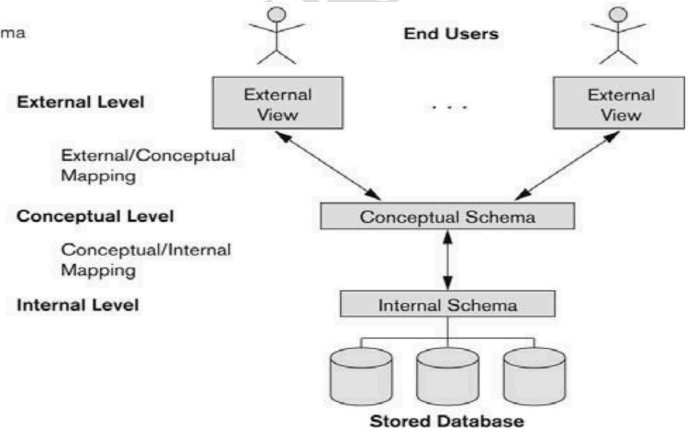
USN

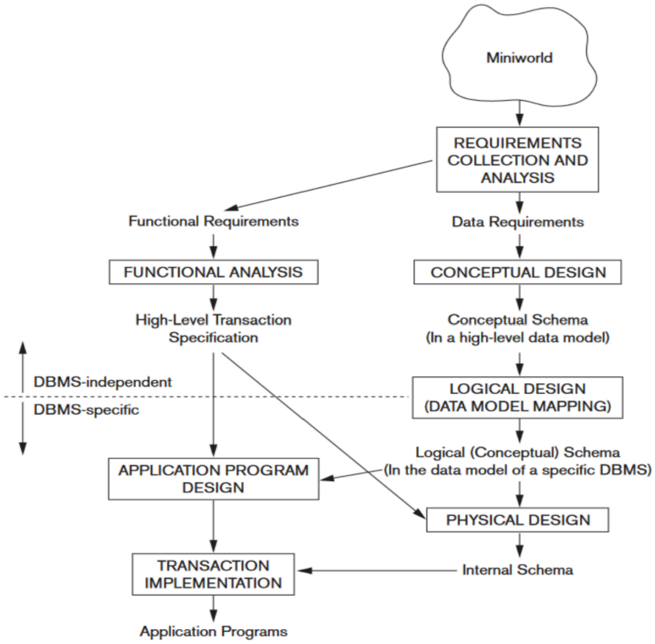
Internal Assessment Test 1 – May 2024

Sub:	**Database Management System**				Sub Code:	**BCS/BAD 403**	Branch:	**AINDS / CS (DS)**
Date:	**04/06/2024**	Duration:	**90 minutes**	Max Marks:	**50**	Sem	**IV**	**OBE**

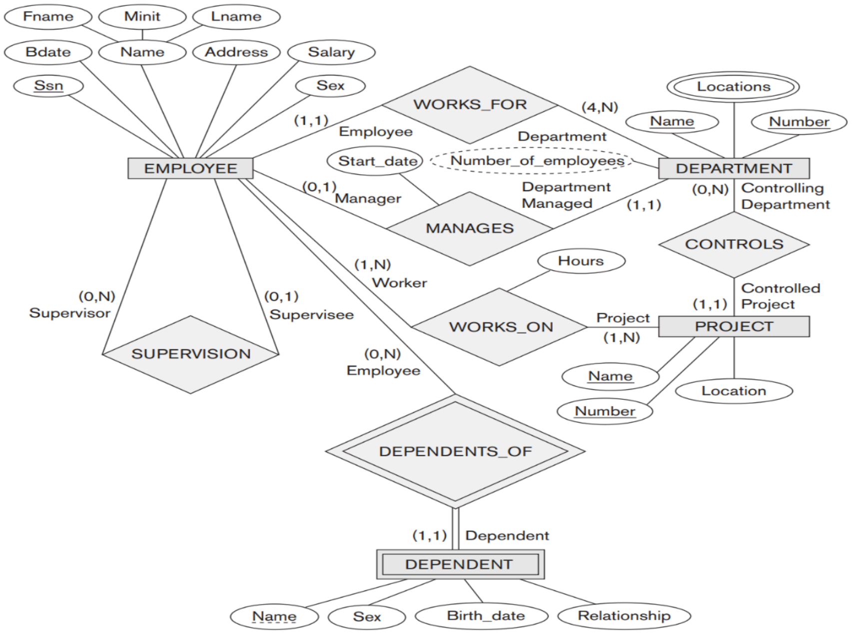
		Answer any FIVE Questions	**MARKS**	**CO**	**RBT**
1	a	Define 1) Entity: Entity, which is a thing or object in the real world with an independent existence. 1 mark 2)Attribute: Attributes are descriptive properties possessed by each member of an entity set. 1 mark 3) Recursive Closure: In some cases the same entity type participates more than once in a relationship type in different roles. In such cases the role name becomes essential for distinguishing the meaning of the role that each participating entity plays. Such relationship types are called recursive relationships or self-referencing relationships. 1 Mark 4)Composite attribute: Composite attributes can be divided into smaller subparts, which represent more basic attributes with independent meanings. 1 Mark 5) Relation: A Relation in a relational database is a collection of data organized as rows (called tuples), where each tuple represents a single piece of information. 1 Mark	5	CO1	L1

