National University of Computer and Emerging Sciences, Lahore Campus

Course:	Object Oriented Programming Lab	Course Code:	CL-217
Program:	BS (Computer Science)	Semester:	Spring 2021
Duration:	2 Hour 30 Minutes + 20 minutes	Total Marks:	100
Paper Date:	26-Jun-21	Weight	60 %
Section:	2A, 2B, 2C & 2D	Page(s):	2
Exam:	Lab Final	Roll No.	

Instruction/Notes:

- You have to complete exam in 2 hrs 30 minutes. An extra 20 minutes are for submission.
- For Q1, create a folder named by your Roll number in the format 19L-9085 which should contain Matrix.cpp, Matrix.h and Driver.cpp. Submission Path is \\cactus\Xeon\Spring 2021\Object Oriented Programming Lab\Final\BCS-2X\Q1. (X is your section name.)
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The main function for Question # 1 is provided. The main function for Question # 2 and a skeleton of classes is also provided on this path:
\\cactus\Xeon\Spring 2021\Object Oriented Programming Lab\Final\Helping Material

Question No. 01: **Marks: 40**

Any company needs employees to complete the ongoing projects and also needs an HR system that manages the recruited employees. "HR Management System" is an information system that deals with the human resources of an organization. It is designed to manage the computerized human resources (HR) processes of the organization.

The ***organization*** (ID, name, location) contains employees and can track information on ***employees***, like their ID, name, full name, age, salary, education, no of leaves.

HR is also an ***employee*** of the organization but not an ***ordinary employee***. Ordinary Employees can be ***Full Time Employee*** or a ***Part Time Employee***. HR can **recruit ordinary employee, approve leave, reject leave** of ordinary employees in this way having additional data members; **no of employees recruited, no of leaves rejected, no of leaves approved** while ***ordinary employee*** has an additional data member; **date of joining**. A Full time Employee can apply leave (once applied, total leaves count will be negated by one) but a part-time employee cannot apply for leaves. If a part-time employee applies for leave, you can generate a suitable error message.

The print function of your HR management system prints the job status of the employee i-e: HR or ordinary. In case of ordinary, it must also tell if the employee is part-time or full-time employee. For all ordinary employees or HR your print function prints unique message and necessary information of entity whose print is being called.

- Identify all the classes (which is base or derived of which class in comments) and implement their suitable structure and functionality.
- You have to implement setter and getters of all members of all classes.
- Default, Overloaded, copy constructors as well as destructors of all the classes.
- A print function that should be in all classes.
- You can use int and char data types only to create your whole system.

Question No. 02: **Marks: 60**

To achieve more productivity and schedule tasks better, people like to use Planner. Whenever one has a new engagement or task (say Y) for a day X, Hour A; they check in their planner to see if task Y can be scheduled on Day X at. In this question, you have to implement a similar system. You are provided with a

class "Task", "Day", "CalanderOfMonth" and main function. Task class holds the information about a task. Each Hour can have none or one task scheduled in it.
Day can be considered to be a page on planner. Each working day will have 12 hours (8 am to 8 pm) and tasks can only be scheduled in these 12 hours.
You have to implement following 3 functions:

1. void AddTask (int day, float Hour, Task T);
2. void ScheduleTask (int day, float Hour, Task T);
3. void printCalender();

1. ***AddTask*** function will receive the date in form of day and month, the desired hour and the task to schedule. You have to add task to the provided date and hour if possible. You have to handle the following exceptions in this functions
   - If the said day is invalid for the month
   - If hour is invalid.
   - If the task is already added on the same date and hour.
2. ***ScheduleTask*** will also receive the same parameters as AddTask. However, in ScheduleTask, if the said date and time are not available for scheduling, find the closest possible slot for this task and schedule it there.
3. ***printCalender***() will print all information stored in Calendar so far.

Implement any other necessary function so that the main runs perfectly. Make sure there is no memory leak in your solution.

Required Output for provided main:

```
Exception: The task cannot be assigned before 8:00 am, because I need to sleep.
You task is assigned successfully.
You task is assigned successfully.

Printing Calendar:
25-6-2021 at 20.00 ==> You have to "Prepare the DLD Exam" on meet.google.com
26-6-2021 at 14.00 ==> You have to "Get ready to go university"
Exception: The task is already assigned on this date and slot.
26-6-2021 at 14.00 ==> You have to "Get ready to go university"

You task is assigned successfully on this slot: 26-6-2021 hour-15.00.
Exception: The task cannot be assigned after 8:00 pm, because I need to sleep.
Exception: The day is invalid

Printing Calendar:
25-6-2021 at 20.00 ==> You have to "Prepare the DLD Exam" on meet.google.com
26-6-2021 at 14.00 ==> You have to "Get ready to go university"
26-6-2021 at 15.00 ==> You have to "Prepare the OOP Exam"

You task is assigned successfully.

Printing Calendar:
25-6-2021 at 20.00 ==> You have to "Prepare the DLD Exam" on meet.google.com
26-6-2021 at 9.00 ==> You have to "Check ID Card and calculator in my bag."
26-6-2021 at 14.00 ==> You have to "Get ready to go university"
26-6-2021 at 15.00 ==> You have to "Prepare the OOP Exam"
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