Institute of Information Technology
University of Dhaka
Bachelor of Science in Software Engineering (BSSE)
3rd Year 5th Semester Final Examination, 2023
CSE 504: Database Management System II
Marks: 30 # Duration: 2 hours

Professionalism   Excellence   Respect

Answer any three (3) of the following questions. The weight of each question is mentioned at the right side. When answering a question, please answer all the subsections of it at once.

1. a) Assume the APRIORI algorithm identified the following seven 4-item sets that satisfy a user given support threshold: **3**

   acde, acdf, adfg, bcde, bcdf, bcdg, cdef

   What initial candidate 5-itemsets are created by the APRIORI algorithm; which of those survive subset pruning?

   b) Consider an indexed sequential file consisting of 10,000 blocks. Each block contains 10 fixed sized records. Each key value found in the file is unique. For this problem, assume that: **5**

   - Pointers to blocks are 10 bytes long.
   - Pointers to records are 20 bytes long.
   - Index blocks are 5000 bytes (in addition to the header).
   - Search keys for file records are 10 bytes long.

   (i) How many blocks do we need to hold a sparse one-level, primary index?
   (ii) Suppose you now construct a one-level, dense secondary index. Compute its minimum.

   c) How might a distributed database designed for a local-area network differ from one designed for a wide-area network? **2**

2. A database has four elements, A, B, C, and D. Assume that the following is a normal sequence of undo log records, using non-quiescent checkpointing:

1	\<start T1\>	6	\<start T3\>	11	\<start T4\>
2	\<T1,B,40\>	7	\<commit T1\>	12	\<T4,C,7\>
3	\<start T2\>	8	\<T3,B,12\>	13	\<T3,A,22\>
4	\<T2,A,56\>	9	\<commit T2\>	14	\<commit T4\>
5	\<T2,C,34\>	10	\<T3,D,89\>	15	\<T3,A,99\>
				16	\<commit T3\>

   a) When is the latest time for transaction T1, T2 that "dirty data" can be flushed onto disk (i.e., the time Output(X) for data X can be performed)? **1**

   b) Suppose we start checkpointing right after Log 5, indicate where and what the start check-pointing record would look like. Then, indicate where and what the earliest end checkpoint record would look like. **1**

   c) Continue from question (b). Suppose the system crashes right after Log 14 and the end checkpoint has been written out to disk. What is the contents of the earliest log line we must examine? And which transaction records do we need to undo in sequence? **2**

   d) Indicate which of the following schedule are conflict serializable and why? **6**
      (i)   r1(A) r2(A) w1(A) r2(B)
      (ii) r1(A) w1(A) r2(A) w2(B)
      (iii) w1(A) w2(A) w1(A) w2(A) w1(A)
      (iv) w1(A) w2(A) w1(B) w2(B) w1(B)

3. a) Why data cube is necessary for Data analysis? Explain with example. 3

b)

F1	F2	F3	Category
f	f	t	+
f	t	f	+
f	t	f	+
t	f	f	+
f	f	f	+
t	f	f	−
t	t	f	−
f	t	t	−

How would a Naive Bayes system classify the following test example?

F1 = f, F2 = t, F3 = f

c) Using the following attribute data, calculate the entropy difference as would be used to decide attribute position in a decision tree. Which attribute would be chosen as the first branching node of the decision tree? 3

HINT: Entropy = -freq(x) * LOG2(freq(x)) + -freq(y) *
             LOG2(freq(y)) + …

```
1/5  * LOG2(1/5)   = 0.46
2/5  * LOG2(2/5)   = 0.53
3/5  * LOG2(3/5)   = 0.44
4/5  * LOG2(4/5)   = 0.26
4/10 * LOG2(4/10)  = 0.53
5/10 * LOG2(5/10)  = 0.5
6/10 * LOG2(6/10)  = 0.44
```

Attribute1	Attribute2	Target
A	X	T
B	Y	T
B	X	T
A	X	T
B	X	T
A	Y	F
B	Y	F
A	Y	F
B	X	F
A	X	F

4. a) Describe parallel external sort merge algorithm 2

b) What factors could result in skew when a relation is partitioned on one of its attributes by: 4
   (i) Hash partitioning
   (ii) Range partitioning

   In each case, what can be done to reduce the skew?

c) For each of the three partitioning techniques, namely round-robin, hash partitioning, and range partitioning, give an example of a query for which that partitioning technique would provide the fastest response. 4

