



Department of Electrical and Computer Engineering North South University

Final Term Examination
Summer 2020

CSE 373: Design and Analysis of Algorithms
Section: 3
Faculty: Dr. Sifat Momen (SfM1)

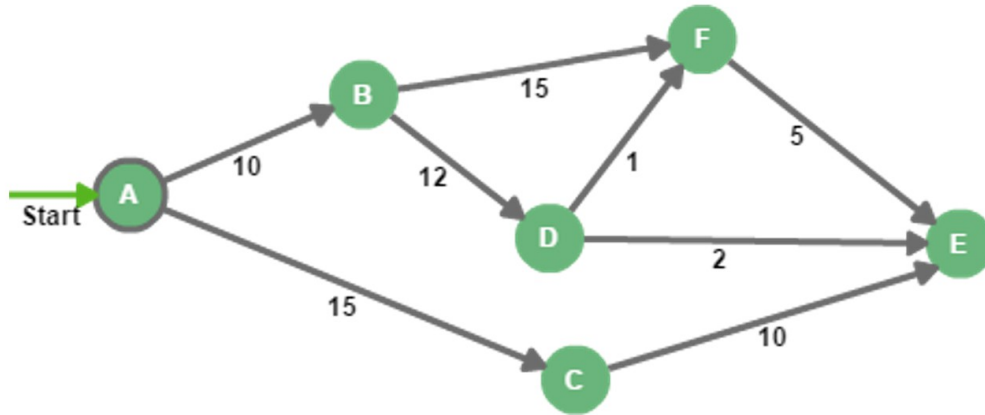
Total Time: 1 hour + 10 minutes (for uploading
the script)

Total Marks: 45

Instructions: Read the following instructions very carefully. These instructions should be strictly followed.

1. You must complete the examination within 1 hour. You will then have an extra 10 minutes to pre-process and upload your script via google classroom.
2. Only one submission is allowed. You must ensure that you submit a single pdf file. There should not be more than one files. Files submitted in any other formats will not be considered.
3. You must write your name and ID in each page of your script. You should ensure that you have included all your answers in the pdf file that you plan to submit. Ensure that the answers are in correct sequence and no page is rotated.
4. You should answer ALL questions. There are altogether three questions in this paper
5. You must not cheat in the examination. You will obtain a zero mark in this assessment if you have been found to cheat or collaborate in any form.
6. You must show all your workings (as appropriate).
7. Answer to the point

- 1 a) Explain very briefly why the breadth first search algorithm takes $O(V+E)$ time 4 marks
- b) Explain the advantages and the disadvantages of Bellman Ford algorithm over Dijkstra's algorithm. 3 marks
- c) Use the Dijkstra's algorithm to determine the shortest path from A to all vertices. Clarity is expected while answering this question. 10 marks



- d) Dijkstra's algorithm uses the priority queue data structure. If the priority queue is built using array (and not heap), what would be the time complexity of the Dijkstra's algorithm. 3 marks
- 2 In a rod cutting problem, given a table of prices p_i , you are required to determine the maximum revenue r_n obtainable by cutting up a given rod of length n and selling the pieces. The following is a price matrix in one such situation.

Length / i	1	2	3	4
Price / p_i	1	5	8	8

- a) How can brute force approach be used to solve this problem. Is this approach a realistic one? Explain. 6 marks
- b) Apply greedy approach on this particular case and show whether it will give an optimal solution. 7 marks

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| c) | Write down the top-down memoized DP algorithm to solve the rod cutting problem | 7 marks |
| 3 | Explain briefly the differences between P, NP, NP-complete and NP-hard problems | 5 marks |