

BSCCS2003: Graded Questions with Solutions
Week 1

1. Consider the statement given below:

curl http://127.0.0.1:8080

Select the appropriate option that correctly identifies different components of the given statement. [MCQ : 2 points]

- ☐ Protocol: http, port: 127.0.0.1,
host-name: 8080, command: curl
- ☐ Protocol: http, host-name: 127.0.0.1,
port: 8080, command: curl
- ☐ Protocol: curl, host-ip: 8080,
host-name: 127.0.0.1, port: http
- ✓ ☒ Protocol: http, port: 8080,
host-ip: 127.0.0.1, command: curl

Solution: Here, “curl” is a command used to send a request.
“http” is the protocol.
“127.0.0.1” is the host-ip address.
“8080” is the port number.

2. Suppose a client machine C is communicating with a data center D located 12,500 km away from C. Assume that the TCP connection has been established and is kept alive. Calculate the RTT (Round trip time) in ms for an HTTP request. (Assume speed of light in cable is 2×10^8 m/s). [NAT : 3 points]

✓ 125

Solution: Recall that,

$$Speed = \frac{Distance \text{ (in m)}}{Time \text{ (in s)}}$$

$$\implies Time = \frac{Distance \text{ (in m)}}{Speed \text{ (in m/s)}}$$

So,

$$time = \frac{1.25 \times 10^7 \text{ m}}{2 \times 10^8 \text{ m/s}}$$

$$\implies \text{time} = 62.5 \text{ ms}$$

The round trip time = $62.5 \times 2 = 125 \text{ ms}$.

Therefore, the answer is **125 ms**.

3. Consider the given URL below:

`http://myserver.com/index.html?uid=10&sid=4032013`

Select the appropriate option that correctly identifies different components of the given URL. [MCQ : 2 points]

- ☒ Protocol: `http`, query-string: `uid=10&sid=4032013`, host-name: `myserver.com`, file-path: `index.html`
- ☐ Protocol: `myserver.com`, query-string: `index.html?uid=10&sid=4032013`, host-name: `http`, file-path: `myserver.com/index.html`
- ☐ Protocol: `http`, query-string: `index.html?uid=10&sid=4032013`, host-name: `http://myserver.com`, file-path: `index.html`
- ☐ Protocol: `myserver.com`, query-string: `index.html?uid=10&sid=4032013`, host-name: `http://myserver.com`, file-path: `myserver.com/index.html`

Solution: Here, HTTP is the protocol.

The query string is: “`uid=10&sid=4032013`”.

The host-name is: “`myserver.com`”.

The file path is: “`index.html`”.

4. Which of the following is/are true for a web browser? [MSQ : 1 point]

- ☒ A web browser is an application program to display web documents.
- ☒ A web browser sends an HTTP request and receives an HTTP response.
- ☐ A web browser is installed in a web server machine and hosts websites.
- ☐ A web browser is a web app.

Solution:

Option 1 : A web browser acts as a web client to send a request to the web server to fetch web pages.

Option 2 : Both the server and the client communicate with each other using HTTP protocol.

Option 3 : A web browser is an application installed in the client's system that is used to send HTTP requests.

Option 4 : A web browser is an application software used to access web applications.

5. Identify the correct order of the tasks that takes place when we request for `http://myserver.com/index.html`. [MCQ : 3 points]

1. The web browser sends an HTTP request to the server, requesting a copy of `index.html`.
 2. The web browser assembles the response and displays it.
 3. The server responds either with the requested resource or an error code.
 4. The web browser connects to the DNS server to get the server IP address for `myserver.com`
- ☐ 1-4-3-2
- ☐ 1-3-4-2
- ✓ ☒ 4-1-3-2
- ☐ 4-3-1-2

Solution:

As the first step, the web browser connects to a DNS server to get the IP address which is hosting “myserver.com”.

Then, the web browser sends an HTTP request, requesting a base html file (`index.html`) to the server.

Then, the server processes the request and returns the requested resource if found, else sends an error code.

Then, the web browser displays the response sent by the server.

6. The view in MVC architecture is responsible for _____. [MSQ : 1 point]

- ✓ ☒ Displaying the data.
- ☐ Storing and retrieving the data.
- ☐ Executing the the business logic.
- ✓ ☒ Receiving the data from the user.

Solution: View in the “MVC” is part of application to which user interacts directly. So, it can be used to display data and user can submit data using form which is an example of a view.

7. Let A be a website that receives 10,000 requests in a second. If each request has to be sent a response of size 150kB, what should be the minimum bandwidth (approximately) of the server serving A? [MCQ : 3 points]

- ☐ 4 Gbps
☐ 6 Gbps
☒ 12 Gbps
☐ 20 Gbps

Solution: Number of requests per second = 10,000

Amount of data to be sent back for each request = 150 kB

So, total amount of data to be sent back per second is $15 \times 10^5 \text{ kB} \approx 12 \text{ Gb}$.

Note: In practice, there will be some overhead that could result in even more bandwidth requirement.

8. Which of the following statements is/are true? [MSQ : 2 points]

- ☒ Internet Protocol (IP) is a set of rules that specifies one way to deliver data over the network.
☒ Domain Names are used in place of IP addresses.
☒ Hypertext is the text which contains links to other documents or websites.
☐ TCP stands for Traffic Control Protocol.

Solution:

- Internet Protocol (IP) is a set of rules that specifies one way to deliver data over the network.
- Domain Names are used instead of IP addresses.
- Hypertext is the text which contains links to other documents or websites.
- TCP is the Transmission Control Protocol.

Please refer to lecture 1.5 for more details

9. Consider the webpage link shown below:

<https://onlinedegree.iitm.ac.in/academics.html>

[MSQ : 1 point]

Which among the following is/are true?

- ☒ HTTPS is a protocol.
☐ onlinedegree.iitm.ac.in/academics.html is a domain name.

- ✓ <https://onlinedegree.iitm.ac.in/academics.html> is a url.
- ☐ <https://onlinedegree> is a root domain.

Solution: <https://onlinedegree.iitm.ac.in/academics.html>

- **HTTPS** is a protocol.
- **onlinedegree.iitm.ac.in** is a domain name.
- <https://onlinedegree.iitm.ac.in/academics.html> is a url.
- **iitm.ac.in** is a root domain.
- **onlinedegree** is a subdomain.

10. Which of the following is/are valid IPv4 address(es)? [MSQ : 2 points]

- ✓ [192.168.64.34](#)
- ☐ 192.168.256.1
- ✓ [34.39.43.202](#)
- ☐ 34.239.314.206

Solution: An IPv4 address has the format x.x.x.x, where x is called an octet and must be a decimal value between 0 and 255. Octets are separated by periods. An IPv4 address must contain three periods and four octets.
192.168.64.34 and 34.39.43.202 are valid IPv4 addresses.
192.168.256.1 and 34.239.314.206 are invalid IPv4 addresses.

<p style="text-align: center;">BSCCS2003: Graded Questions with Solutions</p> <p style="text-align: center;">Week 2</p>

1. Consider the following code: [MCQ : 2 points]

`<p id = "abc" class = "First Second" > This is a paragraph </p>`

Which of the following statements is true with respect to the above code?

- ☐ The Paragraph has one class "First Second".
- ☒ The Paragraph has two different classes, "First" and "Second".
- ☐ A Paragraph cannot have id and class together.
- ☐ A Paragraph cannot have any space within the class attribute.

