CSL213 Data Structure and Program Design – I

Lab Assignment (Announcement: 24th October, 2019)

Due Date : 5th November, 2019 (By 12.00 noon)

For batch – RZ

Notes

1. You can choose to do the assignment in a group of 2 students. If done in a group, both students should be from the same practical batch.
2. No late submission will be allowed.
3. No copying/sharing the code across the groups. If found copied, NO marks will be awarded to the assignment for all such groups including original authors.
4. Evaluation will be done during 5th November to 11th November, 2019. Please make sure that you attend your lab hours during this week. For some batches, the evaluation may take place at scheduled time other than lab hours as will be announced.
5. You need to submit your source files by
   - Attaching these files in a mail by sending the mail to dspd.assignment@gmail.com

   Please attach only *.c, *.h files (and other i/p text files if any). NO *.objs and *.exe to be attached.
6. Please mark your subject line as *DSPD-1-Assignment: Your Enrollment numbers.*

Hostel Management System:

In an Engineering Institute campus, the hostels are filled once in an academic year at the beginning of the session. Each hostel is four storied. Ground floor is occupied by 1st year students only. Rest of the floors may be occupied by 2nd, 3rd or 4th year students with no bindings. All the rooms are two-seaters. Ground floor contains two guest rooms. Consider a single hostel of N rooms for (2N-4) students' occupancy. The seats can be allotted for (i) newly admitted students, (ii) existing students eager to room change in the same hostel or from different hostel, (iii) existing students staying outside campus. Students other than 1st year can give their preference of choosing floor, room partner. If no room is available according to either of the preferences of the student then the student will not be allotted. Number of vacant rooms should be less than number of applicants. Define appropriate structures to formulate the hostel allotment process for a particular hostel.

The order of preference given to the applicants during allotment is-

Preference-1 : The applicant is the boarder of the same hostel (=1 highest priority)
Preference-2 :The applicant is the newly admitted student (=2)
Preference-3 :The applicant is staying outside campus (=3)
Preference-4 :The applicant is the boarder of a different hostel (=4 lowest priority)

A. *Determine*

- *Number of seats filled in each floor for n number of available seats and k number of applicants (k>n)*
- *Number of students who got rooms as per their 1st preference*
- *Number of students who got rooms as per their 2nd preference*
- *Number of vacant seats in each floor after allotment (if any)*

(P.T.O.)

B. *What are the possible stable combination of room allotment if the order of preferences of a student for choosing roommate is as below.*

1-> same department and same year

2-> different department and same year

3-> junior of any department

4-> senior but same department

5-> other department's senior

[**hint**: A stable combination is one which consists of k/2 number of pair among k elements such that no two unmatched pair prefer each other to their partners under the matching. Example-

Student	Preference List
1	2 5 4 6 7 8 3
2	3 6 1 7 8 5 4
3	4 7 2 8 5 6 1
4	1 8 3 5 6 7 2
5	6 1 8 2 3 4 7
6	7 2 5 3 4 1 8
7	8 3 6 4 1 2 5
8	5 4 7 1 2 3 6

Three stable matching set are- {1/2, 3/4, 5/8, 6/7}, {1/4, 2/3, 5/6, 7/8}, {1/5, 2/6, 3/7, 4/8}]

C. *Based on all preference criteria mentioned in question B (preference of floor and preference of roommate), list as many possible seat allotments for a particular student.*