DATABASE SYSTEMS – DIGITAL ASSIGNMENT 1

Submission Due Date – 02-Sep-2024

1. Consider the following information about a university database: [10 Marks]
   - Professors have an SSN, a name, an age, a rank, and a research specialty.
   - Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget.
   - Graduate students have an SSN, a name, an age, and a degree program (e.g., B.E, M.E, M.S. or Ph.D.).
   - Each project is managed by one professor (known as the project's principal investigator).
   - Each project is worked on by one or more professors (known as the project's co-investigators).
   - Professors can manage and/or work on multiple projects.
   - Each project is worked on by one or more graduate students (known as the project's research assistants).
   - When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one.
   - Departments have a department number, a department name, and a main office. II Departments have a professor (known as the chairman) who runs the department.
   - Professors work in one or more departments, and for each department that they work in, a time percentage is associated with their job.
   - Graduate students have one major department in which they are working on their degree
   - Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take.

   Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes. Be sure to indicate any key and participation constraints.

2. Convert the ER diagram pertaining to question 1 to its equivalent Relational model representation. [10 Marks]

3. An agency called XYZ supplies part-time/temporary staff to hotels throughout the country ABC. The table shown below lists the time spent by agency staff working at two hotels. The National Insurance Number (NIN) is unique for employee.

NIN	contractNo	hoursPerWeek	eName	hotelNo	hotelLocation
113567WD	C1024	16	John Smith	H25	Edinburgh
234111XA	C1024	24	Diane Hocine	H25	Edinburgh
712670YD	C1025	28	Sarah White	H4	Glasgow
113567WD	C1025	16	John Smith	H4	Glasgow

   a. Provide examples for different types of anomalies. [3 Marks]
   b. Describe and illustrate the process of normalizing the table shown in the figure up to 3NF. State any assumptions you make about the data shown in this table. [7 Marks]