Time Allowed: 25 Mins | Max Marks: 12 | Roll No.

Question # 1 **Marks (12)**

ENCIRCLE the most appropriate option for the following statements.

1. To eliminate duplicate records_____ is used.
   A. Eliminate
   B. Distinct
   C. Singular
   D. NonDuplicate
2. _____ SQL command can be used to modify the existing data in a database table.
   A. Modify
   B. Alter
   C. DRL
   D. update
3. Which one of the following statements is part of DDL?
   A. Insert
   B. Delete
   C. Create
   D. All of above
4. The Number of entity types that participate in a relationship is known as
   A. Cardinality
   B. Relations
   C. Degree
   D. None of above
5. For each attribute of relation R, there is a set of permitted values, called as the_____ of that attribute.
   A. Relationship
   B. DML
   C. Domain
   D. Reference
6. If an instance of relational schema R(A,B,C) has distinct values of A excluding NULL values.
   A. A is a secondary key
   B. A is non-key
   C. A is primary key
   D. A is foreign key
7. A domain is atomic if elements of the domain are considered to be_____ Units
   A. Different
   B. Divisible
   C. Indivisible
   D. Both A and C
8. One can use Max and Min functions for____ data types
   A. Date
   B. Numeric Sum , Avg
   C. Character
   D. All of above
9. If every non-key attribute is fully functional dependent on the primary key, the relation will be in_____ normal form.
   A. 1st
   B. 2nd
   C. 3rd
   D. 4th
10. _____ Database level is closest to the users
    A. Internal
    B. User level
    C. External
    D. Conceptual
11. _____ Least Time grain of DWH is feasible for organizations working **24/7**.
    A. Monthly
    B. weekly
    C. Daily
    D. Hourly
12. _____ Do not display non matched tuples
    A. Left Outer Join
    B. Full Outer Join
    C. Cross Join
    D. Inner Join

Attempt any 4 questions

Question # 2 — Marks (12)

GCU has total of 52 university and departmental level societies. The societies have students from different departments. The student record contains the student name, I'd, phone No.s, address that includes house no, street no, City, society designations, and department id. Each department has a name, location, and dept_Id. Each student has exactly one login to access the society page. Different events are arranged by the society that is sponsored by different sponsors. The event information contains the event id, event name and event sponsor. A sponsor may or may not sponsor the event and events may have more than one sponsor. The sponsor information contains the sponsor's name, Id, and Address. Finance section is managed by Finance secretary of every society. The finance contains the finance I'd, amount, and the event on which finance is consumed. One society can arrange many events whereas an event exclusively belongs to a society. One student belongs to only one department whereas a department has many students studying in it. As per societies are concerned, any student can become member of as many societies as he wishes. The society has its id, name, level, and estd. date.

State clearly any other **VALID** assumptions that you make.

a. **Perform noun verb analysis and draw ERD.** (4+5)
b. **Make relational model form ERD developed in part a.** (3)

Question # 3 — Marks (12)

a. Define Primary key, Foreign key, Composite key and candidate key. (4)
b. Define relationship. Differentiate between specialization and generalization. (4)
c. Define entity. Explain unary M:N relationship by the help of example. (4)

Question # 4 — Marks (12)

a. Define and elaborate dead lock. How concurrency can be managed using 2 Phase locking. (2+4)
b. Define anomalies and explain different types along-with suitable example (1+5)

Question # 5 — Marks (12)

a. Define Data warehouse. How @ctive warehouse model addresses the issues of dependent and independent data mart model? **(1+5)**

b. What are properties of transaction? Elaborate the "inconsistent retrieval" issue in the absence of concurrency control. **(2+4)**

Question # 6 — Marks (12)

N&N is having trouble in managing their record. You are hired as analyst to give solution for the issue they are facing by normalizing the data up-to 4NF (**1NF, 2NF, 3NF BCNF, 4NF**) and resolving relationships. Elaborate each step you perform.

M_id	Title	Dur-ation	Lang	C_id	Name	Phone	CNIC	R_id	D_date	R_date	P_id	P_name	P_country
M001	Silence	120	En,Urdu,Cn	C001	Nadeem	0301	352-1	R001	6-6-12	6-6-17	P001	Fly Films	China
				C003	Nadeem	0303	352-3	R002	6-7-12	4-7-17			
				C002	Namrah	0302	352-2	R003	7-6-12	8-6-17			
M002	Arrival	90	En,Gr							9-6-17	P002	Lions gate	USA
				C001	Nadeem	0301	352-1	R001	6-6-12	6-6-17			
M003	Passengers	120	En,Gr,Urdu	C003	Nadeem	0303	352-3	R006	5-7-12	4-7-17	P003	CBS Films	USA
M004	Sully	96	En,Cn	C004	Khawar	0304	352-4	R007	8-7-12	9-7-17	P004	Pixar	UK
				C001	Nadeem	0301	352-1	R008	7-6-12	8-6-17			

Following is the full form of attributes for your comprehension.

