



UNIVERSITY OF LAGOS
DEPARTMENT OF COMPUTER SCIENCES
B.Sc. Hons. (Computer Science) DEGREE EXAMINATIONS APRIL 2017
FIRST SEMESTER, 2016/2017 SESSION
CSC431 : SOFTWARE DESIGN AND ARCHITECTURE

Instruction: Answer any FOUR (4) questions. Strictly write only your
matriculation number as a means of identification.

Time Allowed: 2hrs

- 1 a** Highlight the fundamental difference between a fat-client and a thin-client approach to client-server systems architectures.
- b** You have been asked to design a secure system that requires strong authentication and authorization. The system must be designed so that communications between parts of the system cannot be intercepted and read by an attacker. Suggest the most appropriate client-server architecture for the system, and giving reasons for your answers, propose how functionality should be distributed between the client and the server systems.
- c** Suggest five applications in which a fat server would seem to be an appropriate design strategy.
- 2 a** Discuss some of the most important design issues that have to be considered in distributed system engineering.
- b** Explain why design conflicts might arise when designing an architecture for which both availability and security requirements are the most important non-functional requirements.
- c** Draw diagrams showing a conceptual view and a process view of the architecture of the following systems:
 - i) An automated ticket-issuing system used by passengers at a bus station.
 - ii) A robot floor cleaner that is intended to clean corridors. The robot must be able to sense walls and other obstructions.
- 3 a** Discuss the views or perspectives that are useful when designing and documenting a system's architecture.
- b** Write short notes on the following architectural patterns detailing their description, example, when used, merits and demerits:
 - (i) Layered architecture, (ii) Repository architecture, (iii) Pipe-and -filter architecture.
- 4 a** Describe the process for designing a user-interface.
- b** Design a user interface for a mobile phone. Design suitable buttons and assume that a small display is available as part of the phone. Make assumptions about the tasks that users of the phone want to carry out. Suggest criteria for evaluating your design and suggest how the design could be evaluated (and thereby improved).
- 5 a** Summarize what is meant by tangling and scattering. Using examples, explain why tangling and scattering can cause problems when system requirements change.
- b** Highlight the difference between a join-point and a point-cut. Explain how these facilitate the weaving of code into a program to handle cross-cutting concerns.
- c** What assumptions underpin the idea that a system should be organized as a core system that implements the essential requirements, plus extensions that implement additional functionality? Can you think of systems where this model would not be appropriate?
- 6** With respect to the project you have carried out recently, discuss extensively, the procedure for carrying out the project against the backdrop of software design and architecture.



DEPARTMENT OF COMPUTER SCIENCES, UNIVERSITY OF LAGOS, AKOKA

FIRST SEMESTER 2016/2017 B.Sc, DEGREE PROGRAMME EXAMINATION

CSC 422 – DATA COMMUNICATIONS

Instruction: Attempt any four questions.

Time Allowed : 2 hours

- 1a. Give two energy types and two transmission media that based their transmissions using these types (6 Marks)
- b. What is a wireless network? State its capabilities and advantages over a wired network (8 Marks)
- c. Mention three important features of WiFi (3 Marks)
- d. Distinguish between asynchronous and synchronous transmissions.(3 marks)

- 2a Differentiate between the terms: multiplexing and demultiplexing. (2marks)
- b. Differentiate between these three multiplexing techniques
 - i. Frequency division multiplexing ii. Wave division multiplexing iii . Time division multiplexing (6 Marks)
- c. Data on transmission is susceptible to loss or error. Why? (4 marks)
- d. Discuss four factors responsible for loss of data on transmission (8 Marks)

- 3a. In a tabular form distinguish between C-band and Ku-band VSATs and give six characteristics of each of them.(6 Marks)
- b. Describe how the cyclic redundancy code is applied in data communication (4 marks)
- c. What is data communication and what are the components involved in data transmission? (6 marks)
- d. Describe any two signal encoding formats known to you (4 marks).