<p>Solution: Each HTML tag has "class" attribute and every tag or element can have multiple classes at the same time. Multiple class values can be added to a class attribute by separating them with a space character.</p>

2. How will a browser handle the following code? [MSQ : 1 point]

```
<audio controls autoplay>
  <source src = "iitm.mp3" type = "audio/mp3">
  "sorry audio cannot be played"
</audio>
```

- ☒ If the browser supports audio tag and mp3 format, then it will start playing the audio as soon as the page is loaded.
- ☐ It will display the message 'sorry audio cannot be played', if the browser does not support mp3 format but supports the audio tag.
- ☒ It will display the message 'sorry audio cannot be played', if the browser does not support audio tag.
- ☐ None of the above

<p>Solution: Autoplay is a boolean attribute. It can be used with audio and video. If present, audio/video will start playing as soon as the page loads.</p>

3. Suppose you have a document which contains only lower case alphabets. How many bits are required to encode a character such that the size of the document is minimum?

Note:

- i) You can create your own encoding method.
- ii) Document contains all lower case alphabets.
- iii) Code for each alphabet should be of the same length.

[MCQ : 3 points]

- ☐ 3
- ☐ 4
- ☒ 5
- ☐ 6

Solution: There are 26 different characters in the document. Using n bits, we can encode 2^n different characters and $2^4 < 26 < 2^5$. So, we need at least 5 bits to represent 26 different characters.

4. Consider the following code:

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Document</title>
    <style>
      body {
        color: red;
        color: green;
        color: yellow;
      }
    </style>
  </head>
  <body>
    IIT Madras
  </body>
</html>
```

What will be the color of text “IIT Madras”?

[MCQ : 1 point]

- ☐ Red
- ☐ Green
- ☒ Yellow
- ☐ Black

Solution: If a value is assigned more than once, the browser will choose the last assigned value of that property. So, in this case, it will choose ‘yellow’ as value of the property color.

5. How will a browser render the following code?

```
<div>
  Welcome to<span style="visibility: hidden">Modern</span>Application
  Development<span style="display: none">Course</span> Test.
</div>
```

[MCQ : 2 points]

- ☒ Welcome to Application Development Test.
- ☐ Welcome to Application Development Test.
- ☐ Welcome to Modern Application Development Course Test.
- ☐ Welcome to Application Development Test.

Solution: When “display: None” is applied to some element, it removes the element from the DOM. So, the browser will not display any white space in place of the element. But “visibility: hidden” does not remove the element from DOM but will make it invisible, so there will be white space in place of the target element.

6. Which of the following code segments will display the result given below? [MSQ : 3 points]

Welcome to IITM ONLINE DEGREE

IIT Madras, India’s top technical institute,
welcomes you to the **world’s first BSc Degree program**
in Programming and Data Science.

[Click here](#) for more details

- ☐ `<!DOCTYPE html>`
`<html>`
`<body>`

`<h1> Welcome to IITM ONLINE DEGREE </h1>`

`<p>IIT Madras, India’s top technical institute,
`
`welcomes you to the world’s first BSc Degree program`
`
 in Programming and Data Science. </p>`


```
<a url="https://onlinedegree.iitm.ac.in/">Click here for  
more details</a>  
</body>  
</html>
```

```
✓ <!DOCTYPE html>  
<html>  
<body>  
  
<h1> Welcome to IITM ONLINE DEGREE </h1>  
  
<p><b>IIT Madras</b>, India's top technical institute, <br>  
welcomes you to the <b> world's first BSc Degree program  
  </b> <br> in Programming and Data Science. </p>  
<a href="https://onlinedegree.iitm.ac.in/">Click here</a>  
for more details  
</body>  
</html>
```

```
○ <!DOCTYPE html>  
<html>  
<body>  
  
<h1> Welcome to IITM ONLINE DEGREE </h1>  
  
<p><b>IIT Madras</b>, India's top technical institute, <br>  
welcomes you to the <strong> world's first BSc Degree program  
  </strong> <br> in Programming and Data Science. </p>  
<a src="https://onlinedegree.iitm.ac.in/">Click here</a>  
for more details  
</body>  
</html>
```

```
✓ <!DOCTYPE html>  
<html>  
<body>  
  
<h1> Welcome to IITM ONLINE DEGREE </h1>  
  
<p><b>IIT Madras</b>, India's top technical institute, <br>  
welcomes you to the <strong> world's first BSc Degree program  
  </strong> <br> in Programming and Data Science. </p>  
<a href="https://onlinedegree.iitm.ac.in/">Click here</a>
```

```
for more details
</body>
</html>
```

Solution: The correct syntax for hyperlink is

```
<a href="https://onlinedegree.iitm.ac.in/">Click here</a>
```

So, options 1 and 3 are incorrect.

The text written under `` tag and `` tag will be displayed as bold.
So, options 2 and 4 will display the same result.

7. Calculate the 8-bit binary representation of decimal number 89.

Note : No white spaces are allowed in the answer.


[NAT : 2 points]

✓ 01011001

Solution: Decimal value = 89

Conversion from decimal to binary:

2	89	1
2	44	0
2	22	0
2	11	1
2	5	1
2	2	0
	1	



As per the above image, the binary representation will be 1011001. But since it has only 7 bits, we will add one zero in the beginning of the sequence (from the left) to make it an 8-bit sequence.

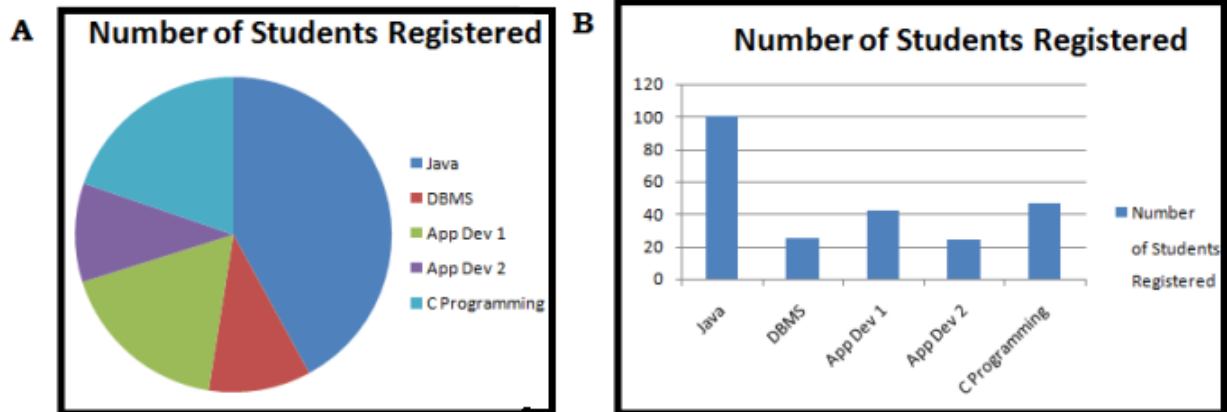
Hence, the 8-bit representation of decimal number “89” is: 01011001.

BSCCS2003: Graded Questions with Solutions

Week 3

1. Consider the images given below and identify the correct statement(s).
[MSQ : 1 point]

Course Name	Number of Students Registered
Java	100
DBMS	25
App Dev 1	42
App Dev 2	24
C Programming	47



- ☒ Model is an object which represents data in the table.
- ☒ Chart A and chart B are two different views of the same data table.
- ☒ Controller is an intermediate between the model and the view.
- ☐ None of the above

Solution:

In MVC design pattern, a model is an application object which can store the application data. The View represents data in specified ways. Controller is the one that manipulates the model and updates the view.

2. Consider the pyhtml code given below and identify the resulting HTML code. [MCQ : 2 points]

```
from pyhtml import *  
  
t = html(  
    head(  
        title('Sample Pyhtml File')
```

```

    ),
    body(
        header(img(src='./logo.png'))
    )
)
print (t.render())

```

```

✓ <!DOCTYPE html>
<html>
  <head>
    <title>
      Sample Pyhtml File
    </title>
  </head>
  <body>
    <header>
      
    </header>
  </body>
</html>

```

```

○ <!DOCTYPE html>
<html>
  <head>
    <title>
      Awesome website
    </title>
    <script src="http://path.to/script.js"></script>
    <title>
      Sample Pyhtml File
    </title>
  </head>
  <body>
    <header>
      
    </header>
  </body>
</html>

```

```

○ <head>
  <title>
  </title>
</head>
<body>
  <header>

```

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

☐ None of the above

Solution:

Option 1 : The first code snippet will be the output of given template code.

Option 2 : An additional script tag is included which is not defined in the template code.

Option 3: The title is missing in the output code.

3. What will be the output of the following Python code if rendered using a browser?

