

國立臺北科技大學

九十四學年度電機工程系碩士班入學考試

計算機概論試題

填准考證號碼

第一頁 共一頁

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注意事項：

1. 本試題共【七】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. A certain computer adopts modified IEEE 754 standard for floating-point number representation. Therefore, a number can be expressed as $(-1)^{\text{Sign}} \times (1.\text{Mantissa}) \times 2^{(\text{Exponent}-7)}$, at which Sign-bit occupies the MSB (Most Significant Bit) position and followed by a 4-bit Exponent and then 7-bit Mantissa.
 - (a) (3%) Explain why there is always a "1" in front of the decimal point of the Mantissa?
 - (b) (3%) Explain why Excess-7 Code has been chosen for representing the Exponent?
 - (c) (3%) What is the range of positive number which can be stored in this format?
 - (d) (3%) What is the range of negative number which can be stored in this format?
 - (e) (3%) Try to store a decimal number, -12.5×10^{-2} , in this format and then show out the content in Hexadecimal.
2.
 - (a) (5%) Write a segment program by Pseudo Code to find out all prime numbers between 1 and 100. (Remark: Partial credit for lousy algorithm.)
 - (b) (5%) Write a segment program by Pseudo Code for computing the highest common factor of two numbers A & B. (Remark: Partial credit for lousy algorithm.)
3.
 - (a) (5%) Describe the following three different data bases : (1) Hierarchical Structure, (2) Network Structure, and (3) Relational Structure.
 - (b) (5%) Compare the advantage and disadvantage of these three data bases.
 - (c) (5%) What's the purpose of normalization process in data base management?

- 4. (a) (8%) Given two prime numbers $p=17, q=11$, find out the public key $KU = \{e,n\}$ and private key $KR = \{d,n\}$ in RSA algorithm.
- (b) (7%) Consider a plaintext $M = 88$. Use RSA algorithm and the keys got in (a) to find out the ciphertext C that this plaintext will be encrypted to, and then verify whether the ciphertext C will be decrypted back to the original plaintext M .

5. Refer to Figure 1, this is an institutional network connected to the Internet. Suppose that the average object size is 900,000 bits and the average request rate from the institution's browsers to the origin servers is 1.5 requests per second. Also suppose that the amount of time needed when the router on the Internet side of the access link forwards an HTTP request and then receives the response from the origin servers is 2 seconds in average. Model the total average response time as the sum of the average access delay and the average Internet delay. For the average access delay, use $\Delta/(1-\Delta \times \beta)$, where Δ is the average time required to send an object over the access link and β is the arrival rate of object to the access link.

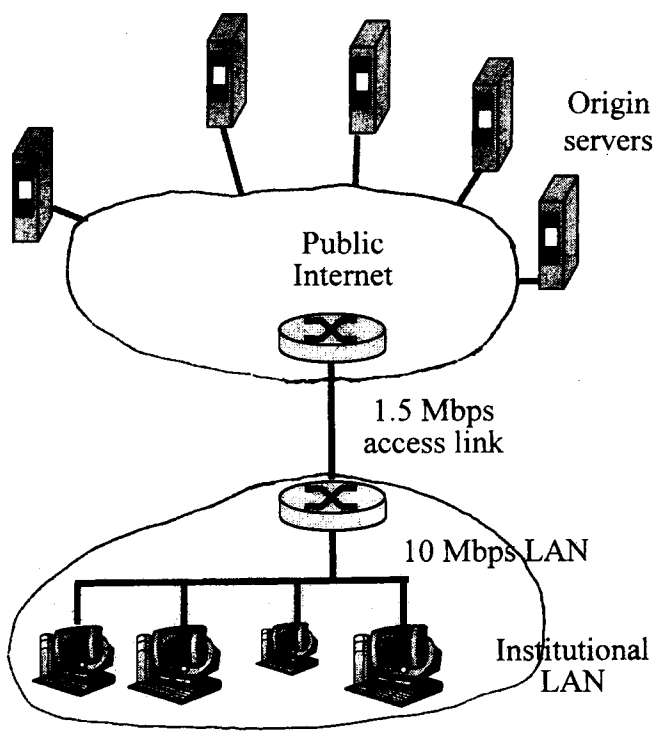


Figure 1

- (a) (7%) Find the total average response time.
 - (b) (8%) Suppose a cache is installed in the institutional LAN and the hit rate is 0.4, find the total response time.
6. (a) (3%) What is multiprogramming?
- (b) (9%) State how the following operating system concepts are used to support multiprogramming? (1) Processes & Threads, (2) Virtual memory, and (3) Mailbox.
- (c) (3%) What issues arise from the need of supporting multi-user environments and interactive (time-sharing) environments?
7. (15%) Write down in English the complete name of the following abbreviations and then give a brief description :
- (a) DHCP
 - (b) HTTP
 - (c) NAT
 - (d) SNMP
 - (e) P2P