- 4a. VSAT networks come in different sizes and shapes and are categorized into three. List three types of VSAT and discuss in detail differences between them. (6 Marks)
- b. There are three flavours of standard WiFi. What are the three standards? (3 Marks)
- c. Construct the Huffman tree for the message "EKO REE" and produce a compressed code for the message (6 marks)
- d. Compare forward error detection mechanism with automatic repeat request mechanism and cite an example to back up your comparison. (5marks)

- 5a. In terms of data communications, differentiate between periodic and non-periodic signals (2 marks)
- b. A sine wave can be represented by these parameters: the peak amplitude, the frequency, the phase and the wavelength. Explain the meaning of these terms. (4 marks)
- c. Present in a tabular form the distinction among twisted-pair, coaxial and fibre-optic cables based on cost, transmission length, transmission rate, interference, and physical topology (10 marks)
- d. What are the factors that can guide you when making a choice of cable for networking? (4 marks)

- 6a. Describe the phases involved in data communication stating the importance of the activities in each phase. (8 marks)
- b. What are the modes of transmission? (3 marks)
- c. Write short note on two of these techniques of signal processing (4 marks)
 - i. Amplitude Modulation ii. Frequency Modulation iii. Phase Modulation
- d. Differentiate between analog signal and digital signals (4 marks)

- e. What is data compression? (1 mark)



UNIVERSITY OF LAGOS
DEPARTMENT OF COMPUTER SCIENCES
B.Sc. (Hons) DEGREE EXAMINATIONS APRIL 2017
FIRST SEMESTER 2016/2017 SESSION
CSC401: INTRODUCTION TO DATABASE DESIGN AND
MANAGEMENT

Instruction: Answer all Questions

Time Allowed: 2 hours

- 1 a For each of the following pairs of related entities, indicate whether (under typical circumstances) there is a one-to-many or a many-to-many relationship. Then, using the shorthand notation introduced in the text, draw a diagram for each of the relationships.
- i STUDENT and COURSE (students register for courses)
 - ii BOOK and BOOK COPY (books have copies)
 - iii COURSE and SECTION (courses have sections)
 - iv SECTION and ROOM (sections are scheduled in rooms)
 - v INSTRUCTOR and COURSE
- b A driver's license bureau maintains a database of licensed drivers. State whether each of the following represents data or metadata. If it represents data, state whether it is structured or unstructured data. If it represents metadata, state whether it is a fact describing a property of data or a fact describing the context of data.
- i Driver's name, address, and birth date
 - ii The fact that the driver's name is a 30-character field
 - iii A photo image of the driver
 - iv An image of the driver's fingerprint
 - v The make and serial number of the scanning device that was used to scan the fingerprint
 - vi The resolution (in megapixels) of the camera that was used to photograph the driver
 - vii The fact that the driver's birth date must precede today's date by at least 16 years
- c Helen Jarvis wants to determine the most important customers for Home Office products. She requests a listing of total dollar sales year-to-date for each customer who bought these products, as revealed by invoiced payments. The list is to be sorted in descending order, so that the largest customer heads the list.

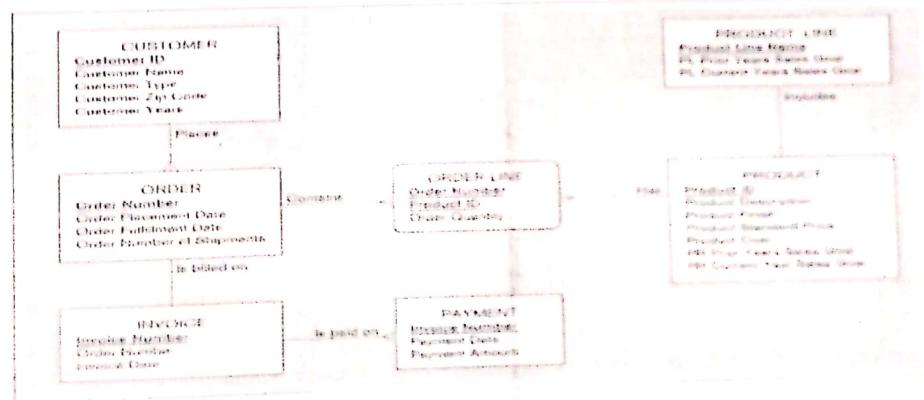


Figure 1

- i Look at Figure 1 and determine what entities are required to produce this list. (6 Marks)
- i Which entities will be involved in the SQL query that will give Helen the information she needs?
- ii Which entities will be involved in the SQL query that will give Helen the information she needs?
- 2 a A cellular operator needs a database to keep track of its customers, their subscription plans, and the handsets (mobile phones) that they are using. The E-R diagram in Figure 2 illustrates the key entities of interest to the operator and the relationships between them. Based on the figure, answer the following questions and explain the rationale for your response. For each question, identify the element(s) in the E-R diagram that you used to determine your answer.
- i Can a customer have an unlimited number of plans?
 - ii Can a customer exist without a plan?

