Group 3
PRACTICE EXAMPLES FOR THE REVIEW QUIZ:

Review Quiz will contain very similar question as below. Some questions may even be repeated. The order of the questions are random and are not in order of importance or difficulty level.
There may be few terminologies unknown to you. Read those from your text (chapter 3 and 5). We will further discuss those in the class.

1. Fill in the blanks with the best matching word from the list provided below.
   a. The entity type whose existence depends on another entity type is called a(n) ___________ entity.
   b. A property or characteristic of an entity type that is of interest to the organization is called a(n) ___________.
   c. An attribute that can be broken down into smaller parts is called a(n) ________________ attribute.
   d. An attribute that can be calculated from related attribute values is called a(n) ________________ attribute.
   e. The number of entity types that participate in a relationship is called the ________________.
   f. The relationship where the minimum and maximum cardinality are both one is a ________________ relationship.
   g. The ________________ rule specifies that an entity instance of a supertype is allowed not to belong to any subtype.
   h. An attribute or attributes that uniquely identify each row in a relation is called a(n) ________________
   i. A relationship between the instances of a single entity type is called a(n) ________________ relationship.
   j. A rule that states that each foreign key value must match a primary key value in the other relation is known as ________________.
   k. The ________________ rule specifies that an entity can be a member of only one subtype at a time.
   l. ________________ rule states that no primary key attribute (or component of of a primary key attribute) can be null.
   m. An attribute in a relation that serves as the primary key of another relation in the same databases is called a(n) ________________ attribute.
   n. An attribute of the supertype whose values determine the target subtype(s) is called a(n) ________________.
   o. The ________________ rule specifies that each entity instance of the supertype must be a member of some subtype in the relationship.

(List of words: foreign key, candidate key, composite, strong, partial specialization, simple, multivalued, unary, weak, codependent, attribute, owner, identifying relationship, composite key, mandatory many, partial specialization, mandatory one, coexisting entity, entity integrity rule, referential integrity, relationship, derived, binary, overlap, ternary, degree of relationship, total specialization, disjoint, subtype discriminator, primary key, entity integrity rule, enterprise data rule.)

2. Circle ONE and only ONE alternative that best completes the statement or answers the question. The answer will be considered wrong, if more than one alternative is circled.
   a. Which of the following is an entity type on which a strong entity depends?
      i. attribute  ii. Weak entity  iii. Unary  iv. None of these
   b. Which of the following are completeness constraints?
      i. total specialization  ii. Disjoint  iii. Partial specialization  iv. i and iii
   c. The statement : “A course is a module of instruction in a subject area” is a(n)
      i. term  ii. Operational constraint  iii. Fact  iv. none of these
   d. An entity, attribute, or relationship which influences the ability to perform an operation on another object is a(n)
      i. constrained object  ii. Constraining object  iii. Structural constraint  iv. none of these.
   e. A relation that contains no multivalued attributes, and has nonkey attributes solely dependent on the primary key, but contains transitive dependencies is in which normal form?
      i. first  ii. second  iii. third  iv. fourth  v. BCNF
   f. A relation that contains no multivalued attributes, and but has nonkey attributes not dependent on the whole of primary key is in which normal form? i. first  ii. second  iii. third  iv. fourth  v. BCNF
3. Following report shows a grade report that is mailed to students at the end of each semester. Prepare an E-R diagram reflecting the data contained in the Grade Report. Assume that each course is taught by one instructor.

![Grade Report Table]

4. What are the different types of cardinality used in Entity relationships. Provide an example for each of them.

5. Fill in the blanks:

An ___________ is an object or concept that is identified by the enterprise as having an independent existence.
An _________ is an instance of an entity type that is uniquely identifiable.
A _________ is an entity that is existence-dependent on some other entity.
A _________ is an entity that is not existence-dependent on some other entity.
An ___________ is a property of an entity or a relationship type.
An ___________ represents a set of values that may be assigned to an attribute.
A ___________ is composed of a single component with an independent existence.
A ___________ is an attribute composed of components, each with an independent existence.
A ___________ is an attribute that holds a single value for a single entity.
A ___________ is an attribute that hold multiple values for a single entity.
A ___________ is an attribute that represents a value that is derivable from the value of a related attribute or a set of attributes, not necessarily in the same entity.
A ___________ is an attribute or set of attributes that uniquely identifies individual occurrences of an entity type.
A ___________ is a selected candidate key of an entity.
A ___________ is a candidate key that consists of two or more attributes.
The ___________ is the number of participating entities in a relationship.
A ___________ is a relationship where the same entity participates more than once in different roles.
A ___________ is an entity type that includes distinct subclasses that require to be represented in the data model.
A ___________ is an entity type that has a distinct role and is also a member of a super class.
_________________ is the process of maximizing the differences between members of an entity by identifying their distinguishing features.
_________________ is the process of minimizing the differences between entities by identifying their common features.
_________________ is the process of modeling a single subclass with a relationship that involves more than one distinct super class.
NORMALIZATION:

1. Explain, with example, the difference between candidate key and primary key.

2. Consider the following relation in the context of MSU, Mankato:

   \[\text{CLASS}(\text{Course\_No}, \text{Section\_No}, \text{Course\_Name}, \text{Room}, \text{Room\_Capacity})\]

   a. Identify, if any, the partial dependencies in the above relation.
   b. Identify, if any, the transitive dependencies in the above relation.

