

考試科目	新媒介與科技	所別	數位內容學位學程/ 創意傳播組 5151	考試時間	2月22日(六) 第三節
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一、最近 iOS7 推出 iBeacon 定位技術，運用此技術，智慧型手機的 APP 可以將定位的準確度提高到僅有數公分的誤差(相較於 GPS 的精度約為十公尺)，美國許多商家已經開始測試這種服務，請同學運用此技術，構想一個新的賣場或博物館的 APP，並從以下項目詳述你的構想：1. 概念描述 2. 使用流程圖 3. 分析與比較此新服務與舊有服務的優點。

二、(50%)

請推薦並分析一項(款)具創新服務的設計應用(可不侷限於 APP，可以為一服務方法；或系統應用；或互動裝置；或創意平台等等)。分析重點請依下列逐一陳述並試申論之：包含 1. 為何推薦的理由？ 2. 創新之處為何？ 3. 對服務價值你的定義為何？ 4. 系統評估你所採用的標準為何？(例如：以易學、易用、易記、少出錯、多滿意來評估；或是「五感行銷」的角度評估，或是請自行訂定指標，亦歡迎具創意、天馬行空的想法指標) 5. 若此「創新服務的設計應用」未來需深化精進，改良之處為何？

備

註 試題隨卷繳交

考試科目	媒介敘事	所別	數位內容碩士學位學程/ 創意傳播組 5151	考試時間	2月22日(六)第四節
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申論題（一大題，內有三子題，佔總分 50%）

一、國際媒體研究機構 Latitude 於 2012 年提出敘事四元素：沈浸 immersion、互動 interactivity、整合 integration、影響 impact。這四個元素的組合，會帶來不同的說故事與聽故事的經驗。

請回答下列三個子題：

1. 請簡單界定這四個元素。
2. 您認為這四個元素應用於不同媒介，例如傳統媒介（如：報紙、雜誌、廣播、電視），與數位媒介（如：電腦、平版、智慧型手機），會有什麼樣的比重差異？請在傳統媒介與數位媒介中，各舉一個平台（不限於上列媒介）為個案分析。
3. 試著寫下一個小故事（原創、引用、或改編，都可以，不必太長，請注意考試時間），您認為這個故事用了哪些元素？在哪一種媒介平台最能展現這些元素的特性？

申論題

二、(50%) 故事(內容)為行銷之未來趨勢，假設你受聘為某產品<sup>a</sup>在母親節的前一週推出建立品牌形象<sup>b</sup>的行銷企劃。請設計你的故事並說明它可以成功的理由。你必需納入以下 3 項條件：(1)連結行動與社交媒介；(2)含文化元素；(3)含遊戲元素。

(註 a: 產品類型請自定; 註 b: 品牌形象請自定;)

備註 試題隨卷繳交

考 試 科 目	計算機概論	所 別	數位內容碩士學位學程 資訊技術組 5152	考 試 時 間	2 月 22 日(六) 第三節
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1. Explain the following technologies / terms and their influence on current digital content related implementations: (20%)
  - 1) Folksonomy
  - 2) Digital Rights Management
  - 3) Digital Publishing
  - 4) Big Data
  
2. Elaborate your experience and observation about recent digital content applications on mobile devices? (10%)
  
3. Describe your knowledge about digital archives and the potential usages of those collected digital contents. (10%)
  
4. What is Multimedia Data Mining? Can you give some examples on current digital content related applications that utilize Multimedia Data Mining technology? Can you explain their technical details? (10%)



備 註	試 題 隨 卷 繳 交
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考試科目	計算機概論 (網路與多媒體)	所別	數位內容碩士學位學程 資訊技術組 5152	考試時間	2 月 22 日(六) 第三節
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5. [Analog to Digital Conversion] Sampling and quantization are two processes to convert an analog signal into its digital representation. (1) State the Nyquist-Shannon sampling theorem. (5%) (2) Illustrate rounding quantization with a simple example. (5%)