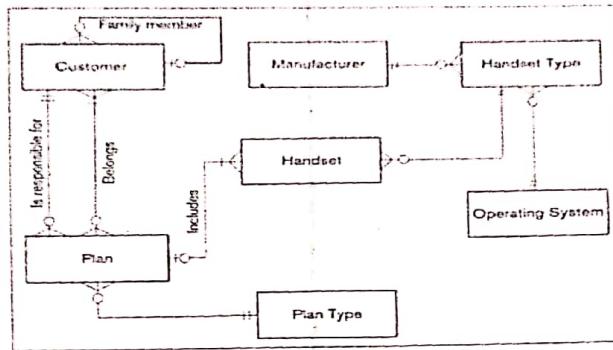


Figure 2

- iii Is it possible to create a plan without knowing who the customer is?
 - iv Does the operator want to limit the types of handsets that can be linked to a specific plan type?
 - v Is it possible to maintain data regarding a handset without connecting it to a plan?
 - vi Can a handset be associated with multiple plans?
 - vii Assume a handset type exists that can utilize multiple operating systems. Could this situation be accommodated within the model included in Figure 2?
 - viii Is the company able to track a manufacturer without maintaining information about its handsets?
 - ix Can the same operating system be used on multiple handset types?
 - x There are two relationships between Customer and Plan. Explain how they differ.
 - xi Characterize the degree and the cardinalities of the relationship that connects Customer to itself. Explain its meaning.
 - xii Is it possible to link a handset to a specific customer in a plan with multiple customers?
 - xiii Can the company track a handset without identifying its operating system?
- b i The entity type STUDENT has the following attributes: Student Name, Address, Phone, Age, Activity, and No of Years. Activity represents some campus-based student activity, and No of Years represents the number of years the student has engaged in this activity. A given student may engage in more than one activity. Draw an ERD for this situation. What attribute or attributes did you designate as the identifier for the STUDENT entity? Why? (3 Marks)
- ii Figure 3 shows a grade report that is mailed to students at the end of each semester. Prepare an ERD reflecting the data contained in the grade report. Assume that each course is taught by one instructor. Also, draw this data model using the tool you have been told to use in the course. Explain what you chose for the identifier of each entity type on your ERD.

MILLENNIUM COLLEGE GRADE REPORT FALL SEMESTER 200X				
NAME:	Emily Williams	ID: 266300458		
CAMPUS ADDRESS:	208 Brooks Hall			
MAJOR:	Information Systems			
COURSE ID	TITLE	INSTRUCTOR NAME	INSTRUCTOR LOCATION	GRADE
IS 350	Database Mgt.	Codd	B104	A
IS 465	System Analysis	Parsons	B317	B

Figure 3

- c Transform Figure 4a, attribute version, to 3NF relations. Transform Figure 4b, relationship version, to 3NF relations. Compare these two sets of 3NF relations with those in Figure 5. What observations and conclusions do you reach by comparing these different sets of 3NF relations?

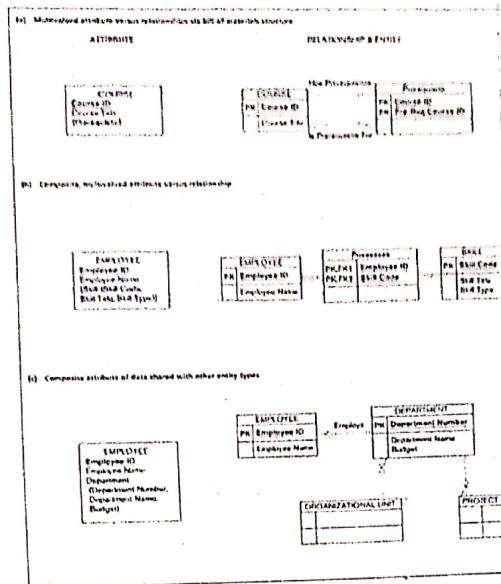


Figure 4

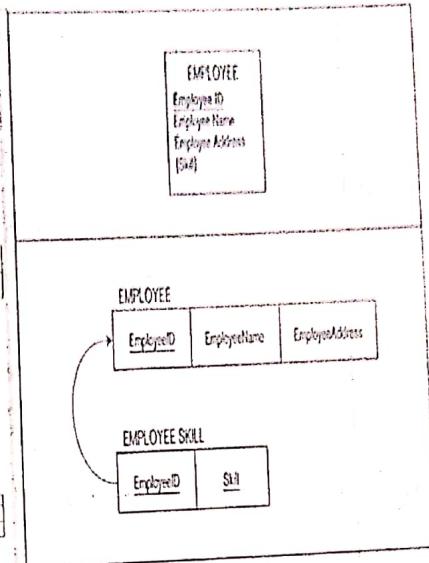


Figure 5

- 3 a Match the following terms to the appropriate definitions in the Table 1:

