

SULIT

UNIVERSITI MALAYSIA PERLIS

Peperiksaan Akhir Semester Kedua
Sidang Akademik 2018/2019

Mac 2019

DKT125 – Object-Oriented Programming
[Pengaturcaraan Berasaskan Objek]

Masa : 3 Jam

Please make sure that this question paper has **FIFTEEN (15)** printed pages including this front page before you start the examination.

[Sila pastikan kertas soalan ini mengandungi LIMA BELAS(15) muka surat yang bercetak termasuk muka hadapan sebelum anda memulakan peperiksaan ini.]

This question paper has **TWO (2)** Parts.

[Kertas soalan ini mengandungi DUA (2) Bahagian.]

Part A: This part has **FOUR(4)** questions. Answer **ALL** questions from this section.

[Bahagian A: Bahagian ini mengandungi EMPAT (4) soalan. Jawab SEMUA soalan dari bahagian ini.]

Part B: This part has **TWO (2)** questions. Answer **ONLY ONE (1)** questions from this section.

[Bahagian B: Bahagian ini mengandungi DUA (2) soalan. Jawab HANYA SATU (1) soalan daripada bahagian ini]

Handwritten notes:
Sila
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Part A
[Bahagian A]

Answer ALL questions in this section.
[Jawab SEMUA soalan dalam bahagian ini.]

Question 1
[Soalan 1]

(a) Determine whether the following variable declaration below is valid or invalid in C++ program. Discuss your answer in brief.

[Tentukan sama ada pembolehubah dibawah sah atau tidak sah di dalam aturcara C++. Bincangkan jawapan anda secara ringkas]

i) `int 4_side;`

[2 Marks/Markah]

i) `char name!;`

[2 Marks/Markah]

ii) `int num one;`

[2 Marks/Markah]

(b) Write a C++ statement to accomplish the following variable declaration.

[Tuliskan pernyataan C untuk melengkapkan pengisytiharan pembolehubah berikut]

i) `weight` as floating number.

[*weight* sebagai nombor perpuluhan.]

[1 Mark/Markah]

ii) `idNo` as array integer.

[*idNo* sebagai integer tatasusun.]

[1 Mark/Markah]

iii) `cChoice` as character.

[*cChoice* sebagai karakter.]

[1 Mark/Markah]

iv) `sName` as string.

[*sName* sebagai string.]

[1 Mark/Markah]

(c) The following statements of C program contain syntax error. Identify and correct the error.

[Pernyataan aturcara C berikut mengandungi ralat sintaks. Kenalpasti dan betulkan ralat tersebut.]

i) `cout<<Welcome to UniMAP Portal;`

[2 Marks/Markah]

ii) `cin<< iEmployee_Num;`

[2 Marks/Markah]

.....3/-

iii) `if(a=b)`
`cout>> "a is equal with b";`

[1 Mark/Markah]

iv) `switch(cChoice)`
`{`
`case A : cout>>"Your selection is A";`
`break;`
`default : "invalid selection";`
`}`

[1 Mark/Markah]

(d)

```
class myClock{
public:
    void setTime(int, int, int);
    void getTime(int&, int&, int&);
private:
    int hr, min, sec;
};
```

Figure 1: MyClock Class
[Gambarajah 1: Kelas MyClock]

Based on **Figure 1**,
[Berdasarkan Rajah 1,]

i) Write a default constructor to initialize the variable hr, min and sec to zero for myClock class.
[Tuliskan pembina asal untuk pemulaan pembolehkan hr, min dan sec kepada kosong untuk kelas myClock.]

[2 Marks/Markah]

ii) Write a destructor for myClock class.
[Tuliskan pemusnah untuk kelas myClock.]

[2 Marks/Markah]

myClock

Question 2

[Soalan 2]

(a) The object-oriented classes in a school scenario are given in **Table 1**.
 [Kelas-kelas berasaskan objek di dalam senario sekolah diberikan dalam **Jadual 1**]

i) Explain the differences between **inheritance** and **aggregation**.
 [Nyatakan perbezaan di antara "inheritance" and "aggregation".]

[2 Marks/Markah]

ii) Identify **inheritance** relationships and **aggregation** relationships between classes.
 [Kenalpasti perhubungan "inheritance" and "aggregation" antara kelas-kelas.]

[6 Marks/Markah]

(b) Decide the differences between **single inheritance**, **multiple inheritance** and **public inheritance**.

[Tentukan perbezaan di antara "single inheritance", "multiple inheritance" and "public inheritance".]

