

### **DB - Assignment # 3**

**Submission deadline Sunday October 30, 2022 @ 11:55 PM**

**Submit only through Google Classroom. No email submissions accepted. No deadline extensions.**

**Question # 1:** An agency called Instant Cover supplies part-time/temporary staff to hotels within Scotland. The table shown below, lists the time spent by agency staff working at various hotels. The National Insurance Number (NIN) is unique for every member of staff.

NIN	contractNo	hours	eName	hNo	hLoc
1135	C1024	16	Smith J	H25	East Kilbride
1057	C1024	24	Hocine D	H25	East Kilbride
1068	C1025	28	White T	H4	Glasgow
1135	C1025	15	Smith J	H4	Glasgow

- The table shown above is susceptible to update anomalies. Provide examples of insertion, deletion, and update anomalies.
- Describe and illustrate the process of normalizing the table shown above to 3NF, by identifying the functional dependencies represented by the attributes. State any assumptions you make about the data shown in the table.

**Question # 2:** *Examine the Patient Medication Form for the Wellmeadows Hospital shown below:*

Wellmeadows Hospital Patient Medication Form							
Patient Number: <u>P10034</u>							
Full Name: <u>Robert MacDonald</u>				Ward Number: <u>Ward 11</u>			
Bed Number: <u>84</u>				Ward Name: <u>Orthopaedic</u>			
Drug Number	Name	Description	Dosage	Method of Admin	Units per Day	Start Date	Finish Date
10223	Morphine	Pain Killer	10mg/ml	Oral	50	24/03/13	24/04/14
10334	Tetracycline	Antibiotic	0.5mg/ml	IV	10	24/03/13	17/04/13
10223	Morphine	Pain Killer	10mg/ml	Oral	10	25/04/14	02/05/15

- Identify the functional dependencies represented by the attributes shown in the form above. State any assumptions that you make about the data and the attributes.
- Describe and illustrate the process of normalizing the attributes shown in the form above to produce a set of well-designed 3NF relations.
- Identify the primary, alternate, and foreign keys in your 3NF relations.

**Question # 3:**

Suppose that we have the following requirements for a university database that is used to keep track of students' transcripts:

- a. The university keeps track of each student's name (Sname), student number (Snum), Social Security number (Ssn), current address (Sc\_addr) and phone (Sc\_phone), permanent address (Sp\_addr) and phone (Sp\_phone), birth date (Bdate), sex (Sex), class (Class) ('freshman', 'sophomore', ... , 'graduate'), major department (Major\_code), minor department (Minor\_code) (if any), and degree program (Prog) ('b.a.', 'b.s.', ... , 'ph.d.'). Both Ssn and student number have unique values for each student.
- b. Each department is described by a name (Dname), department code (Dcode), office number (Doffice), office phone (Dphone), and college (Dcollege). Both name and code have unique values for each department.
- c. Each course has a course name (Cname), description (Cdesc), course number (Cnum), number of semester hours (Credit), level (Level), and offering department (Cdept). The course number is unique for each course.
- d. Each section has an instructor (Iname), semester (Semester), year (Year), course (Sec\_course), and section number (Sec\_num). The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ... , up to the total number of sections taught during each semester.
- e. A grade record refers to a student (Ssn), a particular section, and a grade (Grade).

Design a relational database schema for this database application. First show all the functional dependencies that should hold among the attributes. Then design relation schemas for the database that are each in 3NF or BCNF. Specify the key attributes of each relation. Note any unspecified requirements, and make appropriate assumptions to render the specification complete.

Good Luck