```
def Generate(t1):
    begin = "<!DOCTYPE html>\n<html>\n<body>\n"+t1+"\n</body>\n</html>"
    return begin
def div(head,body):
    return "<div>"+head+"\n"+body+ "\n</div>"
def H1(content):
    return "<h1>"+content+"</h1>"
def p(content):
    return "<p>"+content+"</p>"
Out = Generate(div(H1("This is my heading"),
    p("This is my paragraph")))
```

[MCQ: 2 points]

This is my heading

✓ This is my paragraph

This is my paragraph

☐ This is my heading

This is my paragraph

☐ This is my heading

This is my paragraph

This is my heading

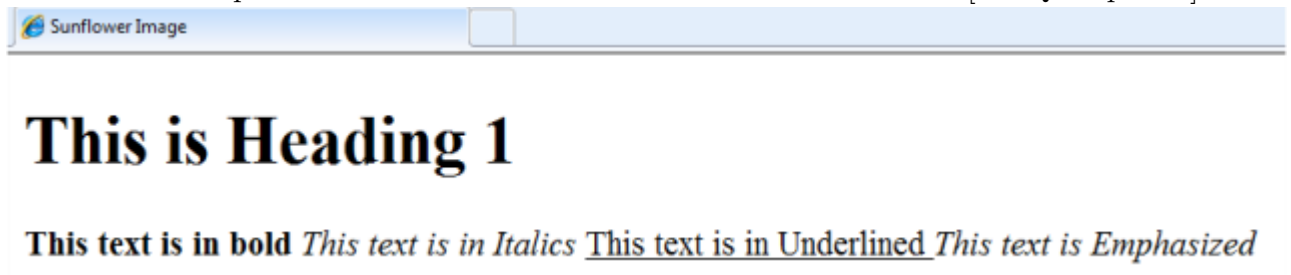


Solution: The given python code will be rendered into the HTML file given below:

```
<!DOCTYPE html>
<html>
<body>
<div><H1>This is my heading</H1>
<p>This is my paragraph</p>
</div>
</body>
</html>
```

The HTML file will display the webpage as given in option 1.

4. Consider the image given below and identify the correct pyhtml code to generate equivalent HTML output. [MCQ : 2 points]



```
✓ from pyhtml import *

t = html(
    head(
        title('Sunflower Image')
    ),
    body(
        h1('This is Heading 1'),
        b('This text is in bold'),
        i('This text is in Italics'),
        u('This text is in Underlined'),
        em('This text is Emphasized')
```

- ```

)
)

print (t.render())

```
- ☐ from pyhtml import \*
- ```

t = html(
    head(
        title('Sunflower Image')
    ),
    body(
        h1('This is Heading 1'),
        b('This text is in bold'),
        i('This text is in Italics'),
        u('This text is in Underlined'),
        em('This text is Emphasized')
    )
)

print (t.show())

```
- ☐ from pyhtml import *
- ```

t = html(
 head(
 title('All tags')
),
 body(
 h1('This is Heading 1'),
 b('This text is in bold'),
 i('This text is in Italics'),
 u('This text is in Underlined'),
 em('This text is Emphasized')
)
)

print (t.display())

```
- ☐ None of the above

**Solution:**

Option 1: The code here is a valid code and will result in correct output without any errors.



Option 2: The code snippet here is similar to option 1 except that it uses `t.show()` method instead of `t.render()` which is not a valid pyhtml rendering method.

Option 3: The code snippet here is similar to option 1 except that it uses `t.display()` method instead of `t.render()` which is not a valid pyhtml rendering method.

5. What will be the output of the following Python code?

[MCQ: 3 points]

```
from jinja2 import Template
my_statement = Template("The special numbers are: {% for n in range(11)
 if n%2 == 0 %} {{n%3}} " "{% endfor %}")
out = my_statement.render()
print(out)
```

- ☐ The special numbers are: 1 0 1 0 1 0 1 0 1 0 1 0
- ☒ The special numbers are: 0 2 1 0 2 1
- ☐ The special numbers are: 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
- ☐ The special numbers are: 0.33 0.67 1.0 1.33 1.67 2.0

**Solution:** In the Template function, the {% %} is a block used to provide conditional statements and the content to be printed is given inside {{ }}. In Python, the expression n%3 will return the remainder when n is divided by 3.

6. What will be the output of following Python code?

[MCQ: 1 point]

```
from jinja2 import Template
statement1 = Template("IIT Madras provides diploma in {{Value_1}} {{Value_2}}")
statement2 = Template("IIT Madras provides degree in {{Value_1}}{{Value_2}}")
out1 = statement1.render(Value_1 = "programming")
out2 = statement2.render(Value_2 = "data science")
print(out1)
print(out2)
```

- ☒ IIT Madras provides diploma in programming  
IIT Madras provides degree in data science
- ☐ IIT Madras provides diploma in data science  
IIT Madras provides degree in programming
- ☐ IIT Madras provides diploma in programming, data science  
IIT Madras provides degree in programming, data science
- ☐ The code will generate parsing error.

**Solution:** The Template class of Jinja2 simply ignores those brackets whose actual content is not provided by the render method. It does not throw any error.

7. Which of the following Python codes will generate the HTML code given below? [MCQ : 3 points]

```
<!DOCTYPE html>
<html>
 <head></head>
 <body>
 <h1>
 Heading 1
 </h1>

 My name is ram

 bold

 <div>
 <h2>
 Heading 2
 </h2>
 <div>
 This is a nested div section
 </div>
 </div>
 <div>
 <h3>
 Heading 3
 </h3>
 <p>
 This is a paragraph
 </p>
 </div>
 </body>
</html>
```

```
✓ import pyhtml as ht
 t=ht.html(ht.head(),
 ht.body(
 ht.h1('Heading 1'),ht.em('My name is ram'),ht.strong("bold"),
 ht.div(ht.h2("Heading 2"),
 ht.div("This is a nested div section")),
 ht.div(ht.h3('Heading 3'),
 ht.p("This is a paragraph")),
```

