Antonios

Ministry of Higher Education
Modern University for Technology and Information
Faculty of Computers and Information

QUESTIONS FOR THE MID-TERM EXAMINATION

Subject:	Object Oriented Programming I (CS231)	**Ac. Year:**	2017/2018
Examiner:	Prof. M. H. ASSAL	**Duration:**	1.5 Hours
Date:	Oct. 2017	**Semester:**	Fall

Attempt all questions **No. of Questions:** 3 **No. of Pages:** 1

Question 1:

Write a C++ Program to do the following:

- Read the values of 200 unsigned integers (4 Bytes), representing pixels of a full color image segment in ARGB format (Alpha, Red, Green, and Blue). Each color has a range of values from 0 to 255.
- Create three arrays of 200 characters for Red Color, Green Color and Blue Color from the previous segment.
- The program then prints the extracted arrays elements in hexadecimal format.

Question 2:

a) Construct the class Student with following member elements:

ID	(of type int)
Name	(of type char)
Address	(of type char)
Weight	(of type float)
Height	(of type float)
Gender	(of type char)

b) Write a function ***GoodShape*** which checks the ideal body shape of an object of type Student according the following:

- *if* Weight+10 < Height -65 *then* function returns "Over Weight"
- *if* Weight > Height-90 *then* function returns "Under Weight"
- *if* Weight-5 <= Height -80 *then* function returns "Ideal Weight"

Then it is required to show how this function can be called from a main program

main()
{
Call
address

Question 3:

Write a C++ function that receive a stack of characters then it is required to remove the character 'a' if exist.

Show how you can call it from the main function and print its contents.

```
remove (*stack S)
stack temp; char c
while ( empty(&S) == False)
{  char c = Pop(&S)
   if (if c != "a")
      Push (&temp, &tem)
}
```

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QUESTIONS FOR THE MID-TERM EXAMINATION

SUBJECT:	**Object Oriented Programming I**	***Ac. Year: 2016 / 2017***
Examiner:	***Dr. M. H. ASSAL***	***Time: 1.5 hours***
Date:	***9 / 11 / 2016***	***Fall Semester***

Attempt all questions	No. of questions: 2	No. of pages: 1

Question 1:

It is required to read the values of 300 bytes, representing pixels of an image segment (each pixel has a value from 0 to 15) and to back each 2 pixels into one byte of an array of 150 characters. The program then prints the packed array elements in hexadecimal format and determines if the number of bits having value 1 in each element is even or odd.

Question 2: What value gets printed by the following C++ program

```
void Myst (int a, int &b) {
        a *= b;
        b = 2 + a;
}
void main() {
        int u = 2;
        int v = 3;
        cout << u << " " << v << endl;
        Myst(u, v);
        cout << u << " " << v << endl;
}
```

Question 3:

a) Construct the following classes:

Employee with following member elements:

ID	(of type int)
Name	(of type char)
Phone	(of type char)
Salary	(of type float)

b) Write stack class whose elements are objects of type **Employee** and write the *Push* and *Pop* functions only.

c) Write the main function that use the implemented stack to take the data for a number of **Employees** and insert them into an object of this stack.

d) Show how the stack can be used to print the inserted **Employees in the order** the user inputs them.

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QUESTIONS FOR THE MID-TERM EXAMINATION

SUBJECT: **Object Oriented Programming I** *Ac. Year: 2013 / 2014*
Examiner : Dr. M. H. ASSAL *Time: 1.25 hours*
Date: 10 / 11 / 2013 *Fall Semester*

Attempt all questions	No. of questions: 2	No. of pages: 1

Write a program to control a set of **8** motors; the motors are operating under load balancing mechanism as follows:

a) Motors operate in **pairs** (i.e. 1,2 then 3,4 ... 7,8 in a cycle).
b) The operating duration for each pair is **10 seconds.**
c) After each operating cycle, all motors must be OFF for 10 Seconds then a new cycle starts.
d) The operating sequence are running 24/7.

It is required to print the motors status in each operating duration.

Question 2:

a) Construct the following classes:

Employee with following member elements:

ID	(of type int)
Name	(of type char)
Phone	(of type char)
Salary	(of type float)

b) Write a function ***Allowance*** which increases the salary of an object of type **Employee** by 10%. The 10% allowance must not exceed 200 pounds. Then it is required to show how this function can be called from the main program.

c) Write stack class whose elements are objects of type **Employee** and write the *Push* and *Reset* functions only.

