UNIVERSITI TUN HUSSEIN ONN MALAYSIA

PEPERIKSAAN AKHIR
SEMESTER II
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JANGKA MASA	:	2 JAM 30 MINIT
ARAHAN	:	JAWAB **SEMUA** SOALAN.

SECTION A

Instruction: State whether each of the following statements is **TRUE** or **FALSE**.

Q1 A class declaration describes an object, but does not create the object.

Q2 A C++ member function that uses a member variable, but does not change its value is called a mutator.

Q3 A subclass may become a super class, if another class is derived from it.

Q4 Data members or member functions declared with access spesifier `private` are accessible to member functions of the class in which they are declared.

Q5 A has-a relationship is implemented via inheritance.

Q6 A `protected` data member cannot be inherited to a subclass.

Q7 A class can have more than one destructor.

Q8 Objects, classes and other instances communicate with each other through message passing.

Q9 When a class is declared as a friend, the friend class has access to the `private` data of the class that made it a friend.

Q10 Dot operator (.) must be used to define a member function outside the class.

(10 marks)

SECTION B

Instruction: Fill in the blanks with the **CORRECT** answers.

Q11 Based on the following class declaration:

```
class Animal : public Herbivor
```

The base class is _____ while _____ is the derived class.

(2 marks)

Q12 _____ allows us to create new classes based on existing classes.

(1 mark)

Q13 A member function that is declared _____ cannot use the `this` pointer.

(1 mark)

Q14 To handle an exception, a program must have a _____ or _____construct.

(2 marks)

Q15 _____ is the process of discovering errors in a program.

(1 mark)

Q16 Exception class object can pass data to _____ via data members.

(1 mark)

Q17 Test cases for _____ are derived from specification of the program while test cases for _____ are derived from the implementation of the program.

(2 marks)

SECTION C
Instruction: Answer **ALL** questions.

Q18 Give a definition for each of the following terms:

(a) Object-oriented analysis

(2 marks)

(b) Encapsulation

(2 marks)

Q19 Write a correct code segment based on the following statement:

(a) Determine whether the variable of `count` is greater than 10. If it is, print `"Count is greater than 10"`.

(2 marks)

(b) `Reptilia` class inherits attributes and functions from `Animal` class.

(2 marks)

(c) `OldFrClass` is a friend of `FrClass`.

(4 marks)

(d) A default constructor for `Circle` class that will initialize value for `private` data member `radius` to zero.

(6 marks)

Q20 Answer the following questions based on the class definition in **Figure Q20**.

```
class Car
{
private:
      int year;
      int speed;
public:
      void accelerate();
      void brake();
};
```

Figure Q20

(a) Write the implementation of `accelerate()` as an outline function which should add `10` to the `speed` data member.

(3 marks)

(b) Write the implementation of `brake()` as an outline function which should minus `10` from the `speed` data member.

(3 marks)

Q21 The following program contains several errors.

```
1     class DumbBell;
2     {
3        int weight;
4     public:
5        void setWeight (int);
6     };
7     void setWeight (int w)
8     { weight = w;}
9
10    int main()
11    {  DumbBell bar;
12
13    DumbBell.setWeight(200);
14    cout << "The weight is " << bar.weight() << endl;
15    return 0;
16    }
```

Figure Q21

(a) Design a test plan to identify the errors shown in **Figure Q21**.

(5 marks)

(b) Fix the error by rewriting the whole program based on your answer in **Q21 (a)**.

(5 marks)

Q22 Answer the following questions based on the class definition in **Figure Q22**.

```
class Thing{
    private:
      int x;
      int y;
      static int z;
    public:
      Thing()
        { x = y = z; }
      static void putThing(int a)
        {  z = a; }
};
int Thing:: z = 0;
```

Figure Q22

(a) Create **THREE (3)** objects for class `Thing` defined in **Figure Q22**.

(3 marks)

(b) Based on objects of class `Thing` created in **Q22 (a)**, write **THREE (3)** statement how the objects could access members from the class.

(3 marks)

(c) What value will be stored in the `x` and `y` members of each object?

(2 marks)

(d) Write **ONE (1)** statement that will call the `putThing` member function before the `Thing` objects are defined.