```
))
print(t.render())
```

- ☐ import pyhtml as ht  
t=ht.html(ht.head(),  
ht.body(  
    ht.h1('Heading 1') ht.em('My name is ram') ht.strong("bold")),  
    ht.div(ht.h2("Heading 2"),  
    ht.div("This is a nested div section")),  
    ht.div(ht.h3('Heading 3'),  
    ht.p("This is a paragraph")),  
)  
print(t.render())
- ☐ import pyhtml as ht  
t=ht.html(ht.head()  
ht.body(  
    ht.h1('Heading 1'),ht.em('My name is ram'),ht.strong("This is bold"),  
    ht.div(ht.h2("Heading 2"),  
    ht.div("This is a nested div section")),  
    ht.div(ht.h3('Heading 3'),  
    ht.p("This is a paragraph")),  
))  
print(t.render())
- ☐ None of the above

**Solution:** This question is based on the Python library called pyhtml to generate a valid HTML file using Python. (Reference: Timeframe 3:40 in Lecture 3.6, Tools-part II)

## BSCCS2003: Graded Questions with Solutions

### Week 4

1. Consider the following two tables: [MCQ : 1 point]

Table 1: Instructors

Instructor_ID	Instructor_Name	Department_Name
101	Amit Dubey	Physics
102	Sarthak Gaur	English
103	Neha Sharma	English
104	Sumit Kumar	Chemistry
105	Himanshi Mehra	Mathematics

Table 2: Departments

Department_Name	Building_Name
English	B1
Mathematics	B2
Physics	B3
Chemistry	B2
Finance	B5

Which of the following queries will list the names of those instructors whose department is “English” or whose building is either ‘B1’ or ‘B2’?

- ☐ SELECT Instructor\_Name from Instructors i, Departments d  
WHERE d.Department\_Name = i.Department\_Name  
and (i.Department\_Name = ‘English’ or d.Building\_Name = ‘B1’) and d.Building\_Name = ‘B2’;
- ☐ SELECT Instructor\_Name from Instructors i, Departments d  
WHERE (i.Department\_Name = ‘English’ or d.Building\_Name in (‘B1’, ‘B2’));
- ☒ SELECT Instructor\_Name from Instructors i, Departments d  
WHERE d.Department\_Name = i.Department\_Name  
and (i.Department\_Name = ‘English’ or d.Building\_Name in(‘B1’, ‘B2’));
- ☐ All of the above

#### **Solution:**

Option 1: The first query will result in no records.

Option 2: The second query will result in a Cartesian product and generate wrong output.

Option 3: The third query will result in the correct result, i.e., instructors names who belong to “English” department or whose building is either ‘B1’ or ‘B2’.

2. Consider the following two tables: [MCQ : 1 point]

Table 1: Instructors

Instructor_ID	Instructor_Name	Department_Name
101	Amit Dubey	Physics
102	Sarthak Gaur	English
103	Neha Sharma	English
104	Sumit Kumar	Chemistry
105	Himanshi Mehra	Mathematics

Table 2: Departments

Department_Name	Building_Name
English	B1
Mathematics	B2
Physics	B3
Chemistry	B2
Finance	B5

Which of the following queries will list the names of those instructors whose department is in the building 'B1'?

- ☒ `SELECT Instructor_Name from Instructors i INNER JOIN Departments d  
ON i.Department_Name = d.Department_Name  
WHERE d.Building_Name = 'B1';`
- ☐ `SELECT Instructor_Name from Instructors i INNER JOIN Departments d  
ON i.Department_Name = d.Building_Name  
WHERE d.Building_Name = 'B1';`
- ☐ `SELECT Instructor_Name from Instructors i INNER JOIN Departments d  
ON i.Department_Name = d.Department_Name  
WHERE i.Building_Name = 'B1';`
- ☐ All of the above

**Solution:**

Option 1: The first query will result "Sarthak Gaur" and "Neha Sharma" as an inner join will be performed over a common column named "Department\_Name" in both of the tables.

Option 2: The second query will show no results, as there is no entry in the "Instructors" table whose "Department\_Name" matches with the column "Building\_Name" in table "Departments".

Option 3: The third query will generate an error, as there is no attribute called "Building\_Name" in the table "Instructors".

3. Is it mandatory for a table to have a primary key? [MCQ: 1 point]

- ☐ Yes, because each table is uniquely identified by its primary key.
- ✓ ☒ No, because databases can have tables with all non-unique fields, they can exist even without a primary key.
- ☐ Yes, because each table should have a field with unique entries.
- ☐ No, as the primary key is automatically set by the table if not given explicitly.

**Solution:** It is not necessary for a table to have a primary key, as tables can be designed with no primary key set. A primary key does not define any table uniquely in the database, but can define a field or a group of fields collectively within the table. Primary keys are set by the user or the creator of the table, and is not automatically set by the table in case it is not set by the creator.

4. Consider the following 2 tables:

Table 1: Employee

Employee_ID	Employee_Name	Age	PhoneNo
1	Saurav Lokesh	23	9871768118
2	Garima Das	25	9987712611
3	Swaroop Kumar	21	9863674830
4	Sumita Verma	25	9872618731

Table 2 : Project

Project_ID	Employee_ID	Client_ID	Project_Name
101	1	4	Project1
102	2	8	Project2
103	3	3	Project3
104	4	7	Project4

Which of the following queries will pull out all the Project names and Project id with their corresponding Employees names only?

[MCQ : 3 Points]

- ☐ SELECT Employee.Employee\_ID,  
Employee.Employee\_Name, Project.Project\_ID,  
Project.Project\_Name  
FROM Employee  
INNER JOIN Project  
ON Employee.Employee\_ID=Project.Employee\_ID;
- ✓ ☒ SELECT Project.Project\_Name,  
Project.Project\_ID, Employee.Employee\_Name

```
FROM Employee
INNER JOIN Project
ON Employee.Employee_ID=Project.Employee_ID;
```

- ☐ SELECT Employee.Employee\_ID,  
Employee.Employee\_Name, Project.Project\_ID,  
Project.Project\_Name,  
FROM Employee,  
INNER JOIN Project ,  
ON Employee.Employee\_ID=Project.Employee\_ID;
- ☐ None of the above

**Solution:** The correct INNER JOIN syntax is :  
SELECT column\_name(s)  
FROM table1  
INNER JOIN table2  
ON table1.column\_name = table2.column\_name;

In option (i) and (iii) this syntax is violated.



5. Consider the following tables.

[MCQ : 1 point]

1) Table 1: records

record_id	matches	runs	highest_score	format	average	player_id
1	39	2679	212	test	46.19	1
2	227	9206	264	odi	48.96	1
3	92	7547	254	test	52.05	2
4	254	12169	183	odi	59.07	2
5	114	8765	278	test	50.66	3
6	228	9577	176	odi	53.55	3
7	77	7540	239	test	61.8	4
8	128	4378	164	odi	43.35	4
9	86	7311	335	test	48.1	5
10	128	5455	179	odi	45.08	5

2) Table 2: players

player_id	country	name	role
1	India	Rohit Sharma	opening_batsman
2	India	Virat Kohli	middle_order_batsman
3	South Africa	AB de Villiers	middle_order_batsman
4	Australia	Steven Smith	middle_order_batsman
5	Australia	David Warner	opening_batsman

What will be the output of the following code?

```
SELECT players.country
FROM players
INNER JOIN records ON records.player_id = players.player_id
GROUP BY country
ORDER BY SUM(records.runs) DESC
LIMIT 1;
```

☒ India

☐ Australia

☐ South Africa

☐ Code will produce an error

**Solution:** The query will produce the name of the country with the highest aggregate runs. In this case, it is India.

6. Consider the following tables.

[MCQ : 2 points]

1) Table 1: records

record_id	matches	runs	highest_score	format	average	player_id
1	39	2679	212	test	46.19	1
2	227	9206	264	odi	48.96	1
3	92	7547	254	test	52.05	2
4	254	12169	183	odi	59.07	2
5	114	8765	278	test	50.66	3
6	228	9577	176	odi	53.55	3
7	77	7540	239	test	61.8	4
8	128	4378	164	odi	43.35	4
9	86	7311	335	test	48.1	5
10	128	5455	179	odi	45.08	5

2) Table 2: players

player_id	country	name	role
1	India	Rohit Sharma	opening_batsman
2	India	Virat Kohli	middle_order_batsman
3	South Africa	AB de Villiers	middle_order_batsman
4	Australia	Steven Smith	middle_order_batsman
5	Australia	David Warner	opening_batsman

What will be the output of following code?

