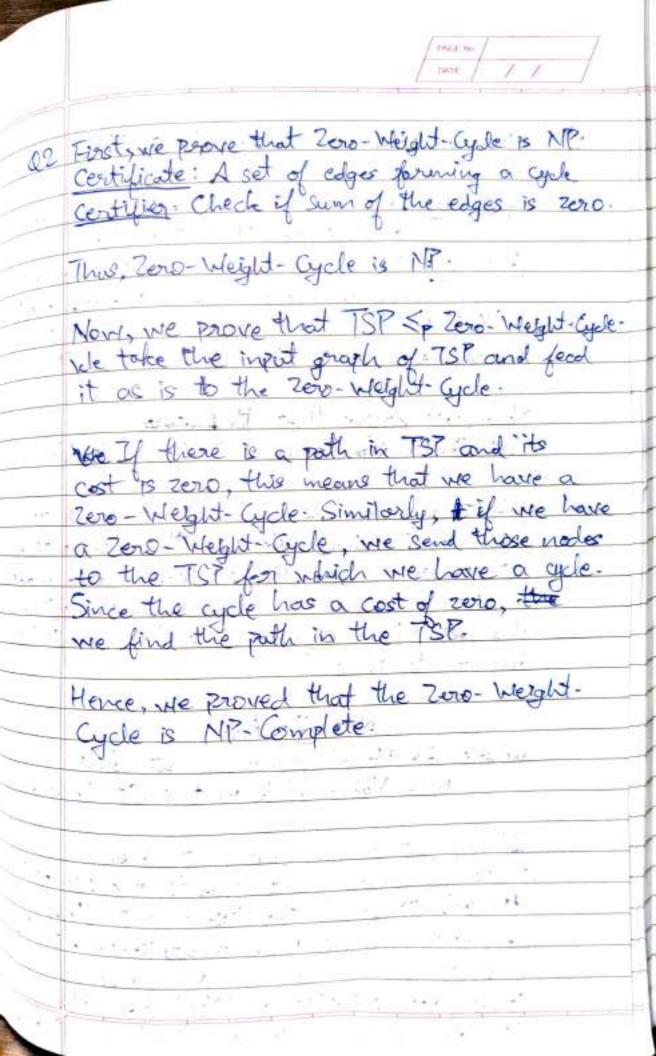
CSC1 570 6498-8280-04 | "ME | / / | Homework 11 Il First, we will prove that k- Spanning Tree is NP-Hord. Certificate: A set of josth edges where the nodes have a legree less than or equal be Certifier: All nodes in visited by the edges having degree < k. and Thus, k-spanning tree is Ni rempted. Now, we select Hamiltonian Path and prove Hamiltonian Path Sk-spanning tree. To prove this, we will take the Hamail tonian Poth's graph and use it for k-spanning tree with k=2. If there is a solution, this means that there exists a spanning tree whose vertices have degree < k and the tree is a path that goes through all vertices which is a Hawhiltonian Path. Conversely, if there exists a Hamiltonian Poth, the path is exactly a tree with This proves the k-spanning troe problem



Q3 First, we prove that Redundant. Clubs problem Certificate A list of dubi that cover each of the adults in the set-Certifier: areak if all the adults are overed whether each person is a member of another of Hence, Redundant Clubs Broken is MP. Now, we prove that the Pedo Set Cover & Redundant Clubs Peroblem The tenanslate the inputs of Got Cover to - Redundant Closs We use the clements of Set cover as peo list of people and make a list of dube, one for each element of the Set Cover agroup. The Redundant Set input is thus: K=G-Kec where G= No of groups in Set Cover production the Set Cover production If we get a yes from Set Cover ie an Instance covering the subsets, the remaining Conversely, if we have it set Redundant Club Subsets and remaining the clubs form a cover, we receive a "Yes" from the dudit Set Cover only if we got a 'Yes from Edudit

DATE / / Thus, own problem is NF- Hord and in turn it is MP-Complete. 104 First, we prove that HALF-IS is in NP. We have a set S=141/2 and verify if two nodes are not adjacent in polynomial time. We prove Independent Set (Is) & Half-Is. Consider an instance of IS where isset ACV, (i) If k= |V|/2, we have the Holf-IS in Is (ii) If k 2 /1/2, we add in new disconnected · nodes such that k+m=(IV)+m)/2 i.e. m= 1/ - 2k. Thus, Y'has an even no of nodes (V = V+ m). Since the new notes are disconnected, they must be present in the independent set and thus we have a new grayh & where it will have an independent set of Size 11/2 if we have an independent set of size to. nodes to graph & G'and connect them to all the nodes in V'. Since these notes are connected to every other, none of them would belong to an independent set. This, the new graph has an independent sol of size V' 1/2. True, the problem is NP-Hand; Hence, it is NP- Complete.

Q5 To check if the problem is HI, we can check if the no- of courses in the solution is larger or agnal to k, and they don't have time overlap.

Given an independent set problem, suppose the graph has a nade and has an independent set of size atteast to:

Suppose we take the courses as the nedes, and we draw an edge if there is an overlap between those edges. If there are K nodes in the independent set, this means that we have K courses which do not overlap conversely, if we have K courses, that do not overlap to not overlap, this means that we have an independent set of size k.

Thurs, the problem is NT- Hard.

Thus, the problem is NP-Complete.