VNUHCM-UNIVESRITY OF SCICENCE

FINAL EXAMNINATION

Semester I – Academic year 2022-2023

ARCHIVE CODE
(written by ET&QA Office)

Course name:	**Object Oriented Programming**	**Course code:**	
Time:	**90 minutes**	Date:	

Note: *Students are allowed to use ONE HAND-WRITTEN A4 PAGE during the examination*

Full name of Student: ….....**Student ID:** ……..… **No**: …...

Question 1 (1 point)

Choose the correct statement about "abstract class" in C++:

a) We can create an object from abstract class.

b) We cannot create an object from abstract class.

c) We cannot inherit from abstract class.

d) Both b and c are correct.

Question 2 (1 point)

Explain the difference between overloading and overriding in C++.

Question 3 (3 points)

```
01: #include <iostream>
02: #include <cstring>
03:
04: struct Base {
05:   Base(const char *s) { m_str = strdup(s); }
06:   Base(const Base &b) { m_str = strdup(b.m_str); }
07:   ~Base() {
08:     std::cout << "~" << m_str << "\n";
09:     delete []m_str;
10:   }
11:   Base & operator =(const Base &b) {
12:     std::cout << m_str << " = " << b.m_str << "\n";
13:     Base tmp(b);
14:     std::swap(m_str, tmp.m_str);
15:     return *this;
16:   }
17: private:
18:   char *m_str;
19: };
20:
```

```
21: struct Derive: public Base {
22:   Derive(const char *s): Base(s) {}
23: };
24: int main() {
25:   Derive d1("hello");
26:   Derive d2("world");
27:   d1 = d1;            // Assign to itself.
28:   d2 = d1;
29: }
```

a) What does the above program print to the screen?

b) Does the above program have memory leak problem? Explain why or why not.

Question 4 (5 points)

xFTech is a sport technology company. To prepare for FIFA Worldcup 2022, xFTech is planning to develop a program for managing football teams. Each football team has a name, a year of establishment, the main head-quarter's address, and the name of the team's home stadium. Each team has many players. The information of each player consists of a name, a date of birth, a gender, and a list of roles that the player is able to play.

In total, there are 8 roles of player: Goalkeeper (GK), Centre Back (CB), Left Back (LB), Right Back (RB), Central Midfielder (CM), Left Midfielder (LM), Right Midfielder (RM) and Striker (ST). A player is able to play more than one role on the field but has only one primary role. For example, Messi can play as a ST or a CM, even sometimes as a LM or RM but his primary role is ST.

Each role has a name and a base salary per minute. The base salaries per minute of the roles are as follow:

Role	Base salary per minute
GK	300
CB	520
LB	500
RB	500
CM	580
LM	500
RM	500
ST	600

The playing time at each role of a player are also recored.

The salary a player get at each role (role salary) is determined by the following formulas:

- For primary role, role salary = role playing time * role base salary per minute * 1.2.
- For additional role, role salary = role playing time * role base salary per minute.

The total salary of a player = sum of role salaries.

A C++ program does the followings:

- Enter from keyboard a football team, its players and their roles.
- Calculate the amount of money the team pays its players.

Apply encapsulations, inheritance and polymorphism in object oriented programming to do the followings:

a) Draw UML class diagram for the above program.

b) Implement the program based on class diagram in a).

-THE END-