- well-structured relation
- anomaly
- functional dependency
- determinant
- composite key
- 1NF
- 2NF
- 3NF
- recursive foreign key
- transitive dependency

- a. constraint between two attributes
- b. functional dependency between the primary key and a nonkey attribute via another nonkey attribute
- c. references the primary key in the same relation
- d. multivalued attributes removed
- e. inconsistency or error
- f. contains little redundancy
- g. contains two (or more) attributes
- h. contains no partial functional dependencies
- i. transitive dependencies eliminated
- j. attribute on left side of functional dependency

Table 1

- b Describe three types of anomalies that can arise in a table and the negative consequences of each.
- c What is the primary purpose of normalization?
- d Briefly describe four typical problems that often arise in merging relations and common techniques for addressing those problems



UNIVERSITY OF LAGOS
DEPARTMENT OF COMPUTER SCIENCES
B.Sc. (Hons) DEGREE EXAMINATION APRIL 2017
FIRST SEMESTER 2016/2017 SESSION
CSC413: DISCRETE MATHEMATICS

Instruction:

Answer ALL questions

Ensure that you fill in your Name, Matri. No. and other information accurately in the space provide below. Also ensure that your name and matric number are written at the back of your OMR sheet.

Matri. No.

Name in Full: (Surname First)

Section A

Given the sets below, determine if the statements in questions 1 - 5 are true or false. Shade A if the answer is true and shade B if the answer is false

$$A = \{x \mid x \text{ is a real number and } 0 < x < 1\},$$

$$B = \{x \mid x \text{ is a real number and } x^2 + 1 = 0\},$$

$$C = \{x \mid x = 4m, m \in \mathbb{Z}\},$$

$$D = \{0, 2, 4, 6, \dots\}, \text{ and}$$

$$E = \{x \mid x \in \mathbb{Z} \text{ and } x^2 = 100\}.$$

1 $C \cap E \not\subseteq (C \cup E)$

2 $\emptyset \subseteq (A \cap B)$

3 $C \cap D = D$

4 $C \cup E \subseteq D$

5 $A \cap D \subseteq A \cap C$

6 A graph with $V = \{1, 2, 3, 4\}$ is described by

$$\phi = \begin{pmatrix} a & b & c & d & e & f \\ \{1,2\} & \{1,2\} & \{1,4\} & \{2,3\} & \{3,4\} & \{3,4\} \end{pmatrix}.$$

It has weights on its edges given by

$$\lambda = \begin{pmatrix} a & b & c & d & e & f \\ 3 & 2 & 1 & 2 & 4 & 2 \end{pmatrix}.$$

How many minimum spanning trees does it have?

a 2 b 3 c 4 d 5

7 Indicate which, if any, of the following four graphs $G = (V, E, \phi)$, $|V| = 5$, is not connected.

a $\phi = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ \{1,2\} & \{1,2\} & \{2,3\} & \{3,4\} & \{1,5\} & \{1,5\} \end{pmatrix}$

b $\phi = \begin{pmatrix} b & a & e & d & c & f \\ \{4,5\} & \{1,3\} & \{1,3\} & \{2,3\} & \{2,5\} & \{4,5\} \end{pmatrix}$

c $\phi = \begin{pmatrix} a & b & c & d & e & f \\ \{1,2\} & \{2,3\} & \{1,2\} & \{1,3\} & \{2,3\} & \{4,5\} \end{pmatrix}$

d $\phi = \begin{pmatrix} b & f & e & d & c & a \\ \{4,5\} & \{1,3\} & \{1,3\} & \{2,3\} & \{2,4\} & \{4,5\} \end{pmatrix}$

