stores the lengths of the roads, in miles, that must be inspected in one district. List the different ways in which the odd vertices can be paired. Find the shortest distance that must be travelled in inspecting all the roads in the district, starting, and finishing at the same point. Find the number of ways of pairing these odd vertices.
3	Find the solution to 9X9 sudoku problem (with/without initial hints)
4	Consider geographic map of a country/state. The adjacent states/districts should be taken as the input. Create an adjacency matrix for the dual of the map and apply greedy and welsh powell algorithm to suitably color the graph using minimum number of colors. (apply both algorithms, but choose whichever gives the better solution)
5	Consider course allotment to faculty in department of CSE in PESU. Each faculty submit their preference (atleast 3) to the chairperson. The department chairperson allots one course per faculty. Find a suitable allotment by modelling the problem as Maximum Bipartite Matching
6	The Indian Premier League has 10 teams and the league stage matches for teams is conducted in a round robin manner where every team plays against every other team and finally the top four make it to the playoffs. Find a suitable schedule by modelling the problem as edge coloring problem.
7	You are a city planner and you are given the road network with n neighbourhoods and m edges that are connecting these. You must ensure that each neighbourhood has access to a hospital, you need to figure out the minimum number of hospitals that you need to construct to ensure each neighbourhood has a path directly to the hospital.
8	You are a city planner and you are given the road network with n neighbourhoods and m edges that are connecting these. Identify bottlenecks in terms of neighbourhoods and suggest additional links/edges to have better reliable connectivity

9	Consider centre of Examinations of a university like PESU. Department of CoE has collected information about the list of course ESAs that each student has applied for. Regular exams are to be scheduled in the afternoon and on alternate days. Backlog ESAs are to be scheduled in the mornings. Help the CoE to come up with a suitable time table
10	set A is Mrs. Weaver's class and set B is Mr. Gordon's class. We want to get the maximum number of kids in a single group from both classes so that no two kids hate each other. All the kids in each class like the other kids in their class, but they may hate some of the kids in the other class.
11	There are m vacant positions and m applicants for these vacant positions. Salary expectations and proficiency in executing a job of every applicant is taken as input. It is not mandatory that every applicant is suitable for available vacant posts. Model the problem and apply Hungarian method to find the optimal assignment.
	Practical session: Networkx
1	Download an existing dataset (from snap or UCI). Perform analysis on the dataset using networkx tool. a. Centrality measures (Analyze what each centrality measure implies) b. Community detection (use different community detection algorithms and summarize the results)
Assignment 4: Graph Database Group Assignment (Max in a group: 2)	
1	Create a graph database. Carry out basic analysis on the created database. Implement recommendation based on content based filtering and collaborative filtering
Assignment 5: Summarizing a research paper Group Assignment (Max in a group: 2)	
1	Student group must identify a research paper based on graph modelling. Student group is required to understand the selected research paper and present the proposed model with literature review, and results. Student group must present the paper and submit a report on the research paper. Guidelines: 1. Tier1/Tier2 Journal/Conference Paper 2. Published after 2015 3. Based on Graph Machine learning/Graph Representation Learning/ Graph Neural Networks Submission: Report Format: Group Details Title of the paper Introduction

	Literature Review Proposed Methodology Results Conclusion Plagiarism shall be viewed seriously. Submission Mode: Google form (report and the paper) in a folder