UNIVERSITI MALAYSIA PERLIS

Peperiksaan Akhir Semester Pertama
Sidang Akademik 2019/2020

Disember 2019 / Januari 2020

ENT189 – Computer Programming
[Pengaturcaraan Komputer]

Masa : 3 jam

Please make sure that this question paper has **TEN (10)** printed pages including this front page before you start the examination.
[Sila pastikan kertas soalan ini mengandungi SEPULUH (10) muka surat yang bercetak termasuk muka hadapan sebelum anda memulakan peperiksaan ini.]

This question paper has **SIX (6)** questions. Answer **ONE (1)** question from **PART A** and **ALL** questions from **PART B**. Each question contributes 20 marks.
[Kertas soalan ini mengandungi ENAM (6) soalan. Jawab SATU (1) soalan daripada BAHAGIAN A dan SEMUA soalan daripada BAHAGIAN B. Markah bagi setiap soalan adalah 20 markah.]

PART A - Answer **ONE** question only.
[BAHAGIAN A – Jawab SATU soalan sahaja.]

Question A1
[Soalan A1]

(a) Describe the hardware of a computer system. Draw a figure to explain the connection between the hardware components.

(2 Marks/ *Markah*)

(b) Write a program to calculate the addition of two integer input values. Design your code so that the process can be reusable.

(5 Marks/ *Markah*)

(c) Explain the meaning of "pre-test loop" and "post-test loop", by giving appropriate examples.

(5 Marks/ *Markah*)

(d) The value of point assign for each grade is given in **Table 1**:

Table 1
[Jadual 1]

Grade	Weightage
A	4.00
A-	3.75
B+	3.50
B	3.00
B-	2.75
C+	2.50
C	2.00
C-	1.75
D+	1.50

Grade point average (GPA) is calculated by summing up the multiplication of credit hours and weightage value according to grade and dividing it with the total of credit hours as shown in equation below. Ahmad scored A- in Static Mechanics, B+ in Engineering Mathematic 101, A in University English, B in Computer Programming and A in Electric Circuit 101. The credit hours for the

courses are 3, 3, 2, 4 and 3, respectively. Write **the section of code** using **while-loop** to take the input of credit hours and grade and print out the GPA.

$$GPA = \frac{\sum(Credit\ hours\ per\ course\ \times Weightage\ per\ grade)}{\sum Credit\ hours}$$

(8 Marks/ *Markah*)

Question A2
[Soalan A2]

(a) Explain the process of a computer program development. Use a flowchart to describe the flow of the process.

(2 Marks/ *Markah*)

(b) Construct the steps required to solve the root of a quadratic equation by writing a pseudocode.

(5 Marks/ *Markah*)

(c) The code below shows a process. The code also contains mistakes. Identify the mistakes and explain what the code does.

(6 Marks/ *Markah*)

```
int main()
{
 float a[7] ={1.0, 3.5, 7.8, 15.0, 3.2, 8.4, 3.3}
 float a1, a2;
 i =0;
 a1 = a[0];
 while(i<7){
   a2 = a[i+1];
   if(a1 > a2){
     a1 = a1;
   }
   else{
     a1 = a2;
   }
   i +=1;
 }
 printf("%f\n", a1);
```

Figure 1
[Rajah 1]

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(d) Flow inside a pipe can be classified as laminar, transitional and turbulent depending on the parameter known as Reynolds number. The Reynolds number (Re) for water flowing in a pipe can be calculated by multiplying the entry velocity of the water (v) with the pipe diameter (D) and dividing the resultant value with the water's dynamic viscosity (γ). The value of water's dynamic viscosity is given as 1.0×10^{-6} ft^2/sec. Construct a program that take the input of water's velocity and pipe diameter to calculate the Reynolds and use the nested **if-else** statement to classify the type of the flow. The range of Reynolds number is given in **Table 2**.

$$Re = \frac{vD}{\gamma}$$

Table 2
[Jadual 2]

Flow Type	Reynolds number (Re)
Laminar	< 2100
Transitional	$2100 - 4000$
Turbulent	> 4000

(7 Marks/ *Markah*)

PART B – Answer **ALL** questions.
[BAHAGIAN B – Jawab SEMUA soalan.]

