National University of Computer & Emerging Sciences, Karachi Campus

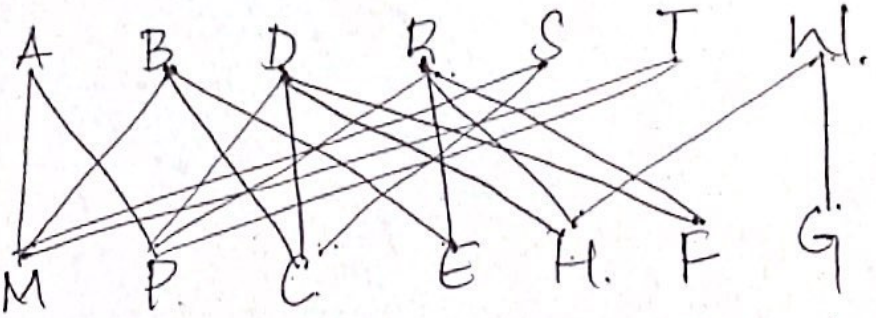
GRAPH THEORY QUIZ-03 [Max Marks:15]

Instructor: Dr. Nazish Kanwal Sections: 5B,5D,5F Date: November 25th, 2022

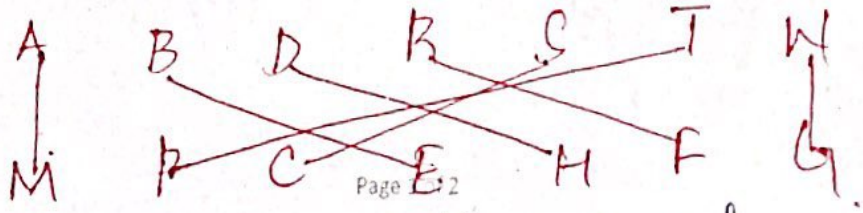
Name: _____ Roll #: _____

Q.1 [5 marks] A school has vacancies for seven teachers, one for each of the subjects Chemistry, English, French, Geography, History, Mathematics and Physics. There are seven applicants for the vacancies and all are qualified to teach more than one subject. The applicants and their subjects are listed in the table below, determine the maximum number of (suitably qualified) teachers the school can employ.

Applicants	Subjects qualified
Miss Adilah	Mathematics, Physics
Miss Boey	Chemistry, English, Mathematics
Miss Doraisamy	Chemistry, French, History, Physics
Mr. Richmond	English, French, History, Physics
Mr. Singh	Chemistry, Mathematics
Mr. Tan	Mathematics, Physics
Mr. Wong	English, Geography, History



M = {WG, RF, DH, EB, CS, PT, AM} → one of the possible
↳ This is Maximum as well

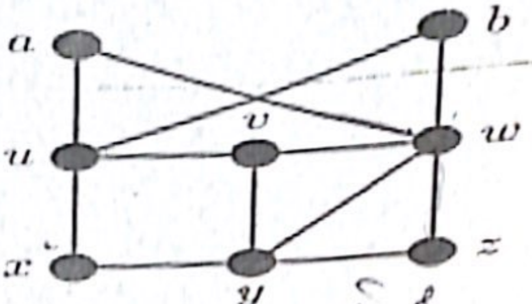


Maximum matching in red.

Q.2 [5 marks] Consider the graph G:

(a) Find maximum matchings in G.

(b) Does G have a perfect matching?



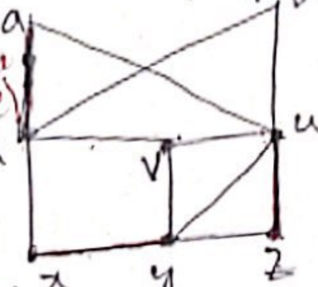
Start with u.

M = {aw, zy}.

So using Edmond's Blossom algo. & path is uawzyx. (here blossom at w (i-e wyz)

So

M' = {ua, wz, yx} (one of the possible)

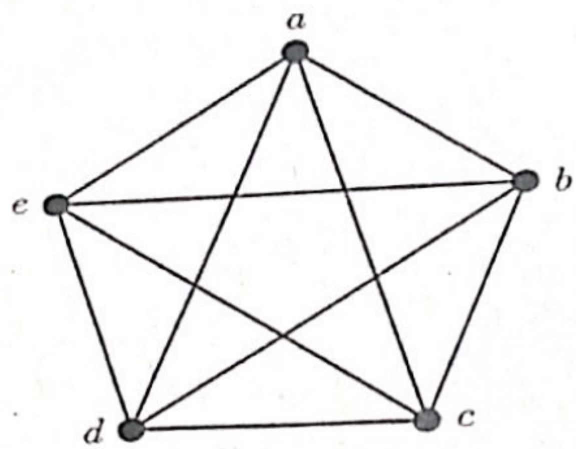


and this is maximum matching.

[Note:- If someone student use hit & try rule for matching, then mark correct b/c I didn't mentioned the method name)

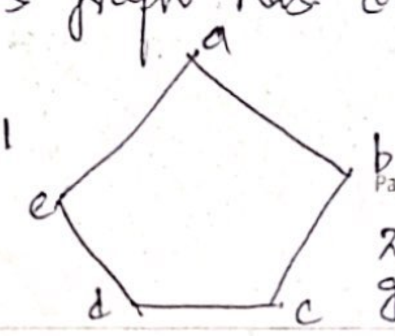
another possible M' = {uv, wz, xy}.

Q.3 [4 marks] Find a two factors for the graph given below.

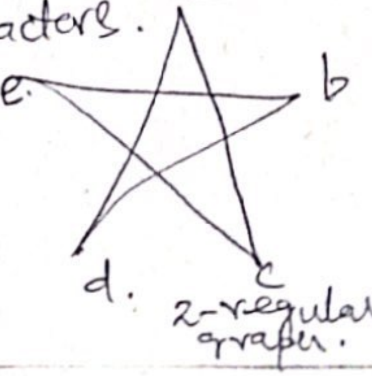


This graph has two 2-factors.

H1



2-regular graph.



2-regular graph.