[6 Marks/Markah]

(c) Interpret **TWO (2)** benefits of object-oriented programming.
 [Jelaskan DUA (2) faedah pengaturcaraan berasaskan objek.]

[4 Marks/Markah]

(d) Explain the **abstract data type (ADT)** concept in object-oriented programming.
 [Terangkan konsep "abstract data type (ADT)" dalam pengaturcaraan berasaskan objek.]

[2 Marks/Markah]

Table 1
 [Jadual 1]

Class	Description
personType	Describes an individual in a school that includes students and staff.
staffType	Describes a staff in a school that includes teachers and admin staff.
schoolType	Describes a school.
studentType	Describes a student in a school.
bookType	Describes a book owned by a student.
referenceBook	Describes a reference book for a subject.
noteBook	Describes a book that is used by a student to write note.
subjectType	Describes a subject taught by a teacher and learnt by a student.

Question 3
[Soalan 3]

```

class car{
private:
    string brand;
    string model;
    int yearMade;
    int cc;
    String colour
public:
    void setName();
    void setModel();
    void setYearMade();
    void setCC();
};

```

Figure 2: Class car
[Rajah 2: Kelas car]

- (a) Indicate how many class member does class car have? Separate the members according to its types.
[Nyatakan bilangan ahli kelas dalam kelas car. Asingkan ahli tersebut mengikut jenis-jenisnya.]
[3 Marks/Markah]
- (b) Based on figure 2, draw the Unified Modelling Language (UML) class diagram of the class car.
[Berdasarkan Rajah 2, lukiskan UML gambarajah kelas bagi kelas car.]
[5 Marks/Markah]
- (c) Assume that one variable (e.g. *string colour*) is added into the class car, but it is declared neither public nor private in that class. Interpret the default member access for *string colour* and why?
[Anggapkan satu pemboleh ubah (contoh: *string colour*) ditambah ke dalam kelas car, tetapi tidak diistiharkan sebagai public atau private di dalam kelas tersebut. Tentukan akses ahli asal untuk *string colour* dan mengapa?]
[2 Marks/Markah]
- (d) Write a class with given names is StudentsClass. Within the class, write declaration for the following statements;
[Tuliskan satu kelas dengan nama StudentClass. Di dalam kelas tersebut, tuliskan pengistiharan untuk kenyataan berikut.]
[2 Marks/Markah]

- (e) Decide how to declare **TWO (2)** attributes in the class as private;
[Tentukan bagaimana untuk isytiharkan Isytiharkan DUA(2) pembolehubah di dalam kelas tersebut sebagai private.]
- i) Student name as string data type.
[Nama pelajar sebagai data jenis string.] [2 Marks/Markah]
- ii) Matric number as integer data type.
[Nombor matrik sebagai data jenis integer.] [2 Marks/Markah]
- (f) Decide how to declare **TWO (2)** methods in the class as public (write only the function declaration);
[Tentukan bagaimana untuk isytiharkan DUA kaedah di dalam kelas tersebut sebagai public (Hanya tuliskan pengistiharan fungsi).]
- i) Get student information with return type is void.
[Dapatkan informasi pelajar dengan jenis pulangan void.] [2 Marks/Markah]
- ii) Show student information with return type is void.
[Paparkan informasi pelajar dengan jenis pulangan void.] [2 Marks/Markah]

Question 4
[Soalan 4]

Given the source codes that create a Graphical User Interface (GUI) application by using *wxWidgets* library in **Figures 3(a), 3(b), 3(c) and 3(d)**. Answer the following questions:
[Diberi kod-kod sumber yang menghasilkan aplikasi grafik antaramuka pengguna dengan menggunakan perpustakaan *wxWidgets* dalam **Rajah 3(a), 3(b), 3(c) dan 3(d)**, jawab soalan-soalan berikut:]

```
#include <wx/wx.h>
#include <wx/menu.h>

class MyMenu : public wxFrame //Question 3(a)
{
public:
    MyMenu(const wxString& title);
    void OnQuit(wxCommandEvent& event);
    wxMenuBar *menubar;
    wxMenu *file;
};
```

Figure 3(a)
[Rajah 3(a)]

```
#include <wx/wx.h>

class NewApp : public wxApp
{
public:
    virtual bool OnInit();
};
```

Figure 3(b)
[Rajah 3(b)]

```
#include "main.h"
#include "menu.h"

IMPLEMENT_APP(MyApp)

bool NewApp::OnInit()
{
    MyMenu *menu = new MyMenu(wxT("This is my menu"));
    menu->Show(true);

    return true;
}
```

