Assignment- 3

Acad. Session
(2021 - 22)

MC 405 (Graph Theory)

Q1. Prove that if v is a cut-vertex of a connected graph G, then v is not a cut vertex of $\overline{G}$.

Q2. The vertices of a graph G are colored with three colors in such a way that each vertex is adjacent to vertices colored with only one of the three colors. Show that the chromatic number of G, $\chi(G) = 2$.

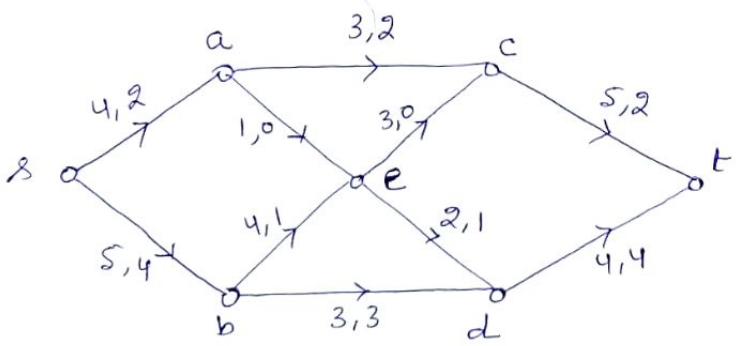
Q3. Given the network below

(i) Verify the law of conservation of flow at a, e and d.

(ii) Find the value of the indicated flow.

(iii) Find the capacity of the (s,t)-cut defined by $S = \{s, a, b\}$, $T = \{c, d, e, t\}$.

(iv) Is the given flow maximum? Explain.



Q4. Prove that in a non-separable graph G, set of edges incident on each vertex of G is a cut-set.

Q5. Prove that a non empty graph G is bicolorable iff G is bipartite.

Q6. Let a_n denotes the number of perfect matching in K_{2n}. Find a recurrence relation for a_n and hence solve.

Q7. If $G = (V, E)$ is a graph, $|V|$ is even and each vertex has degree $d \geq \frac{1}{2}|V|$ then show that G has a perfect matching.