Daffodil International University

Department of Computer Science and Engineering
Faculty of Science and Information Technology
Final examination, Semester: Fall 2019

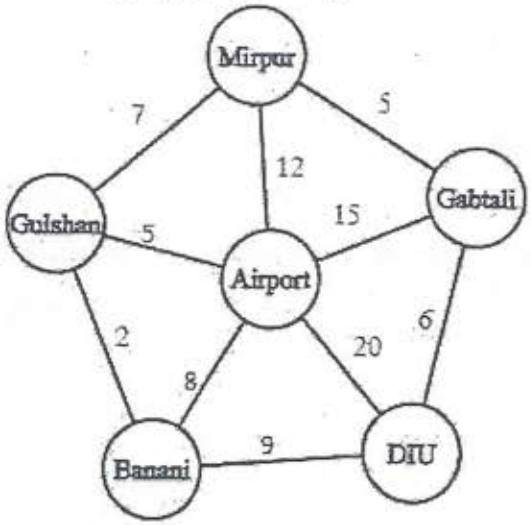
Course Code: CSE 221 **Course Title: Algorithms**

Total Marks: 40 **Time: 2 hours**

Answer all the questions precisely.
(The figure of the right margin indicates the full marks.)

1. a) Let's say the DNA sequences of **cat, tiger,** and **lion** are **CCATT, CCTTGA,** and **GCTGT** respectively. Based on the above sequences according to **Mr. James Watson,** cat and tiger are more similar. On the other hand, **Mr. Francis Crick** claims that cat and lion are more similar. 5
Who is correct? You have to justify your answer by finding longest common subsequences. (Hint: find the LCS between cat vs. tiger and cat vs. lion).

b) **Mr Surgey Brin** has come to Bangladesh for the first time. He has landed to the **Airport** and wants to visit **DIU**. Unfortunately, his phone is not working, therefore, he does not have any internet access. However, Mr. Brin found the following graph indicating weight as distance (in km). You have to help him to find the **shortest path** between **Airports** and **DIU** by applying an appropriate algorithm. 5
Which algorithm are you going to apply for the above scenario? Calculate the shortest distance by applying the algorithm.

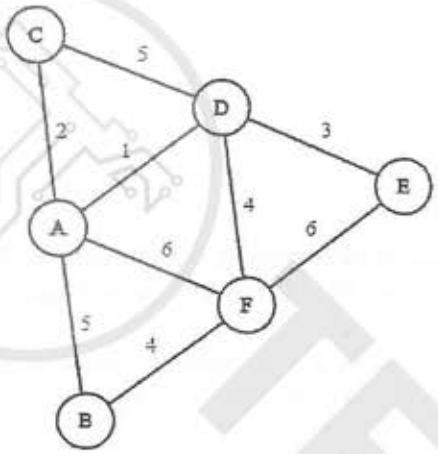


2. a) It takes **8 bits** to represent a character. You have to calculate the total of number required bits to represent the following text **"kkkdddkkdckfcfcggg"**. 2

b) **Huffman Coding Algorithm** is a lossless data compression algorithm which helps to compress text data. Apply the algorithm to the given **text in Question no. 2(a)** and calculate the total number of required bits after compression. 8

3. a) Find the **Longest Increasing Subsequence** of the following sequence of numbers. 5
[9, 5, 1, 3, 4, 8, 3, 6, 7]

b) Find the **Minimum Spanning Tree** using **Kruskal's Algroithms.** 5



4. a) In DIU, Students can take a course if he/she has already taken the pre-requisite courses. Again, the courses he/she has taken in present semester could be a pre-requisite course for the future semesters. Following table represents the info of course and corresponding pre-requisite courses: 5

Course Name	Pre-requisite Courses
Algorithms	C Programming, Data Structure, Mathematics II
Artificial Intelligence	Algorithms, C Programming
Data Structure	Basics of Computer, C Programming

Draw the Graph from the above information.
[Consider, A = Algorithms, B = Basics of Computer, C = C Programming, D = Data Structure, M = Mathematics II, I = Artificial Intelligence]

b) **Which Algorithm** will be appropriate to find out the sequence of taking course for the students? 5
Apply the algorithm to find out the sequence based on graph you have drawn in **Question 4(a).**

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