M_id= Movie ID
C_id= Customer ID
CNIC= Computerized National ID card
R_id= Rental ID
D_Date= Due Date
R_Date =Returned date
P_id= Producer ID
P_Name= Producer Name
P_Country= Producer Country

Roll No.

GC University Lahore
Department of Computer Science
Examination: Fall 2015

Semester: V
Course: Database Systems
Course Code: CS-2014

Allowed Time = 25mins
Total Marks = 14

Note: Encircle the right answer [Erasing/ cutting or overwriting shall bear "No Marks"]

PART A: Objective Type Questions

1. Metadata is
   a) Syntax of data
   b) Semantic of data
   c) Instance of data
   d) Multiple data
2. A conceptual schema is
   a) User view of the data
   b) DBMS view of the data
   c) Analyst view of the data
   d) All of the above
3. An entity related to itself in an ERD diagram is called
   a) Recursive relationship
   b) Unary relationship
   c) Both (a) & (b)
   d) None of (a) & (b)
4. ..... refers to a method of database distribution in which different portion of the database reside at different nodes of network
   a) Splitting
   b) Partitioning
   c) Replication
   d) Dividing
5. In three level schema architecture Entity Relationship diagram is produced at
   a) External Level
   b) Internal Level
   c) Conceptual Level
   d) None of the above
6. The development of ER diagram is a
   a) Linear Process
   b) Sequential Process
   c) Iterative process
   d) static process

P.T.O

7. An Entity Type is defined as
   a) A set of relationships
   b) A set of attributes
   c) A combination of entities and relationship
   d) A set of entities sharing common characteristics

8. The anomalies addressed by moving from BCNF to 4NF deals with
   a) Excessive updates and redundancy of data for each entity
   b) Inability to uniquely identify an entity
   c) Inability to reconstruct the relations once they are broken
   d) Creation of identical rows in a relation

9. The manipulated and processed data is called
   a) Knowledge
   b) Information
   c) Data
   d) Graph

10. Let R(A,B,C,D,E) be a relation in Boyce-Codd Normal Form (BCNF). Suppose ABC is the only key for R. Which of the following functional dependencies is guaranteed to hold for R?
    a) ACD →E
    b) BCE →A
    c) ABCD → E
    d) ACE →D

11. If the relationship is of optional between two related entities, the resultant relational model would have
    a) Foreign key as Not Null
    b) Foreign Key as part of primary key
    c) Foreign key as Null
    d) None of the above

12. Which clause in Select statement executed before any other clause
    a) Order by clause
    b) From clause Select is executed for later
    c) Where clause
    d) Group by clause

13. Data redundancy means
    a) Duplication
    b) Uniqueness
    c) Consistent
    d) Reliable

14. Which of the following is an example of one-to-one relation
    a) Mother – Daughter
    b) State – Governor
    c) Person – Automobile
    d) Doctor – Patient

GC University Lahore

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Roll No: _____
Name: _____

Allowed Time = 155mins
Total Marks = 56

PART B: Subjective Questions

Q No. 1.

a) What is Normalization? Explain 2NF, 3NF and BCNF with examples (7)
b) Explain conceptual view of the database (2)
c) Write down the advantages of database (5)

Q No. 2.

a) What are DDL, DRL and DML, give detail. (3)
b) A company desires to keep record of multiple addresses for their employees, What kind of attribute is the solution to this problem. Also Model this scenario with respect to ERD and Normalization. (4)
c) What are three main integrity constraints? Define Relationship and degree of Relationship with an example (7)

Q No. 3.

a) Suppose a University which has a number of libraries, to support students & staff in providing study materials, each library has identification number and name. These libraries are located in different buildings. Each library is managed by a librarian. The librarian also acts as an officer to other library staff. Both librarian and staff are considered employees of the University, employees are identified by employee_id, name, address and phone numbers. Books are written by authors, authors have Id's and name. An author can write many books and a book could be written by many authors. Each book belongs to a specific subject. An author can write on any number of subjects but at least one. The books are identified by ISBN number and they have book title and year of publication. Many copies of each book are placed in the library but at least one is always there. These copies are catalogued, and placed on different shelves. A librarian can issue a copy of book to member of the library, and define issue date and return date. If the book is not returned on specified date then the member is fined. (10)
    i. Draw an Entity-Relationship diagram with primary and foreign key established also normalized the abnormal relations in your ERD.