```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
WHERE players.role = "opening_batsman" and records.format = "odi"
ORDER BY records.highest_score DESC
LIMIT 1;
```

✓ Rohit Sharma

- ☐ AB de Villiers
- ☐ Virat Kohli
- ☐ David warner

**Solution:** The query will produce the name of the player with highest “highest\_score” in odi and who is also an opening batsman.

7. Consider the following tables.

[MCQ : 3 points]

1) Table 1: records

record_id	matches	runs	highest_score	format	average	player_id
1	39	2679	212	test	46.19	1
2	227	9206	264	odi	48.96	1
3	92	7547	254	test	52.05	2
4	254	12169	183	odi	59.07	2
5	114	8765	278	test	50.66	3
6	228	9577	176	odi	53.55	3
7	77	7540	239	test	61.8	4
8	128	4378	164	odi	43.35	4
9	86	7311	335	test	48.1	5
10	128	5455	179	odi	45.08	5

2) Table 2: players

player_id	country	name	role
1	India	Rohit Sharma	opening_batsman
2	India	Virat Kohli	middle_order_batsman
3	South Africa	AB de Villiers	middle_order_batsman
4	Australia	Steven Smith	middle_order_batsman
5	Australia	David Warner	opening_batsman

Which of the following queries will output the names of batsmen with the top three averages in test matches and has played more than 75 test matches?

- ☐

```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
ORDER BY records.average
```

```
WHERE records.matches > 75 and records.format = "test"
LIMIT 3;
```

- ```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
WHERE records.matches > 75 and records.format = "test"
ORDER BY records.average
LIMIT 3;
```
- ```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
ORDER BY records.average DESC
WHERE records.matches > 75 and records.format = "test"
LIMIT 3;
```
- ✓ 

```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
WHERE records.matches > 75 and records.format = "test"
ORDER BY records.average DESC
LIMIT 3;
```

**Solution:** option 1 and 3 will produce error because WHERE clause should come before the ORDER BY clause.

option 2 will produce the top 3 batsmen with lower average in test matches and has played more than 75 test matches.

option 4 will produce the top 3 batsmen with higher average in test matches and has played more than 75 test matches.

<p>BSCCS2003: Graded Questions with Solutions</p> <p>Week 5</p>
-----------------------------------------------------------------

1. What will the output of the following Python code? [MCQ : 3 Points]

```
def decor(func1):
 def inner():
 s=func1()
 return s.upper()
 return inner

def decor1(func2):
 def wrapper():
 s=func2()
 return s.split()
 return wrapper

def decor2(func3):
 def wrapper1():
 s=func3()
 return s.lower()
 return wrapper1

@decor1
@decor
@decor2
def print_s():
 return "hello world!"

print(print_s())
```

- ☐ Hello World!
- ☐ HELLO WORLD!
- ☒ ['HELLO', 'WORLD!']
- ☐ None of the above

**Solution:** The above code prints ['HELLO', 'WORLD!'].

Here decor2 function is not changing any functionality as the print\_s function is already in the lowercase.

After that, decor() function converts "hello world!" to "HELLO WORLD!" and then decor1() function converts "HELLO WORLD!" to ["HELLO", "WORLD!"].

2. Consider the code segment given below and choose the correct option(s). [MSQ: 2 points]

```
def My_func1(a,b):
 sum1 = a+b
 print(sum1)

def update(original_func):
 def My_func2(*args):
 My_func1(*args)
 a,b = args
 print((a+b)**2)
 return My_func2

My_func_1 = update(My_func1)
```

- ✓ 'My\_func1' prints the sum of numbers a and b.
- ✓ 'My\_func\_1' prints the sum, and also the square of the sum of numbers a and b.
- ✓ The function 'update' works in a way Python decorators work
- ✓ when "My\_func\_1 = update(My\_func1)" is executed, 'My\_func2' is assigned to 'My\_func\_1'.

**Solution:** The function 'update' alters the functionality of function 'My\_func1' such that it returns the sum and also the square of the resulting sum. Thus, the equation: My\_func\_1 = update(My\_func1) works in the way a decorator works.

3. The default 'methods' parameter in the route decorator is\_\_\_\_\_. [MCQ: 1 points]

- ☐ POST
- ✓ ☒ GET
- ☐ UPDATE
- ☐ CREATE

**Solution:** The parameter 'methods' of the route method accepts a list of methods that the given rule is limited to. By default, it listens to the 'GET' method.

4. Which of the following is/are correct regarding the URL? [MSQ : 1 points]

"http://www.example.com/student/marks.html?id=201"

- ☐ www.example.com is a query string.
- ✓ /student/marks.html is the path to the resource.
- ✓ id = 201 is a parameter.
- ✓ www.example.com is a domain name.

**Solution:** In this URL, example.com is domain name, /student/marks.html is path to the resource and id = 201 is a parameter.

5. Consider the following code.

[MCQ : 2 points]

```
from flask import Flask
app = Flask(__name__)

@app.route("/")
def ind():
 return "Hello students !"

@app.route("/home/<name>")
def home(name):
 return f"Hello {name} students!"
```

If the flask application is running on http://127.0.0.1:5000, what will browser render for url http://127.0.0.1:5000/home/iitm?

- ☐ Hello iitm!
- ☐ Hello students!
- ✓ Hello iitm students!
- ☐ Hello world!

**Solution:** If you visit the url “http://127.0.0.1:5000/home/iitm” flask will invoke home function which will return Hello iitm students!

6. A Python code with a Flask app and two HTML files in the template folder are shown below.

```
from flask import Flask, render_template
app = Flask(__name__)
@app.route('/index')
def info():
 return render_template('web1.html')
```

```
@app.route('/info')
def index():
 return render_template('web2.html')
```

```
if __name__ == '__main__':
 app.run(debug = True)
```

HTML file: web1.html

```
<!DOCTYPE html>
<html>
<head>
<title>Web 1</title>
</head>
<body>
<h3>This is the index page of my website</h3>
<p>This page gives introduction of the website.</p>
</body>
</html>
```

HTML file: web2.html

```
<!DOCTYPE html>
<html>
<head>
<title>Web 2</title>
</head>
<body>
<h3>This is the info page of my website</h3>
<p>This page gives information of the website.</p>
</body>
</html>
```

Choose the correct statement(s)

[MCQ : 3 points]

- ✓ For the URL 'http://127.0.0.1:5000/index', the browser will render the HTML file as;



**This is the index page of my website**

This page gives introduction of the website.

- For the URL 'http://127.0.0.1:5000/index', the browser will render the HTML file as;

**This is the info page of my website**

This page gives information of the website.

- For the URL 'http://127.0.0.1:5000/info', the browser will render the HTML file as;

**This is the index page of my website**

This page gives introduction of the website.

- ✓ For the URL 'http://127.0.0.1:5000/info', the browser will render the HTML file as;

**This is the info page of my website**

This page gives information of the website.

**Solution:** The HTML file rendered by the browser depends on the route method. The route method with endpoint '/index' will render HTML file 'web1.html' and that with endpoint '/info' will render HTML file 'web2.html'. For the flask app to run without error, the name of functions under the decorator should have different names, and these names are independent of the rendered HTML file.

7. A model class 'Users' is used to create a table with name 'users' in the database, which is shown in the figure below.

id	user_name	e_mail_id
1	Shiv	<a href="mailto:shiv@example.com">shiv@example.com</a>
2	Rudra	<a href="mailto:rudra@example.org">rudra@example.org</a>
3	Mahesh	<a href="mailto:mahesh@example.com">mahesh@example.com</a>
4	Neel	<a href="mailto:neel@example.org">neel@example.org</a>

What will be the output if the following lines of code are executed with help of Python console?

