國立臺北科技大學

九十六學年第二學期電機系博士班資格考試

電腦網路理論試題

填學生證號碼

注意事項：

1. 本試題共【10】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間:二小時。

1.(10%) The length of UDP header is 64 bits. The information of UDP header is listed as below. Please removes the '??' sign and completes the following table.

Bit allocation	**Parameter**	**Function**
Bit 0 ~ ??	??	??
…	…	…
Bit ?? ~ 31	??	??
Bit 32 ~ 47	Length	A 16-bit field that specifies the length in bytes of the entire datagram
Bit 48 ~ 63	Checksum	The 16-bit checksum field is used for error-checking of the header and data.

2.(10%) What is ARP? Please describes it and its function as detail as possible.

3.(10%) How to get the value of the following items? Please writes down the step or command.

(a) IP Address of your PC

(b) MAC Address of your PC

(c) MAC Address of your Neighbour PC

4.(10%) In the RFC-959, FTP protocol is designed. Please lists all of the client commands that supported by the RFC.

5.(10%) Consider an overlay network with 200 active peers, with each pair of peers having an active TCP connection. Additionally, suppose that the TCP connections pass through a total of 30 routers. How many nodes and edges are there in the corresponding overlay network?

6.(10%) Recall the macroscopic description of TCP throughput. In the period of time from when the connection's rate vrries from W/(2 · RTT) to W/RTT, only one packet is loss(at the very end of the period)

(a) Show that the loss rate(fraction of packets lost) is equal to

$$\text{L=loss rate=}\frac{1}{\frac{3}{8}W^2+\frac{3}{4}W}$$

(b) Use the result above to show that if a connection has loss rate L, then its average rate is approximately given by $\approx\frac{1.22\cdot MSS}{RTT\sqrt{L}}$

7.(10%) What is the size of the multicast address space? Suppose now that two multicast groups randomly choose a multicast address. What is the probability that they choose the same address? Suppose now that 2000 multicast groups are ongoing at the same time and choose their multicast group addresses at random. What is the probability that they interfere with each other?

8.(10%) Recall that with the CSMA/CD protocol, the adapter waits K · 512 bit times after a collision, where K is drawn randomly. For K=200, how long does the adapter wait until returning to Step 2 for a 1 Mbps Ethernet? For a 10 Mbps Ethernet?

9.(10%) What is RTP? The length of RTP header? Based on TCP or UDP or IP?

10.(10%) What is SIP? Please lists all of the SIP commands listed in RFC-3261.