-PTO-

ii. Additional requirements may be generated for illustration purpose, however, write them down for further verification.

b) Explain Optional and Mandatory Cardinality in a relationship with example (4)

Q No. 4.

a) Describe different techniques for requirement collection (4)

b) Convert following table into 2NF and 3NF (10)

Student_ID	Major	Student_name	Course_Code	Course_Title	Attendance Percentage
100-BSCS-13	CS	Hamza	CS-2014	Database Systems	80%
100-BSCS-13	CS	Hamza	CS-3208	Data Mining	85%
101-BSCS-13	IT	Kashif	CS-2014	Database Systems	82%

{Note:
Write down appropriate functional dependencies with each step of normalization
Explain the process by highlighting the important points as you proceed with the Normalization. }

Q No. 5.

a) Define transaction? Also elaborate properties of transaction. (4)

b) Elaborate lost updates, uncommitted data and inconsistent retrievals when simultaneous transactions are executed on a shared database (3)

c) Explain ETL and discuss the types of extraction, transformation and loading in detail. (7)

ROLL NO.

GC University Lahore

Examination: Final, 2018

Semester: V
Course: Database Systems
Course Code: CS-2014

Allowed Time = 25 Minutes
Total Marks = 14

Note: Encircle the right answer [Erasing/ cutting or overwriting shall bear "No Marks"]

PART A: Objective Type Questions

1. Usually designing and ER Diagram is _____process:
   a) A Sequential
   b) A Random
   c) An Iterative
   d) A Probabilistic
2. The type of relationship is abnormal in Relational Database,
   a) One-to-one relationship
   b) One-to-many relationship
   c) Many-to-many relationship
   d) Optional relationship
3. In a relation R(A, B,C), A is primary key and C is unique key, C can be _____
   a) NULL
   b) NOT NULL
   c) Multivalued
   d) Empty
4. Alter command is part of
   a) Data Manipulation Language
   b) Data Control Language
   c) Data Retrieval Language
   d) Data Definition Language
5. For each attribute of relation R there is a permitted values called _____ of that attribute
   a) Range
   b) Co-Range
   c) Domain
   d) Set
6. Primary key in a relation is conceptually related to
   a) Entity Integrity
   b) Referential Integrity
   c) Domain Integrity
   d) Partial Integrity

P.T.O

7. A _____ represents the number of entity instances to which another entity instances can be associated
   a) Data Dictionary
   b) Table
   c) Cardin ality
   d) schema
8. A relational database includes
   a) Relations
   b) Tuples
   c) Keys
   d) All of the above
9. An attribute that gets its value from computation of other attributes is _____ attribute
   a) Multivalued
   b) Composite
   c) Derived
   d) Identifier
10. A domain is atomic if elements of domain are considered to be _____ units
   a) Different
   b) Indivisible
   c) Divisible
   d) Constant
11. Only one primary key constraint exist in a relation but multiple _____ constraints can exist
   a) Unique
   b) Check
   c) Foreign Key
   d) All of the above
12. Which command makes data in database changes permanent
   a) Commit
   b) Alter
   c) Delete
   d) Update

GC University Lahore

Examination: Final, 2018

Semester: V
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Allowed Time = 155mins

Total Marks = 56

PART B: Subjective Questions

Note: Attempt any four questions

Q No. 2.

At a Movie Rental Store each movie is identified by a movie number and has a title and Director of the movie is identified Director Id and Director Name and the Studio (Fox Studio, Evernue Studio) that produced the movie, a studio is located in city at a specific address and may have more than one phone numbers. There are many actors who play characters in the movies. Each movie can have several actors and each actor can play in many movies. A video store has multiple copies of the same movie, and the store differentiates copies with a movie copy number. Each movie has a type (HD, Blu-Ray, DVD) and rent of the movies varies according to movie type. A customer gets the movie on rent after getting registered with the Movie Shop. A customer is registered on the referral of another customer.

a) Draw an ER Diagram of the given scenario (9)
b) Resolve many-to-many or unary relations in ER Diagram (3)

Q No. 3.