Use the following to answer questions 8-10

I. $f: Z \rightarrow R$ is given by $f(x) = x^2$

II. $f: Z \rightarrow Z$ is given by $f(x) = 2x$

III. $f: R \rightarrow R$ is given by $f(x) = x^3$

IV. $f: Z \rightarrow N$ is given by $f(x) = |x|$

8 Which of the functions above is 1-to-1?

a I b II c III d IV

9 Which of the functions above is onto?

a I b II c III d IV

Time Allowed 1hr 30mins

- 10 Which of functions above is a bijection?
a I b II c III d IV
- 11 In a symmetric relation R over A
a $(\forall x \in A) xRx$ d All of these
b $(\forall x, y \in A) xRy \Rightarrow yRx$ e None of these
c $(\forall x, y, z \in A) xRy \wedge yRz \Rightarrow xRz$
- 12 Find the number of relations from $A = \{a, b, c\}$ to $B = \{1, 2\}$.
a 2 b 3 c 5 d 6
- 13 What is the cardinality of this set $|\{3, \{1, 2, 3, 4\}, \emptyset\}|$?
a 2 b 5 c 4 d 3
- 14 What is the power set of S ? $S = \{2, 4, 9, 11, 17\}$
a 5 b 10 c 16 d 32
- 15 Identifying all edges in an adjacency list takes
a $\Theta(n^2)$ b $\Theta(m+n)$ c $\Theta(m+n)$ d $\Theta(n^2)$
- 16 Which of the following representation is good for a sparse graph?
a Adjacency matrix c None of these
b Adjacency list d All of these
- 17 Identifying all edges in an adjacency matrix takes
a $\Theta(n^2+1)$ b $\Theta(m+n)$ c $\Theta(m+n)$ d $\Theta(n^2)$

For questions 18 to 21, shade A if the answer is true and shade B if the answer is false.

Determine the truth value of each of these statements if the domain consists of all integers.

18 $\forall n (n + 1 > n)$

19 $\exists n (2n = 3n)$

20 $\exists n (n = -n)$

21 $\forall n (3n \leq 4n)$

22 Let FHAM be the problem of finding a Hamiltonian cycle in a graph G and DHAM be the problem of determining if a Hamiltonian cycle exists in a graph. Which one of the following is TRUE?

- a Both FHAM and DHAM is NP hard, but DHAM are NP-hard c FHAM is NP hard, but DHAM is not
b DHAM is NP hard, but d Neither FHAM nor DHAM is FHAM is not NP hard

23 Suppose that $f(n)$ is polynomial reducible to $g(n)$. If $f(n)$ is solvable in polynomial time then
a $g(n)$ is NP-Complete c $g(n)$ is NP-Hard
b $g(n) = f(n)$ d $g(n)$ is solvable in polynomial time

24 Let S be a NP-complete problem and Q and R be two other problems not known to be in NP. Q is polynomial time reducible to S and S is polynomial time reducible to R . Which one of the following statements is TRUE?

- a R is NP hard c Q is NP complete
b R is NP complete d Q is NP hard

25 Consider three decision problems P_1 , P_2 and P_3 . It is known that P_1 is decidable and P_2 is undecidable. Which one of the following is TRUE?

- a P_3 is decidable if P_1 is reducible to P_2
b P_3 is undecidable if P_3 is reducible to P_2
c P_3 is undecidable if P_2 is reducible to P_3

- 26 d P_3 is decidable if P_3 is reducible to P_2 's complement
 Which of the following is true for an undirected graph G with n nodes and $n-1$ edges?
 a G is a multigraph c G is connected
 b G is a complete graph d G is a clique
- Use the information below to answer questions 27 - 29
 Consider the graph M where $V(M) = \{a, b, c, d\}$ represented by the matrix below
- | | | | |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 |
- 27 Which of the following represent the indegrees of the vertices

