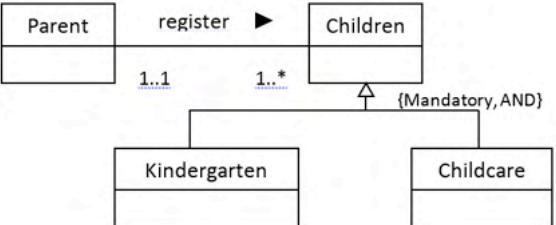


PART A: TRUE/FALSE QUESTION

(20 MARKS)

1.	Database application program is a computer program that interacts with the database by issuing an appropriate request (typically an SQL statement) to the DBMS.	TRUE / FALSE
2.	Some disadvantages of DBMSs include complexity, cost, reduced performance, and higher impact of a failure.	TRUE / FALSE
3.	The goal of the three-schema architecture is to combine the user applications and the physical database.	TRUE / FALSE
4.	Entity integrity refers to if a foreign key exists in a table, either the foreign key value must match a candidate key value of some record in its home table or the foreign key value must be wholly null.	TRUE / FALSE
5.	The primary key is an attribute or set of attributes within one relation that matches the candidate key of some (possibly the same) relation. A foreign key is the candidate key that is selected to identify tuples uniquely within a relation.	TRUE / FALSE
6.	A user view defines what is required of a database system from the perspective of a particular job (such as Manager or Supervisor) or business application area (such as marketing, personnel, or stock control).	TRUE / FALSE
7.	There are two approaches (describing transactions and using transaction pathways) that could be used to validate local conceptual model against user transactions.	TRUE / FALSE
8.	Physical data independence refers to the immunity of the external schema to changes in the conceptual schema.	TRUE / FALSE
9.	There are two main approaches in managing the design of a database system that has multiple user views.	TRUE / FALSE
10.	We can use the example of following SQL statement to display the structure of the table Branch; DESC Branch;	TRUE / FALSE
11.	Assume that the following table is created and stored in your database: Staff (staffNo, name, post, salary, sex, DOB) We can use the following SQL statement to remove the records of all 'salesmen' from the Staff table; DELETE FROM Staff WHERE post = 'salesman';	TRUE / FALSE

12.	<p>The following query (in SQL) can be used to insert a record in the 'vehicles' table;</p> <p>INSERT INTO vehicles VALUES (carType ('T567SDF', 'Nissan', 'Primera'));</p> <p>INSERT INTO vehicles VALUES ('S123NPM', 'Ford', 'Escort');</p>	TRUE / FALSE																		
13.	<p>Table 1: Data structure for 'Student' relation</p> <table border="1" data-bbox="398 541 1001 765"> <thead> <tr> <th>Attribute</th><th>Type</th><th>Description</th></tr> </thead> <tbody> <tr> <td>MatricNo</td><td>Varchar</td><td>8</td></tr> <tr> <td>Name</td><td>Varchar</td><td>50</td></tr> <tr> <td>FacultyCode</td><td>Varchar</td><td>4</td></tr> <tr> <td>DateRegister</td><td>Date</td><td></td></tr> <tr> <td>CPA</td><td>Number</td><td>3,2</td></tr> </tbody> </table> <p>The following SQL statement can be used to create 'Student' relation according to the details of 'Student' relation above;</p> <p>CREATE TABLE Pelajar (MatricNo VARCHAR2(8), Name VARCHAR2(50), FacultyCode VARCHAR2(4), DateRegister DATE, CPA NUMBER);</p>	Attribute	Type	Description	MatricNo	Varchar	8	Name	Varchar	50	FacultyCode	Varchar	4	DateRegister	Date		CPA	Number	3,2	TRUE / FALSE
Attribute	Type	Description																		
MatricNo	Varchar	8																		
Name	Varchar	50																		
FacultyCode	Varchar	4																		
DateRegister	Date																			
CPA	Number	3,2																		
14.	Data Manipulation Language (DML) is a language that provides a set of operations to support the basic data manipulation operations on the data held in the database.	TRUE / FALSE																		
15.	A design methodology is a structured approach that uses procedures, techniques, tools and documentation aids to support and facilitate the process of design.	TRUE / FALSE																		
16.	 <p>Figure 1: ER diagram (conceptual level) for Clinic Management</p> <p>This figure shows an ER diagram that represents each of the following requirements:</p> <p>A company called Perfect Pets runs a number of clinics. A clinic has many staff and a member of staff manages at most one clinic (not all staff manage clinics). Each clinic has a unique clinic number (clinicNo) and each member of staff has a unique staff number (staffNo).</p>	TRUE / FALSE																		