CID	CAddress	SID	PS	S_Name	C_P_Hr	CNIC	Desig	Salary	DNo	DName	DeptTele
C1	IRQ-Jhang	S1	18	Azeem	900	123	Lecturer	50,000	D1	CS	998,999
		S3	11	Anum	200	125	Clerk	30,000	D1	CS	998,999
		S9	10	Waqas	200	124	Clerk	30,000	D1	CS	998,999
		S5	18	Ali	900	127	Lecturer	50,000	D9	Math	+300,220
C2	IRQ-Bawalpur	S7	19	Asad	1000	139	Assistant Prof.	80,000	D3	Physics	9991
		S4	20	Maria	1200	136	Associate Prof.	95,000	D3	Physics	2387
		S8	18	Fouzia	900	134	Lecturer	50,000	D4	English	990,994
		S10	19	Namrah	1000	131	Assistant Prof.	80,000	D4	English	5698
		S5	11	Ali	200	127	Clerk	30,000	D4	English	4278

CID: Campus Identification Number
SID: Staff Identification Number
S_Name: Staff Name
PS: Pay Scale
DNo: Department Number
C_P_Hr: Charge Per Hour
CNIC: Computerized National ID Number
Desig: Designation

a) Find out all the functional dependencies (2)
b) Normalized this data : 1NF, 2NF, 3NF, BCNF, 4NF (10)

P.T.O

Q No. 4.

a) What is foreign key, Differentiate between Candidate Key and Foreign Key (4)
b) Mention the detail of Insertion, Modification and Deletion anomalies anomalies (6)
c) Without mentioning detail, only write down all six phases of Database Life Cycle in appropriate sequence (2)

Q No. 5.

a) During Database Life Cycle what kind of measure are done in, write short answer (3)
    i. Adaptive Maintenance
    ii. Corrective Maintenance
    iii. Preventive Maintenance

b) What are concurrent transactions? What is the core objective of concurrency control ?Explain lost update in absence of concurrency control (5)
c) What are transaction logs and what role they play in recovery of transaction (4)

Q No.6.

a) What is Data Warehouse? What are tasks performed in Extraction, Transformation Loading (6)
b) What are wait/ die and wait/ wound schemes? (6)

1. Which is not included in the definition of an entity?
   A. Person
   B. Object
   C. Concept
   D. Action

2. If an instance of relational schema R(A,B,C) has distinct values of A including NULL values, then___
   A. A is a unique key
   B. A is non-key
   C. A is primary key
   D. A is foreign key

3. A unary many-to-many relation?
   A. Can be resolved like unary one-to-many
   B. Cannot be resolved
   C. Can be resolved with the help of another entity
   D. None of above

4. An attribute is atomic/simple if elements of the attribute are considered to be_____ Units
   A. Different
   B. Divisible
   C. Indivisible
   D. Both A and C

5. The Number of entity types that participate in a relationship is known as
   A. Cardinality
   B. Relations
   C. Degree
   D. None of above

6. An associated entity is driven from?
   A. When we have attribute on a relationship
   B. When we have many-to-many relationship cardinality
   C. Both A&B
   D. None of above

7. Each Super Store in a country can have more than one branch in a district. The cardinality of relationship between district and Branches would be:
   A. Many-to-Many
   B. One-to-One
   C. One-to-Many
   D. None of Above

8. _____Type of attribute is always abnormal in relational database.
   A. Many-to-Many
   B. One-to-One
   C. Multivalued
   D. None of Above

9. A derived attribute in ERD is placed.
   A. On the top of attribute from which it is driven
   B. Separately with the entity
   C. On the relationship
   D. None of the Above

10. ERD, is a_____
    A. Logical Model
    B. Conceptual Model
    C. Basic Model
    D. Cannot be implemented

Encircle the most appropriate option for the following statements.

1. **Designing an ERD is a_____process.**
   - A. Sequential
   - B. Iterative
   - C. Quadratic
   - D. None of the above

2. **The pre-condition for a table to apply 2nd NF is:____**
   - A. The table in 1NF, and does have Composite Key.
   - B. The table is in 1NF and no composite key but anomalies.
   - C. A table is in 1NF with Transitive Dependency.
   - D. Only 1NF is checked.

3. **A One-to-One mandatory relationship implemented in relational model as**
   - A. FK must be not null
   - B. FK must be not null and unique
   - C. FK must be cascade
   - D. FK without any further constraint

4. **Select NULL+4 from dual; will result**
   - A. 4.
   - B. Null.
   - C. An Error.
   - D. None of the above.