Question B1
[Soalan B1]

(a) The code in **Figure 2** shows two function f0 and f1 with different input parameter. What will happen to value "a" after both functions are invoked? Explain the reasons.

(5 Mark/ *Markah*)

```
#include<stdlib.h>
#include<stdio.h>

void f0(int);
void f1(int *);

void main()
{
  int a = 1;
  f0(a);
  printf("Value of a=%d after f0 call.\n", a);
  f1(&a);
```

Figure 2
[Rajah 2]

(b) State the three logical operators in C and give the example of the syntax.

(5 Marks/ *Markah*)

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(c) There are three types of repetition in C. Explain all of them and construct simple codes to demonstrate their usage.

(5 Marks/ *Markah*)

(d) The main data types in C are character, integer and float number. Construct a program that will print out the memory size for each data type.

(5 Marks/ *Markah*)

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Question B2
[Soalan B2]

(a) In C programming, an array can be initialized using **FOUR (4)** different approaches. Explain all approaches with suitable example.

(4 Marks/ *Markah*)

(b) There are two float type one-dimensional arrays, X and Y. Each array has 10 values.

Construct suitable program using C Language:

(i)   to calculate the average of the values in Array X.

(4 Marks/ *Markah*)

(ii)   to determine the lowest value in Array Y.

(4 Marks/ *Markah*)

(iii)   to identify the numbers that exists in Array X and Array Y.

(4 Marks/ *Markah*)

(c)   A plot of the function, $y(t) = e^{-0.5exp(-0.2t)}$ is required to be generated in the time range of 0 to 20 seconds in steps of 1 second. Construct a program in C to compute the value of y for the various values of t. The program should display the results in a tabular form.

(4 Marks/ *Markah*)

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Question B3
[Soalan B3]

(a) 'Call by value' passes arguments to a function by copying the actual value of an argument into the formal parameter of the function. Describe **FOUR (4)** possible combinations of information passing in a function.

(4 Marks/ *Markah*)

(b) Given the projectile at angle θ, the projectile's initial velocity (v_o) and the acceleration due to gravity (g), the horizontal range of the trajectory (R) can be determined by using the following equation:

$$R = \frac{v_o^2 \sin \theta}{g}$$

(i) Construct a user defined function named 'projectile_calc' to compute the horizontal range of the trajectory.

(4 Marks/ *Markah*)

(ii) Develop a main function in C that calls the user defined function 'projectile_calc' in (b)(i) to compute the horizontal distance travelled. The values of projectile's angle and projectile's initial velocity should be obtained from the input by the user.

(6 Marks/ *Markah*)

(c) "Call by reference" is one of the methods that can be used to pass the information from one function to other functions in C programming. Justify that "call by reference" function can pass more than one value by construct a suitable sample program and estimate its output.

(6 Marks/ *Markah*)

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Question B4
[Soalan B4]

(a) Data file allows user to store information in a program permanently, where the contents can be accessed and edited by user whenever necessary. Explain the differences between sequential-access file and random-access file.

(4 Marks/ *Markah*)

(b) An intelligent surveillance system has been developed to trace two types of traffic offence committed by motorists at Kangar, Perlis. **Table 3** shows the number of cases during the first week of December 2019.

Table 3
[Jadual 3]

Day *[Hari]*	Speeding *[Melebihi Had Laju]*	Beating Traffic Light *[Melanggar Lampu Isyarat]*
1	17	15
2	8	20
3	6	18
4	10	26
5	15	23
6	9	17
7	13	11

(i) Construct a program in C to record the traffic offence data above in **Table 3** into a data file named traffic.txt.

(8 Marks/ *Markah*)

(ii) Construct a program in C to read the data from traffic.txt and determine the total and average cases of speeding.

(8 Marks/ *Markah*)

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