National University of Computer and Emerging Sciences

FAST School of Computing **Spring-2023** **Islamabad Campus**

CS-2005: Database Systems

Serial No:

Sessional Exam-I

Total Time: 1 Hour

Total Marks: 60

Monday, 27th February 2023

Course Instructors

Dr. Waseem Shahzad, Dr. Ramoza Ahsan, Ms. Ayesha Kamran ul Haq

_____

Signature of Invigilator

__Student Name Roll No. Course Section Student Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Attempt on the question paper. Attempt all of them. Read the question carefully, understand the question, and then attempt it.
2. No additional sheet will be provided for rough work. Use the back of the last page for rough work.
3. If you need more space, write on the back side of the paper and clearly mark the question and part number, etc.
4. After being asked to commence the exam, please verify that you have **ten (10)** different printed pages including this title page. There is a total of **3** questions.
5. Calculator is strictly prohibited.
6. Use permanent ink pens only. Any part done using a soft pencil will not be marked and cannot be claimed for rechecking.

	Q-1	Q-2	Q-3	Total
Marks Obtained				
Total Marks	**25**	**25**	**10**	**60**

Question 1 [25 Marks]

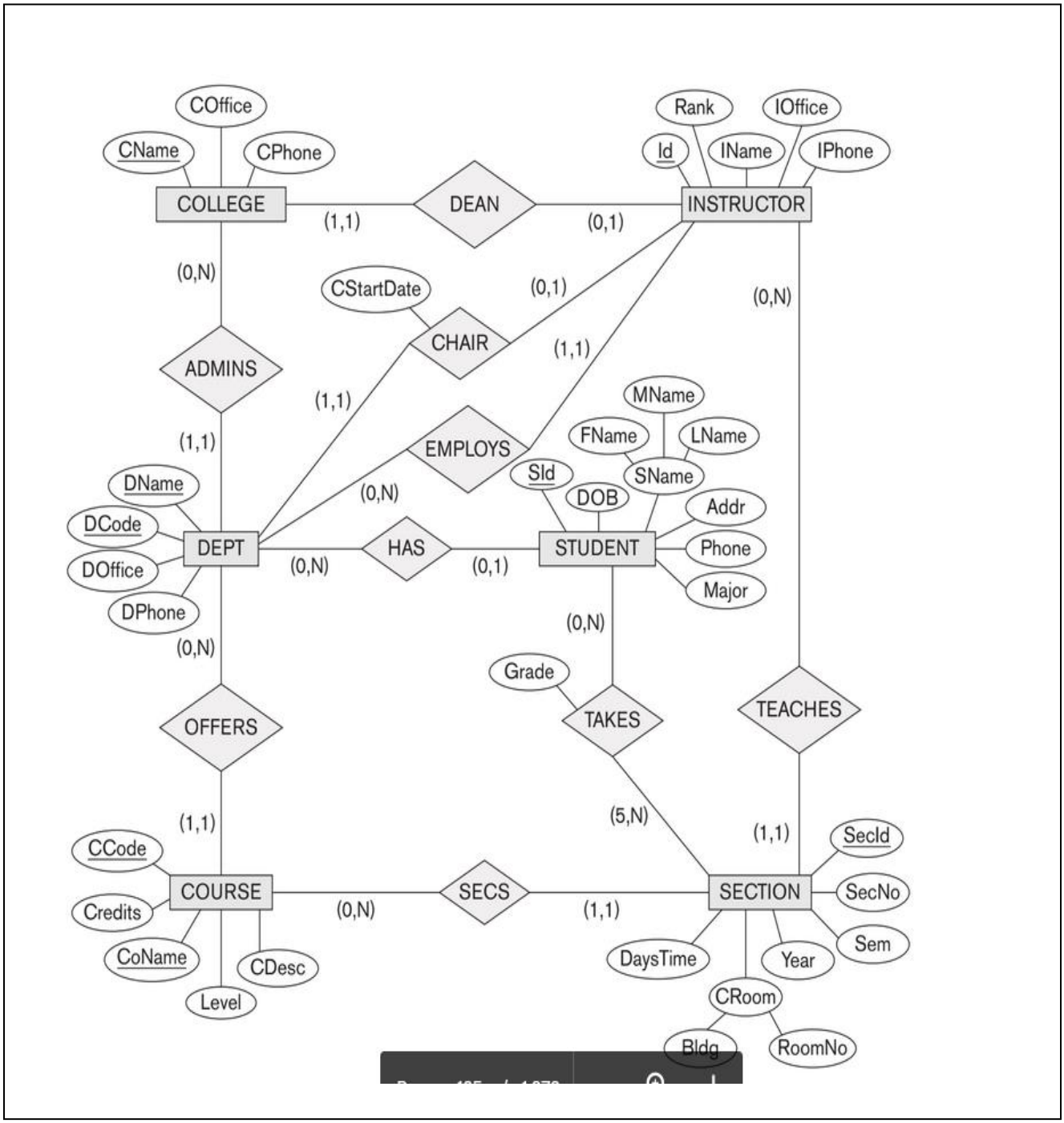
Consider you are making a UNIVERSITY database. The requirements of the database are as follows:

