

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. For the following used terminologies in information field, explain the content, purpose, and application of each term and give an illustrative example if possible. If it is an acronym, give the full name. *For example, UPS: Uninterruptible Power Supply, a device that contains surge protection circuits and one or more batteries to provide power during a temporary or permanent loss of power.* (30%)
(a) LTE; (b) OLED; (c) Full HD; (d) MPEG; (e) DVD; (f) FAT32; (g) APP; (h) MFC; (i) USB; (j) DDR.
2. (a) List at least three operating systems applied in current commercial mobile phones. (5%)
(b) What are the seven layers of Open Systems Interconnection protocols? (5%)
3. How can you express the *exclusive OR* function between events A and B by Boolean expression? (5%) How can you apply the above function to control the light which located between the upper and down stairs of a building? Draw your designed circuit. (10%)
4. The program development life cycle is a set of steps programmers use to build computer programs. Give the steps and describe the jobs for each step. (10%)
5. Draw a digraph with at least 10 vertices and 20 edges. Represent the graph by (a) Adjacency list; (5%) (b) Adjacency matrix; (5%) and (c) Give the complexities for the storage, edge insertion, and graph traversal operations (assume the graph with n vertices and m edges). (5%)
6. The Fibonacci numbers is defined as $F_0=0$, $F_1=1$, and $F_n=F_{n-1}+F_{n-2}$, for $n \geq 2$.
(a) Write a recursive algorithm to generate the number sequence. (5%)
(b) Write an iterative algorithm to generate the number sequence. (5%)
(c) Discuss the time complexities of (a) and (b), and give some comments. (5%)
7. How can you implement a priority queue by heap data structure? (5%)