5. **A unary relationship occurs when?**
   - A. The instances of an entity type refers to other instances of another entity type
   - B. The instances of an entity type refers to other instances of same entity type
   - C. The instances of an entity type refers to two other instances of another entity types
   - D. The instances of an entity type refers to three other instances of another entity types

6. **Returns a single occurrence of identical values in a table**
   - A. unique
   - B. distinct
   - C. not null
   - D. fk

7. **Data Warehouse is_____ type of storage:**
   - A. Object oriented
   - B. Relational
   - C. Subject oriented
   - D. Hierarchal

8. **Normalization_____ data redundancies.**
   - A. Eliminates
   - B. Increases
   - C. Reduces
   - D. None of them

9. **A Transaction that is not ended with a commit statement and involve only DQL statements.**
   - A. does not affect the database
   - B. does affect the database
   - C. database logs are updated
   - D. None of above

10. **Assume action is a column in spek table, SELECT 'Hammad Jameel', action, 100, item FROM spek**
    - A. displays all records with selected columns of table spek
    - B. syntax error in SELECT clause
    - C. syntactically wrong because there is no WHERE clause
    - D. FROM clause is optional so, can be skipped from the given statement

11. **In an SQL query, once an alias is used for table, the actual table name may be used in query** Same query is discussed here.
    - A. Yes
    - B. No
    - C. In Subquery only
    - D. In Views only

12. **Consistency property of a transaction is primarily maintained by.**
    - A. Programmer
    - B. Recovery Manager of DBMS
    - C. Concurrency Manager of DBMS
    - D. All of Above

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Roll No. _____ Name: _____

13. **In deferred write of transaction operations**
   A. immediately update physical database
   B. not immediately update database
   C. only logs are maintained
   D. None of the above

14. **UPDATE is part of _____ commands**
   A. DDL
   B. DML
   C. DLL
   D. DCL

15. **A _____ is a dependency of one non primary key attribute on another non primary key attribute.**
   A. Full Functional dependency
   B. Partial Functional dependency
   C. Transitive dependency
   D. none of above

Question # 2 **Marks (13)**

ASF is a non-profit organization that provides aid to people after natural disasters such as floods, earthquakes and famines. Individuals from anywhere in the world, volunteer their time to carry out the tasks of the organization. The name, address which is stored as city, state, country and telephone number for each volunteer is stored. Each volunteer may be assigned to several tasks of rescue work during the time that he or she is doing volunteer work. Some of the rescue tasks may require many volunteers. A volunteer may register for many rescue tasks on different dates. It is possible for a volunteer to be in the system without having been assigned a task yet. It is possible to have tasks that no volunteer has been assigned so far. For each task, there is a task code, task description, task type, and task status. A task status could be "closed", "on-going" or "open".

Some of the tasks are of type "packing", there is a packing list that specifies the contents of the packages prepared in these tasks. Different packages, such as basic medical packages, child-care packages, food packages, etc. are prepared. Each packing list has a packing list ID number, a packing list name, and a packing list description, which describes the items that ideally go into making that type of package. Every packing task is associated with only one packing list. A packing list may not be associated with any tasks, or may be associated with many tasks. Tasks that are not packing tasks are not associated with any packing list. Packing tasks result in the creation of packages. Each individual package of supplies that is produced by the organization is also stored. Each package is assigned an PackageID number. The date the package was created and the total weight of the package are recorded. A given package is associated with only one task. Some tasks (e.g.,"answer the phones") will not have produced any packages, while other tasks (e.g., "prepare 5000 packages of basic medical supplies") will be associated with many packages. The packing list describes the ideal contents of each package, but it is not always possible to include the ideal number of each item. Therefore, the actual items included in each package should be tracked. A package can contain many different items, and a given item can be used in many different packages. For each item that the organization provides, there is an item ID number, item description, item value, and item quantity on hand stored in the system. Along with stored the actual items that are placed in each package, the quantity of each item placed in the package must be tracked too. For example, a packing list may state that basic medical packages should include 100 bandages, 4 bottles of iodine, and 4 bottles of hydrogen peroxide. However, because of the limited supply of items, a given package may include only 10 bandages, 1 bottle of iodine, and no hydrogen peroxide. The fact that this package includes bandages and iodine needs to be recorded along with the quantity of each that is included. It is possible for the organization to have items donated that have not been included in any package yet, but every package will contain at least one item.

i.Elaborate Noun/ Verb Analysis (2)
ii.Draw an ER Diagram to help building this database. (8)
iii.Normalize ERD (3)

Assume cardinalities and cardinality constraints wherever feel appropriate and mark them properly for each relationship.

