

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- October 2017

B.Tech (CSE&IT) VII Semester

COURSE CODE: 10B1WCI733

MAX. MARKS: 25

COURSE NAME: Graph Algorithms and Applications

COURSE CREDITS: 3

MAX. TIME: 1 Hr 30 Min

Note: All questions are compulsory.

1. [5 Marks]

a. Determine the stable matching resulting from the Proposal algorithm run with men proposing and women proposing, given the preference lists below:

Men $\{x, y, z, w\}$	Women $\{a, b, c, d\}$
$x: a > b > c > d$	$a: z > x > y > w$
$y: a > c > b > d$	$b: y > w > x > z$
$z: c > d > a > b$	$c: w > x > y > z$
$w: c > b > a > d$	$d: x > y > z > w$

b. Determine  $k(G)$ ,  $k'(G)$ , and  $\delta(G)$  for the graph shown in Figure 1.

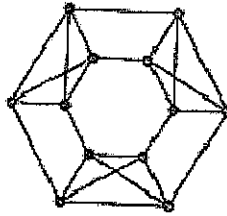


Figure 1

2. [5 Marks]

For the network with edge capacities shown in Figure 2, find the maximum flow from S to T, along with a matching cut.

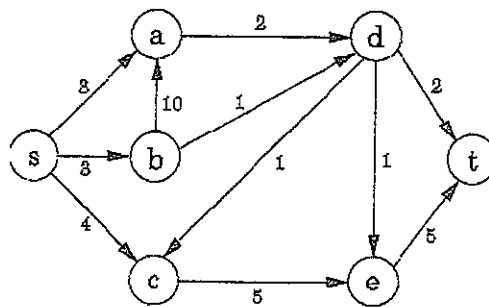


Figure 2

3. [5 Marks]

Prove or disprove:

- Every 3-connected graph has connectivity 3
- Every tree  $T$  has at most one perfect matching.

4. [5 Marks]

Prove or disprove:

- Let  $G$  be a graph without isolated vertices, and let  $S$  be a minimal dominating set in  $G$ . complement of  $S$  is a dominating set.
- If  $x, y$  are vertices of a graph  $G$  and  $xy$  is not an edge in  $G$ , then the minimum size of an  $x, y$  cut equals the maximum number of pairwise internally disjoint  $x, y$  paths.

5. [5 Marks]

- Exhibit a maximum matching in the graph shown in Figure 3.
- Compute the maximum size of independent set, maximum size of matching, minimum size of vertex cover, and minimum size of edge cover for the graph shown in Figure 4.

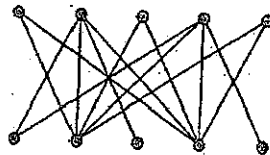


Figure 3

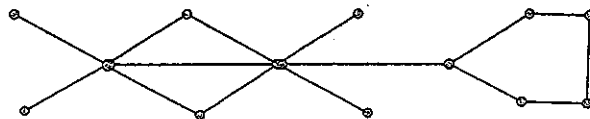


Figure 4