6. [Video Compression] In motion-compensation-based video compression algorithms, each image is divided into *macroblocks* of size  $N \times N$ . After the first frame, only the motion vectors and difference macroblocks need be coded. The following pseudo-code demonstrates a sequential search process for motion vectors:

**Note:** MAD (Mean absolute difference) is defined as:

$$\text{MAD}(i, j) = \frac{1}{N^2} \sum_{k=0}^{N-1} \sum_{l=0}^{N-1} |C(x+k, y+l) - R(x+i+k, y+j+l)|$$

where  $C(x+k, y+l)$  are the pixels in the macroblock in the Target (current) frame and  $R(x+i+k, y+j+l)$  are the pixels in the macroblock in the Reference frame.

```

Procedure Motion-vector MV: sequential search
BEGIN
min_MAD=LARGE_NUMBER; /*Initialization */
for i=-p to p
  for j=-p to p
  {
    current_MAD=MAD(i, j);
    if current_MAD < min_MAD
    {
      min_MAD= current_MAD;
      u = i; /*Get the coordinates for MV */
      v= j ;
    }
  }
END

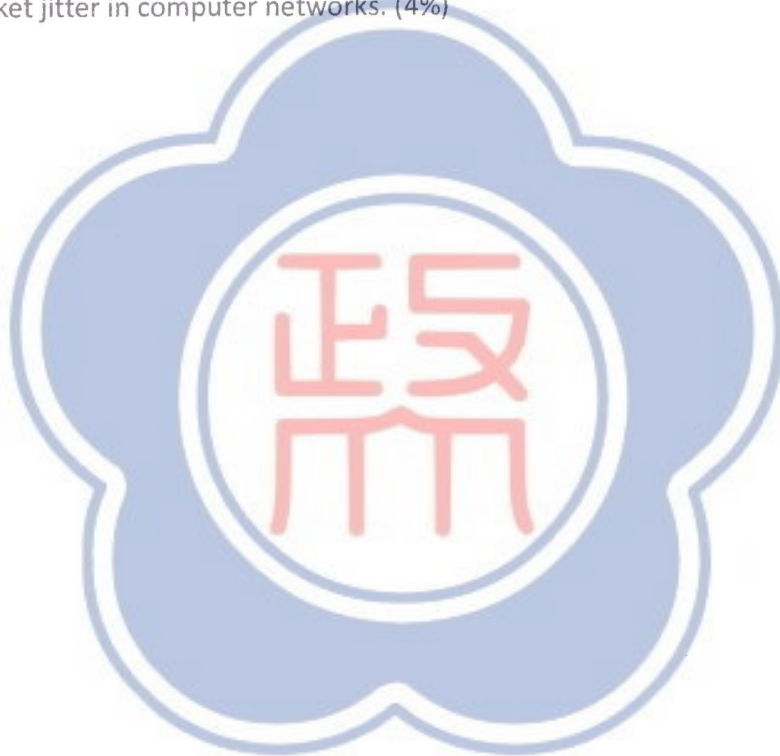
```

(1) Show that the complexity for the sequential search for a **single** macroblock is  $O(p^2N^2)$ . (5%)

(2) Assume that  $p=15$  and  $N=16$ . Compute the total number of operations needed per second to estimate the motion vectors for a video of resolution  $720 \times 480$  and 30 frames per second. (5%)

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7. **[Number system]** A base-3 representation has three digits: 0, 1, 2.
- (1) Convert  $1201_3$  into its equivalent binary representation. (2%)
  - (2) How many bits are required to store a five-ternary-digit number? (2%)
  - (3) Use the binary-coded-ternary representation (i.e.,  $0 \rightarrow 00$ ,  $1 \rightarrow 01$ ,  $2 \rightarrow 10$ ) to encode  $1201_3$ . How many bits are required to store a length N ternary number using binary-coded-ternary representation? (4%)
  - (4) Design a logic circuit to compute the Hamming distance between two binary-encoded ternary digits. (2%)
8. **[Multimedia Communication]** Illustrate the concepts of unicast, multicast, and broadcast with simple drawings. (10%)
9. **[QoS]** (1) IP networks are often described as 'best-effort' networks. Why? (3%) (2) What does 'QoS' stand for? (3%) (3) Explain packet jitter in computer networks. (4%)



