國立臺北科技大學 107 學年度碩士班招生考試

系所組別：2150 電機工程系碩士班戊組

第一節　計算機概論　試題

注意事項：

1. 本試題共 13 題，共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

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1. Convert each of the following decimal representation to its equivalent two's complement form using patterns of 7 bits:
   (a) 35　　(*5 points*)　　(b) -35　　(*5 points*)

2. Convert each of the following two's complement representation to its equivalent decimal form:
   (a) 10000　　(*5 points*)　　(b) 11111　　(*5 points*)

3. What would be the result of performing a 1-bit right circular shift on the following bytes represented in hexadecimal notation (give your answers in hexadecimal notation):
   (a) 4F　　(*5 points*)　　(b) 9E　　(*5 points*)

4. What is a context switch? (*3 points*)　　What is the time quantum used for? (*3 points*)　　How should the time quantum be related to the context switch time? (*4 points*)

5. List three overall strategies in handling deadlocks. (*6 points*)

6. Convert the expression A + B * (C – D * E) / F to postfix form (*5 points*) and prefix form (*5 points*).

7. Give a topological order for the following directed graph: (*5 points*)
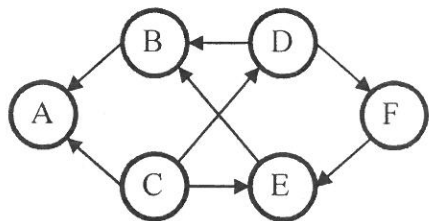
8. Write **recursive** algorithms to solve the following problems:
   (a) Finding the maximum of a list of numbers. (*5 points*)
   (b) Finding the average of a list of numbers. (*5 points*)

9. What is an AVL tree? (*3 points*)　　What is an advantage of AVL trees? (*2 points*)

10. What is a data hazard in a pipelined unit? (*3 points*)　　Give an example. (*2 points*)

11. What is a control hazard in a pipelined unit? (*3 points*)　　Give an example. (*2 points*)

12. Prove using the definition of big-O notation that $\sqrt{n^2 + 16}$ is O(n). (*5 points*)

13. Please explain the following terms:
    (a) Array　　(*3 points*)　　　　(b) Stack　　(*3 points*)　　　　(c) Queue　　(*3 points*)