(2 marks)

Q23 Give the output of the program in **Figure Q23**.

```
#include <iostream.h>
class parent
      {
      int i,j;
      public:
            void set(int a, int b )
            {
               i = a;
               j = b;
               cout <<"Swaping values between i,a and j,b\n";
            }
            void show()
            {  cout <<i<<" "<<j<<"\n";}

            void add()
                  {  cout <<"i = "<< i + j<<"\n";}
      };

      class child : public  parent
      { int k;
      public:
      child (int x)
      {   k = x;
          cout<<" An object for child class is created\n";
      }
      ~child()
      {   cout<<" Now, an object for derived class is destroyed\n";}

      void showk()
      {   cout << k << "\n"; }
      };

      int main()
      {     child Aone(3);
            Aone.set(1,2);
            Aone.show();
            Aone.showk();
            Aone.add();
            return 0;
      }
```

Figure Q21

(6 marks)

SECTION D
Instruction: Answer **ALL** questions.

Q24 Based on the following problem statement:

```
Design a class for a widget manufacturing plant. Assumming that 10
widgets may be produced each hour, the class object will calculate how
many days it will take to produce any number of widgets. The plant
operate two shifts of eight hours each per day.
```

(a) Draw a UML class diagram.

(10 marks)

(b) Based on your answer in **Q24 (a)**, write a C++ program that asks the user the number of widgets that have been ordered and then display the number of days it will take to produce them.

(20 marks)

BAHAGIAN A

Arahan: Nyatakan samada setiap penyataan berikut **BETUL** atau **SALAH.**

S1 Pengistiharan sebuah kelas memperihalkan secara umum sesuatu objek, tetapi ia tidak mencipta objek berkenaan.

S2 *Member function* di dalam C++ yang hanya menggunakan pembolehubah tanpa mengubah nilai dinamakan *mutator*.

S3 Sebuah *sub*-kelas boleh menjadi *super*-kelas apabila terdapat kelas lain yang diwarisi daripadanya.

S4 *Data member* atau *member functions* yang diistiharkan menggunakan *access spesifier* `private` boleh dipanggil secara terus oleh *member functions* yang berada di dalam kelas yang sama.

S5 Konsep perwarisan menggunakan pendekatan hubungan ia-ada (*has-a relationship*).

S6 Data berjenis `protected` tidak boleh diwarisi oleh *sub*-kelas.

S7 Sebuah kelas boleh memiliki lebih daripada satu pemusnah (*destructor*).

S8 Objek, kelas-kelas dan *instances* yang lain berinteraksi di antara satu sama lain melalui hantaran mesej.

S9 Apabila sebuah kelas telah diistiharkan sebagai kawan (*friend*), kelas kawan tersebut boleh membuat capaian secara terus terhadap data `private` yang berada di dalam kelas yang menjadi kawannya.

S10 Operator titik (.) mesti digunakan untuk mentakrifkan *member function* di luar kelas.

(10 markah)

BAHAGIAN B

Arahan: Isikan tempat kosong dengan jawapan yang **BETUL**.

S11 Berdasarkan pengisytiharan kelas berikut:

```
class Animal : public Herbivor
```

Kelas asas adalah _____ manakala _____ merupakan kelas yang mewarisi.

(2 markah)

S12 _____ membenarkan kita mencipta kelas baru daripada kelas yang sedia ada.

(1 markah)

S13 Sebuah member function yang diistiharkan sebagai _____ tidak boleh menggunakan penunjuk `this` (`this` *pointer*).

(1 markah)

S14 Untuk menangani ralat (*handle exception*), program mesti mempunyai *contruct* _____ atau _____.

(2 markah)

S15 _____ merupakan proses mengenalpasti ralat di dalam program.

(1 markah)

S16 Objek dari *Exception class* boleh menghantar data kepada _____ melalui *data members*.

(1 markah)

S17 Kes pengujian untuk _____, diperolehi daripada spesifikasi program manakala kes pengujian untuk _____ diperolehi daripada pengimplementasian program.

(2 markah)

BAHAGIAN C
Arahan: Jawab **SEMUA** soalan.

S18 Berikan definisi untuk setiap istilah yang dinyatakan berikut:

(a) Analisis berorientasikan objek

(2 markah)

(b) Pengkapsulan

(2 markah)

S19 Tuliskan keratan kod yang betul berdasarkan penyataan berikut:

(a) Kenalpasti sama ada pembolehubah `count` lebih besar dari 10. Jika benar, paparkan pernyataan `"Count is greater than 10"`.

(2 markah)

(b) Kelas `Reptilia` mewarisi ciri-ciri dan fungsi-fungsi daripada kelas `Haiwan`.

