國立臺北科技大學一百零七學年第一學期

電機系博士班資格考試試題範本說明

一. 本系博士班資格考試試題為 A4 格式之版面。

二. 提供之試題範本自第 1 頁起提供 A4 格式之版面共 4 頁，若有不足請自行加頁。

三. 本範本以 Office 之 Word 文書應用軟體製作，命題委員至少須輸入之資料共四項，各項簡要說明如下：(前三項請依範本上之原字型與字型大小輸入，*前二項已代為執行合併列印套稿，請確認組別名稱與考試科目*。謝謝您！)

（一）【考試科目名稱】 ⟹ ［依所附檔案內考試科目名稱完整輸入取代］

（二） ⟹ ［請依試題題數輸入取代並增加必要之配分與各項特殊規定］

注意事項：

1. 本試題共【7】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。

（三）

試題本文 ⟹ ［請輸入題號與試題內容並完成排版與列印］

範本版面說明

試題本文之外方格線，係以單格表格並以隱藏格線方式設計，請在格線內命題，不要超出格線外；若有圖片，亦請於列印後黏貼於規劃版面內。謝謝！

四. 命題版面達 A4 共 2 頁(含)以上時，請修改範本第 1 頁之 第一頁　共一頁 為 第一頁　共二頁；若頁數更多，請類推修改增加之。

五. 本範本檔案及考試科目名稱檔案，將由本系以隨身碟提供命題委員，請命題委員在規劃版面內命題，並以 A4 紙張列印出試題繳交，隨身碟亦請交給本系。本系將直接列印後隨即製版，不再作其他處理，若有圖片請自行黏貼於妥當之版面位置。

國 立 臺 北 科 技 大 學

一百零七學年第一學期電機系博士班資格考試

網際網路工程 試題

注意事項：

1. 本試題共【7】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. (15 points) Assume you request a webpage consisting of one document and N images. The document size is L_d bytes, all images have the same size of L_i bytes, the download rate is R byte/s, and the RTT is RTT_{avg}. How long does it take to obtain the whole webpage under the following conditions.

(a) Nonpersistent HTTP with serial connections.

(b) Persistent HTTP with one connection.

2. (15 points) Assume that the RTT between a client and the local DNS server is RTT_l, while the RTT between the local DNS server and other DNS servers is RTT_r.

(a) Assume that no DNS server perform caching. What is the total response time for the iterative scenario.

(b) Assume that the DNS record for the requested name is cached at the local DNS server. What is the total response time for the recursive scenario.

3. (15 points) Assume a client and a server can connect through either network in Figure 1. Suppose that each link between the server and the client has a packet loss probability p, and the packet loss probabilities for these links are independent. What is the probability that a packet is successfully received by the receiver? If a packet is lost in the path from the server to the client, then the server will re-transmit the packet. On average, how many times will the server re-transmit the packet in order for the client to successfully receive the packet?

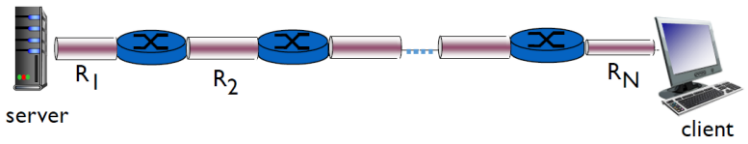

Figure 1

4. (15 points) Consider the SDN OpenFlow network shown in Figure 2. Suppose that the desired forwarding behavior for datagrams arriving at s2 is as follow:

- Any datagrams arriving on input port 1 from host h5 or h6 that are destined to host h1 or h2 should be forwarded over output port 2.
- Any datagrams arriving on input port 2 from host h1 or h2 that are destined to host h5 or h6 should be forwarded over output port 1.
- Any datagrams arriving on input ports 1 or 2 and destined to host h3 or h4 should be delivered to the host specified.
- Hosts h3 and h4 should be able to send datagrams to each other.

Specify the flow table entries in s2 that implement this forwarding behavior.

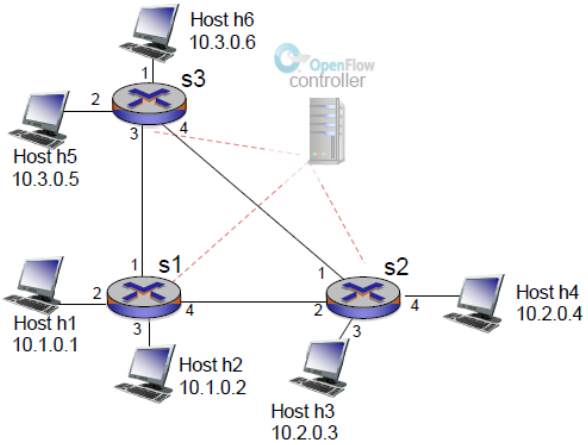

Figure 2

5. (15 points) Explain how the Adaptive Retransmission Timeout Interval is calculated in TCP.

6. (15 points) Consider the network shown in Figure 3. Suppose that each node initially knows the costs to each of its neighbors. Consider the distance-vector algorithm and show the distance table entries at node z

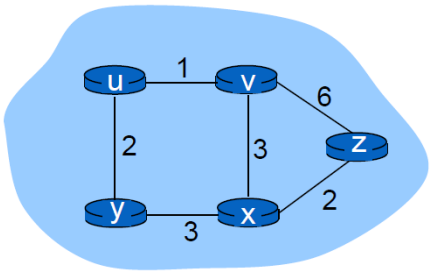

Figure 3

7. (10 points) With the fixed-delay strategy, the receiver attempts to play out each chunk exactly *q msecs* after the chunk is generated. So if a chunk is timestamped at the sender at time *t*, the receiver plays out the chunk at time *t*+*q*, assuming the chunk has arrived by that time. Packets that arrive after their scheduled playout times are discarded and considered lost. This demonstrates an important delay-loss trade-off that arises when designing a playout strategy with fixed playout delays. Ideally, we would like the playout delay to be minimized subject to the constraint that the loss be below a few percent. Please propose a generic algorithm that the receiver can use to adaptively adjust its playout delays.