3. Given the following relation and the relevant business rules. Make any necessary assumptions.

   \[\text{Property\_Inspection} (\text{Property\_no}, \text{Idate}, \text{Itime}, \text{Paddress}, \text{Comments}, \text{Staff\_No}, \text{Sname}, \text{Car\_Reg})\]

   Business rules:
   c. Each property has one address.
   d. A property is not visited more than one time a day.
   e. A staff uses the same car for all his visits on a given day.
   f. Staff number determines staff name.
   g. Comments after each visit is recorded.

   Decompose the relation into BCNF relations step by step by answering to the following questions.

   a. State the conditions necessary for a relation to be in first normal form.
   b. State the conditions of a second normal form. Identify if and why the above relation is not in second normal form. Decompose the relation, as necessary, into second normal form relations.
   c. State the conditions of third normal form. Identify if and why any of the relation(s) is not in third normal form. Decompose the relation, as necessary, into third normal form relations.
   d. State the conditions of BCNF form. Identify if and why any of the relation(s) is not in BCNF form. Decompose the relation, as necessary, into BCNF form relations.
   e. State the conditions of fourth normal form. Give an example.
   f. Explain, with examples, the difference between functional dependency and multivalue dependency.

4. Consider the following relation in the context of MSU, Mankato:

   \[\text{CLIENT\_INTERVIEW}(\text{Client\_No}, \text{Interview\_Date}, \text{Interview\_Time}, \text{Staff\_No}, \text{Room\_No})\]

   a. Identify, if any, partial dependency in the above relation.
   b. Identify, if any, transitive dependency in the above relation.
   c. Identify one candidate key in the above relation.
   d. Explain, with example, the term relational integrity.

5. Given the following relation. Functional dependencies (other than those implied by the primary key) are shown.

   \[\text{CLASS}(\text{Course\_No}, \text{Section\_No}, \text{Course\_Name}, \text{Room}, \text{Capacity})\]

   \[\text{Course\_No} \rightarrow \text{Course\_name}, \text{Room} \rightarrow \text{Capacity}\]

   a. Define first normal form. Based on the definition indicate if the relation is in first normal form. If not, decompose it into 1NF.
   b. Define second normal form. Based on the definition indicate if the relation is in second normal form. If not, decompose it into 2NF.
   c. Define third normal form. Based on the definition indicate if the decomposed relation(s) is(are) in third normal form. If not, decompose it into 3NF.
   d. Define boyce codd normal form. Based on the definition indicate if the decomposed relation(s) is(are) in BCNF form. If not, decompose it into BCNF.
e. Define fourth normal form. Based on the definition indicate if the decomposed relation(s) is(are) in fourth normal form. If not decompose it into 4NF.
f. Copy below all the decomposed relations those represent the given relation in BCNF form.

6. Fill in the blanks.

______________ is a table that contains one or more repeating groups. (Unnormalized form (UNF))

______________ is a relation in which the intersection of each row and column contains one and only one value. (First Normal Form (1NF))

______________ is a relation that is in first normal form and every non-primary key attribute is fully functionally dependent on the primary key. (Second Normal Form(2NF))

______________ indicates that if A and B are attributes of a relation, B is fully functionally dependent on A if B is functionally dependent on A but not on any proper subset of A. (Full functional dependency)

______________ is a relation that is in first and second normal form in which no non-primary key attribute is transitively dependent on the primary key. (Third Normal Form(3NF))

______________ is a condition where A, B, and C are attributes of a relation such that if A → B and B→ C, then C is transitively dependent on A via B (provided that A is not functionally dependent on B or C). (Transitive dependency)

______________ is a relation in which every determinant is a candidate key. (Boyce-Codd Normal Form (BCNF))

______________ is a relation that is in BCNF and contains no trivial multi-valued dependency. (Fourth Normal Form (4NF)).

A ________________ represents a dependency between attributes (A, B, and C) in a relation, such that for each value of A there is a set of values for B and a set of values C. However, the set of values for B and C are independent of each other. ( A multi-valued dependency (MVD)).

7. a. Describe the three types of anomalies which can arise in a relation. Use examples.
   b. Write two synonym terminologies used in databases for each of the followings:
      i. File   ii. Record   iii. Field