BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : V/ADD**
BRANCH: AIML **SESSION : MO/2025**

SUBJECT: CS361 DATABASE SYSTEM CONCEPTS

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	We can convert weak entity sets into strong entity sets by simply adding the appropriate attributes. Then, why are weak entity sets actually needed? Explain with an example.	[2]	1	3
Q.1(b)	Explain the significance of each level of data independence in the 3-Level Abstraction of a Database, and support your explanation with a diagram.	[3]	2	3
Q.2(a)	Here is some information about an art museum. Assume that the following requirements were collected: • The museum has a collection of ART_OBJECTS. Each ART_OBJECT has a unique IdNo, an Artist (if known), a Year (when it was created, if known), a Title, and a Description. The art objects are categorized in several ways, as discussed below: • ART_OBJECTS are categorized based on their type. There are three main types: PAINTING, SCULPTURE, and STATUE, plus another type called OTHER to accommodate objects that do not fall into one of the three main types. • A PAINTING has a PaintType (oil, watercolor, etc.), material on which it is DrawnOn (paper, canvas, wood, etc.), and Style (modem, abstract, erc.). • A SCULPTURE or a STATUE has a Material from which it was created (wood, stone, etc.), Height, Weight, and Style. • An art object in the OTHER category has a Type (print, photo, etc.) and Style. • ART_OBJECTS are also categorized as PERMANENT_COLLECTION, which are owned by the museum (these have information on the DateAcquired, whether it is OnDisplay or stored, and Cost) or BORROWED, which has information on the Collection (from which it was borrowed), DateBorrowed, and DateRetumed. • ART_OBJECTS also have information describing their country/culture using information on country/culture of Origin (Italian, Egyptian, American, Indian, etc.) and Epoch (Renaissance, Modem, Ancient, etc.). • The museum keeps track of ARTIST'S information, if known: Name, DateBom (if known), DateDied (if not living), CountryOfOrigin, Epoch, MainStyle, and Description. The Name is assumed to be unique. • Different EXHIBITIONS occur, each having a Name, StartDate, and EndDate. EXHIBITIONS are related to all the art objects that were on display during the exhibition. • Information is kept on other COLLECTIONS with which the museum interacts, including Name (unique), Type (museum, personal, etc.), Description, Address, Phone, and current ContactPerson. Design an ER and/or EER diagram to capture the above requirements. Specifically, mention your assumptions (if any).	[3]	2	3
Q.2(b)	Convert the diagram for the above problem into relational schemas, pictorially specifying foreign keys, primary keys, etc.	[2]	2	2

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Q.3(a) **[3] 1 3**

Sailor Database

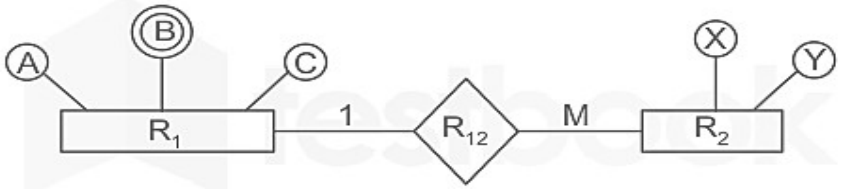
Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid, day)

Write the following queries in relational algebra using the above schemas:
a) Find the names of sailors who've reserved a green boat.
b) Find the sailor ids of the sailors who've reserved all boats.
c) Find the names of sailors who've reserved boat id 105.

Q.3(b) [2] 2 2



What is the minimum no. of tables required to convert the ER diagram above to a relational database?

Q.4(a) Explain the concept of view and assertion in SQL using examples. [2] 2 2

Q.4(b) Consider the relational database [3] 3 3

supplier(sid, sname, address)
parts(pid, pname, color)
catlog(sid, pid, cost)

Write the queries in SQL for the following:
i) Find the name of supplier who supplies some red parts.
ii) Find the name of all part whose cost is more than Rs. 250.
iii) Find the name of all part whose color is green.

Q.5(a) Consider the relation R(A,B,C,D,E,F,G,H) and set of FDs F={A->BC, CD->E, E->C, D->AEH, ABH->BD, DH->BC, AEG->G}. Is BCD->H a valid FD? [2] 3 3

Q.5(b) Consider the universal relation R = {A, B, C, D, E, F, G, H, I,J}} and the set of functional dependencies F = {{A, B} -> {C}, {A} -> {D,E}, {B} -> {F},{F} -> {G, H},{D}-> {I,J }}. What is/are the key/keys for R? [3] 3 3

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