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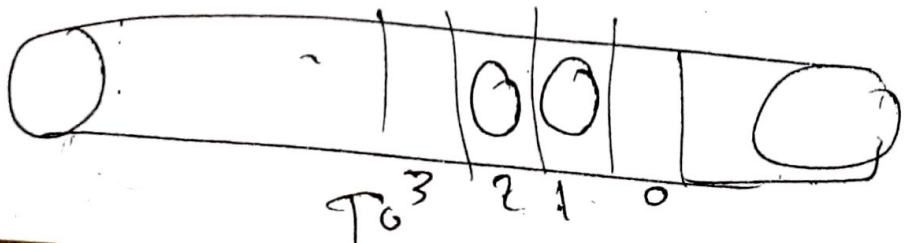

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QUESTIONS FOR THE MID-TERM EXAMINATION

SUBJECT: **Object Oriented Programming I (CS231)** ***Ac. Year: 2014 / 2015***
Examiner: Dr. M. H. ASSAL ***Time: 1.5 hours***
Date: 11 / 11 / 2014 ***Fall Semester***

Attempt all questions	No. of questions:3	No. of pages: 2

1) Write a program to read an integer number (32 bits) from program user then it is required to:

a) Unpack the integer number into Four bytes
b) Count number of 0's in this integer.
c) Set bits 7,12 and Reset bits 3,10

Print the values in each case.

2) What value gets printed by the program?

a)
```
int foo(int y);

int main() {
    int x = 3;
    int y = 6;

    cout << x << " " << y << endl;
    cout << foo(x) << endl;

    return 0;
}

int foo(int x) {
     return x+1;
}
```

x = 3
y = 6
x << " " << y << endl
cout << foo (x) << endl;
0

b)
```
void Myst (int a, int &b) {
    a *= b;
    b = 2 + a;
}
void main() {
    int u = 2;
    int v = 3;
    cout << u << " " << v << endl;
    Myst(u, v);
    cout << u << " " << v << endl;
}
```

Modern University for Technology & Information
Faculty of Computers & Information

Academic year: 2016/2017
Semester: Fall 2016

Course: (CS-213) Object Oriented Programming I
Examiner: Prof. Dr. Mohamed Anwar Assal

Time: 3 hours

Questions for Final Written Examination

Number of Questions: 6 | Number of Pages: 2

Question 1: (6 Marks)

a) Describe the difference between Shallow copy and Deep copy in object oriented programming languages. **(2 Marks)**

b) Define the following: **(4 Marks)**

- Class, Base Class and Derived Class.
- Function & Operator Overloading.
- Member & Friend Functions.
- Scope Resolution Operator

Question 2: (6 Marks)

Determine the programming errors (syntax or semantic) in the following C++ code snippets:

a) **(3 Marks)**

```
class Mammal {
    public:
        void Mammal(int age);
        ~Mammal(bool disposed);
    protected:
        int _age;
}
```

b) **(3 Marks)**

```
float 3product(float a, float b) {
        double result = a * b * c;
        return result;
}
```

Question 3: (6 Marks)

Show how you can overload the + operator to add two objects of type matrix. The Matrix dimension must be created dynamically during runtime. Assume that the matrix elements are stored in the memory column-wise. **(6 Marks)**

Hint: if the matrix dimension is 2x3, the matrix elements will be stored in the memory as an array of 6 elements as follows:

Element: 0,0	Element: 1,0	Element: 0,1	Element: 1,1	Element: 0,2	Element: 1,2
Elements of the 1st column		Elements of the 2nd column		Elements of the 3rd column	

Question 4: (12 Marks)

a) Construct the following classes: **(2 Marks)**

Worker with following member elements:

ID	(of type int)
Name	(of type char)
Address	(of type char)
Salary	(of type int)
Weight	(of type float)

Engineer with following member elements:

ID	(of type int)
Name	(of type char)
Address	(of type char)
Salary	(of type int)
Mobile	(of type char)

b) Write a program that reads the data for an unknown number of Employees in a linked list. The Employee may be either an Engineer or a Worker *(Classes constructed in a)*. **(10 Marks)**

It is required to count the total number of Employees and to print the average salary for the engineers.

Question 5: (10 Marks)

Consider a Temperature Control Project, in which a microcontroller is used to communicate with a temperature sensor. The temperature sensor uses 1-wire protocol to send the temperature value represented in 16 bits binary format (one bit every one second). **(10 Marks)**

The procedure to read the temperature is performed as follows:

1. The Microcontroller sends the 8 bits READ_TEMP command (10110011) to the sensor (one bit every one second).
2. When the READ_TEMP command is received by the sensor, it will keep the bus high (1) until the temperature data becomes available.
3. The Microcontroller must waits until the bus become low by the temperature sensor (i.e. temperature data is ready).
4. The Microcontroller starts to read the temperature, which is prepared by the sensor in 2 bytes.