SECTION B

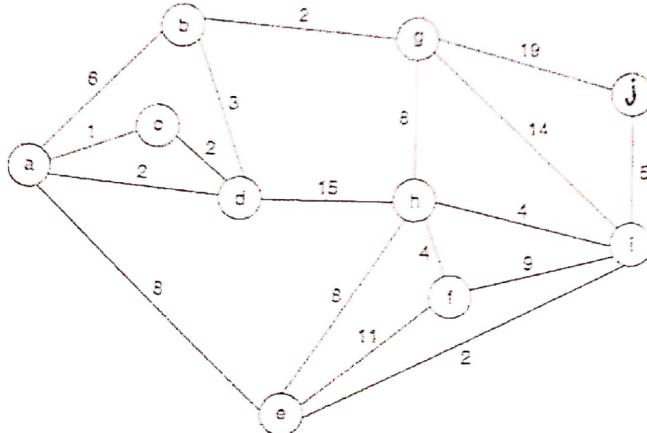
- 1 a Suppose that 109 of the 150 Computer Science students at Lake University take at least one of the following programming languages: Java, Python, C++. Suppose 45 study Java, 61 study Python, 53 study C++, 18 study Java and Python, 15 study Python and C++, and 23 study Java and C++.
 i How many students study all three languages? Show how you got your answer. (5 marks)
 ii How many students study only Python? Show how you got your answer. (5 marks)
- b List the elements of the following sets if the universal set is $U = \{a, b, c, \dots, y, z\}$. Furthermore, identify which of the sets, if any, are equal. (10 marks)
 i $A = \{x \mid x \text{ is a vowel}\}$ iii $C = \{x \mid x \text{ precedes } f \text{ in the alphabet}\}$
 ii $B = \{x \mid x \text{ is a letter in the word "little"}\}$ iv $D = \{x \mid x \text{ is a letter in the word "title"}\}$
- 2 The distances between six stations are shown in the table below. Two stations cannot use the same channel when they are within 150 miles of each other.

	1	2	3	4	5	6
1	—	85	175	200	50	100
2	85	—	125	175	100	160
3	175	125	—	100	200	230
4	200	175	100	—	210	220
5	50	100	200	210	—	100
6	100	160	230	220	100	—

- a Represent the problem by means of a graph. (6 marks)
 b Construct the adjacency matrix of the graph. (6 marks)
 c How many different channels are needed for the six stations? (2 marks)
 List the station and assign channels to each of them. (3 marks)
 Explain how you got your answer. (3 marks)
- 3 a Determine whether each of these functions is a bijection from R to R . (9 marks)

i $f(x) = 2x + 1$ ii $f(x) = (x^2 + 1)/(x^2 + 2)$ iii $f(x) = x^2 + 1$

b



- i Using Kruskal's algorithm, determine the minimum spanning tree of the graph above. (9 marks)
 ii What is the weight of the MST in 3b(i)? (2 marks)

UNIVERSITY OF LAGOS
DEPARTMENT OF COMPUTER SCIENCES
B.Sc. Hons. (Computer Science) Degree Examination
First Semester, 2016/2017 Session; April 2017

CSC 421: SOFTWARE PROJECT MANAGEMENT

INSTRUCTION: ANSWER FOUR QUESTIONS

TIME: 2 HOURS

- 1a. Using a Student Records and Examination processing system as an example, explain the characteristics of a Software Project.
- b. Using the example given in 1a., explain the benefits of employing Project Management techniques and tools to Software development.
- 2a. Explain the three stages of Project Cost Estimation
 - b. What are the pros and cons of adopting the Parametric technique of estimating cost of Software projects over other named techniques?
- 3a. Describe the circumstances when Agile project planning is preferable to Plan-based approach
 - b. Explain the following terms in the context of project planning:
 - i. Person-hour ii. Milestone iii. Activity dependency
 - iv. Task duration v. Deliverable
- 4a. i. What is a Risk in the context of Software Project Management?
 - ii. List and discuss any five possible Risks that could be a threat to the success of a Software Project
- b. Consider "Low level of user education and support" as a possible Risk to a software project. Develop Avoidance, Minimisation and Contingency strategies to handle the Risk.
- 5 a. Software Project is a knowledge-based, knowledge-driven activity, as a Project Manager, outline what needs to be done to motivate staff assigned to the project for effective project delivery.
- b. A Software project team has the following options as media of communication among group members; discuss the benefits and limitations of adopting each approach: i. project website ii. Email iii. Facebook iv. Twitter v. Whatsapp/BBM



UNIVERSITY OF LAGOS
DEPARTMENT OF COMPUTER SCIENCES
B.Sc. (Hons) DEGREE EXAMINATIONS APRIL 2017
FIRST SEMESTER 2016/2017 SESSION
CSC405: WEB DESIGN AND DATA SECURITY

Instruction: Answer all questions.

