Beijing-Dublin International College

SEMESTER 2 FINAL EXAMINATION – (2022/2023)

School of Computer Science

COMP2009J Computer Networks

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Time Allowed: 120 minutes

Instructions for Candidates

This paper consists of four questions. Answer all questions. All questions carry equal marks. This is a closed-book exam.

BJUT Student ID: _____ **UCD Student ID: _____**

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge：_____ (Signature)

Instructions for Invigilators

Non-programmable calculators are permitted.
No rough-work paper is to be provided for candidates.

Question 1: [Total: 25 marks]

(a) Computer networks are organised as a stack of layers. List each of the 5 layers introduced in our module and briefly explain their main objectives. What are the features provided by layering? **[5 marks]**

(b) Discuss with examples what transport services does an application needs? **[5 marks]**

(c) Briefly explain how the Domain Name Service (DNS) is implemented and how DNS queries are resolved in the DNS system. **[10 marks]**

(d) Briefly discuss the multiple access protocol? **[5 marks]**

Question 2: [Total: 25 marks]

(a) Using FSM explain how the rdt2.1 protocol solves the corrupted ACK/NAK. **[10 marks]**

(b) Compare Error Detection and Error Correction **[5 marks]**

(c) Why are cookies important for web browsing? Discuss the cookies' privacy issue briefly. **[5 marks]**

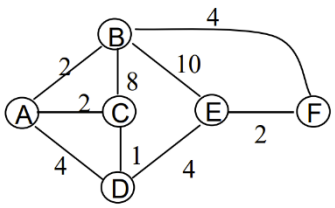
(d) What is the purpose of the Address Resolution Protocol (ARP)? **[5 Marks]**

Question 3: [Total: 25 marks]

(a) Consider the network shown to the right. **[12 marks]**

i. Show the operation of Dijkstra's (Link State) algorithm for computing the least cost path from B to all destinations. **[7 Marks]**

ii. From these results, show the shortest path from B to D, and briefly describe how you got that answer from your work in part i). **[5 Marks]**



(b) Write segments (Not full program) of Java programs for creating and using TCP sockets for the client and the server (IP: 127.0.0.1 and Port: 8888)? **[10 Marks]**

(c) What are the two main similarities between traditional Internet routing and the SDN approach to Internet routing? **[3 Marks]**

Question 4: [Total 25 marks]

(a) Compare Non-persistent HTTP with persistent HTTP? **[5 Marks]**

(b) Assume that you have a base HTML file with 30 embedded images, images & base files are small enough to fit in one TCP segment. How many RTTs are required to retrieve base files & images under-following conditions: **[10 Marks]**

i. Non-Persistent connection with no parallel connection. **[3 Marks]**
ii. Non-persistent connection with 10 parallel connections. **[2 Marks]**
iii. Persistent connection without pipelining. **[3 Marks]**
iv. Persistent connection with pipe-lining. **[2 Marks]**

(c) What is congestion control? Discuss how the TCP protocol handles the congestion**. [5 marks]**

(d) What are the key design issues of a computer network? **[5 Marks]**

----- GOOD LUCK -----