	b	Explain three schema Architecture with a neat diagram. **Figure 2.2** The three-schema architecture.  Diagram - 3 Marks Explanation- 2 marks **1. Internal Level** • The internal level has an internal schema which describes the physical storage structure of the database. • The internal schema is also known as a physical schema. • It uses the physical data model. It is used to define that how the data will be stored in a block. • The physical level is used to describe complex low-level data structures in detail. **2. Conceptual Level** • The conceptual schema describes the design of a database at the conceptual level. Conceptual level is also known as logical level. • The conceptual schema describes the structure of the whole database. • The conceptual level describes what data are to be stored in the database and also describes what relationship exists among those data. • In the conceptual level, internal details such as an implementation of the data structure are hidden. • Programmers and database administrators work at this level. **3. External Level** • At the external level, a database contains several schemas that sometimes called as subschema. The subschema is used to describe the different view of the database. • An external schema is also known as view schema. • Each view schema describes the database part that a particular user group is interested and hides the remaining database from that user group. • The view schema describes the end user interaction with database systems Mapping between Views There are basically two types of mapping in the database architecture: o Conceptual/ Internal Mapping o External / Conceptual Mapping Conceptual/ Internal Mapping • The Conceptual/ Internal Mapping lies between the conceptual level and the internal level.	5	CO1	L2

		• Its role is to define the correspondence between the records and fields of the conceptual level and files and data structures of the internal level. External/ Conceptual Mapping • The external/Conceptual Mapping lies between the external level and the Conceptual level. • Its role is to define the correspondence between a particular external and the conceptual view.			

2		With the block diagram, explain the different phases of database design.  Diagram: 4 Marks Explanation for each step: 2 Marks total 6 marks - Figure 3.1 shows a simplified overview of the database design process. - The first step shown is requirements collection and analysis. - During this step, the database designers interview prospective database users to understand and document their data requirements. - The result of this step is a concisely written set of users' requirements. - These requirements should be specified in as detailed and complete a form as possible. - In parallel with specifying the data requirements, it is useful to specify the known functional requirements of the application. - These consist of the user-defined operations (or transactions) that will be applied to the database, including both retrievals and updates. - In software design, it is common to use data flow diagrams, sequence diagrams, scenarios, and other techniques to specify functional requirements. - We will not discuss any of these techniques here; they are usually described in detail in software engineering texts. - Once the requirements have been collected and analyzed, the next step is to create a conceptual schema for the database, using a high-level conceptual data model. - This step is called conceptual design. - The conceptual schema is a concise description of the data requirements of the users and includes detailed descriptions of the entity types, relationships, and constraints; these are expressed using the concepts provided by the high-level data model. - Because these concepts do not include implementation details, they are usually easier to understand and can be used to communicate with nontechnical users. - The high-level conceptual schema can also be used as a reference to ensure that all users' data requirements are met and that the requirements do not conflict.	10	CO1	L2