5. a) Explain the process of inserting a new spatial object into an R-tree and maintaining its balance. 3

b) Discuss its advantages and limitations compared to other tree-based data structures. 3

c) Consider a k-d tree in 3-dimensional space. Construct the tree if the following data points are given in order (3, 1, 4), (2, 3, 7), (2, 1, 3), (4, 3, 4), (2, 4, 5), (6, 1, 4), (0, 5, 7), (5, 2, 5), (7, 1, 6), (4, 0, 6), (1, 4, 4). 4

Institute of Information Technology
University of Dhaka
Bachelor of Science in Software Engineering (BSSE)
3rd Year 5th Semester Final Examination, 2023
SE 506: Design Patterns
Marks: 50   # Duration: 2.5 hours

Respect

Professionalism	Excellence

Answer any five (5) of the following questions. The weight of each question is mentioned at the right side.
When answering a question, please answer all the subsections of it at once.

1. a) *"Comments are often used as deodorant"* -- justify this statement. What are the remedies of   **3**
comment? Give example.

   b) What kind of code smells you get from the below code segment? Refactor the code and mention   **7**
the approach of refactoring you applied.

```java
class Employee{
    private int type;
    private static final int ENGINEER = 0;
    private static final int SALESMAN = 1;
    private static final int MANAGER = 2;
    private double monthlySalary;
    private double commission;
    private double bonus;

    public Employee(int type, double salary,
                    double commission, double bonus){
        this.type = type;
        this.monthlySalary = salary;
        this.commission = commission;
        this.bonus = bonus;
    }

    public double PayAmount(){
        switch (this.type){
            case ENGINEER:
                return monthlySalary;
            case SALESMAN:
                return monthlySalary + commission;
            case MANAGER:
                return monthlySalary + bonus;
            default:
                System.out.println("Incorrect Employee");
                return 0;
        }
    }
}

class TestEmployee {
    public static void main(String[] args){
        Employee manager = new Employee(2, 20000, 5000, 2500);
        manager.PayAmount();
        Employee salesman = new Employee(1, 10000, 2500, 1500);
        salesman.PayAmount();
        Employee engineer = new Employee(0, 15000, 3000, 2000);
        engineer.PayAmount();
    }
}
```

2. Suppose we are creating a very simple file system. We have to maintain the data of files and folders. Files are the basic elements that can be saved in the file system. A folder contains several files in it. A folder may also contain one more folder in it. A file has the following information: *file name, file_extension, creation_time, file size, location.* A folder also has the following attributes: *creation_time, location, folder name.* A folder must maintain the list of folders and files in it. A folder should have the functionality to add and remove new folder and new file. A folder should be able to provide the list of files with file attributes in it.

Design the system mentioned above. Write down the name of the design pattern(s), draw the class diagram and write the code to support your design.

3. a) What is Primitive Obsession? Give one example of primitive obsession and refactor it. What are the remedies of primitive obsession? 3

   b) 7
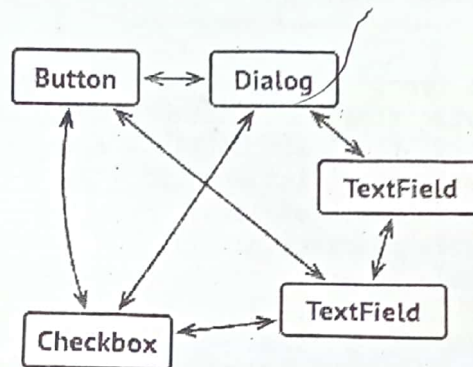
The diagram above shows the dependencies among several UI components of a specific program. What are the problems associated with such a design? Which design pattern/ patterns can you use to solve these problems? Modify and redraw the diagram to show your solution.

4. a) Which design pattern provides a way for object cloning? Explain a scenario where this pattern can be used. 3

   b) "*Talk to the interface, not to the concrete class*" -- Explain this statement with appropriate reasoning. 3

   c) What are the patterns that seem to be similar to Proxy pattern? Explain why they are similar. What are the dissimilarities that made these patterns exist separately? 4

5. a) Which design pattern/patterns is/are implemented in the following code? Explain your answer. 5

```java
public abstract class ReportTemplate {
    protected ReportFormat reportFormat;

    public void setReportFormat(ReportFormat reportFormat) {
        this.reportFormat = reportFormat;
    }

    public void generateReport() {
        generateHeader();
        reportFormat.generateBody();
        generateFooter();
    }
```

```
    protected abstract void generateHeader();

    protected abstract void generateFooter();

}

public interface ReportFormat {
    void generateBody();
}
```

b) Write the similarities of the facade and the mediator design patterns with code/ UML examples.   5