```
>>> Names = Users.query.order_by(Users.user_name).all()
>>> for name in Names:
... print(name.user_name)
```

[MCQ : 2 points]

- ☐ Shiv  
Rudra  
Mahesh  
Neel
- ☐ Rudra  
Shiv  
Mahesh  
Neel
- ☒ Mahesh  
Neel  
Rudra  
Shiv
- ☐ mahesh  
neel  
rudra  
shiv

**Solution:** The 'query.order\_by()' method sorts all the records in the 'users' table with respect to the field passed to it as an argument. In this case, it will sort the table with respect to user\_name. The following 'for' loop prints the alphabetically sorted user\_names in newline.

<p>BSCCS2003: Graded Questions with Solutions</p> <p>Week 6</p>
-----------------------------------------------------------------

1. REST APIs are 'stateless', with keeping that in mind, which of the following statements is/are true? [MSQ : 2 Points]

- ✓ Every request from the client is independent of one another, i.e., the request runs independently of other requests from the same client.
- ✓ The client cannot assume state of the server.
- ✓ The server need not maintain the client's previous interaction.
- ☐ Sometimes, the server can take advantage of any previously stored context information on the server.

**Solution:** Option 4) The server cannot take advantage of any previously stored information on the server, as in REST API, statelessness means that every HTTP request happens in complete isolation. They should not keep a client state on the server and vice versa.

2. Which of the following is/are true regarding POST HTTP method? [MSQ : 3 points]

- ☐ It should be safe in context of REST.
- ☐ It should be idempotent in context of REST.
- ✓ It is allowed in HTML forms.
- ✓ POST Request has a body.

**Solution:** An HTTP method is safe if it does not change the state of the server. POST request is used to create a resource. It changes the state of the server, so it is not safe. It is not idempotent because multiple identical POST request can create multiple resources. It is allowed in the HTML forms. And POST request has a body.

3. For an API, which of the following can be an output? [MCQ: 2 points]

- ✓ JSON
- ✓ XML
- ✓ YAML
- ✓ CSV

**Solution:** The most common outputs of an API are JSON, XML and YAML. JSON is most popular as most APIs give JSON as output. APIs can produce CSV as the output, but a CSV file is not a standard output, and they might lack in structure.

4. Which of the following come(s) under authenticated APIs in the context of the CoWin website? [MSQ : 2 Points]

- ☐ state-wise search of positive cases.
- ☐ district-wise search for medicine.
- ✓ ☒ booking appointment for vaccination.
- ✓ ☒ download vaccination certificate.

**Solution:** The authentication APIs enable us to manage and control all the aspects of user identity. Booking an appointment or downloading a certificate on CoWin website requires mobile OTP to authenticate the user. Retrieving general information will come under unauthenticated APIs.

5. Consider the following YAML file.

