

題號： 366

國立臺灣大學 111 學年度碩士班招生考試試題

科目：計算機概論(B)

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1. (40%, 2 points for each problem) Please define the following terms and explain the content, purpose, and application of each term and give an illustrative example if possible. If possible, define the term in mathematical equation. If it is an acronym, please write the full name. For example: CD-ROM: Compact Disk-Read Only Memory: the most common type of optical storage medium; data is written in a series of lands and pits on the surface of a disk, which can be read by a laser in a CD-ROM drive; stores approximately 650 MB but cannot be altered.  
(1) Hamming error correction code (2) Wi-Fi: Wireless Fidelity (3) context switching in multitasking (4) Dijkstra's algorithm for shortest path (5) CNN: Convolutional Neural Network (6) ReLU: Rectified Linear Unit (7) average pooling (8) batch normalization (9) RISC: Reduced Instruction Set Computer (10) finite state machine (11) packet in local area network (12) page in for virtual memory (13) deadlock in operating system (14) incremental backup (15) register (16) cache memory (17) inheritance in object-oriented programming (18) structure diagram in unified modeling language (19) execution thread (20) kernel mode
2. (6%) Please write the full name of P2P network. Please describe the differences, advantages, and disadvantages of P2P network and client-and-server network.
3. (4%) Please use Bitcoin as example to describe how blockchain works.
4. (4%) Please describe the differences, advantages, and disadvantages of pass by value and pass by reference.
5. (10%) Please describe in detail five steps of software system life cycle.
6. (4%) Please explain RSA (Rivest-Shamir-Adleman) public-key cryptosystem and private key.
7. (4%) Please write equation for Fibonacci sequence. Please write the first ten Fibonacci numbers: 0, 1, 1, ...
8. (8%) Please write prefix expression  $*/ab*cd+efg$  into infix form with parentheses and postfix expression.
9. (4%) Please describe the differences, advantages, and disadvantages of User Datagram Protocol (UDP) and Transaction Control Protocol (TCP).
10. (4%) Please write decimal  $-21.625$  in two's complement.
11. (8%) Please describe mergesort in detail and write down the step-by-step result of mergesorting 6, 5, 3, 1, 8, 7, 2, 4.
12. (4%) For any integer  $n$ , prove that  $(n/3)+(n*n/2)+(n*n*n/6)$  is an integer. Show as example:  $n=1, 2, 3, \dots, 10$ .

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