Section II

Attempt Any 2 out of 3 Questions

Question # 4 — Marks (10)

a. What are super key, candidate key and primary key. **(3)**
b. Explain the concept of anomalies that occur in data, elaborate your answer with a single example. **(7)**
(Examples carry marks)

Question # 5 — Marks (10)

a. What is the concept of Transaction? What does 2Phase locking protocol do, elaborate answer with diagram. **(5)**
b. Exemplify concurrency control with time stamping i.e. (wait/die, wound/wait schemes). **(5)**

Question # 6 — Marks (10)

Differentiate between following with the help of example:

a. Define Data warehouse? Draw two architectures of data warehouse implementation **(5)**
b. Elaborate the concepts of lost update and inconsistent retrievals in absence of concurrency control? **(5)**

Question # 3 Marks (12)

N&N Hospital is facing problems in its data organization. As database analyst, you have to normalize following N&N Hospital data up to **4NF**. Elaborate each step you perform with logic and state clearly any other **VALID** assumption that you make.

C_id	Country_ Name	Contest	Contest _year	Match_no	Match _Type	Player_ id	Player_Name	Skill	Played For	Balls Faced	Runs Scored	Overs Bowled	Wkts
PAK	Pakistan	Q-Trophy	2008	M001	One-Day	P001	Shafiq	Batsmah	KK, FSD	29	36	Nill	Nill
PAK	Pakistan	Asia Cup	2009	M006	One-Day	P002	Kamran	Bowler	LQ, FSD	Nill	Nill	3	0
WD	West Indies	Asia Cup	2009	M006	One-Day	P003	Darren Sammey	All-Rounder	WD1, WD2, WD3	20	50	5	2
AUS	Austrailia	World T20	2011	M010	T20	P004	Steven Smith	Batsman	AUS1	30	70	Nill	Nill
IND	India	World T20	2011	M010	T20	P005	Virat	Batsman	IND1, PSL	50	50	Nill	Nill
AUS	Austrailia	Pentangular Cup	2010	M001	One-Day	P006	Adam	Bowler	AUS1, AUS2	Nill	Nill	10	3
PAK	Pakistan	Asia Cup	2009	M006	One-Day	P007	Misbah	Batsman	KK, ISL	34	75	Nill	Nill

Lahore

IINo 259-BSCS-16 Max Allowed time:50 Mins Max Marks.

Name Mahnoor Section: E1

Question # 2

a. Define and explain following by the help of example. **Marks (10)**

i. Primary key (4)

An attribute that uniquely identifies the whole record.

Properties:

1. It must be unique or have unique values.
2. It can't be Null.

Represented as: 

ii. Foreign key

~~An attribute whose value must match~~

An attibute in a relationship that refers to the primary key of other entity type. The domain of the values must match with the primary key of other entity type.

Properties:

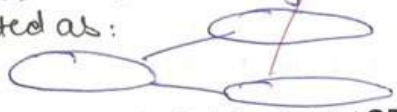
1. It can have Null values
2. It can have duplicate values.

Represented as: 

iii. Composite Attribute

An attibute that uniquely identifies the record when two or more attibutes with distint values join togethre.

example: First name and Lastname as Name as composite key, Paitient, date, time together identifies the record of patient, etc

Represented as: 

iv. Three components of relational model **OR** Entity Integrity

Three components of Relational model:

- Data Structures: The representation of data as tables containing rows and columns
- Data Manipulation: The constraints and operations to perform the database relational model operations.
- Data Integrity: The rules or constraints for the accuracy of data ie to remove duplication and reaundancy of data and achieve unique data.

'OR'

Entity Integrity: It specifies that each relation should contai the primary key with following properties:

1. It must have unique values
2. It should not contain Null values.

ROLLNO _____ Allowed time: 50 Mins Name _____ Section: _____ Max

b. Differentiate between Cardinality Constraint and Degree of Relationship by the help of example. (2)

Cardinality Constraints

1. The number of entity instances that must associate with the each entity of other Entity instance, called cardinality.

example: A musician plays instruments.

∴ Many-to-Many relationship, as many musicians can play many instruments

Degree of Relationship.