- The university is organized into colleges (COLLEGE), and each college has a unique name (CName), an office (COffice) and phone (CPhone), and a particular faculty member who is dean of the college. Each college administers a number of academic departments (DEPT). Each department has a unique name (DName), a unique code number (DCode), an office (DOffice) and phone (DPhone), and a particular faculty member who chairs the department. We keep track of the start date (CStartDate) when that faculty member began chairing the department.
- A department offers a number of courses (COURSE), each of which has a unique course name (CoName), a unique code number (CCode), a course level, a course credit hour (Credits), and a course description (CDesc). The database also keeps track of instructors (INSTRUCTOR); and each instructor has a unique identifier (Id), name (IName), office (IOffice), phone (IPhone), and rank (Rank); in addition, each instructor works for one primary academic department. The database will keep student data (STUDENT) and stores each student's name (SName), composed of first name (FName), middle name (MName), last name (LName)), student id (Sid, unique for every student), address (Addr), phone (Phone), major code (Major), date of birth (DoB) and age. A student is assigned to one primary academic department. It is required to keep track of the student's grades in each section the student has completed.
- Courses are offered as sections (SECTION). Each section is related to a single course and a single instructor and has a unique section identifier (SecId). A section also has a section number (SecNo), semester (Sem), year (Year), classroom (CRoom: this is coded as a combination of building code (Bldg) and room number (RoomNo) within the building). The database keeps track of the students in each section, and the grade is recorded when available

Question 1-a [3 Marks]: List down the entities in your Database

Question 1-b [7 Marks]: For each of the entities list down its attributes and type of attributes.

Question 1-c [15 Marks]: Design the ER model for your application illustrating entities, attributes, relationships, and cardinalities of relationships (1:1, 1:M, etc.)