Time Allowed: 2hrs

- 1 a Identify and explain four new features in HTML5 that differentiate it from previous HTML versions. (8 marks)
- b Briefly explain the following positioning methods in CSS. Illustrate each with sample CSS rules. (12 marks)
 - i Static positioning
 - ii Fixed positioning
 - iii Relative positioning
 - iv Absolute positioning
- 2 a <html>
 <head>
 <title>Victor Odumuyiwa's home page</title>
 <link rel="stylesheet" href="style.css" type="text/css"/>
 <script src = myscript.js></script>
 </head>
 <body>
 <div id="page">
 <div id="header">
 <div id="logo">
 <image src="image/unilag_logo.png">
 </div>
 <div id="title">
 DR VICTOR ODUMUYIWA
 </div>
 <div id="nav">

 Home
 Courses
 Contact

 </div>
 </div>
 <div id="content">
 <h1>Welcome to my home page </h1>
 <h1>Welcome to my home page </h1>

 </td>
 </td>

```

</div>
<div id="footer">
    <p>
        Webpage made by <a href="/" target="_blank">Victor Odumuyiwa</a>
    </p>
</div>
</div>
</body>
</html>

```

The html page above saved as home.html is opened on a browser using this url
<http://www.mysite.com/entrance/home.html>

- i How many HTTP requests will be necessary to display the page? (2 marks)
- ii Based on your answer in 2a(i), list the url(s) that will be contained in the http request(s).

- b i What is the difference between isset() and empty() methods in Php? Provide some lines of code to capture a scenario where isset() is true and empty() is true on a given variable. (5 marks)
- ii Briefly explain five categories of HTTP status and give an example under each. (5 marks)

- 3 Use the php files below to answer questions 3a, 3b, 3c, 3d and 3e.

dbconnect.php

```

<?php
$hostname = "localhost";
$username = "webuser";
$password = "";
$database = "citation";
try {
    $conn= new PDO("mysql:host=$hostname; dbname=$database", $username,
    $password);
    $conn->setAttribute( PDO::ATTR_ERRMODE, PDO::ERRMODE_EXCEPTION );
}
catch(PDOException $ex) {
    echo "Sorry, something went wrong";
    file_put_contents('PDOException.txt',$ex->getMessage(), FILE_APPEND);
}
?>

```

citation.php

```
<?php
include('dbconnect.php');
if(isset($_POST['Submit'])) {
    $author = $_POST["author"];
    $citation = $_POST["citation"];
    $email= $_POST['em'];
    if(($author!="")&&($citation!="")){
        $requete = $conn->prepare("INSERT INTO citation_table(author,citation,
            email) VALUES(?, ?, ?)");
        $requete->execute();
    }
} else
{echo "please enter a citation and the name of the author";}
?
?>
```

- a Briefly analyse and discuss the lines of code in dbconnect.php file above. (3 marks)
- b Briefly analyse and discuss the lines of code in citation.php file above. (3 marks)
- c Create an appropriate HTML form through which input will be supplied to citation.php. (8 marks)
- d citation.php as presented above will not submit any record to the database.
Rewrite the code to ensure that captured data are properly inserted into the database. (4 marks)
- e If the form you created in (c) above were to use a GET method, provide the URL that will be sent in the http request generated after clicking on the submit button. The authority component of the URL should be localhost. Use any data to represent user input. (7 marks)
- 4 a Given the html file below, implement the changeDisplay function in JavaScript such that when the button is clicked, the style (fontsize, fontfamily and color) of the paragraph (id = "text") is modified and the content of the paragraph is changed to the input captured from the user through the text field. (5 marks)
- ```
<!DOCTYPE html>
<html>
<head>
<title>Exam question 4(a)</title>
</head>
<body>
<p id = "text"> I am a good web developer </p>
<div>
Enter your message: <input id = "msg" type = "text"/>
<button id="jstreat" onClick = "changeDisplay();">Change Display</button>
</div>
</script>
```

```
</body>
</html>
```

- b Given the html file below, implement the changeContent function in JavaScript such that it accepts row, column, (to identify a particular cell) and a string to update the content of that cell. (10 marks)

```
<!DOCTYPE html>
<html>
<head>
<title>Exam question 4(b)</title>
</head>
<body>
<table id="myTable" border="1">
<tr>
<td> Row1 cell1 </td>
<td> Row1 cell2 </td>
</tr>
<tr>
<td> Row2 cell1 </td>
<td> Row2 cell2 </td>
</tr>
<tr>
<td> Row3 cell1 </td>
<td> Row3 cell2 </td>
</tr>
</table>
<input type="button" onClick="changeContent()" value="Change Content">
</body>
</html>
```



**UNIVERSITY OF LAGOS**  
**DEPARTMENT OF COMPUTER SCIENCES**  
**B.Sc. Hons. (Computer Science) DEGREE EXAMINATIONS APRIL 2017**  
**FIRST SEMESTER, 2016/2017 SESSION**  
**CSC311 : OPERATIONS RESEARCH**

**Instruction:** Attempt any THREE (3) questions. Strictly write only your matriculation number as a means of identification.