17.	<p>Identify the representation of a superclass/subclass relationship based on the participation and disjoint constraints in Figure 2 below.</p> <p>Parents are allowed to register their children whether to joint kindergarten only or kindergarten and childcare.</p>  <pre> erDiagram class Parent class Children class Kindergarten class Childcare Parent { o--o Children : register } Children { *--o Kindergarten : " " *--o Childcare : " " } " " { o--o{ Children : "Mandatory, AND" } } </pre> <p>Figure 2: Entity Relationship Diagram</p>	TRUE / FALSE
18.	Block N28, Faculty of Computing, Universiti Teknologi Malaysia, 81310 Skudai, Johor. The record of address above is an example of simple attribute.	TRUE / FALSE
19.	Specialization is the process of minimizing the differences between entities by identifying their common features.	TRUE / FALSE
20.	A disjoint constraint describes the relationship between members of the subclasses and indicates whether it is possible for a member of a superclass to be a member of one, or more than one subclass.	TRUE / FALSE

PART B: STRUCTURED QUESTION**(80 MARKS)****QUESTION 1 (15 MARKS)**

Figure 3 is for Questions (a) – (c).

The tables in Figure 3 show the data collected for a student file in UTM's Faculty Information System and College Management System. The systems are two separated file-based systems that is managed individually by the faculties and student colleges. Please note that, both system uses different database: Faculty Information System is using Microsoft SQL Server, and College Management System is using Microsoft Access.

DATA PELAJAR (UNTUK FAKULTI) <i>STUDENT DATA (FOR FACULTY)</i>	DATA PELAJAR KOLEJ (UNTUK KOLEJ) <i>STUDENT COLLEGE DATA (FOR COLLEGE)</i>
No Matrik	No Matrik
No KP	No KP
Nama Pelajar	Nama Pelajar
Tarikh Lahir	Nama Ibu/Bapa/Penjaga
Jantina	Jantina

Figure 3: Data for Faculty Information System (left) and College Management System (right).

Assumed that UTM has asked you to design a new Student Management Systems that can be used by both the faculty and college management. In your proposal, you need to answer the following questions to justify the need of a new (merged) system:

- a) What are the limitations of a traditional file-based system? Describe **TWO (2)** of the limitation based on Figure 3.
(4 Marks)
- b) Define DATABASE and DATABASE MANAGEMENT SYSTEM (DBMS) and give **ONE (1)** example of each definitions (based on Figure 3).
(4 Marks)
- c) Provide **THREE (3)** advantages on how DBMS can solve the limitation in (a)?
(3 Marks)

- d) Figure 4 shows the ANSI-SPARC Three-Level Architecture. Explain the four level architect as in Figure 4.

(4 Marks)

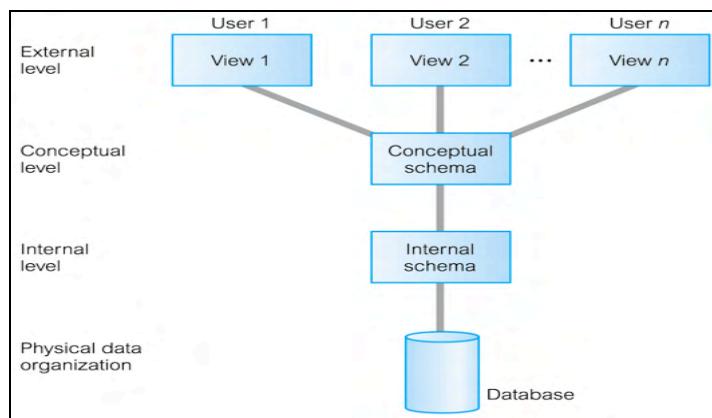


Figure 4: The ANSI-SPARC Three-Level Architecture

QUESTION 2 (15 MARKS)

a) Describe each of the following concept in the context of relational data model.

(4 Marks)

- i. Domain
- ii. Degree
- iii. Cardinality
- iv. Tuple

b) Describe what is view and identify **TWO (2)** advantages of views.