```
openapi: 3.1.0
info:
 title: A minimal OpenAPI document
 version: 0.0.1
paths: {}
```

How many endpoints are defined in the given YAML file? [MCQ: 1 points]

- ✓ ☒ 0
- ☐ 1
- ☐ 2
- ☐ 3

**Solution:** Empty curly braces corresponding to 'paths' denote null array and state that no endpoint has been defined for given OpenAPI.

6. In the context of REST, a DELETE request that deletes a random resource in the database will be \_\_\_\_\_. [MCQ: 3 points]

- ☐ idempotent
- ✓ ☒ not idempotent
- ☐ safe
- ☐ All of the above

**Solution:** A DELETE request of a random resource from the database is a violation of REST principles.

7. Which of the following is an invalid JSON object? [MCQ : 1 Points]

- ☐ {  
    "Year" : "2020",  
    "Month" : 4,  
    "Date" : 19  
}
- ☐ {  
    "Year" : 2016,  
    "Month" : "7",  
    "Date" : 28  
}
- ✓ ☒ {  
    "Year" : "2007",  
    "Month" : 2,  
    "Date" : NULL  
}
- ☐ None of the above

**Solution:** A JSON object is a collection of key : value pairs, where a key must be a string and value can be a number, string, object, array, true, false, array or null. NULL is not a valid value, but null is a valid JSON value.

## Week 7 Graded Questions with Solutions

1] You write an algorithm to sort N numbers (stored in an array a[0] to a[N-1]) as follows:

Algorithm steps:

- i. Search through the list of numbers to find the lowest number - say it is position
- ii. Move a[i-1] to a[i], a[i-2] to a[i-1] etc, till a[0] to a[1]
- iii. Place the original a[i] in position 0
- iv. Repeat the above steps but now starting from position 1 to N-1, then 2 to N-1 etc till all numbers are in the correct places.

What is the running complexity of this algorithm?

1. linear
2. quadratic
3. cubic
4. exponential

Answer: Option 2.

Solution: Step 1 can take  $O(N)$  time in worst case (search through all elements). Then step 2 will also take  $O(N)$  time (if i is close to end of the list). But this is total  $2N$  which is still  $O(N)$ . This is done once for each of N numbers, so total algorithm is  $O(N*N)$  or quadratic.

2] Balancing a binary tree is done in order to\_\_.

1. reduce the height of the tree
2. ensure logarithmic searching time
3. make the search time linear
4. reduce the space required for storage.

Answer: Option 1 and 2.

Solution: Reducing the height of the tree and ensuring logarithmic searching time do not have any impact on storage.

3] A binary tree of height H can store a maximum of how many values?

1.  $2^H - 1$
2.  $2^H + 1$
3.  $H^2 - 1$
4.  $H^2 + 1$

Answer: Option 1.

Solution:  $2^H - 1$  (for example, height 5 means 5 steps to root, there will be 16 at the lowest level, 8 above that, 4 above that, 2 above that and then the root).

4] A binary tree is used to store an index of names of people (table NAME). Which of the following queries will be able to make use of the index to speed up the response?

1. NAME LIKE 'RA%';
2. NAME = 'RAHUL' ;
3. NAME LIKE '%DR%';
4. ROLLNO LIKE 'EE%';

Answers: Option 1 and 2.

Solution: The queries NAME LIKE 'RA%' and NAME = 'RAHUL' will make use of the index to speed up the response.

5] If our main interest is in scaling out a database by adding more distributed servers, then which of the ACID conditions is most difficult to meet?

1. A
2. C
3. I
4. D

Answer: Option 2.

Solution: consistency - all the other can be done more easily on a distributed system.  
consistency is hard because there are multiple servers

6] You want to create an app where students can log in and download halltickets. To make this more efficient, you want to have some very quick way to check whether a given user has already downloaded their hallticket or not. Which kind of database will you prefer?

1. RDBMS
2. Doc-oriented database
3. Graph database
4. Key-value store

Answer: Option 4.

Solution: Key-Value stores are usually kept in memory and are very fast at answering Yes/No questions like whether a person has already downloaded their hallticket

7] Which type of database will be worst at scaling out to large number of servers?

1. RDBMS
2. Doc-oriented database
3. Graph database
4. Key-value store

Answer: Option 1.

Solution: RDBMS are usually designed for consistency and do not scale out easily.

# Week 8 Graded question with Solutions

1] Which of the following are permitted in a fully static website? [MSQ: 1 point]

1. Images
2. Javascript
3. Database connection request for each page
4. All of the above

Answer: Option 1 and 2.

Solution: Options 1 and 2 are OK. but option 3 i.e. database connection for each page will require work by the server and is therefore not a fully static site.

2] Which of the following is most dangerous to the client? [MCQ: 1 point]

1. Static HTML web page
2. PHP script on server
3. JS with native mode access
4. JS with only basic API access

Answer: Option 3.

Solution: Option 3 is the most dangerous to client. Option 2 is dangerous to the server. Others are generally safe.

3] Which of the following is/are true for constraint validation API? [MSQ: 2 points]

1. Constraint validation API is sufficient to protect against SQL injection
2. Constraint validation API only protects the form itself.
3. It is always possible to directly submit to the controller. without going through the HTML form.
4. None of the above

Answer: Option 2 and 3.

Solution: Constraint validation API is not completely sufficient to protect against SQL injection because it only protects the form itself and It is always possible to directly submit to the controller. without going through the HTML form.

4] A server has a 16-core CPU, 64 GB RAM and 1 Gbps network connection. It can run a Python Flask application that can generate 500 HTML pages per second. Each page also has a 100 KB image that needs to be downloaded by the client. What will be the maximum number of requests per second that the server can handle? [NAT: 3 points]

Answer: 500.

Solution: The image size is about 100KB per image, so 1250 of these per second can be delivered on the network. So the limit will come from the Flask application which can generate only 500 pages per second.



5] In question No. 4, if the image resolution is improved such that the size of all the images is increased from 100KB to 500KB but keeping all other parameters unchanged. What will be the maximum number of requests per second that the server can handle? [NAT: 2 points]

Answer: 250.

Solution: The image size is increased to 500KB per image, so 250 of these per second can be delivered on the network. So even though the Flask application which can generate 500 pages per second, the limit will come from the network bandwidth which will allow only 250 requests per second.

6] In question No. 4, if the server gets an upgrade in the network bandwidth from 1 gbps to 2 gbps and the Flask app is optimized to generate 1500 HTML pages per second. Keeping all other parameters unchanged, what will be the maximum number of requests per second that the server can handle? [NAT: 3 points]

Answer: 1500.

Solution: With the increased bandwidth of 2gbps, the number of images (100KB each) that can be delivered to the network is 2500. however, the Flask application generate only 1500 HTML pages per second so limit is determined by the Flask app which is 1500.

7] Which of the following is/are true for a DOM? [MSQ: 2 points]

1. The DOM is used only inside the browser for asynchronous updates.
2. Javascript has APIs for manipulating the DOM at runtime.
3. It is mostly used only for updating inside a browser, but is not restricted to it.
4. DOM updates can be used to add new entries to the database.

Answer: Option 2 and 3.

Solution: DOM is a general document model. It is mostly used only for updating inside a browser, but is not restricted to this. For example, Python has a DOM module that can manipulate such models, but may not be directly useful for runtime changes. Javascript has APIs for manipulating the DOM at runtime like adding new wntries into the database however, DOM cannot itself cannot be used to update database.

## Week 9 Graded Questions with Solutions

1] You want to join a secret club, and you are told that you need to go to a specific place at midnight and say the password "ChennaiSuperKings". Which of the following is true about this setup? [MSQ: 3 points]

1. It is role based access control
2. It is attribute based access control
3. It is discretionary access control
4. It is mandatory access control

Answer: Option 2 and 3.

Solution: Not role based because there is no role associated with the access, and not mandatory because you can give the password and information to someone else.

2] Which of the following are good characteristics of a function that can be used for digest authentication (assume that in  $y=f(x)$ , computing  $y$  given  $x$  is the forward computation and getting back  $x$  given  $y$  is the inverse computation)? [MCQ: 2 points]

1. It should be easy to compute in the forward direction, but difficult to compute the inverse.
2. It should be easy to compute the inverse, but not the forward function.
3. Both forward and inverse functions should be easy to compute.
4. Both forward and inverse functions should be difficult to compute.

Answer: Option 1.

Solution: Option 2 is not correct - if the forward is also difficult, then using the function itself will be impossible. Other two options are clearly wrong.

3] In a Flask application, which of the following would typically be the place where you apply access control directives? [MCQ: 1 point]

1. Model
2. View
3. Controller
4. All of the above

Answer: Option 3.

Solution: Views and Models cannot be accessed directly in any case, only through appropriate controllers.

4] HTTPS certificates are associated with\_. [MCQ: 1 point]

1. A domain name
2. An individual person
3. An IP address
4. A company

Answer: Option 1.

Solution: Though it is usual to get a certificate for a company website, it does not mean the certificate is associated with the company itself, only with the domain name.

5] In the picture shown below, there are some log entries corresponding to a Flask application. Which of the following data are being logged by this application? [MSQ: 3 points]

Image..

1. IP address of the client
2. Type of HTTP request
3. Operating system of the client
4. Browser used by the client

Answer: Option 1 and 2.

Solution: Others are not being logged here.

6] Log files tend to be: [MCQ: 2 points]

1. Mostly read operations and few write operations.
2. Mostly write operations and few read operations.
3. Proportional in size to the number of requests the website receives.
4. Constant in size independent of server load.

Answer: Option 2.

Solution: Log files are mostly write operations and few read operations. It may be possible to have constant log files under some specific logging scenarios, but that is not typical usage.

7] Consider two statements on HTTPS given below: [MCQ: 2 points]

Statement 1: HTTPS reduces load on servers as less information needs to be transmitted.

Statement 2: HTTPS is only used for humans to interact with web servers, and is not required for machine-to-machine communication.

1. Both statement 1 and statement 2 are correct.
2. Both statement 1 and statement 2 are incorrect.
3. Statement 1 is correct, statement 2 is incorrect.
4. Statement 2 is correct, statement 1 is incorrect.

Answer: Option 2.

Solution: Generally after encryption the size of data and headers would increase a bit, not decrease. HTTPS is just as essential for machine-to-machine communication to avoid leaking information.

# Week 10 Graded Questions with Solutions

1] You are creating a form for entering data for a new employee in a company. Which of the following are essential functional tests for this code? [MSQ: 2 points]

1. Response of form when the name field gets special characters as input.
2. Response of form when Chinese characters are entered for the name.
3. Colour of page background.
4. Whether the page appears in the top search ranking of Google search results.

Answer: Option 1 and 2.

Solution: Colouring the page background is not an essential functional test and the top search ranking is not something that can be tested as part of program specification.

2] Which of the following groups of people would be considered stakeholders in terms of requirements gathering for an online ecommerce application like Amazon or Flipkart? [MSQ: 1 point]

1. Government regulators
2. Customers
3. Sellers
4. Internet service providers

Answer: Option 2 and 3.

Solution: The customers and sellers are groups of people who would be considered stakeholders in terms of requirements gathering for an online ecommerce application like those mentioned. Others may impact the use of the system but play no role directly in the requirements.

3] Consider the statements given below and choose the correct option. [MCQ: 3 points]

Statement 1: 100% statement coverage automatically implies 100% branch coverage.

Statement 2: 100% branch coverage automatically implies 100% statement coverage.

1. Both statement 1 and 2 are correct.
2. Both statement 1 and 2 are incorrect.
3. Statement 1 is correct but, statement 2 is incorrect.
4. Statement 2 is correct but, statement 1 is incorrect.

Answer: Option 2.

Solution: 100% statement coverage does not imply 100% branch coverage as each option of the branch needs to be covered. Statement 2 is incorrect because both parts of a branch are covered, this definitely means that all statements involving branches are covered, but does not say anything about other statements.

4] Consider the statements given below and choose the correct option. [MCQ: 2 points]

Statement 1: Unit testing tries to reduce the number of tests by combining multiple tests into a single unit.

Statement 2: Unit testing can be done even if the inputs and outputs are unclear or only vaguely defined.

1. Both statement 1 and 2 are correct.
2. Both statement 1 and 2 are incorrect.
3. Statement 1 is correct but, statement 2 is incorrect.
4. Statement 2 is correct but, statement 1 is incorrect.

Answer: Option 2.

Solution: Statement 1 is incorrect as unit testing actually tries the opposite. Statement 2 is incorrect as unit testing requires clear specifications of input and output.

5] If you write a browser automation test that will randomly click on different parts of a web-page several times, what kind of errors is it likely to catch? [MSQ: 2 points]

1. Errors from broken links.
2. Error from submitting empty data in a form.
3. Validation errors in an email input field.
4. Errors in colour scheme implementation.

Answer: Option 1 and 2.

Solution: Validation errors in an email input field and errors in colour scheme implementation have no connection with random clicking.

6] Consider the code below. [MCQ: 3 points]