Figure 3(c)
[Rajah 3(c)]

```
#include "menu.h"

SubMenu::SubMenu(const wxString& title)
    : wxFrame(NULL, wxID_ANY, title, wxDefaultPosition,
wxSize(280, 180))
{
    menubar = new wxMenuBar;
    file = new wxMenu;

    file->Append(wxID_ANY, wxT("&New"));
    file->Append(wxID_ANY, wxT("&Open"));
    file->Append(wxID_ANY, wxT("&Save"));
    file->AppendSeparator();

    imp = new wxMenu;
    imp->Append(wxID_ANY, wxT("Import images..."));
    imp->Append(wxID_ANY, wxT("Import documents..."));
    imp->Append(wxID_ANY, wxT("Import audios..."));

    file->AppendSubMenu(imp, wxT("I&mport"));

    quit = new wxMenuItem(file, wxID_EXIT, wxT("&Quit\tCtrl+W"));
    file->Append(quit);

    menubar->Append(file, wxT("&File"));
    SetMenuBar(menubar);

    Connect(wxID_EXIT, wxEVT_COMMAND_MENU_SELECTED,
            wxCommandEventHandler(SubMenu::OnQuit));
    Centre();
}

void SubMenu::OnQuit(wxCommandEvent& WXUNUSED(event))
{
    Close(true);
}
```

Figure 3(d)
[Rajah 3(d)]

- (a) Given a statement class MyMenu : public wxFrame in **Figure 3(a)**, identify the base class and the derived class.
[Berdasarkan pernyataan class MyMenu : public wxFrame di dalam Rajah 3(a), kenalpasti kelas asas dan kelas yang diwarisi.]
(2 Marks/Markah)
- (b) Analyze the source codes and identify **FOUR (4)** classes from wxWidgets library that are used in this application.
[Analisa kod sumber yang diberikan dan kenalpasti EMPAT (4) kelas dari perpustakaan wxWidgets yang digunakan di dalam aplikasi ini.]
(4 Marks/Markah)
- (c) In your own words, Illustrate the meaning of source code in **Figure 3(b)**.
[Dengan ayat anda sendiri, terangkan maksud kod sumber di dalam Rajah 3(b).]
(4 Marks/Markah)
- (d) Redraw the output window of the GUI application.
[Lukiskan semula keluaran tettingkap aplikasi GUI itu.]
(10 Marks/Markah)

PART B

[Bahagian B]

Answer ONLY ONE (1) questions from this section.

[Jawab HANYA SATU (1) soalan daripada bahagian ini.]

Question 5

[Soalan 5]

Given the class definition of class **testClass** in **Figure 4**, answer the following questions.

[Diberikan definisi kelas untuk kelas **testClass** dalam **Rajah 4**, sila jawab soalan-soalan berikut.]

- (a) Produce a C++ statement that initializes the member variable **count** to 0.
[Hasilkan sebuah pernyataan C++ yang memberikan nilai awal kepada pembolehubah **count** kepada 0.]
(1 Mark/Markah)
- (b) Produce the definitions for all of the functions of the class **testClass** as described in the class definition.
[Hasilkan definisi untuk semua fungsi di dalam kelas **testClass** sebagaimana yang diberikan di dalam definisi kelas.]
(12 Marks/Markah)
- (c) Given that **myObject1** and **myObject2** are declared as **testClass** objects in the following statements.
[Diberikan **myObject1** dan **myObject2** diisytiharkan sebagai objek **testClass** di dalam pernyataan berikut]

```
myClass myObject1(5);
myClass myObject2(7);
```

Decide the output of the following C++ code.

[Jangkakan output daripada C++ kod yang berikut.]

(7 Marks/Markah)

```
myObject1.printX();
cout << endl;
myObject1.incrementCount();
myObject1.printCount();
cout << endl;
myObject2.printCount();
cout << endl;
myObject2.printX();
cout << endl;
myObject1.setX(14);
myObject1.incrementCount();
myObject1.printX();
cout << endl;
myObject1.printCount();
cout << endl;
myObject2.printCount();
cout << endl;
```

5.6
brand string

....11/-

```
class testClass
{
    public:
        void setX(int a);
        //Function to set the value of x.
        //Postcondition: x=a;
        void printX const();
        //Function to output x.
        static void printCount ();
        //Function to output count.
        static void incrementCount ();
        //Function to increment count by 1.
        //Postcondition: count++;
        testClass(int a=0);

    private :
        int x;
        static int count;
};
```

Figure 4
[Rajah 4]

Question 6
[Soalan 6]

Consider the class definition in Figure 5(a) and the definitions of the member functions in Figure 5(b).