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可用中文或英文回答

1. (10%) A binary tree is stored in an array as follows: {1,2,3,4,5,6,7,8,9,10,11}.
- (a) What is the definition of a binary heap?
- (b) Please adjust the binary tree into a max-heaps. (Give your answer in the form of a tree AND in the form of an array.)
2. (15%) Consider an AVL tree, a 2-3 tree, and a splay tree. Initially suppose each tree contains only a root node with key 1. First insert these keys in the given order: 2, 3, 4, 5. Next remove these keys in the given order: 1, 2, 3. Redraw each tree after each operation is complete. (It is not required to show the heights of each node in the AVL tree.)

3. (15%) Big-Oh and Run Time Analysis:
- (a) Describe the running time of the following pseudo-code in Big-Oh notation in terms of the variable  $n$ . Assume all variables used have been declared.

```
int foo(int k) {
    int cost;
    for (int i = 0; i < k; ++i)
        cost = cost + (i * k);
    return cost;
}
```

(1) `ans = foo(n);`

```
(2) int sum;
for (int i = 0; i < n; ++i) {
    if (n < 1000)
        sum++;
    else
        sum += foo(n);
}
```

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```
(3) for (int i=0; i < n+100; ++i){
    for (int j = 0; j < i * n ; ++j){
        sum = sum + j;
    }
    for (int k = 0; k < n + n + n; ++k){
        c[k] = c[k] + sum;
    }
}
```

```
(4) for (int j=4; j < n; j=j+2){
    val = 0;
    for (int i = 0; i < j; ++i) {
        val = val + i * j;
        for (int k = 0; k < n; ++k){
            val++;
        }
    }
}
```

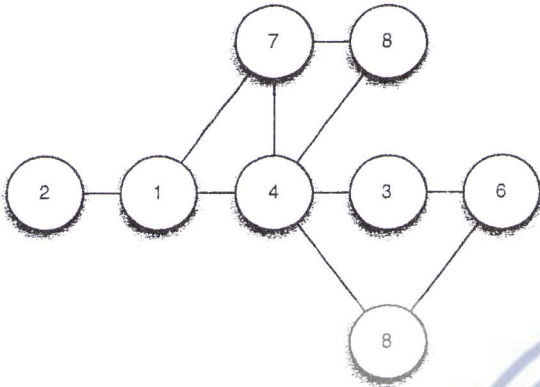
```
(5) for (int i=0; i < n*1000; ++i){
    sum = (sum * sum)/(n * i);
    for (int j = 0; j < i; ++j) {
        sum += j * i;
    }
}
```

(b) Consider the following function. Write down the complete recurrence relation,  $T(n)$ , for the running time of  $\text{mystery}(n)$ . Be sure you include a base case  $T(0)$ . (You do not have to actually solve this relation)

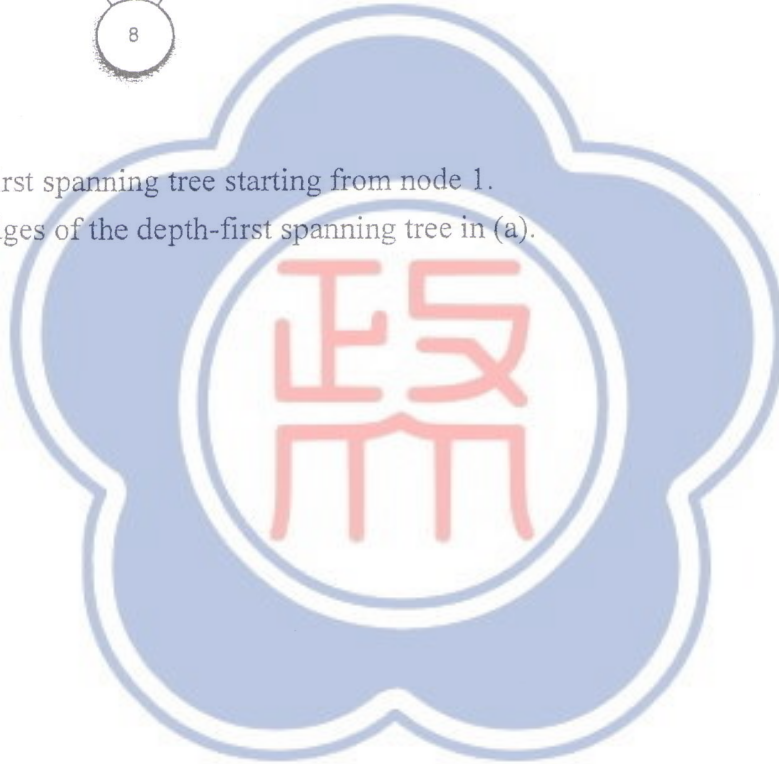
```
int mystery(int n) {
    int answer;
    if (n > 0) {
        answer = (mystery(n-2)+3 * mystery(n/2) + 5);
        return answer;
    }
    else
        return 1;
}
```

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4. (10%) Suppose that smaller number node is visited first. According to the following graph,



- (a) Draw the depth-first spanning tree starting from node 1.
- (b) Write the back edges of the depth-first spanning tree in (a).



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5. [10 pts] Given the following code segments. List the error(s) / issue(s) and the fix(es).  
(a) [5 pts]