6. a) What is a Lazy Class? Give an example of a lazy class. How lazy class can be refactored?   4

   b) What kind of code smells do you get from the below code segment? Refactor the code and   6
   mention the approach of refactoring you applied.

```
public class Person{
    public String Name;
    public String Email;
    public int Age;
}
public class CsvGenerator{
    public String GetCsvWithHeader(List<Person> persons){
        String str = "Name, Email, Age\n";
        for (int i = 0; i < persons.size(); i++){
            str += persons.get(i).Name + "," +
                    persons.get(i).Email +"," +
                    persons.get(i).Age + "\n";

        }
        return str;

    }

    public String GetCsv(List<Person> persons){
        String str = "";
        for (int i=0; i< persons.size(); i++){
            str += persons.get(i).Name + "," +
                    persons.get(i).Email + "," +
                    persons.get(i).Age + "\n";

        }
        return str;
    }

    public String GetCsvWithHeaderAndFooter(List<Person> persons){
        String str = "Name, Email, Age\n";
        for(Person person : persons){
            str += person.Name +
                    person.Email +
                    person.Age + "\n";
            str = "Total no of persons:" + persons.size();
        }
        return str;
    }
}
```
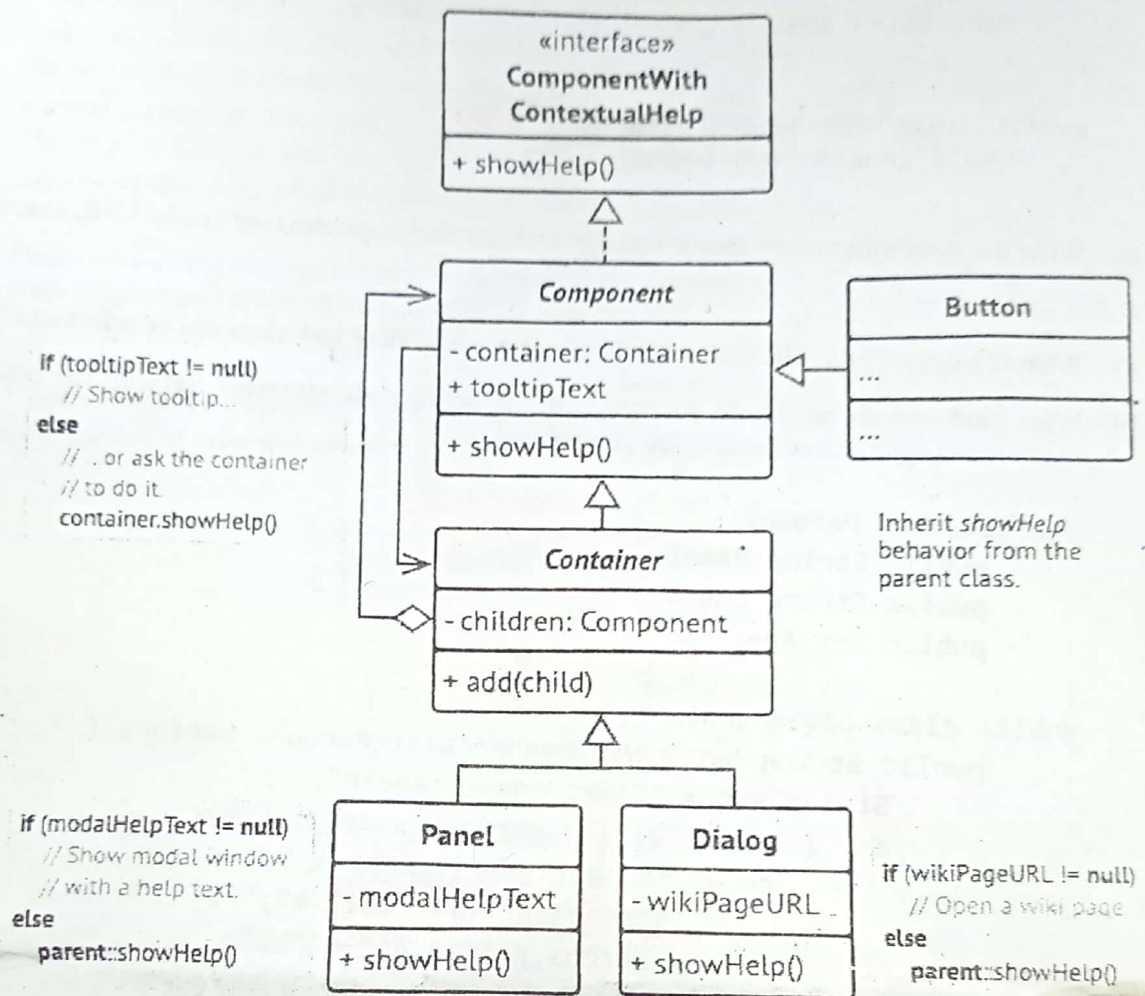
7. Consider the following UML diagram:


```
«interface»
ComponentWith
ContextualHelp

+ showHelp()
```

```
Component

- container: Container
+ tooltipText

+ showHelp()
```

```
Button

...

...
```

```
Container

- children: Component

+ add(child)
```

```
Panel

- modalHelpText

+ showHelp()
```

```
Dialog

- wikiPageURL

+ showHelp()
```

