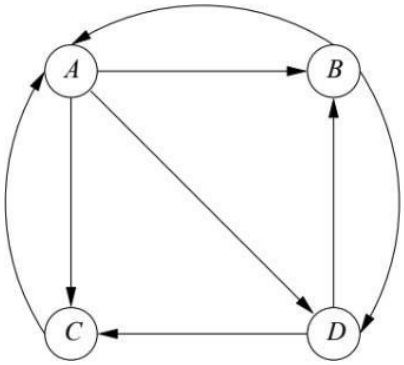
# Graph Mining CSF426
# Lab session 3(Evaluative)
# Time: 2pm-4 pm
# Date: Sept 2, 2023

Instructions: All questions need to be answered. You are required to submit programs in jupyter notebook on canvas only. For theoretical questions, you can type answers in the jupyter notebook itself.

**[Total Marks =10]**




Q1.

a) Create the adjacency and transition matrices for web graph G (shown in figure) and display them such that each column expresses the outgoing edges from one node to others. **[1 mark]**

b) Implement power method (on your own) and do not use any library function to compute pagerank $v$ of all the webpages assuming initial uniform probability distribution for all nodes. Print the number of iterations at which steady state is reached and the final pagerank vector. **[2marks]**

Q2. Remove edge from C to A in the given graph G, and for the resultant graph G', recompute ***a)*** and ***b)***. What are the changes observed and why? Give comments in text box within jupyter notebook. **[2 marks]**

Q3. In G', add self-loop at C and for the resultant graph G'' recompute a) and b). What are the challenges observed and their effects on resultant pagerank vector? Give comments in text box within jupyter notebook. **[2marks]**

Q4. On G'', apply teleportation with rate α = 0.1 and recompute pagerank vector. Print vector in all the iterations. Also explain how teleportation helps to address the challenge of graph in G' and G''. **[3 marks]**