**Department of Computer Science and Engineering**

**Independent University, Bangladesh**

**CSC 401: Database management System**

**Midterm Exam Autumn 2015**

**Total Marks: 100 Time: 3 hr**

**Problem 01**: Prepare an ERD for a real estate firm. Prepare a definition for each entity type, attribute, and relationship on your diagram. Prepare DFD using the activities found in this system. You can add more activities to make the business process complete. The following describes this organization: [30+30]

* The firm has a number of offices in several states. Attributes of office include Office Number (identifier) and Location.
* Each office is assigned one or more employees. Attributes of employee include Employee ID (identifier), Employee Name, phone no and address. An employee must be assigned to only one office.
* For each office, there is always one employee assigned to manage that office. An employee may manage only the office to which he or she is assigned.
* The firm lists property for sale and rental. Attributes of property include Property ID (identifier) and Location. Components of Location include Address, City, State, and Zip Code.
* Each unit of property must be listed with one (and only one) of the offices. A office may have any number of properties listed or may have no properties listed.
* Each unit of property has one or more owners. Attributes of owners are Owner ID (identifier) and Owner Name. An owner may own one or more units of property. An attribute of the relationship between property and owner is Percent Owned.
* Each unit of the property has associated to one or more categories i.e., a property can be listed for rental or sale. It is a common scenario that a single property is listed as rental property and sale property. In case of rental property the rent and start date and end date of rent is stored on the other hand in case of sale property asking price must be stored.
* The real estate company post advertisement on the daily/weekly newspapers. The attributes of the advertisement are advertise no, newspaper name, day, property no and contents.
* Customers can be categorized in two category renter and buyer. In case of buyer maximum price and in case of renter payment record are kept as additional attribute on top of regular attributes like id, name, address, and phone no.
* Customer inspects the property before purchase or rental. The employee creates the inspection routine. The attributes of inspection are inspection day, time, duration, property details, and inspection no.
* The customer willing to rent a property must mentioned the features they want to include in the rental agreement. Feature is connected to property. For feature the description is stored. A property may have many features on the other hand a single feature may be found in many properties. The client may enable or disable the features. After satisfying with the rental agreement both renter and owner sign the contract. Please note that an employee must be assigned with each contract. The rental agreement should contain the agreement no and contents of the agreement. In the contract multiple owners or multiple customers can be accommodated.
* The buyers provide offers for the property. Offer contains condition, day and price for the property. In case the owner agrees with the offer a deal is created including the price and day. Both owner and buyer sign the deal.

Marking for ERD:

i. Identifying entity type with attributes and draw them using conventional symbols. [15]

ii. Identifying relationships between then entities and cardinality, cardinality constrains. [15]

Marking for DFD:

i. Context level diagram. [5]

ii. Process decomposition diagram. [10]

iii. System Level diagram. [5]

iv. level one diagrams. [10]

**Problem 02**: Create relation schema from the ERD presented below. [20]



**Problem 3**: Below six functional dependencies are given. Normalize the table T using the functional dependencies to get rid of all possible anomalies. [20]

T (a, b, c, d, e, f, g, h, i, j, k, l, m, n, t, x, y, z)

Functional Dependencies:

1. a-> b, c, d, k, l, m, n
2. e-> f, g, h, i, j
3. b->k, l, m, n
4. a, b ->t, x, y, z
5. h->e, i, j
6. t->b