(2 markah)

(c) `OldFrClass` adalah kawan (*friend*) kepada `FrClass`.

(4 markah)

(d) *Default constructor* untuk kelas `Circle` yang akan memberi nilai awalan kepada `private` *data member* `radius` kepada `sifar`.

(6 markah)

S20 Jawab soalan berikut berdasarkan takrifan kelas dalam **Rajah S20**.

```
class Car
{
private:
      int year;
      int speed;
public:
      void accelerate();
      void brake();
};
```

Rajah S20

(a) Tuliskan implementasi bagi `accelerate()` sebagai *outline function* yang menambah nilai `10` kepada pembolehubah `speed`.

(3 markah)

(b) Tuliskan implementasi bagi `brake()` sebagai *outline function* yang menolak `10` daripada pembolehubah `speed`.

(3 markah)

S21 Aturcara berikut mengandungi beberapa ralat sintaks.

```
1     class DumbBell;
2     {
3       int weight;
4     public:
5       void setWeight (int);
6     };
7     void setWeight (int w)
8     { weight = w;}
9
10    int main()
11    {  DumbBell bar;
12
13    DumbBell.setWeight(200);
14    cout << "The weight is " << bar.weight() << endl;
15    return 0;
}
```

Rajah S20

(a) Bina satu perancangan pengujian bagi mengenalpasti ralat-ralat yang dipaparkan dalam **Rajah S20**.

(5 markah)

(b) Perbaiki semua ralat dengan menulis semula aturcara berdasarkan jawapan anda dalam **S20 (a).**

(5 markah)

S22 Jawab soalan berikut berdasarkan takrifan kelas dalam **Rajah S22.**

```
class CheckPoint{
      private: int a;
      protected: int b;
      public: int c;
      ....
}
class Quiz : private CheckPoint {
      private: int d;
      protected: int e;
      ....
};
class Test : public CheckPoint {
      private: int f;
      ....
};
```

Rajah S22

(a) Bina **TIGA (3)** objek bagi kelas `Thing` yang dibangunkan dalam **Rajah S22.**

(3 markah)

(b) Berdasarkan objek-objek bagi kelas `Thing` yang telah dibina di **S22 (a)**, tuliskan **TIGA (3)** penyataan yang menunjukkan bagaimana objek-objek tersebut boleh mencapai ahli kelasnya.

(3 markah)

(c) Apakah nilai yang disimpan dalam `x` dan `y` bagi setiap objek?

(2 markah)

(d) Tuliskan **SATU (1)** penyataan yang akan memanggil fungsi `putThing` sebelum objek-objek `Thing` ditakrifkan.

(2 markah)

S23 Berikan output bagi aturcara dalam **Rajah S23**.

```
#include <iostream.h>
class parent
      {
      int i,j;
      public:
            void set(int a, int b )
            {
               i = a;
               j = b;
               cout <<"Swaping values between i,a and j,b\n";
            }
            void show()
            {  cout <<i<<" "<<j<<"\n";}

            void add()
                  {  cout <<"i = "<< i + j<<"\n";}
      };

      class child : public  parent
      { int k;
      public:
      child (int x)
      {   k = x;
          cout<<" An object for child class is created\n";
      }
      ~child()
      {   cout<<" Now, an object for derived class is destroyed\n";}

      void showk()
      {   cout << k << "\n"; }
      };

      int main()
      {     child Aone(3);
            Aone.set(1,2);
            Aone.show();
            Aone.showk();
            Aone.add();
            return 0;
      }
```

Rajah S23

(6 markah)

BAHAGIAN D
Arahan: Jawab **SEMUA** soalan.

S24 Berdasarkan penyataan masalah berikut:

Reka bentuk satu kelas untuk satu kilang pembuatan *widget*. Andaikan bahawa 10 *widget* boleh dihasilkan pada setiap jam, objek kelas itu akan menghitung bilangan hari yang diperlukan bagi menghasilkan beberapa jumlah *widget*. Kilang itu beroperasi secara dua syif dalam masa lapan jam setiap sehari.

(a) Lukiskan rajah kelas UML.

(10 markah)

(b) Berdasarkan jawapan dalam **S24 (a)**, tulis satu aturcara C++ yang meminta pengguna untuk memasukkan bilangan *widget* yang dipesan dan kemudian memaparkan bilangan hari yang diperlukan untuk menghasilkan *widget* tersebut.

(20 markah)