Department of Electrical and Computer Engineering
North South University

Final Term Examination
Summer 2020

CSE 373: Design and Analysis of Algorithms
Section: 2
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. The name of the file should be of the form **firstname_lastname** and should be in the pdf format.

4. **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.**

5. Answer **ALL** questions. There are altogether **three** questions in this paper.

6. 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.

7. You must show all your workings (as appropriate).

8. Answer to the point

1 a) Graphs can be implemented using either adjacency list or adjacency matrix. 5 marks
Explain carefully, under what circumstances would you prefer to implement a
graph using (1) adjacency list, and (2) adjacency matrix.

b) Bellman Ford and Dijkstra's algorithms solve the single source shortest path 5 marks
(SSSP) problem. Explain the circumstances when you would use each of these
algorithms

c) Using the Dijkstra's algorithm, determine the shortest path from a to all vertices   10 marks
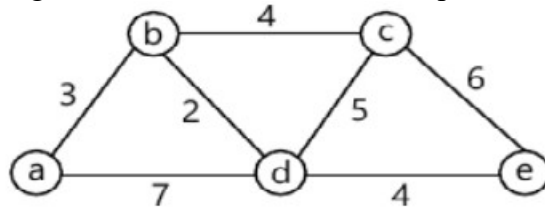
Show your workings.

2 a) State the rod cutting problem and write down the recurrence relation for finding 5 marks
the maximum revenue, r_n , of a rod of length n.

b) Show that the rod cutting problem exhibits optimal substructure property   5 marks

c) The following table shows the length and the corresponding prices for a particular 5 marks
kind of rod.

Length / i	1	2	3	4
Price / p_i	1	20	33	36

Using the table given above, determine whether the rod cutting problem exhibits
greedy choice property.

d) Compute r_4 using dynamic programming   5 marks

3   Explain carefully the differences between the following computational problems: 5 marks
P, NP, NP-complete, NP-hard