```
#include <stdio.h>

int main(){
    float result = 7.0 / 22.0;
    printf("The result is %d.\n", result);
    return 0;
}
```

(b) [5 pts]

```
#include <stdio.h>
#define QUAD(x) (x * x * x)

int main(){
    int counter = 2;
    printf("%d\n", QUAD(counter+3));
    return 0;
}
```

6. [30pts] Please write down the results of the following programs:  
(a) [5 pts]

```
#include <stdio.h>

int main(){
    int i;
    for ( i = 1 ; i < 15; i++ ) {
        if ( i % 3 == 0 ) {
            printf("%d\n", i);
        }
    }
    return 0;
}
```

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(b) [5 pts]

```
#include <stdio.h>

int main() {
    int i = 1;
    while(1) {
        switch ( i % 2 ) {
            case 0:
                printf("a\n");
                break;
            case 1:
                printf("b\n");
                break;
        }
        i++;
        if ( i > 4 ) {
            break;
        }
    }
    return 0;
}
```

(c) [10 pts]

```
#include <stdio.h>

int main() {
    int a = 0;
    int b = 1;
    int n = 20;
    for ( a = 1; a <= n; a++){
        if (a % 3 == 0) continue;
        else{
            b = a < n/2 ? b*2 : b*1;
        }
    }
    printf("%d %d", a, b);
    return 0;
}
```

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(d) [5 pts]

```
#include <stdio.h>

int main() {
    int number = 2;
    int stop = 1;

    while ( stop == 1 ) {
        printf("%d\n", number);
        number *= 2;

        if (number > 1000) {
            stop = 0;
        }
    }
    return 0;
}
```

(e) [5 pts]

```
#include <stdio.h>

int fab (int n) {
    if ( n == 1 || n == 2 ) {
        return 1;
    } else {
        return fab(n-1) + fab(n-2);
    }
}

int main(){
    printf ("ans: %d\n", fab(5) );
    return 0;
}
```

7. [10 pts] Try to write down a program: Calculate  $n!$  by using the **while loop**. The program can read an input  $n$  from standard input and print the result on standard output.

```
#include <stdio.h>

int main( void ) {
    //write your code here
}
```

備 註 試 題 隨 卷 繳 交