Write the C++ Program to print the temperature every 1 minute. Also it is required to display a warning message if the temperature is higher than 32 degree Celsius.

Hint: use the following functions to communicate with the sensor:

- bool ReadBitFromSensor(void)
- void WriteBitToSensor(bool b)

Question 6: (10 Marks)

a) Create a class called *Date* that includes the Date components (*day*, *month* and *year*). **(4 Marks)**
Your class should have the following features:

- A constructor that initialize the date components and check that the values provided for them are valid.
- Provide a set and a get functions for each date components.
- Provide a member function *DisplayDate* that displays the month, day and year separated by forward slashes (/).

Write your own C++ test program that demonstrates the capabilities of class Date.

b) Using the *Date* Class *(constructed in a)* to show how the operator +, ++ & += can be overloaded to perform the following: **(6 Marks)**

- Plus Operator (+) for the addition of two Dates.
- Postfix Unary Operator (++) that increment the current date.
- Unary Operator (+=) that adds days to the current date.

You must insure that the date is valid after each operation.

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Modern University for Technology & Information
Faculty: Computer Science
Course: (CS-213) Object Oriented Programming I
Examiner: Prof. Dr. Mohamed Anwar Assal

Academic year: 2015/2016
Semester: Fall 2015
Specialization: Computer Science
Time: 3 hours

Questions for Final Written Examination

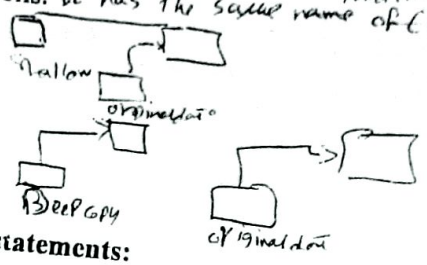
Number of Questions: 5

Number of Pages: 2

Question 1: (8 Marks)

Define the following:

- Constructor & Destructor functions.
- Shallow and Deep copy
- Encapsulation & Data Hiding.
- Tree and Multiple Inheritances.



Question 2: (6 Marks)

Find the error(s) in the following statements:

a)
```
class Human {
    public:
        // function prototypes
        int Human(int height, int weight);
    private:
        int Weight = 0;
        int Height = 0;
};
```
(2 Marks)

b)
```
void product() {
    int a, b, result;
    cin >> a >> b >> c;
    result = a * b * c;
    cout << "Result is " << result;
    return result;
}
```
(2 Marks)

c)
```
double x = 19.34;
double xPtr = x;
cout << xPtr << endl;
```
(2 Marks)

Question 3: (8 Marks)

a) Write a C++ Program to do the following:

- Read the values of 200 unsigned integers (4 Bytes), representing pixels of a full color image segment in ARGB format (Alpha, Red, Green, and Blue). Each color has a range of values from 0 to 255. **(6 Marks)**
- Create three arrays of 200 characters for Red Color, Green Color and Blue Color from the previous segment.
- The program then prints the extracted arrays elements in hexadecimal format.

Write the required code to declare an array of size 200 locations. Each location has 10 bits only. **(2 Marks)**

Question 4: (18 Marks)

a) Construct the following classes: **(4 Marks)**

Car with following member elements:

int	ID	(of type int)
int	Wheels	(of type int)
double	Weight	(of type double)
char	Type	(of type char)

Truck with following member elements:

int	ID	(of type int)
int	Length	(of type int)
int	Weight	(of type int)
double	Payload	(of type double)

b) Write stack class whose elements are objects of type **Vehicle**. The Vehicle may be either a **Car** or a **Truck** *(Classes constructed in a)*. **(6 Marks)**

The stack class functions (push, pop, reset, empty and full) are to be designed as member functions.

c) Write a program that reads the data for an unknown number of **vehicles** in a linked list. It is required to count the number of **cars** and number of **trucks** and the total number of vehicles and to print the average weight for the vehicles. **(8 Marks)**

Question 5: (10 Marks)

a) Create a class **Fraction**, which represent a fraction number with integer numerator and non-zero denominator e.g. **(4 Marks)**

$$\frac{4}{7} \quad \frac{(\text{numerator})}{(\text{denominator})}$$

Create a constructor that prevents a 0 denominator in a fraction, and avoids negative denominators.

b) Show how the operator +, - & * can be overloaded to perform the following: **(6 Marks)**

- Plus Operator (+) for the addition of two fractions.
- Minus Operator (-) for the subtraction of two fractions.
- Multiplication Operator (*) for multiply two fractions.

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