1. The number of Entity types participating in a relationship, called degree of Relationship

example: A musician plays instrument

∴ Binary Relationship have two entities

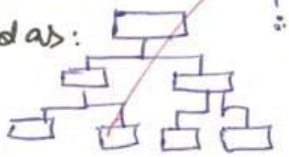
∴ degree of Relationship is (2) Binary as two entities (Musician & Instrument) are

c. Differentiate between hierarchical and networked data model along with example. (2) included

Hierarchical Model.

The Hierarchical Model is an upside down tree of ~~Many~~ One to Many relationships, also called parent child relationship.

Represented as:



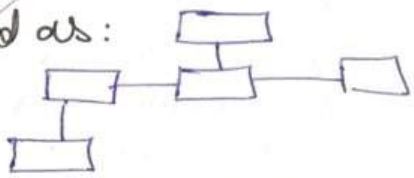
∴ each level shows one record.

• It can only represent the 1:M relationship

Network Model.

The Network model ~~is~~ have relationships that can be one to many or many to one.

Represented as:

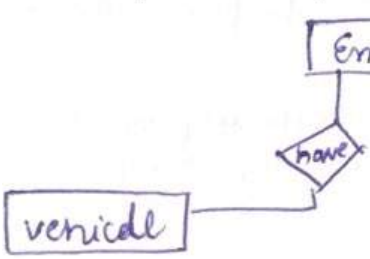


• It is more efficient than hierarchical Model.

d. What is the concept of weak entity? Elaborate by the help of example. (2)

Weak entity is the entity that depends on another entity. It is not mandatory to be represented, if it is not of the interests of organisation.

example: Employee of an organisation (ERD)



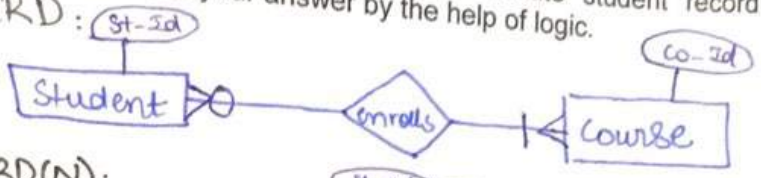
∴ here defining the attributes of vehicle are not necessary due to the interests of an organisation, so it is a weak entity.

Lahore
SIINo 259 Max Allowed time:50 Mins Max Marks:20
Name Mahnoor Section: E1

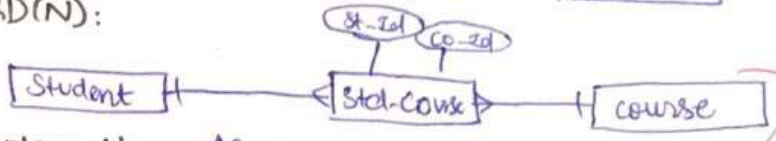
Question # 3

a. Students are enrolled in a course for specific programs. Enrollment is mandatory for each student. Can the organization create student record without course being assigned? Elaborate your answer by the help of logic. **Marks (5)** (1.5)

ERD :



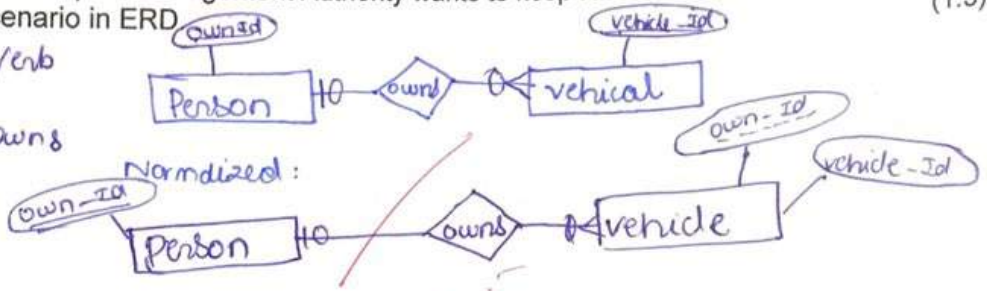
ERD(N):



Explanation: As the statement, "Enrollment is mandatory of each student" specifies that the organisation can't create student record without course being assigned.

b. Motor Transport Management Authority wants to keep record of vehicle ownership. Model this scenario in ERD (1.5)

Noun Verb
Vehical
owner owns



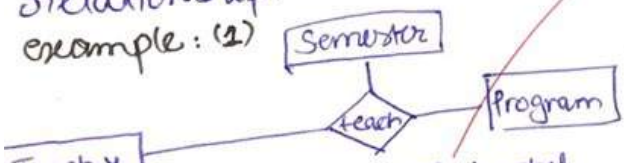
Normalized :

1.5

c. Explain ternary relationship by the help of example. (2)

Ternary Relationship is defined as a relationship that simultaneously have three Entity types participating in relationship.

