North South University (NSU)
Department of Electrical and Computer Engineering
CSE 225: Data Structure and Algorithms
Section: 08
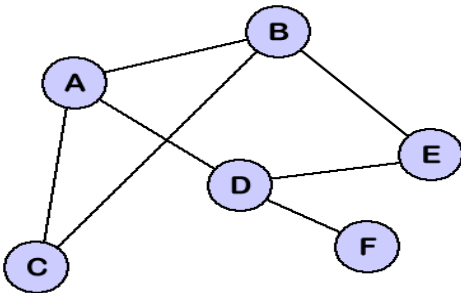Final Examination (Subjective Part)

Total Marks: 30   **Total Time: 1 Hour**

Instruction:

- Draw a small TRIANGLE at the middle of all A4 pages that you use to write answers of the below questions. Put your signature inside the TRIANGLE.

- Now, write the answers (handwritten) on the signed A4 paper using pen (around the TRIANGLE)

- Scan the answer script as a single pdf, **name it as your FULL NSU ID** and submit/upload the pdf file as instructed during the examination [upload against CANVAS assignment and also email with the **Subject as "S8-Final-Exam-Script-*YOUR ID*"** to shafiul.khan@northsouth.edu].

- You must show all your work for each problem to receive full credit.

- If an answer in two different scripts is exactly same for any question, then both of the scripts will get Zero for that specific question.

- In the front page, write your Full Name, Full NSU ID, and Section.

Answer all of the following questions. Point for each question is mentioned at the right margin

1.	This question is based on the graph given on the right side. Simulate traversal of all vertices starting at node 'A' using **Breadth First Search (BFS) and Depth First Search (DFS)**. Use alphabetical order to break ties. Show the state of your auxiliary data structures (e.g., stack/queue) at each step.	7+7

2.	Write a recursive method (pseudo-code / code) Tibonacci, that takes some integer **n** as a parameter and returns the **n-th Tibonacci number**, which could be defined as follows: **Tibonacci(n) = 2*Tibonacci(n-1) + 3*Tibonacci(n-3).** Base cases: **Tibonacci(0) = 1, Tibonacci(1) = 1, Tibonacci(2) = 1;**	**6**

3.	a) Draw a tree with at least 10 nodes that is
	     i. Both full and complete
	     ii. Neither full nor complete
		5

4.	For each of the following algorithms or operations on data structures, mention the worst-case running time in asymptotic (**big-O**) notation. **Justify your answer briefly.** **a)** Dequeue an item from a Queue **b)** Push an item into a Stack **c)** Sorting _N_ items using Merge sort	**5**

Best of Luck!

Stay Home and Stay Safe.