

KASNEB

CICT PART II SECTION 3

DATABASE SYSTEMS

WEDNESDAY: 25 November 2015.

Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

- (a) Explain the following terminologies as used in database systems:
- (i) Query processor. (2 marks)
 - (ii) Tombstones. (2 marks)
- (b) (i) Write a structure of a relation schema called "students" with a degree of four. (2 marks)
- (ii) Create a relation using the structure in (b) (i) above with a cardinality of two. (2 marks)
- (c) Distinguish between "discretionary access control" and "mandatory access control". (4 marks)
- (d) Using an example in each case, explain the following approaches in distributed databases:
- (i) Horizontal partitioning. (2 marks)
 - (ii) Vertical partitioning. (2 marks)
- (e) Explain four benefits of a three-tier architecture database over a two-tier architecture database. (4 marks)
- (Total: 20 marks)**

QUESTION TWO

- (a) As a database expert, you have been contracted to design a data warehouse which could help the management in decision making and provide return on investment (ROI).
- Required:**
Giving relevant examples, examine three major phases of designing the data warehouse. (6 marks)
- (b) Use the sample fuel table given below to answer the question that follows:

Fuel table

Date	Mileage (km)	Fuel (litres)	Price (Sh.)
07-09-2015	179,001		73.70
11-09-2015	270,000	170	189.70
14-09-2015	32,001	206	250.00

- Required:**
Write a structured query language (SQL) code to get the sum of column "price" for the month of September 2015. (3 marks)
- (c) Using an example, distinguish between "super key" and "primary key" in the context of database systems. (4 marks)
- (d) Use an illustration to explain how data search is done using a B-tree indexing. (3 marks)
- (e) Analyse four database design strategies that could be used to reduce occurrence of blocking, locks and deadlocks in a database. (4 marks)
- (Total: 20 marks)**

QUESTION THREE

(a) Explain the following facilities for database recovery provided by database management system:

(i) Remote journaling. (2 marks)

(ii) Checkpoint facilities. (2 marks)

(b) Justify why the relational model approach is preferred to navigational approaches in database development. (4 marks)

(c) The figure below contains codes used by a database administrator:

```
Private sub btnload_Click(sender As object, e As EventArgs) Handles btnLoad.Click
    Dim con As New OleDb.OleDbConnection

    Dim dbProvider As String
    Dim dbSource As String
    Dim MyDocumentsFolder As String
    Dim TheDatabase As String
    Dim FullDatabasePath As String

    dbProvider = "PROVIDER=Microsoft.Jet.OLEDB.4.0:"

    TheDatabase = "/Supplier.mdb"
    MyDocumentsFolder = Environment.GetFolderPath(Environment.SpecialFolder.MyDocuments)
    FullDatabasePath = MyDocumentsFolder & TheDatabase

    dbSource = "Data Source = " & FullDatabasePath

    con.ConnectionString = dbProvider & dbSource

    con.Open( )
    MessageBox.Show("Database is now open")

    con.Close( )
    MessageBox.Show("Database is now Closed")
End sub
```

Required:

Interpret the above code statements.

(6 marks)

(d) Mr. James Oliech maintains a database of movies rented out as shown in the table below:

Full Names	Physical Address	Movies rented	Salutation	Category
Janet Mwende	First Street Plot No 4	Pirates of the Caribbean	Ms.	Action
		Clash of the Titans		Action
Robert Ouma	3 rd Street 34	Forgetting Sarah Marshal	Mr.	Romance
		Daddy's Little Girls		Romance
Robert Mwakali	5 th Avenue	Clash of the Titans	Mr.	Action

Required:

Normalise the above database table up to third normal form (3NF).

(6 marks)

(Total: 20 marks)

QUESTION FOUR

- (a) Giving an example in each case, explain one merit of two leading commercial database management systems (DBMS). (4 marks)
- (b) Justify with reasons, why an organisation should adopt database approach in data management. (4 marks)
- (c) ABC Company is in the process of hiring a database administrator.

As an information technology (IT) consultant, you have been tasked to help the human resource director in preparation of the job advertisement.

Required:

Formulate specific technical skills required for the prospective database administrator. (4 marks)

- (d) Describe four strategies of leveraging on big data for competitive advantage in an organisation. (4 marks)
- (e) The following tables show employees details:

Employee	
EmpID	EmpName
13	Jason
8	Alex
3	Ram
17	Babu
25	Johnson

Location	
EmpID	EmpLoc
13	San Jose
8	Los Angeles
3	Pune, India
17	Chennai, India
39	Bangalore, India

Required:

Using the tables above, explain the difference between “inner join” and “outer join” in the context of database systems. (4 marks)

(Total: 20 marks)

QUESTION FIVE

- (a) Highlight three benefits of denormalising a database. (3 marks)
- (b) Assess two database design strategies of storing historical data. (4 marks)
- (c) Describe four computer based and three non computer based measures of protecting database from external threat. (7 marks)
- (d) Analyse the activities involved during development of a relational database in the following phases:
- (i) Conceptual modelling (2 marks)
- (ii) Logical modelling (2 marks)
- (iii) Physical modelling (2 marks)

(Total: 20 marks)