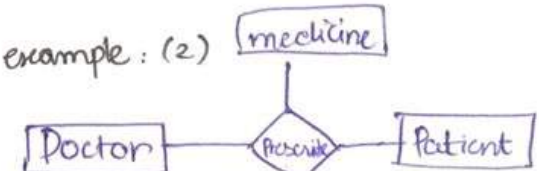
example : (1)



explanation: A teacher [1] teaches a Program [2] as well as semester [3]. All three ~~attributes~~ entities are connected by one relation 'teach'.

2

example : (2)



explanation: A doctor [1] can prescribe a Medicine [2] to a patient [3], All three entities are connected by the relation 'prescribe'.

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RollNo_____ ***Name_____Section:_____***

INSTRUCTIONS

- This is an open book, open internet and limited time (9:30 AM to 11:00 AM) examination.
- Extra 30 Mins shall be given to upload the exam. No exam shall be acceptable **after 11:30 AM**
- All questions are compulsory.
- All questions must be hand written on a register page with lining.
- Mention your name, roll no. and section on each page.
- Scan or take picture of your papers carefully as blur (unreadable) images shall be graded with zero mark.
- You have to submit the paper on the email address: nadeem.zafar@gcu.edu.pk (**Only for section A,B and E2**)
- Submit your paper timely (Max at 4:30 PM) as late submitted paper shall not be considered.
- Group submission is not allowed. Each student has to submit paper individually.
- The file must be of Pdf format or zip file.
- The **file name** (single Pdf file or zip file) must contain **your complete roll number, name, section, Subject name (DBS) (e.g. 000-BSCS-18,Your Name,A,DBS)**
- The **subject field of email** must contain "**Full Rollno, Name, Section , DBS Final Examination 2021**"
- Elaborate your answers on the basis of strong logic.
- Clearly mention question number and its part number.

Question # 1 Marks (10)

a. You have been asked to design a Student Entity. You have Roll No, CNIC, Registration No., Phone No, along with other attributes. The attributes mentioned are all unique and not null. Which attribute will you make as Primary key and why will you leave others? Elaborate your answer with strong logic. **(3)**

b. Differentiate between data redundancy and duplication by the help of example. Why redundancy cannot be eliminated? Elaborate your answer with strong logic. **(3)**

OR

Explain different data models with the help of examples. **(3)**

c. If there is no concurrency control and at-least one transaction is in the write mode, which problems can arise? Elaborate with the help of examples. **(4)**

OR

Draw ERD from the following scenarios, also mark minimum and maximum cardinality. **(4)**

GCU Lahore *Max Allowed time:90 Mins* *Max Marks:20*

***RollNo**_____ **Name**_____**Section:**_____*

A Software House before handing over its software to the client perform different Testing on the software to ensure its quality. A software is identified by SoftwareID, a short description and many functional requirements. The quality testing is performed by Quality Assurance Engineers, each Engineer is identified by EngineerID, Designation, DoB. There are different types of tests that needed to be performed on a software such as unit test, integration test, Black Box Test, Each test has its TestID and TestDescription. An Enginer can perform many tests on a software. Each time a test is performed the Date of Test and Status of test i..e Pass or Fail should be stored in database.

Question # 2 Marks (10)

a. What is the solution of Many-to-Many relationship, what other possibility can occur on Many-to-Many relationship? Elaborate your answer with example. **(2)**

b. Explain Unary Many to many relationship by the help of example. **(2)**

c. Motor Transport Management Authority wants to keep record of vehicle ownership. Model this scenario in ERD.**(2)**

d. Which phase in DBLC is most important according to your point of view? Answer with strong logical reasoning. Also explain that phase in detail. **(4)**

OR

Draw ERD from the following scenarios, also mark minimum and maximum cardinality. (4)

A hospital has a large number of registered physicians. Each physician is identified by Physician IDand a Specialty such as Dermatologist, Onclogist etc. . Patients are admitted to the hospital by physicians. Attributes of PATIENT include Patient ID and Patient Name. Any patient who is admitted must have exactly one admitting physician. A physician may optionally admit any number of patients. Once admitted, a given patient must be treated by at least one physician (This may or may not be the same physician who admitted patitent). A particular physician may treat any number of patients, or may not treat any patients. Whenever a patient