Past Papers May/June 2015 to 2018:

9608/12/M/J/15
Q9 A database has been designed to store data about salespersons and the products they have sold.
The following facts help to define the structure of the database:
- each salesperson works in a particular shop
- each salesperson has a unique first name
- each shop has one or more salespersons
- each product which is sold is manufactured by one company only
- each salesperson can sell any of the products
- the number of products that each salesperson has sold is recorded.

The table **ShopSales** was the first attempt at designing the database.

FirstName	Shop	ProductName	NoOfProducts	Manufacturer
Nick	TX	television set refrigerator digital camera	3 2 6	SKC WP HKC
Sean	BH	hair dryer electric shaver	1 8	WG BG
John	TX	television set mobile phone digital camera toaster	2 8 4 3	SKC ARC HKC GK

(a) State why the table is not in First Normal Form (1NF).

....
....[1]

(b) The database design is changed to:

SalesPerson (<u>FirstName</u>, Shop)
SalesProducts (<u>FirstName</u>, ProductName, NoOfProducts, Manufacturer)

Using the data given in the first attempt table (**ShopSales**), show how these data are now stored in the revised table designs.
Table: **SalesPerson**

FirstName	Shop

Table: **SalesProducts**

FirstName	ProductName	NoOfProducts	Manufacturer

[3]

(c) (i) A relationship between the two tables has been implemented.
Explain how this has been done.

....
....
....
....[2]

(ii) Explain why the SalesProducts table is not in Third Normal Form (3NF).

....
....
....
....[2]

(iii) Write the table definitions to give the database in 3NF.

....
....
....
....[2]

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Q.8 A school stores a large amount of data. This includes student attendance, qualification, and contact details. The school's software uses a file-based approach to store this data.
(a) The school is considering changing to a DBMS.
(i) State what DBMS stands for.
....[1]
(ii) Describe two ways in which the Database Administrator (DBA) could use the DBMS software to ensure the security of the student data.
1 ....
....
....
....
2 ....
....
....
....[4]

(iii) A feature of the DBMS software is a query processor.
Describe how the school secretary could use this software.
....
....
....
....[2]
(iv) The DBMS has replaced software that used a file-based approach with a relational database.
Describe how using a relational database has overcome the previous problems associated with a file-based approach.
....
....
....
....[3]

(b) The database design has three tables to store the classes that students attend.
STUDENT(StudentID, FirstName, LastName, Year, TutorGroup)
CLASS(ClassID, Subject)
CLASS-GROUP(StudentID, ClassID)

Primary keys are not shown. There is a one-to-many relationship between **CLASS** and **CLASS–GROUP.**
(i) Describe how this relationship is implemented.
....
....
....[2]
(ii) Describe the relationship between **CLASS-GROUP** and **STUDENT.**
....[1]

(iii) Write an SQL script to display the **StudentID** and **FirstName** of all students who are in the tutor group 10B. Display the list in alphabetical order of **LastName**.

....

....

....

....[4]

(iv) Write an SQL script to display the **LastName** of all students who attend the class whose **ClassID** is CS1.

....

....

....

....

....

....

....

....[4]

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Answers:
9(a) Any one from:
- (ShopSales) table has repeated group (of attributes)
- each sales person has a number of products
- FirstName, Shop would need to be repeated for each record   [1]

(b) One mark for SalesPerson table
table: SalesPerson

FirstName	Shop
Nick	TX
Sean	BH
John	TX

table: SalesProducts

FirstName	ProductName	NoOfProducts	Manufacturer
Nick	television set	3	SKC
Nick	refrigerator	2	WP
Nick	digital camera	6	HKC
Sean	hair dryer	1	WG
Sean	electric shaver	8	BG
John	television set	2	SKC
John	mobile phone	8	ARC
John	digital camera	4	HKC
John	toaster	3	GK

(c) (i) Any two from:
- primary key of SalesPerson table is FirstName
- links to FirstName in SalesProducts table
- FirstName in SalesProductsS table is foreign key   [2]

(ii)
- There is a non-key dependency
- Manufacturer is dependent on ProductName, (which is not the primary key of the SalesProducts table)   [2]

(iii) SalesPerson (FirstName, Shop)
–SalesProducts (FirstName, ProductName, NoOfProducts) OR   SalesProducts (SalesID, FirstName, ProductName, NoOfProducts)

-Product (ProductName, Manufacturer)

1 mark for correct attributes in SalesProducts and Product tables and 1 mark for correct identification of both primary keys   [2]

Answers
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8 (a) (i) Database Management System [1]

Maximum of two marks per method. Maximum of two methods. [4]

- Issue usernames and passwords...
    - o stops unauthorised access to the data
    - o any further expansion e.g. strong passwords / passwords should be changed regularly etc…
- Access rights / privileges...
    - o so that only relevant staff / certain usernames can read/edit certain parts of the data
    - o can be read only, or full access / read, write and delete
    - o any relevant example e.g. only class tutors can edit details of pupils in their tutor group
- Create (regular / scheduled) backups...
    - o in case of loss/damage to the live data a copy is available
    - o any relevant example e.g. backing up the attendance registers at the end of each day and storing the data off-site/to a separate device
- Encryption of data...
    - o if there is unauthorised access to the data it cannot be understood // needs a decryption key
    - o any relevant example e.g. personal details of pupils are encrypted before being sent over the Internet to examination boards
- Definition of different views...
    - o composed of one or more tables
    - o controls the scope of the data accessible to authorised users
    - o any relevant example e.g. teachers can only see their classes
- Usage monitoring / logging of activity...
    - o creation of an audit /activity log
    - o records the use of the data in the database / records operations performed by all users / all access to the data
    - o any relevant example, e.g. Track who changed a student's grade

(iii) Two points from: [2]

- Set up search criteria
- To find / retrieve / return the data that matches the criteria
- Any relevant example e.g. find pupils who were absent on a particular day