**西南大学计算机与信息科学学院（软件学院）**

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**《面向对象程序设计(C++)》课程试题【A】卷**

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| **2022～2023学年 第1学期** | | | | | | | | | | | **期****末考试** | | |
| **考试时间** | | **120分钟** | | **考核方式** | | **案例分析** | | | **学生类别** | | **本科** | **人数** | **130** |
| **适用专业或科类** | | | | **计算机科学与技术（中外）** | | | | | | | **年级** | **2021级** | |
| **题号** | **一** | | **二** | **三** | **四** | | **五** | **六** | | **七** | **八** | **九** | **合计** |
| **得分** |  | |  |  |  | |  |  | |  |  |  |  |
| **签名** |  | |  |  |  | |  |  | |  |  |  |  |

**阅卷须知：阅卷用红色墨水笔书写，得分用阿拉伯数字写在每小题题号前，用正分表示，不得分则在题号前写0；大题得分登录在对应的分数框内；统一命题的课程应集体阅卷，流水作业；阅卷后要进行复核，发现漏评、漏记或总分统计错误应及时更正；对评定分数或统分记录进行修改时，修改人必须签名。**

**特别提醒：学生必须遵守课程考核纪律，违规者将受到严肃处**

**编程题（总分100分）**

Write a program to achieve the following functions, analyze and design some classes and draw class diagrams, select two key algorithms and draw program flow charts for them;

1. A collection station conducts nucleic acid collection, divides the people into two categories, ordinary person and police officer. And designs a class, which randomly generates the number of people coming per minute, and randomly generates information such as the ID number, age, gender, police number (only available to the police) of the person, and completes the following requirements:

1). The number of people coming to the collection station per minute is (10-50 people);

2). Randomly generate ordinary personnel or police officers;

3). Randomly generate the person information, ID number is 100000-200000, police number is 1000-2000, age is 1-150 years old, gender is "male" or "female";

2. The collection station can adjust the number of detection points in real time according to the number of real-time personnel, and the rules are as follows:

1). The collection station begins to have one ordinary collection point and one dedicated police collection point, and the initial number of queuing is 0;

2). Assume that the acquisition speed is 5 people per minute for each collection point.

3). Each person generated will be assigned a collection point, that is, ordinary personnel will be assigned ordinary collection points, and police will allocate special police collection points;

4). The simulation time length is 30 minutes (it can be expressed as 30 cycles in the program);

5). Output the information of queuing personnel at each collection point on the screen every minute;

6). STL can be used;

7). Complete the program coding and debugging to ensure that the program runs normally and is interactive friendly.

8). Fully consider the correctness, robustness, reusability and other issues of the program.

3. Optional: The maximum number of people queuing at ordinary collection points is 10, and the number of queuing at dedicated police collection points is unlimited. When the number of people queuing at all ordinary collection points exceeds the set value of 10, one ordinary collection point is added. For each person generated, collection points are assigned, that is, ordinary personnel are given priority to ordinary collection points with the smallest number of queues, and the police are assigned special police collection points.