		- This approach enables database designers to concentrate on specifying the properties of the data, without being concerned with storage and implementation details, which makes it easier to create a good conceptual database design. - During or after the conceptual schema design, the basic data model operations can be used to specify the high-level user queries and operations identified during functional analysis. - This also serves to confirm that the conceptual schema meets all the identified functional requirements. - Modifications to the conceptual schema can be introduced if some functional requirements cannot be specified using the initial schema. - The next step in database design is the actual implementation of the database, using a commercial DBMS. - Most current commercial DBMSs use an implementation data model—such as the relational (SQL) model—so the conceptual schema is transformed from the high-level data model into the implementation data model. - This step is called logical design or data model mapping; its result is a database schema in the implementation data model of the DBMS. - Data model mapping is often automated or semiautomated within the database design tools. - The last step is the physical design phase, during which the internal storage structures, file organizations, indexes, access paths, and physical design parameters for the database files are specified. - In parallel with these activities, application programs are designed and implemented as database transactions corresponding to the high-level transaction specifications. - We present only the basic ER model concepts for conceptual schema design in this chapter. - Additional modeling concepts are discussed in Chapter 4, when we introduce the EER model.			

3		Draw an ER-diagram of an Employee department database taking into account at least 5 entities. Indicate all keys, constraints and assumptions that are made.  ER Diagram: 7 marks Explanation; 3 marks(why cardinality ratio is considered so and so, why its weak entity/ strong entity, what are entities, attributes, if complex/composite entities are used)	10	CO2	L4

4		Consider the following Schema. Sailors(sid, sname, rating, age) Boats(bid, bname, color) Reserves(sid, bid, day) Write the relational algebra query for: 1. Find names of sailors who've reserved boat #103. 2 Marks 2. Find names of sailors who've reserved a red boat. 2 Marks 3. Find sailors who've reserved a red or a green boat. 2 Marks 4. Find sailors who've reserved a red and a green boat. 2 Marks 5. Find sailors who've reserved all the boats. 2 Marks **1. Find names of sailors who've reserved boat #103:** $$\pi_{\text{sname}}(\sigma_{\text{bid}=103}(\text{Reserves} \bowtie \text{Sailors}))$$ **2. Find names of sailors who've reserved a red boat:** $$\pi_{\text{sname}}(\sigma_{\text{color}='red'}(\text{Boats} \bowtie \text{Reserves}) \bowtie \text{Sailors})$$ 3. π_{sname} (σ_{color='red' ∨ color='green'} (Sailors ⋈ (Reserves ⋈ Boats))) 4. π_{sname} ((σ_{color='red'} (Sailors ⋈ (Reserves ⋈ Boats))) ⋈_sid π_{sid} (σ_{color='green'} (Sailors ⋈ (Reserves ⋈ Boats)))) 5. π_{sname} (Sailors ⋈ (Reserves ⋈ Boats)) - (π_{sname} (Sailors ⋈ (Reserves ⋈ Boats)) ÷ π_{bname} (Boats)) **Or** π_{sname} (Sailors ⋈ (Reserves ÷ π_{bid} (Boats)))	10	CO1	L2
5		Explain the four relational model constraints with an Example. 1. Domain Constraint with example 2 Marks 2. Key Constraint with example 3 Marks 3. Constraint on Null 2 Marks 4. Referential integrity Constraint 3 Marks If they explain these constraint effects on Insert, update and delete will be the plus point along with definition of relational model constraints.	10	CO3	L2