if (tooltipText != null)
   // Show tooltip...
else
   // ... or ask the container
   // to do it.
   container.showHelp()

Inherit showHelp
behavior from the
parent class.

if (modalHelpText != null)
   // Show modal window
   // with a help text.
else
   parent::showHelp()

if (wikiPageURL != null)
   // Open a wiki page
else
   parent::showHelp()

a) Which design pattern is shown in this UML diagram. Justify your answer. 3

b) Write a code to implement the given UML diagram. 7

Institute of Information Technology
University of Dhaka
Bachelor of Science in Software Engineering (BSSE)
3rd Year 5th Semester Final Examination, 2023
CSE 502: Web Technology
Marks: 30 # Duration: 2 hours

Professionalism   Excellence   Respect

Answer any three (3) of the following questions. The weight of each question is mentioned at the right side.
When answering a question, please answer all the subsections of it at once.

1.   i.   What will be the output of the following PHP code?   **10**

```php
<?php
$i=0;
for(++$i; ++$i; ++$i){
        print $i;
        if ($i == 4)
                break;
}
?>
```

   ii.   What will be the output of the following PHP code?

```php
<?php
$names = array("Sam", "Bob", "Jack");
echo $names[0]."is the brother of ".$names[1]."and
      ".$names[1].".".$brother;
?>
```

   iii.   What will be the output of the following PHP code?

```php
<?php
$a = "clue";
$a .= "get";
echo "$a";
?>
```

   iv.   What will be the output of the following PHP code?

```php
<?php
$team = "arsenal";
switch ($team) {
case "manu":
        echo "I love man u";
case "arsenal":
        echo "I love arsenal";
case "manc":
        echo "I love manc";
}
?>
```

v. Find the output of the following PHP code?

```php
<?php
$num = "1";
$num1 = "2";
print $num+$num1;
?>
```

2. a) Assume, in a system **login.php, index.php, logout.php** are the three php pages. Username and password will be asked in **login.php. Id, username** and **password** are three attributes of a table "user" in a database "userinfo". The username and password should be checked for the authentication of any user in the system. If the username is found in the database, then you have to redirect to the **index.php** by setting the session variable by user id. Implement the appropriate logout by destroying session variables and associated session data. When any user checks the remember me option, set the cookies expiration time to one day. A simple scenario is given in Figure 1 for more clarification.   7

login.php   index.php

Figure: 1

Design a proper PHP login-logout scheme with PHP **session, cookies** and the specification given above.

b) Explain DOM and CSS selectors with proper example.   3

3. a) What is the difference between a block-level and an inline-level element in HTML?   2

b) Write an HTML code snippet that creates a form with a mandatory text input field and a submit button.   3

c) Explain how <canvas> element works and provide a simple example of its usage.   3

d) What is the <iframe> element? How it is different from <embed> and <object>?   2

4. a) What are JavaScript Objects? Give some examples of JavaScript built-in objects.   3

b) Write a JavaScript program to evaluate the following mathematical expression: 5

$$1 + \frac{2}{2!} + \frac{3}{3!} + \cdots + \frac{n}{n!}$$

c) Create a regex for JavaScript which can validate any email id.   2

5. a) Distinguish between "padding" and "margin" area of CSS box model.   2

    b) What are the differences between GET and POST methods in form submitting? Give the case   3
        where we can use GET and where we can use POST methods.

    c) What does HTML stand for? Write the image tag required to link from the page *links.html* to the   3
        image *contact.jpg* when the files are organized as follows:

        i.   both in the same folder
        ii.   the *contact.jpg* is located in a subfolder called *"images"*
        iii.   the *links.html* page is located in a subfolder called *"otherfiles"*

    d) Write the differences between "id" and "class" attribute of an HTML element.   2

Institute of Information Technology
University of Dhaka
Bachelor of Science in Software Engineering (BSSE)
3rd Year 5th Semester Final Examination, 2023
BUS 503: Business Communication
Marks: 50   # Duration: 2.5 hours