**Time Allowed:** 2hrs

- 1 a** Put the following program in standard form:

$$\text{Minimize: } z = 25x_1 + 30x_2$$

$$\text{Subject to: } 4x_1 + 7x_2 \geq 1$$

$$8x_1 + 5x_2 \geq 3$$

$$6x_1 + 9x_2 \geq -2$$

- b** A manufacturer produces, KOOL and KAAL. KOOL has a contribution of  $=N=3$  per unit, and KAAL has a contribution of  $=N=4$  per unit. The manufacturer wishes to establish the weekly production plan which maximizes contribution. Production data are as follows:

	PER UNIT		
	Machining (Hours)	Labour (Hours)	Materials(Kg)
KOOL	4	4	1
KAAL	2	6	1
Total Available	100	180	40
per week			

Because of a trade agreement, sales of KOOL are limited to a weekly maximum of 20 units and to honour an agreement with an old established customer at least 10 units of KAAL must be sold per week.

- 2 a** A new bank branch has an average arrival rate of 30 per hour. The management is seeking to assess whether there should be a two service point system each being capable of dealing with 18 per hour or a three service point system each dealing with 14 per hour. The two point system costs \$80 per hour and the three point system, \$100 per hour in total. Customer waiting time is assessed as \$6 per hour. Calculate  $P_o$  for the two and three service point system. Determine which system is cheaper.
- b** A firm is considering the following mutually exclusive projects:

Outlay now	Year 1 receipt	Year 2 receipt	Year 3 receipt	Year 4 receipt
Project A	60000	44300	35000	44000
Project B	100000	35200	65200	57400

Based on the cash flows above and a 18% cost of capital calculate:

- a. The NPV and IRR's of the projects.
- b. Select the better project.
- 3 a** What are Decision Trees?
- b** Distinguish between the types of nodes found in Decision Trees
- c** A firm has developed a new product X. They can either test the market or abandon the project. The details of are set below: Test market cost  $=N=50,000$ ; likely outcome are favourable ( $P = 0.7$ ) or failure ( $P = 0.3$ ). If favourable they could either abandon or produce it when demand is anticipated to be

Low  $P = 0.25$  Loss  $=N= 100,000$

Medium  $P = 0.6$  Profit  $=N= 150,000$

High  $P = 0.15$  Profit  $=N= 450,000$

If the test market indicates failure the project would be abandoned. Abandonment at any stage

results in a gain of  $=N=30,000$  from the special machinery used. Draw the decision tree showing the nodes and probabilities. Finally evaluate the decision tree.

- 4 The following data have been collected regarding the sale of television sets:

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Year 2011	24	35	62	32
Year 2012	25	41	73	32
Year 2013	23	37	75	44
Year 2014	22	36	90	51

You are required to:

- (a) calculate trend in the data using the least square method;
- (b) estimate the sales for each quarter using the regression formula;
- (c) calculate the percentage variations from (b);
- (d) prepare forecast based on trend + or - percentage seasonal variations;
- (e) determine the adjusted forecast for quarters 17, 18, 19 and 20.

- 5 An insurance company has decided to upgrade and refit one of its branch offices. Some of the existing office equipment will be disposed of but the remainder will be returned to the branch on the completion of the alterations. Estimates for the alterations are to be invited from a selection of builders and the builder chosen will be responsible for all aspects of the alterations with the exception of the prior removal of the old equipment and its subsequent replacement. The major elements of the project have been identified as follows, along with approximate durations and the immediately preceding elements.

	Element	Duration (weeks)	Preceding Element
A	Obtain estimates from builders	5	E
B	Decide a builder to be used	1	A
C	Arrange details with selected builder	2	B
D	Alterations take place	14	K
E	Design new premises	16	-
F	Decide which equipment to retain	1	E
G	Arrange storage of retained equipment	2	F
H	Arrange disposal of remaining equipment	3	F
I	Order new equipment	2	F
J	Take delivery of new equipment	3	I,L
K	Remove old equipment to storage or disposal	4	C,G,H
L	Clear up after builder has finished	2	D
M	Return old equipment from storage	2	I,L

- (a) Draw a network to represent the inter-relationships between the various elements of the project.
- (b) What is the minimum time that the alterations can take from commencement of the design stage?
- (c) Determine the critical activities.
- (d) Calculate the float which is available for each of the non-critical activities.