(3 Marks)

c) The following tables from part of a database held in a relational DBMS

SportComplex	<u>(sportcomplexNo, sportcomplexName, city)</u>
Court	<u>(courtNo, sportcomplexNo, type, price)</u>
Booking	<u>(sportcomplexNo, guestNo, date, timeFrom, timeTo, courtNo)</u>
Guest	<u>(guestNo, guestName, guestAddress)</u>

Description:

- **Sport Complex** contains hotel details and sportcomplexNo is the primary key;
- **Court** contains court details for each sport complex and (courtNo, sportcomplexNo) forms the primary key
- **Booking** contains details of booking and (sportcomplexNo, guestNo, timeFrom) forms the primary key
- **Guest** contains guest details and guestNo is the primary key

i. For each of relation schema, identify foreign key (if exist).

(3 Marks)

ii. Explain how the entity and referential integrity rules apply to **Booking** and **Court** relations.

(5 Marks)

QUESTION 3 (15 MARKS)

Below are a set of relations of a clothing store.

CUSTOMER (custNo, custName, custPhone, gender)

PRODUCT (pCode, pName, price)

ORDERS (orderNo, ordDate, custNo, prodNo, quantity)

Foreign key: custNo -> **CUSTOMER** (custNo)

prodNo -> **PRODUCT** (pCode)

Construct a SQL Data Definition Language (DDL) for the following statement:

- a) Define the **ORDERS** relation which has the following constraints.

Attribute	Data Type	Constraints
orderNo	Integer of length 7	Primary Key
ordDate	Date	
custNo	Various characters of length 5	Foreign Key where the reference relation is CUSTOMER (custNo)
prodNo	Various characters of length 6	Foreign Key where the reference relation is PRODUCT (pCode)
quantity	Integer	-

(5 Marks)

- b) Modify the **ORDERS** relation such that the attribute *orderNo* holds the same data type as *prodNo* in **PRODUCT** relation.

(2 Marks)

- c) Add a new attribute named *totalPrice* in the **ORDERS** relation that reflects the total sum of money to be paid for the order.

(2 Marks)

- d) Add a constraint to the *totalPrice* attribute in the **ORDERS** relation where the default value is set to NOT NULL.

(2 Marks)

- e) Create a new relation named **NEWORDERS** that has the same structure as **ORDERS**.

(2 Marks)

- f) Delete the **ORDERS** relation from your database.

(1 Mark)

- g) Recover the deleted **ORDERS** relation to your database and rename the relation to **OLDORDERS**.

(1 Mark)

QUESTION 4 (20 MARKS)

- a) Identify **ALL** errors and correction on the entity relationship diagram (ERD) given in Figure 5.

Provide your answers in **Appendix 1** by:

- i. Circle the errors identified on the diagram.
- ii. For each error identified, correct them. Show your corrections either by redrawing the corrected diagram OR by describing how the errors should be corrected next to the circles that you have identified.

(5 Marks)