COffice
CName
CPhone
COLLEGE
(1,1)
DEAN
(0,1)
Rank
IOffice
Id
IName
IPhone
INSTRUCTOR
(0,N)
CStartDate
(0,1)
CHAIR
(1,1)
(0,N)
ADMINS
(1,1)
(1,1)
EMPLOYS
MName
FName
LName
SName
SId
DOB
Addr
Phone
Major
STUDENT
(0,N)
DName
DCode
DOffice
DPhone
DEPT
(0,N)
HAS
(0,1)
(0,N)
Grade
TAKES
(0,N)
OFFERS
TEACHES
(1,1)
(5,N)
(1,1)
SecId
SecNo
Sem
CCode
Credits
CoName
CDesc
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COURSE
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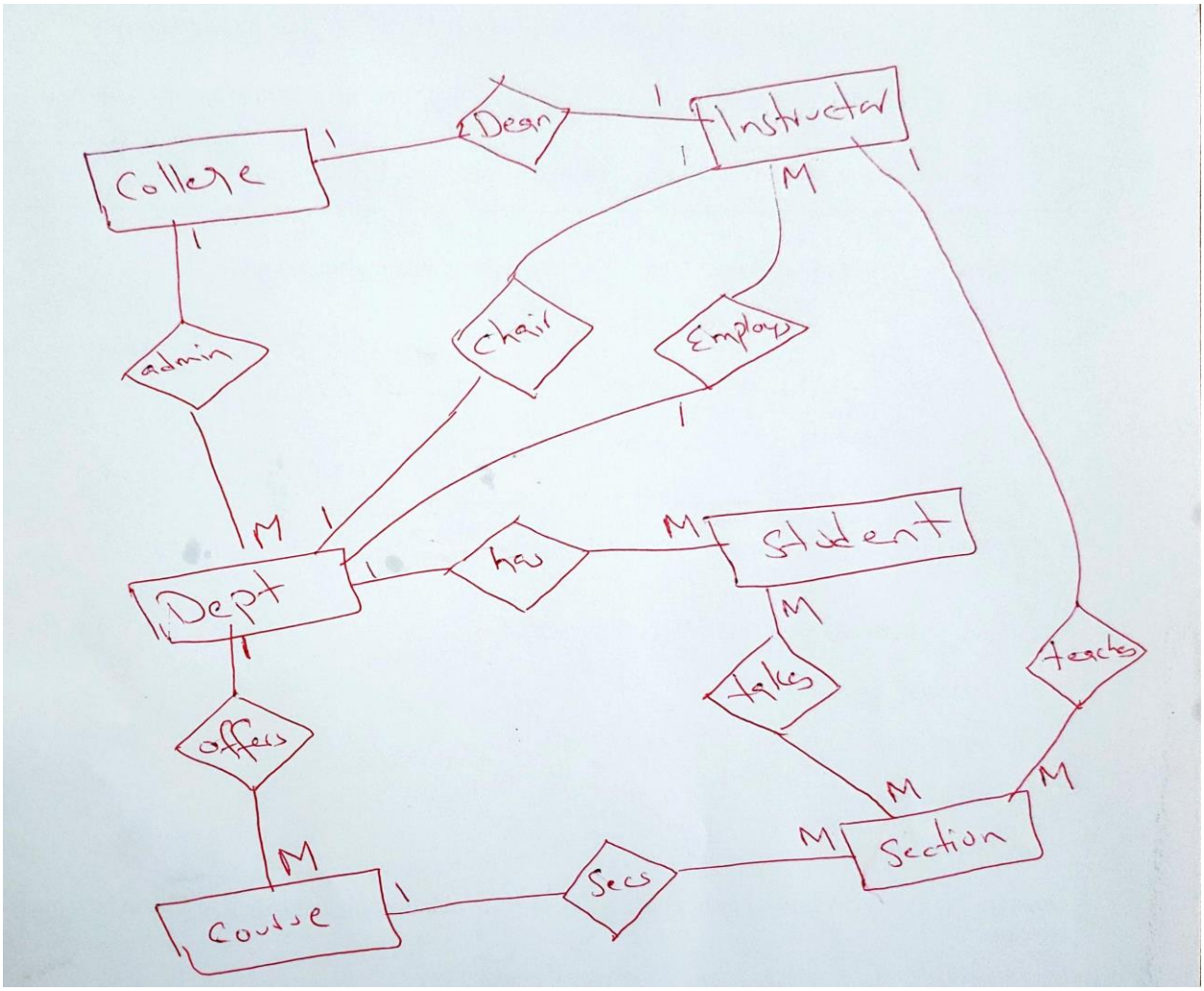
(1,1)
SECTION
DaysTime
Year
CRoom
Bldg
RoomNo



Question 2 [25 Marks] Short Questions

Question 2-a: **(2 Mark)** For the following binary relationships, suggest cardinality ratios based on the common-sense meaning of the entity types. Clearly state any assumptions you make.

	Entity 1	Cardinality Ratio	Entity 2
1.	Person	_____1:1_____	CNIC_card
2.	Course	_____1:M_OR M:M_____	Text Book
3.	Doctor	_____1:M_____	Patient
	Another solution Doctor	_____M:M_____	Patient
4.	Country	_____1:1_____	Current_President
5.	Instructor	_____1:1 OR M:1__	Office
6.	Car	_____M:1_____	Owner

Question 2-b: **(1 Mark)** _____ level of Data abstraction describes what data is stored in the database and their relationships among data

a) Physical Level

b) Logical Level

c) External Level

d) None of the above

Question 2-c: **(1 Mark)** A _____ attribute is made up of more than one simple attribute

