UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2000/2001

September/October 2000

CSI502 – Problem Solving & Programming

Duration : (3 hours)

INSTRUCTION TO CANDIDATE:

• Please ensure that this examination paper contains **FOUR** questions in **FIVE** printed pages before you start the examination.

• Answer **ALL** questions.

• This is an 'Open Book' examination.

• You are allowed to bring in any references into the examination hall.

• You can choose to answer either in Bahasa Malaysia or English.

ENGLISH VERSION OF THE QUESTION PAPER

1. (a) Explain the relationship between source program, compiler and executable program.

(15/100)

(b) What is the difference between program and application programming interface (API)?

(15/100)

(c) Recently all the petrol stations in Penang implement the self-service system. Draw a flow chart for petrol machine in the process of pumping petrol.

(20/100)

(d) Write an algorithm in pseudocode to read a list of names, and display the names in an ascending order.

(25/100)

(e) Below is a simple structure chart of student registration program. Show the corresponding chart in a modular C program and omit the irrelevant part. In other words, your coding need not be a complete program.
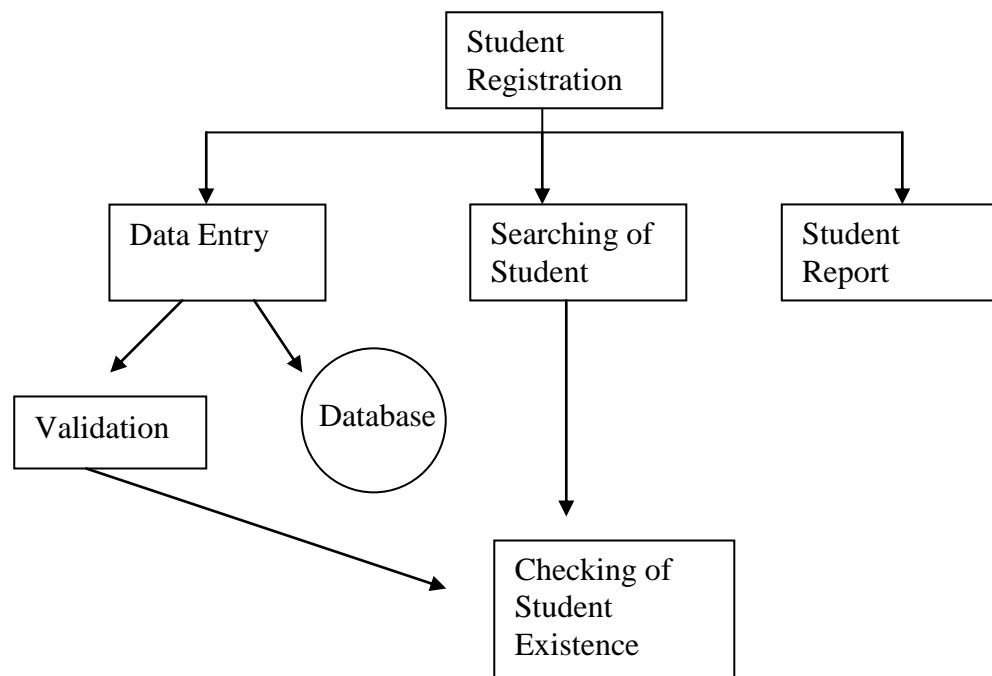
(25/100)

2. (a) A C program contains the following declarations and initial assignments:

> int i =12, j=8;
> char ch1= 'a', ch2 = 'm';
> float real1 = 122.56; real2 = 33.22;

Determine the output of each the following C statements. Use the values initially assigned to the variables for each statement.

(i) printf("%d", 5 + i * 3 % 2 − j * 4);

(ii) printf("%d", ++i * 2 − j--);

(iii) printf("%c", (ch1 < ch2) ? ch1 + 1: ch2 −1);

(iv) printf("%14.0f", real1);

(v) printf("%d", abs(real1) * 2 + ceil(real2));

(25/100)

(b) Change the for loop below to a do-while loop.

> #define PRICE 50
>
> int i, item, total=0;
>
> for (i =0; i < 5; i++) {
>   scanf("%d", &item);
>   if (item == 99) break;
>   total = total + item * PRICE;
> }

(25/100)

(c) Below is the specification for the salary:

If the worker is full time, deduct the salary for the EPF and income tax, but no deduction to the contract worker. If the worker is part time, count the salary on daily basis, and deduct the salary for EPF but not income tax, except for contract worker. If the worker is on contract basis, pay monthly salary to full timer and weekly salary for part timer. If the workers are not married and salary is more than 3000, they have to deduct their salary for income tax, regardless full time, part time or contract.

Write this specification in C program with selection statements.

(30/100)

(d) What is the difference between call by value and call by reference? Give one example in a C program using 'function'.

(20/100)

3. (a) If a person doesn't know anything about programming, can he do a top-down design? What is his disadvantage?

(20/100)

(b) Study the codes below carefully. What will be printed when the following codes are executed?

```
int m[4][3] = {{2, 4, 6}, {1, 3, 5}, {3, 9, 27}, {8, 16, 24}};
int k[3][4];

for  (i=0; i < 4; i++) {
    for (j=0; j < 3; j++) {
        switch (i) {
          case 0 :
            k[j][i] = m[i][j] – 1;
            break;
          case 1 :
            k[j][i] = m[i][j] + 3;
            break;
          case 2 :
            k[j][i] = m[i][j] / 3;
            break;
          case 3 :
            k[j][i] = m[i][j]++;
            break;
        }  /* end switch */
    }
}

  for (i=0; i < 3; i++) {
   printf("\n");
   for (j=0; j<4; j++) {
      printf("%d ", k[i][j]);
   }
```

(30/100)

(c) Given two strings of character. Write your own strcat function to concatenate two strings into one.

The prototype of the function: char *strcat(char *str1, char *str2);
Purpose: append str2 to the end of str1 and return the address of str1.

(30/100)

(d) For a non-programmer who doesn't have the access to the source code of a program, what is the testing technique that he should use to verify the program?

(20/100)

4. (a) Below is the data structure of customer record. It is a linked list.

```
struct customer {
        int cust_id;
        char name(30);
         struct customer *next;
};
```

Write a C function to store the whole list of customers in a new file.

(25/100)

(b) Write a C function to remove a customer from the above linked list.

The prototype of the function : int rem_cust(int cust_id);

The function should find a record which has the same cust_id in the linked list. If it exists then remove it, else find until at the end of the list. If there is no record found, then return −1, else return 0 after deletion;

(30/100)

(c) (i) What is the relationship between class and object?

(ii) What are the advantages and disadvantages of class inheritance?

(20/100)

(d) What is the difference of declaration between call by reference in C and call by reference in C++. Give examples in your function declaration.

(25/100)

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