[Pertimbangkan definisi kelas pada Rajah 5(a) dan definisi ahli fungsi di dalam Rajah 5(b).]

- (a) Identify the member access specifier status (**protected**, **private** and **public**) of variables k and j in **secondClass**.
[Kenalpasti status akses ("**protected**", "**private**" dan "**public**") untuk pembolehubah k dan j di dalam **secondClass**.]
(2 Marks/Markah)
- (b) Write the definition of the default constructor of **secondClass** so that the **private** member variables of **secondClass** are initialized to 2.
[Tulis definisi "default constructor" kepada kelas **secondClass** supaya ahli pembolehubah "**private**" kepada **secondClass** diberi nilai awalan 2.]
(1 Mark/Markah)
- (c) Produce a function definition for function **getAverage()** of class **secondClass** which calculates a variable $average = (j + k) / 2$. This function then returns the $average$ value.
[Hasilkan sebuah definisi fungsi untuk fungsi **getAverage()** dari kelas **secondClass** yang mengira pembolehubah " $average = (j+k)/2$ ". Fungsi ini kemudian mengembalikan nilai pembolehubah " $average$ ".]
(3 Marks/Markah)
- (d) By using part (c), produce statements to create an object **secondObject** of class **secondClass** in a main function and to call the function **getAverage()**.
[Dengan menggunakan bahagian (c), hasilkan pernyataan untuk membentuk sebuah objek **secondObject** dari kelas **secondClass** dan memanggil fungsi **getAverage()** di dalam sebuah fungsi **main**.]
(2 Marks/Markah)
- (e) Given the following statements in main function, Decide the output.
[Diberikan menggunakan pernyataan berikut di dalam fungsi "**main**", jangkakan outputnya.]
(10 Marks/Markah)

```
int main
{
    firstClass firstObject(7);
    thirdClass thirdObject (3,8);
    secondClass secondObject (2,5);
    firstObject.print();
    thirdObject.print();
    secondObject.print();
    cout << "****" << firstObject.getValueX() << endl;
    cout << "###" << thirdObject.getResult() << endl;
    secondObject.setValue(4,2);
    secondObject.print ();

    return 0;
}
```

...13/-

- (f) Assume that the function `print()` in `secondClass` is modified as shown in the following statement. Identify whether the statement is **invalid** or **valid**. If **invalid**, explain why. *[Anggap bahawa fungsi `print()` dalam kelas `secondClass` diubah sebagaimana ditunjukkan di dalam pernyataan berikut. Kenalpasti sama ada pernyataan berikut adalah sah atau tidak sah. Sekiranya tidak sah, terangkan kenapa.]*

```
void secondClass:: print() const
{
    firstClass firstObject(5);
    cout << "In second: x=" << firstObject.x << endl;
}
```

(2 Marks/Markah)

```
class firstClass
{
    public:
        void print() const;
        int getValueX() const;
        firstClass (int a=0);

    protected:
        int x;
};

class secondClass
{
    double k;
    double j;

    public:
        void print() const;
        double multiply() const;
        void setValue();
        secondClass (double, double);
};

class thirdClass:: public firstClass
{
    public:
        void print() const;
        int getResult() const;
        thirdClass (int a=0, int b=0);

    protected:
        int y;
};
```

Figure 5 (a)
[Rajah 5 (a)]

```
Void firstClass::print () const
{
cout<< "In first: x="<< x << endl;
}

secondClass::secondClass (double a, double b)
{
k = a;
j = b;
}

void secondClass::setValue (double a, double b)
{
k = a;
j = b;
}

firstClass::firstClass (int a)
{
x =a;
}

int firstClass::getValueX () const
{
return x;
}

void thirdClass::print() const
{
cout << "In third: x="<< x << ",y=" << y
<<"; x + y=" << x + y << endl;
}

void thirdClass:: getResult() const
{
return x + y;
}
```

Figure 5(b)
[Rajah 5(b)]

APPENDIX A

[Lampiran A]

Class definition

```
class newClass{  
//member variables  
//function prototypes  
//constructors  
};
```

Function definition

```
void newClass::newFunction()  
{  
//function's operations  
}
```