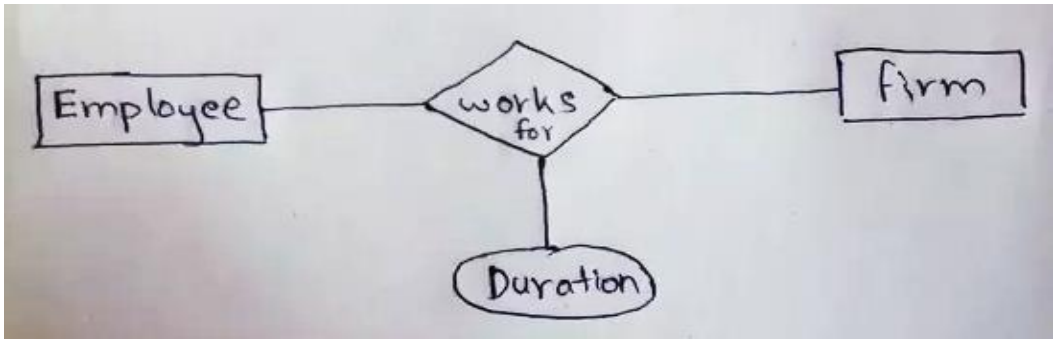
a) Single Valued

b) Composite

c) Derived

d) Multi-valued

Question 2-d: **(1 Mark)** In the following example, What is the type of "Duration" attribute



a) Composite

b) Derived

c) Single

d) Descriptive

Question 2-e: **(1 Mark)** The ability to query data, as well as insert, delete, and alter tuples, is offered by _____

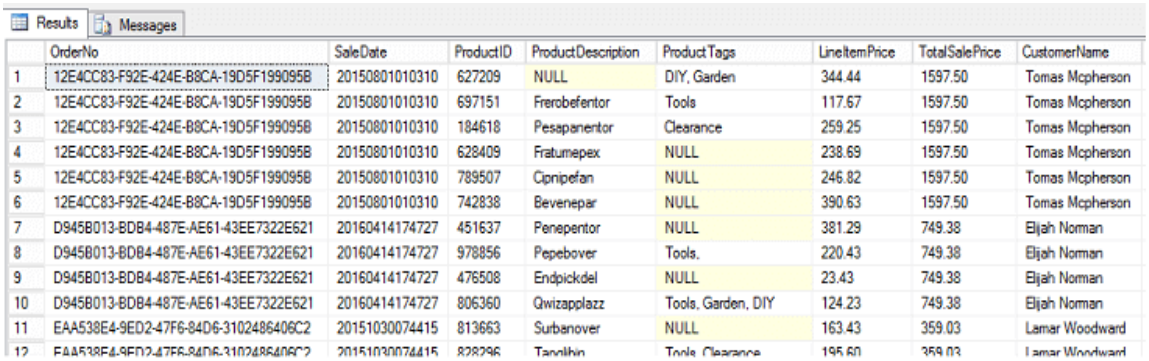
a) TCL (Transaction Control Language)

b) DCL (Data Control Language)

c) DDL (Data Definition Langauge)

d) DML (Data Manipulation Langauge)

Question 2-f: **(2+2+2 Marks)** Write down any three errors in the given database design. Also, write the possible solution if exist.



