

UNIVERSITY OF AGRICULTURE, ABEOKUTA
COLLEGE OF NATURAL SCIENCES
DEPARTMENT OF COMPUTER SCIENCE

2009/10 SECOND SEMESTER UNIVERSITY EXAMINATION
TITLE OF THE PAPER: DATABASE DESIGN
COURSE CODE: CSC422 TIME ALLOWED: 2HOURS 30MINUTES
INSTRUCTION : ATTEMPT ANY FOUR QUESTIONS

Question One

Consider the following relational schemas and use them to answer below questions

product(maker, model, type)
personal_Computer(model, speed, ram, hdd, price)
laptop(model, speed, ram, hdd, screen, price)
printer(model, colour, type, price)

- (i) Find those manufacturers that sell personal computers but not laptops
- (ii) Find those processor speed that occur in two or more personal computers
- (iii) Find the laptops whose speed is slower than that of the fastest personal computer
- (iv) Find the makers of the personal computers with the fastest processor among all those personal computers that have the greatest amount of RAM
- (v) Manufacturer B buys manufacturer C. Change all products made by C so they are now made by B

Question Two

Figure 1 is an XML document that contains some of the records from question one.

```
<product>
  <maker name ="A">
    <pc model = "1001" price = "N2050.00">
      <speed>2.66</speed>
      <ram>1024</ram>
      <hdd>250</hdd>
    </pc>
    <pc model = "1002" price = "N995.00">
      <speed>2.60</speed>
      <ram>512</ram>
      <hdd>250</hdd>
    </pc>
    <laptop model = "2004" price = "N1150.00">
      <speed>2.00</speed>
      <ram>512</ram>
      <hdd>60</hdd>
      <screen>13.3</screen>
    </laptop>
    <laptop model = "2005" price = "N2500.00">
      <speed>2.16</speed>
```

```

    <ram>1024</ram>
    <hdd>120</hdd>
    <screen>17.0</screen>
</laptop>
</maker>
<maker name ="E">
  <pc model = "1011" price = "N959.00">
    <speed>1.86</speed>
    <ram>2048</ram>
    <hdd>160</hdd>
  </pc>
  <pc model = "1011" price = "N650.00">
    <speed>2.80</speed>
    <ram>1024</ram>
    <hdd>310</hdd>
  </pc>
  <laptop model = "2001" price = "N3500.00">
    <speed>2.00</speed>
    <ram>2048</ram>
    <hdd>240</hdd>
    <screen>20.1</screen>
  </laptop>
  <printer model ="3002" price ="N320.00">
    <colour>>false</colour>
    <type>laser</type>
  </printer>
</maker>
<maker name ="H" >
  <printer model ="3006" price ="N100.00">
    <colour>>true</colour>
    <type>ink_jet</type>
  </printer>
  <printer model ="3007" price ="N200.00">
    <colour>>true</colour>
    <type>desk_jet</type>
  </printer>
</maker>
</product>

```

Figure 1. XML document

Use figure 1 to write the following XPath queries and what is the result of each?

- (i) Find the model amount of personal computer with a hard disk of at least 300 gigabytes
- (ii) Display the amount of hard disk on each personal computer
- (iii) Select the maker of at least two printers
- (iv) Find the makers of colour printer
- (v) Find all the laptop elements

Question Three

Convert figure one into Object Definition Language (ODL) and relations (tables).

Question Four

Create sql database relational schemas for question one taking into consideration the following constraints

- (i) The only type of the products are personal computers, laptops and printers
- (ii) The speed of a laptop must be at least 2.2
- (iii) A model of a product must also be the model of a personal computer, laptop or a printer
- (iv) All prices of the products must be between ₦200.00 and ₦5000.00

Question Five

Consider this relation

product(maker, model, price, type) and functional dependencies

model, price \rightarrow type

type \rightarrow maker

maker \rightarrow model

- (i) What are all the keys of relational product?
- (ii) What are all the superkeys for relational product that are not keys?
- (iii) List all the nontrivial functional dependencies that follows from the given functional dependencies
- (iv) Decompose the relation as necessary into collection of relations if it violates Boyce Codd Normal Form
- (v) Verify using the chase that the decomposition has a lossless join
- (vi) Determine if your decomposition preserve dependencies

Question Six

Based on the decision of College of Natural Sciences to upgrade a score from 38 and 39 into 40 in mark sheet originated from the college, write sql procedure using **cursor** to upgrade mark sheet of this schema

mark_Sheet(matriculation_Number, dept, course_code, score)