6

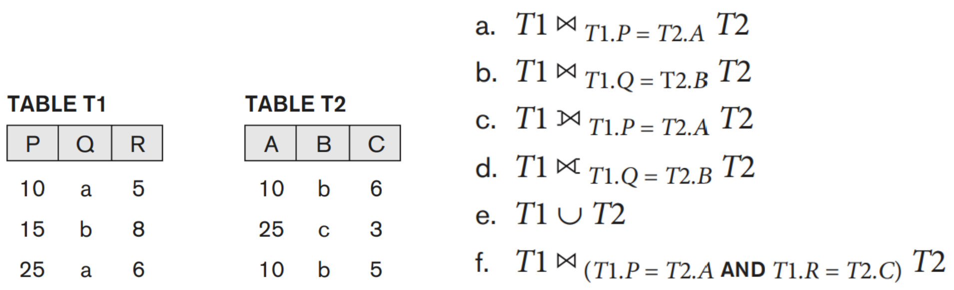


TABLE T1

P	Q	R
10	a	5
15	b	8
25	a	6

TABLE T2

A	B	C
10	b	6
25	c	3
10	b	5

a. $T1 \bowtie_{T1.P = T2.A} T2$

b. $T1 \bowtie_{T1.Q = \mathrm{T2}.B} T2$

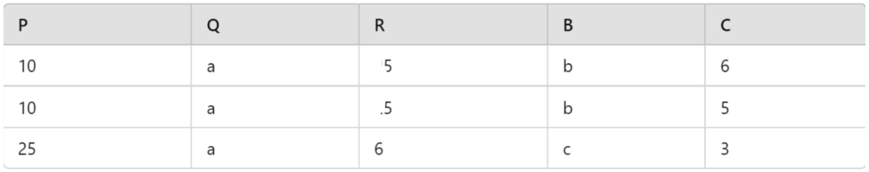
c. $T1 ⟕_{T1.P = T2.A} T2$

d. $T1 ⟖_{T1.Q = T2.B} T2$

e. $T1 \cup T2$

f. $T1 \bowtie_{(T1.P = T2.A \textbf{ AND } T1.R = T2.C)} T2$

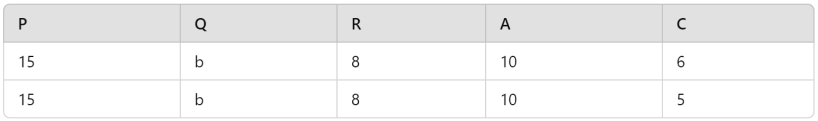
a.



P	Q	R	B	C
10	a	5	b	6
10	a	.5	b	5
25	a	6	c	3

2 Marks

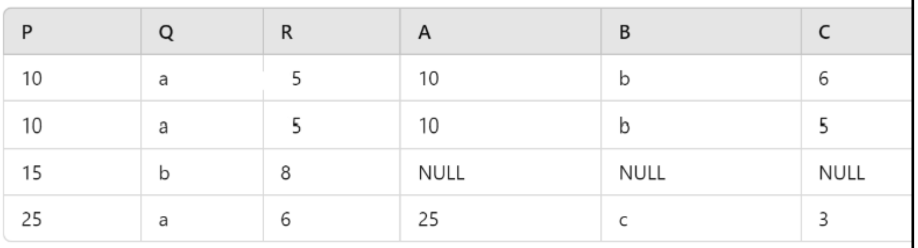
b.



P	Q	R	A	C
15	b	8	10	6
15	b	8	10	5

1 marks

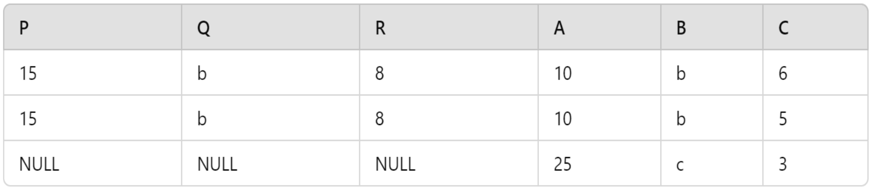
c.



P	Q	R	A	B	C
10	a	5	10	b	6
10	a	5	10	b	5
15	b	8	NULL	NULL	NULL
25	a	6	25	c	3

2 marks

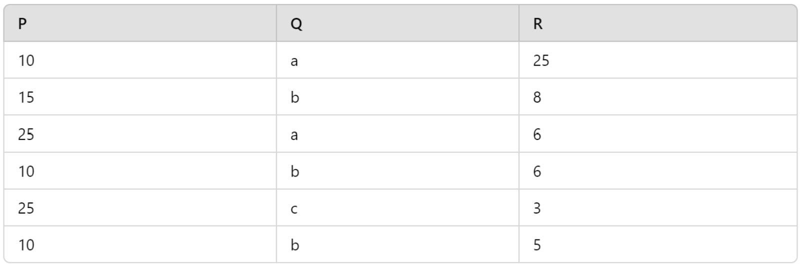
d.



P	Q	R	A	B	C
15	b	8	10	b	6
15	b	8	10	b	5
NULL	NULL	NULL	25	c	3

2 marks

e.



P	Q	R
10	a	25
15	b	8
25	a	6
10	b	6
25	c	3
10	b	5

1 mark

10

CO3

L3

f.

P	Q	R	B
10	a	5	b

2 Mark

CI CCI HOD