Professionalism	Excellence	Respect

*Answer any **five** (5) of the following questions. The weight of each question is mentioned at the right side.
When answering a question, please answer all the subsections of it at once.*

1. a) How can you use grapevine communication at your advantage? — 3

   b) Briefly explain different types of communication barriers. — 3

   c) What are the differences between gesture and posture? Give some examples of postures and what these postures imply. — 4

2. a) *"At times silence is a powerful communication tool"* – elaborate this idea citing some cases when remaining silent is the best strategy in communication. — 2.5

   b) Briefly explain the characteristics of different stages of Tuckman's Team Development process with appropriate strategies at each level. — 5

   c) What are the basic differences among CV, resume and Bio-data? Is there any difference in the structure of a resume of a fresher and an applicant with years of job experience? — 2.5

3. a) Why does conflict arise in workplaces? How can you manage conflicts among the team members? — 5

   b) What are the features of a short report? What are the components of the prefatory part of a report? How should you draft the title of a formal report? Give an example. — 5

4. a) What are the steps in a systematic writing process? What steps should you follow in the planning phase of business communication? — 6

   b) State the structure for General Indirect Plan that is helpful for most negative-news situation. — 4

5. a) What factors should you keep in mind before you face job interview? — 2

   b) Explain the structure of writing Credit Refusal letters. — 3

   c) You are the manager of a newly established software firm. Your company has developed a banking solution, which automates most of the banking transaction process. You want to send sales messages to your potential customers, who are mostly the IT heads of the local private commercial banks. Following the AIDA approach of writing a persuasive message, draft a letter requesting the IT executives of these bankers to use your banking solution. — 5

6. a) You are the manager of a software company. One of your valued clients asked you to develop a software for her organization. But the price that she is offering is not sufficient at all to cover your software development cost; let alone the profit. — 5

   Given this situation, you can't say "No" directly to the client as the client is from a reputed giant company. However, accepting this deal will lead to substantial financial loss to your company. Following the indirect approach of negative message, write a refusal letter while maintaining a good relationship with the client. Don't forget to mention the probable alternatives.

b) Give some examples where you can follow a "YOU" attitude in writing messages. Is there any situation where "You" attitude may not be appropriate? Give brief examples.   3

c) What are the four most common mistakes made by communicators in writing business messages?   2

7. a) Define culture and explain its effect on cross-cultural communication?   3

b) Briefly explain the cultural differences in views and practices concerning human relations and how to use this knowledge effectively in communicating.   3

c) What will you do to enhance your cross-cultural communication skills?   4

Institute of Information Technology
University of Dhaka
Bachelor of Science in Software Engineering (BSSE)
3rd Year 5th Semester Final Examination, 2023
SE 511: Professional Ethics for Information Systems
Marks: 50   # Duration: 2.5 hours

Professionalism	Excellence	Respect

Answer any five (5) of the following questions. The weight of each question is mentioned at the right side. When answering a question, please answer all the subsections of it at once.

1. a) What is Bathsheba syndrome? How can you relate it to the ethical failure of a leader in an IT company? Explain. **5**

    b) What is offshore outsourcing? Discuss the strategies for successful offshore software development. **5**

2. a) Compare the utilitarian and the common good approach regarding an organization's ethical decision making. **6**

    b) What are the differences between Deontologists and Consequentialists? **4**

3. a) What is computer forensics? Discuss the goals of computer forensics. **4**

    b) Outline the action steps necessary to implement trustworthy computing. **6**

4. a) Briefly discuss some forms of Plagiarism. **4**

    b) (i) Consider, that you are unable to work out the calculations for your lab report but you know what the correct answer should be. Since your report is due, you take one of your numbers from an old lab report so that you can arrive at the correct answer. Is this considered to be plagiarism? Discuss. **2**

    (ii) Consider the documentation for a new algorithm is on the Web and the author has given permission to use the code. Is it plagiarism if you use the code in your problem? Do you need to cite the source or not? **2**

    (iii) Paraphrasing too closely to the original text, even if you do credit the source, is still considered plagiarism. Why? **2**

5. a) Define copyright and patent. Why might an organization elect to use open-source code instead of proprietary software? **5**

    b) Define malicious insider. Is it ethical to gain a competitive advantage using IT sabotage, data theft, or insider fraud? Explain your opinion. **5**

6. a) Explain the area of ICT Industry code of conduct. **7**

    b) What is reverse engineering? How it worked in software industry? **3**

7. a) Define professionalism. Explain detail the relationship between IT worker and their employer regarding-BSA, trade secret and whistle blowing. **7**

    b) Why professional relationship of IT workers must be managed? Explain with diagram. **3**