```
int foo (int x, int y)
{
 int z=0;
 if ((x > 0) && (y > 0))
 {
 z=x;
 }
 return z;
}
```

Assuming that we are calling function foo(1, 0). Which of the following coverage methods will satisfy the test cases completely?

1. Condition coverage
2. Statement coverage
3. Branch coverage
4. Function coverage

Answer: Option 4.

Solution: Whenever we call foo(1, 0), it will not satisfy either of the conditions (i.e., (x>0) && (y>0)) and thus it will not have 100% condition coverage. Now if the condition will not satisfy, so it will not be able to go inside the 'if' condition and thus it will not have 100% branch coverage and 100% statement coverage.

7] Test fixtures are used to\_\_\_ [MCQ: 1 point]

1. detect code that needs to be tested.
2. set up the environment and data needed for a test.
3. format code neatly for testing.
4. None of the above

Answer: Option 2.

Solution: Test fixtures are used to set up the environment and data needed for a test.

# Graded Questions with Solutions

1] Which of the following statements about SGML is/are correct? [MSQ: 1 point]

1. SGML is a language on which other markup schemes can be built.
2. The set of tags that can be used in an SGML document is fixed and standardized by ISO.
3. In SGML, tags can be defined for specific applications.
4. All versions of HTML are specific applications of SGML.

Answer: Option 1 and 3.

Solution: Markup schemes can be built on SGML as SGML applications. In SGML, tags can be defined for specific applications. HTML 2 to 4 were attempts at standardizing, but HTML5 has moved away from this.

2] Which of the following statements about XML is true? [MCQ: 2 points]

1. XML is a form of machine language and cannot be read by humans.
2. XML was designed to display data with focus on how data looks.
3. The XML language has no predefined tags.
4. XML cannot have attributes like HTML.

Answer: Option 3.

Solution: The XML markup is simple enough to read. XML was designed to carry data with focus on what data is and not how it looks. It does not have predefined tags but can have attributes just like that of HTML.

3] Which of the following are used to create web components? [MCQ: 2 points]

1. JS filesystem APIs
2. CSS shadow styles
3. HTML templates and slots
4. None of the above

Answer: Option 3.

Solution: JS customElement APIs and shadow DOM are needed.

4] Consider the following JavaScript code below. [MCQ: 3 points]

```
const para = document.querySelector('p');
para.addEventListener('click', updateName);

function updateName() {
 let name = prompt('Enter a new name');
 para.textContent = 'Player 1: ' + name;
}
```

What will be the output of above code?

1. It will output all the names of the players within the paragraph.
2. It will show a pop up which will replace the player name within the paragraph.

3. It will only shows a pop up which doesn't do anything functional.
4. None of the above

Answer: Option 2.

Solution: On executing the code, it will show a pop up which will replace the player name within the paragraph.

5] A custom element is created with the name `<my_button>` . What will the browser infer from its name? [MCQ: 2 points]

1. It adds a link to the HTML page.
2. It adds a button to the HTML form.
3. It displays an image of a button on the HTML page.
4. None of the above

Answer: Option 4.

Solution: There is nothing compulsory that the browser will infer the functionality of a tag by its button unless it is defined.

6] Which of the following statements is true? [MCQ: 3 points]

1. JavaScript is a subset of Java.
2. The Document Object Model can be manipulated only using JS.
3. JS by itself cannot be used to display anything on the screen, that can only be done with HTML and CSS.
4. JS can be used directly to draw with the canvas API.

Answer: Option 4.

Solution: In case of Java and JavaScript, there is very little in common except the name. JS can be used directly to draw with the canvas API. Now how do you invoke the Canvas API without HTML? This can still be done by some browsers that can directly invoke JS without needing HTML.

7] Consider the following statements and choose the correct option. [MCQ: 1 point]

Statement 1: XHTML allowed users to create and use arbitrary tags without any extra language support.

Statement 2: Implementation of tag functionality cannot be done purely in XHTML alone, something like JS is required.

1. Both statements 1 and 2 are correct.
2. Both statements 1 and 2 are incorrect.
3. Statement 1 is correct but, statement 2 is incorrect.
4. Statement 2 is correct but, statement 1 is incorrect.

Answer: Option 4.

Solution: Implementation of tag functionality in XHTML can be done with extra language support of something like JS.



# Week 12 Graded Questions with Solutions

1] Which of the following would be characteristics of a good CDN \_\_\_\_ . [MCQ: 2 points]

1. multiple servers in different geographical locations
2. multiple servers concentrated in one high efficiency data center
3. good connectivity to Jio even if connection to Airtel and other networks is poor
4. None of the above

Answer: Option 1.

Solution: Multiple servers in same data center leads to risk of single point of failure. Connecting to only one provider is not useful in a CDN as it has to be well connected to as many providers as possible

2] Possible problems with continuous deployment are: [MSQ: 3 points]

1. presence of bugs that were not caught by tests.
2. users will see up to date versions of the application.
3. users may be forced to change to a new interface when they don't want to.
4. increased load on servers

Answer: Option 1 and 3.

Solution: No specific reason to increase load on the servers, and seeing up to date applications is usually desirable.

3] Consider the following statements and choose the correct option. [MCQ: 2 points]

Statement 1: When multiple backend servers are used, database replication techniques must be used to make sure that the data is the same in all cases.

Statement 2: It is possible to run multiple frontend servers on a single physical server using concepts from parallelism

1. Both, statement 1 and 2 are correct.
2. Both, statement 1 and 2 are incorrect.
3. Statement 1 is correct but, statement 2 is incorrect.
4. Statement 2 is correct but, statement 1 is incorrect.

Answer: Option 1.

Solution: Frontends need not be physically separate and can be separate processes on different CPUs of the same server.

4] Which of the following statements is true for 'Continuous integration'? [MCQ: 3 points]

1. Continuous Integration can only be implemented using web-based interfaces like github.
2. Continuous integration requires powerful servers that can run all tests on a repository every time a change is pushed to the server.
3. Continuous integration is only needed on projects with multiple developers.

4. Using continuous integration is sufficient to guarantee that an application will be completely tested and remain defect free.

Answer: Option 2.

Solution: Continuous integration is more a concept than something specific about github, and can be implemented in other ways. Since CI can trigger multiple compilation or build steps, it can lead to lot of load on the servers. It can be useful even if only a single developer is working on a project, as it takes care of automating repetitive tasks.

5] Which of the following is/are true for Continuous deployment? [MSQ: 1 point]

1. Continuous Deployment refers to the procedures that must be followed after code has been integrated in order for app updates to be sent to users.
2. Continuous Deployment keeps an application safe from becoming obsolete.
3. Continuous Deployment can be helpful to create a feedback loop with the end user with the app.
4. All of the above

Answer: Option 1 and 3.

Solution: Continuous Deployment does not guarantee as that depends on updating functionality of the application

6] Consider the following statements and choose the correct option. [MCQ: 1 point]

Statement 1: Google App Engine is an example of platform as a service.

Statement 2: Google docs is an example of platform as a service.

1. Both, statement 1 and 2 are correct.
2. Both, statement 1 and 2 are incorrect.
3. Statement 1 is correct but, statement 2 is incorrect.
4. Statement 2 is correct but, statement 1 is incorrect.

Answer: Option 3.

Solution: On a fully managed serverless platform, Google App Engine allows app developers to create scalable web and mobile backends in any programming language. However for google docs, there isn't really much "development" that can happen on top of Google docs (apps scripts are not really developing new applications) so it is not appropriate to consider it a platform.

7] Which of the following statements is/are true for PaaS? [MCQ: 2 points]

1. In PaaS, the platform provider writes and maintains the code required to implement the application.
2. With PaaS, developers do not have control over how their applications can scale to large numbers of users.
3. While using PaaS, developers have to write and maintain the code
4. All of the above

Answer: Option 3.

Solution: While using Paas, developers have to write and maintain the code. There is some control available to the user, but they have to work with the provider.