

## 國立臺北科技大學 110 學年度碩士班招生考試

系所組別：1504 自動化科技研究所

## 第二節 程式設計 試題 (選考)

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**注意事項：**

1. 本試題共 10 題，每題 10 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Implement a void function F that takes pointers to two arrays of integers (A and B) and a size N as parameters. It then populates B where  $B[i]$  is the sum of all  $A[j]$  where  $j \neq i$ .? For example: If  $A = \{2, 1, 5, 9\}$ , then B would be  $\{15, 16, 12, 8\}$ . (10%)

2. What is the output of the following code: (10%)

```
#include <iostream>

int main(int argc, const char * argv[]) {
    int a[] = {1, 2, 3, 4, 5, 6};
    std::cout << (1 + 3)[a] - a[0] + (a + 1)[2];
}
```

3. What is the output of the following code: (10%)

```
#include <iostream>
struct A
{
    int data[2];

    A(int x, int y) : data{x, y} {}
    virtual void f() {}
};
int main(int argc, char **argv)
{
    A a(20, 33);
    int *arr = (int *) &a;
    std::cout << arr[2] << std::endl;
    return 0;
}
```

4. Observe the following sequence  $x[n]=\{0, 1, 1, 2, 3, 5, 8, 13, 21, 34, \dots\}$  where  $0 \leq n \leq 30$  and implement a program to compute  $x[30]$ . (10%)

5. What is the output of the following code: (10%)

```
#include<stdio.h>
int main()
{
    char *ptr;
    char string[] = "110-Year Programming Entrance Exam";
    ptr = string;
    ptr += 6;
    printf("%s",ptr);
    return 0;
}
```

6. Implement a program to print prime numbers between 1 to n where n is a any given integer. (10%)

7. Implement a program to swap two Integers without using temporary variable. (10%)

8. What is the output of the following code: (10%)

```
#include <bits/stdc++.h>
using namespace std;

struct Node {
    int data;
    Node *left, *right;
    Node(int data)
    {
        this->data = data;
        this->left = this->right = NULL;
    }
};

void preorderIterative(Node* root)
{
    if (root == NULL)
        return;
    stack<Node*> st;
    Node* curr = root;
    while (!st.empty() || curr != NULL) {
        while (curr != NULL) {
            cout << curr->data << " ";
            if (curr->right)
                st.push(curr->right);
            curr = curr->left;
        }
    }
}
```

注意：背面尚有試題

```
    if (st.empty() == false) {
        curr = st.top();
        st.pop();
    }
}
}
int main()
{
    Node* root = new Node(10);
    root->left = new Node(20);
    root->right = new Node(30);
    root->left->left = new Node(40);
    root->left->left->left = new Node(70);
    root->left->right = new Node(50);
    root->right->left = new Node(60);
    root->left->left->right = new Node(80);
    preorderIterative(root);
    return 0;
}
```

9. Given an array of integers A, implement a program to find and return the local maximum element in it. For example, Input = [5, 17, 100, 11, 1, 50, 30], Output = [100, 50]. (10%)
10. Consider the following declaration of a 'two-dimensional array in C:

```
char a[100][100];
```

Assuming that the main memory is byte-addressable and that the array is stored starting from memory address 0, what is the address of a[30][40]? (10%)