Results | Messages

	OrderNo	SaleDate	ProductID	ProductDescription	ProductTags	LineItemPrice	TotalSalePrice	CustomerName
1	12E4CC83-F92E-424E-B8CA-19D5F199095B	20150801010310	627209	NULL	DIY, Garden	344.44	1597.50	Tomas Mcpherson
2	12E4CC83-F92E-424E-B8CA-19D5F199095B	20150801010310	697151	Frerobefentor	Tools	117.67	1597.50	Tomas Mcpherson
3	12E4CC83-F92E-424E-B8CA-19D5F199095B	20150801010310	184618	Pesapanentor	Clearance	259.25	1597.50	Tomas Mcpherson
4	12E4CC83-F92E-424E-B8CA-19D5F199095B	20150801010310	628409	Fratumepex	NULL	238.69	1597.50	Tomas Mcpherson
5	12E4CC83-F92E-424E-B8CA-19D5F199095B	20150801010310	789507	Cpnipefan	NULL	246.82	1597.50	Tomas Mcpherson
6	12E4CC83-F92E-424E-B8CA-19D5F199095B	20150801010310	742838	Bevenepar	NULL	390.63	1597.50	Tomas Mcpherson
7	D945B013-BDB4-487E-AE61-43EE7322E621	20160414174727	451637	Penepentor	NULL	381.29	749.38	Elijah Norman
8	D945B013-BDB4-487E-AE61-43EE7322E621	20160414174727	978856	Pepebover	Tools,	220.43	749.38	Elijah Norman
9	D945B013-BDB4-487E-AE61-43EE7322E621	20160414174727	476508	Endpickdel	NULL	23.43	749.38	Elijah Norman
10	D945B013-BDB4-487E-AE61-43EE7322E621	20160414174727	806360	Qwizapplazz	Tools, Garden, DIY	124.23	749.38	Elijah Norman
11	EAA538E4-9ED2-47F6-84D6-3102486406C2	20151030074415	813663	Surbanover	NULL	163.43	359.03	Lamar Woodward
12	EAA538E4-9ED2-47F6-84D6-3102486406C2	20151030074415	828296	Tanollbin	Tools, Clearance	195.60	359.03	Lamar Woodward

...

1) **ProductTags contains multiple data values in the same column separated by commas.**
2) **No keys or constraints on the table**
3) **All Customer details are duplicated for each line item.**
4) **Product related information should be in separate table.**
5) **SaleDate is being stored as a VARCHAR(14) instead of in a DATETIME format.**

Other possible mistakes:
https://www.mssqltips.com/sqlservertip/4293/remodel-poorly-designed-sql-server-database-tables/

Question 2-g: **(2 Marks)** A table has two primary keys. Is it true? give an appropriate reason.

No, a table has only one primary key, or have a composite primary key.

Question 2-h: **(1+1+1+1+1 Mark)** Write down the type of data in each scenario.

1) ATM _____Structure _____
2) Facebook ____Semi Structure / Unstructured _____
3) Customer Reviews _____ Unstructured_____ ___
4) Phonebook _____Structure _____
5) Email ___Semi Structure / Unstructured _____

Question 2-i: **(1 Mark)** Weak entity set is represented as

a) Underline

b) Double line

c) Double diamond

d) Double rectangle

Question 2-j: **(1 Mark)** If two entities have many to many relationships mostly it results in how many tables.

_____**3**_____

Question 2-k: **(1 Mark)** Which one is an example of a single-valued attribute?

a) Reference

b) Address

c) SUBJECT_TAKEN

d) Register_number

Question 2-m: **(2 Marks)** Suppose in a classroom, we have many students who belong to a particular club-like a dance club, basketball club, etc., and some of them are club leads. So, a particular group of students is managed by their respective club lead. Here, the group is formed from students and also, and the club leads are chosen from students. **What will be the degree of relationship in the above scenario?**

Unary relation OR 1 degree

Question 3 [10 Marks] SQL

Consider the following **Customer** table

customer_id	cust_name	city	grade	salesman_id
3002	Nick Rimando	New York	100	5001
3007	Brad Davis	New York	200	5001
3005	Graham Zusi	California	200	5002
3008	Julian Green	London	300	5002
3004	Fabian Johnson	Paris	300	5006
3009	Geoff Cameron	Berlin	100	5003
3003	Jozy Altidor	Moscow	200	5007

SQL Commands	**SQL Query**

Create the above table. Consider "customer_id" as the primary key	create table Customer(customer_id int primary key, cust_name varchar(20), city varchar(20), grade int, salesman_id int);
Show the name of the customers whose city starts with 'L' and ends with 'N'.	Select cust_name from Customer Where city like 'L%N';
Shows the Name and City of the customer whose Grade is between 100 and 200	Select cust_name , city from Customer where grade between 100 and 200
Insert a record only for customer_id and city	insert into Customer (customer_id, city) values (5, "ISLAMABAD") # Data may vary
Update the city of the "3002" customer to "London".	UPDATE Customer SET city= "London" WHERE customer_id = 3002;