Semester Two of Academic Year (2014---2015) of BJUT

《 Computer Networks (COMP2001J)》

Resit Exam Paper A

Exam Instructions： **Answer 4 Questions out of 5**

Honesty Pledge：

I have read and clearly understand the Examination Rules of Beijing University of Technology and University College Dublin and am aware of the Punishment for Violating the Rules of Beijing University of Technology and 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 would accept the punishment thereof.

Pledger： _____ **Class No：** _____

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

Notes：

The exam paper has 5 questions on 6 pages, with a full score of 100 points. 25 marks are given for each question. You are required to use the given Examination Book only.

Instructions for Candidates

Students must attempt four questions out of the five questions.

Obtained score

Question 1:

(a) With the help of a diagram list the layers in the TCP/IP communications model. Outline the functions implemented in each layer.

(6 marks)

(b) What is the importance of *Acknowledgement* packets in a reliable computer communications system?

(4 marks)

(c) What is the purpose of *ARP* in computer networks? Describe the mechanics used in the ARP process and give reference to how the ARP table is used and updated.

(7 marks)

(d) Compare and contrast Datagram switching techniques and Circuit switching techniques with regard to:

i. Their mechanics
ii. Performance for bursty traffic.

(8 marks)

Total (25 marks)

Obtained score

Question 2:

(a) What are the advantages of using optical fiber cabling over twister pair cables?

(5 marks)

(b) What is *signal attenuation*? Explain the issues caused by attenuation in computer communications and describe how it is eliminated in LANs.

(5 marks)

(c) Explain what is meant by the term baseband modulation in network computer networks. Describe using a diagram the use of Manchester Encoding.

(7 marks)

(d) Suppose a communications channel uses a spectrum between 40MHz and 49MHz for communications and has an intended capacity of 3Mbps:

i. Use Shannon's theorem to find the required SNR to obtain this capacity.

ii. Use the Nyquist theorem to find the number of signalling levels required to achieve this capacity.

(8 marks)

Total (25 marks)

Obtained score

Question 3:

(a) Why is error detection required in computer communication systems? Explain how a parity bit can be used to detect errors in a message.

(5 marks)

(b) Two packets are received by a network interface:

i. 110010100
ii. 110011100

Using a *CRC check* with grenerator polynomial G(x): 1101, determine if the packets contain errors.

(6 marks)

(c) Describe the *token ring* method of medium access. *FDDI* uses two rings to facilitate communication. Why is this an improvement over a single ring implementation?

(7 marks)

(d) Describe the CSMA-CD method of medium access. Discuss the reason why there is a minimum frame length specified for CSMA-CD systems.

(7 marks)

Total (25 marks)

Obtained score

Question 4:

(a) What is *Classless Inter Domain Routing (CIDR)?* What was purpose of introducing *CIDR* to the IPv4 protocol?

(7 marks)

(b) Djikstra's algorithm to work out the path for C for the following Link State Database. Show which links are included to the path for each step.

Link State Database:

A	
B	6
D	2

B	
A	6
C	2
E	1

C	
B	2
F	2
G	5

D	
A	2
E	2

E	
B	1
D	2
F	4

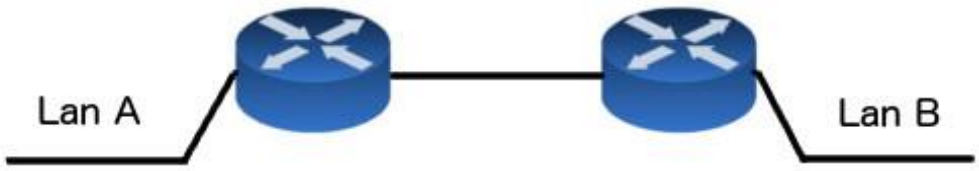
F	
C	2
E	4
G	1

G	
C	5
F	1

(8 marks)

(c) You are given an IP range of 192.168.0.0/16. Design the IP ranges required to facilitate the network shown in the figure below where:
Lan A has 87 computers
Lan B has 786 computers

Design the subnet ranges for maximum efficiency of use of IP addresses.



(10 marks)

Total (25 marks)

Obtained score

Question 5:

(a) Explain the purpose of using port addressing in the transport layer of the TCP/IP model.

(5 marks)

(b) Discuss the Silly Window phenomenon in TCP with regard to TCP windowing. How does TCP prevent the silly window from happening?

(6 marks)

(c) What is the purpose of DNS in communications networks? Describe using a diagram the steps involved in recursive DNS.

(7 marks)

(d) Explain using a graph the working of TCP Reno. How does this reduce the number of packets lost in the network due to congestion?

(7 marks)

Total (25 marks)