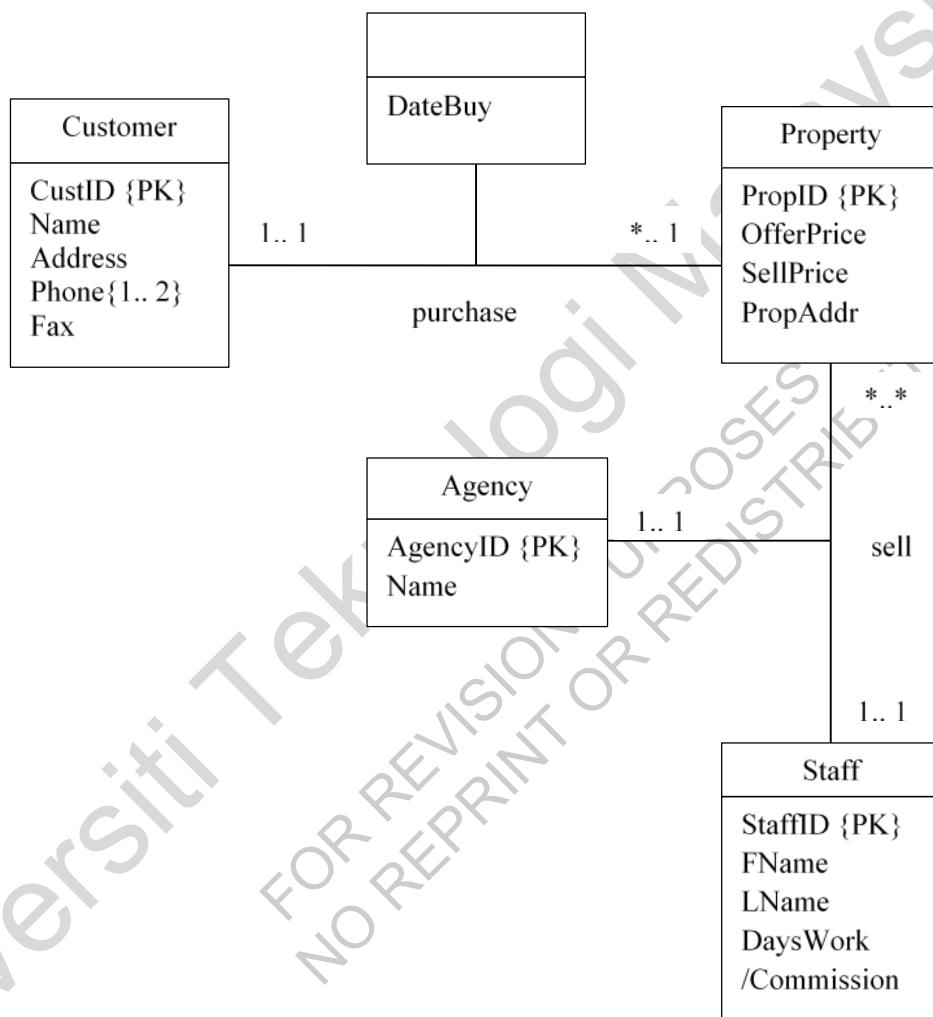


Figure 5: Conceptual ERD

- b) Based on the description given, construct a conceptual entity relationship diagram (ERD) to model the CONFERENCE REVIEW database.

(15 Marks)

A CONFERENCE REVIEW database system is a system where researchers submit their research papers for considerations. Reviews by reviewers are recorded for use in the paper selection process. The database system caters primarily to reviewers who record answers to evaluation question for each paper they review and make recommendations regarding whether to accept or reject the paper. The data requirements are summarized as follows:

- Authors of papers are uniquely identified by e-mail id. First and last name are also recorded.
- Each paper is assigned a unique identifier by the system and is described by a title, abstract, and the name of the electronic file containing the paper.
- A paper may have multiple authors, but one of the authors is designated as the contact author.
- Reviewers of papers are uniquely identified by e-mail address. Each reviewer's first name, last name, phone number, affiliation, and topics of interest are also recorded.
- Each paper is assigned between two and four reviewers. A reviewer rates each paper assigned to him or her on a scale of 1 to 10 in four categories: technical merit, readability, originality, and relevance to the conference. Finally, each reviewer provides an overall recommendation regarding each paper.
- Each review contains two types of written comments: one to be seen by the review committee only and overall recommendation regarding each paper.

QUESTION 5 (15 MARKS)

- a) Examine the Employee Table in Table 2, and then draw a complete Entity Relationship Model / Enhanced Entity Relationship Model (ERM / EERM) based on the information given.

(7 Marks)

Table 2: Employee Table

ENo	EName	BDate	Title	Salary	SupENo	DNo	Lang	DB	MBA	Bonus
E1	Dolly	01-05-75	EE	15000	E2		C++	MySql	Y	4000
E2	Sarah	06-04-79	SA	13000	E5	D3			N	2000
E3	Leman	07-05-76	ME	10000	E7	D2			N	3000
E4	Mika	18-10-71	PR	15000	E6	D3	Java	Oracle	Y	4000
E5	Choon	06-04-79	SA	12000	E8	D3			Y	4000
E6	Cun	30-09-73	EE	14000	E7	D2	C++	DB2		
E7	David	09-08-77	ME	12000	E8	D1			N	3000
E8	Jaffar	10-11-72	SA	16000		D1			Y	6000

- b) Al-Zahra Training Centre is a company that runs training courses. As a junior data admin at Maju Teguh Software House, you are required to design a conceptual database design.

“For each trainee (about 2,000), identified by a trainee code, we want to store his/her name, age, sex, and place of birth. We also want to store each trainee previous employers which contains information on identifiable of employer name, employer address and employer telephone number besides trainees periods employed (can be determined by checking between past employment start date and end date). To work with us, each trainee must have at least one employment history as basis. We also notice there are some trainees who worked at the same companies previously, especially from Oracle and Microsoft companies. Trainee also need to be classified either self-employed or employee. If a trainee is self-employed (i.e., professional), we need to know her area of expertise, and, if appropriate, her professional title. For somebody who works for a company, we store the level and position held.”

Draw a complete EERD for Al-Zahra Training Company business rules above.

(8 Marks)

Appendix 1

