A. M. E. C. E. A

CAT

SEPTEMBER-DECEMBER 2024 TRIMESTER

SCHOOL OF SCIENCE

DEPARTMENT OF COMPUTER AND INFORMATION SCIENCE

REGULAR PROGRAMME

CMT 302: ADVANCED DATABASE SYSTEMS

Date: SEPT/DEC 2024	**Duration: 45 Minutes**

INSTRUCTIONS: Answer All the Question

NOTE:

i.) You are required to answer all without leaving any blank question. You will be penalized for leaving any blank space for the questions selected.

ii.) Ensure that you use the CORRECT SPELLINGS.

SECTION A (*COMPULSORY*) **(30marks)**

QUESTION ONE **(30marks)**

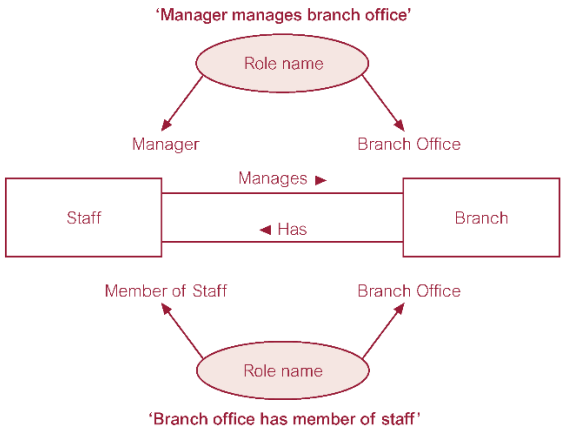
a) **Define** the following terms as used in advanced database systems: **(3 marks)**
   (i) Tuple;
   (ii) Relations
   (iii)Degree

b) **Explain TWO** *drawbacks* of file-based database systems. **(4 marks)**

c) **Outline TWO** *merits* related to the wide use of database management systems (DBMS). **(2 marks)**

d) **Distinguish** between ***DDL*** and ***DML*** as used in database systems. **(4 marks)**

e) **Given** the following entities associated through two distinct relationships with role names:



Distinguish between the following types of *attributes* as used in advanced database systems using the above illustration: **(3 marks)**

(i) Composite Attribute
(ii) Multi-Valued Attribute
(iii)Derived Attribute

f) **Discuss TWO** types of restrictions on relationships as made up in *multiplicity* on structural constraints of advanced database systems. (**4 marks)**

g) **Explain** how the **A.C.I.D** properties of database transactions assist database integrity. **(4 marks)**

h) The Uchumi Football Federation (KFF) has requested you to design a database for a certain football league at Kasarani. The President has provided you with the following requirements:
"The league has several teams. Each team has several players, officials and home grounds. A player can only play for one and only one team. A player has a country of birth but a country can have more than one player in the same or different teams. Team officials have various responsibilities in managing the team. But an official can only attend to a particular team. A team may have one or more home grounds but a particular ground/field belongs to one and only one team".
Using **Chen's** notation, produce a conceptual database design for this case complete with cardinalities and optionalities. **(6 marks)**

CAT 2 (STREAM B)

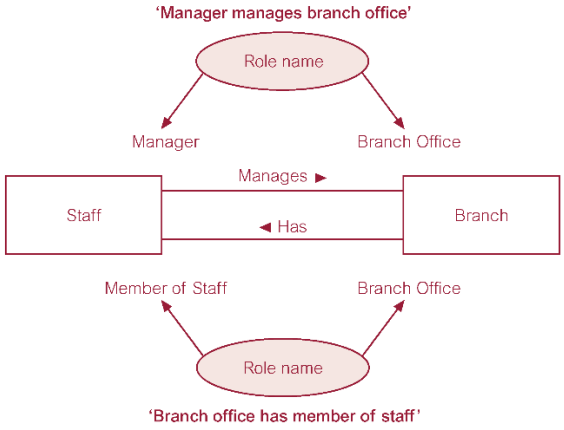
QUESTION ONE **(14 marks)**

i) **Define** the following terms as used in advanced database systems: **(3 marks)**
(iv) Tuple;
(v) Relations
(vi) Degree

j) **Explain TWO** *drawbacks* of file-based database systems. **(4 marks)**

k) **Outline THREE** *merits* related to the wide use of database management systems (DBMS). **(3 marks)**

l) **Given** the following entities associated through two distinct relationships with role names:



Distinguish between the following types of *attributes* as used in advanced database systems using the above illustration: **(3 marks)**

(iv) Composite Attribute
(v) Multi-Valued Attribute
(vi) Derived Attribute

Outline TWO *merits* related to the wide use of database management systems (DBMS).

(2 marks)

QUESTION 2

a) Study the SQL code below written in MySQL:

```
CREATE TABLE TEACHER
(
TearcherID varchar(100) not null,
Firstname varchar(100),
Lastname varchar(100),
Age Int,
PRIMARY KEY(TeacherID)
);
```

State and explain TWO types of integrity used in this code. **(4 marks)**

b) Briefly describe the following types of advanced databases.

i. Temporal databases

ii. Spatial databases

iii. Mobile databases **(6 Marks)**

a) **State *transitive dependency*** condition as applied in Third Normal Form **(3NF)** of database systems. **(2 marks)**

b) **Distinguish** between *Conceptual schema* and *Conceptual modelling* terms as used in advanced database systems. **(4 marks)**

c) Define **UML** term as applied in database design and state it's role**.** **(2 marks)**

QUESTION THREE **(11 Marks)**

a) **Given** MySQL environment, write SQL queries to execute the following commands:

1. Create the following Relation (Tables) with primary key integrity constraint

i. ***lecturers*** **(6 marks)**

ID	**name**	**dept_name**	**salary**
10101	Srinivasan	Comp. Sci.	65000
12121	Wu	Finance	90000
15151	Mozart	Comp. Sci.	40000
22222	Einstein	Physics	95000
32343	El Said	History	60000

b) **Write** the most appropriate **SQL** queries to do the following: **(5 marks)**

(i) **Insert** following additional tuple in lecturers ('10211', 'Smith', 'Biology', 66000) **(3 marks)**

(ii) **Delete** this tuple from lecturers ('10211', 'Smith', 'Biology', 66000). **(2 marks)**