BSCCS2003: Practice Questions with Solutions
Week 1

1. Which component is responsible for executing the business logic in the MVC architecture?
   Note: No space or uppercase letter is allowed in the answer. Please enter the answer as a singular noun only.

   √ controller

   Solution: The controller directs the model and the view.
   It is also responsible for executing the business logic of the application.

2. Suppose a client machine C is communicating with a data center D located 10,000 km away from C. Assume that the TCP connection has been established and is kept alive. If each new request can be sent only after receiving an acknowledgement from D for the previous request, then what is the maximum number of requests that can be sent from C to D in one second? (Assume speed of light in cable is 2e8 m/s).

   √ 10

   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,

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

   $$\implies time = 50 \text{ ms}$$

   The round trip time $= 50 \times 2 = 100$ ms.

   Number of requests in one second $=$

   $$\frac{1000 \text{ ms}}{100 \text{ ms}}$$

$\implies$ 10 requests

Therefore, the answer is **10 requests / s**.

3. How many port numbers are available in total for communication between devices in TCP?

   ◯ 131072
   ◯ 65530
   √ 65535
   ◯ 32768

Solution: The size of source or destination port field in TCP header is 16 bits.
So, total number of ports possible = 2^{16} i.e, 65536.
But the port 0 (zero) is reserved and cannot be used for communication.
Therefore, total available port numbers are : $65536 - 1$ i.e, **65535**.

4. How many bits are there in an IPv4 address?

   √ 32

Solution: There are 4 octets (each separated by a period) in a typical IPv4 address and each octet uses 8 bits.
So, 4 octets use 8×4 i.e, 32 bits. Therefore, the size of an IPv4 address is **32 bits**.

5. How many bits are there in an IPv6 address?

   √ 128

Solution: IPv6 is a hexadecimal address which uses 8 sets of 16 bits each (each set separated by a colon).
Each set has 4 hexadecimal characters and each hexadecimal character uses 4 bits.
So, 8 sets use 8×16 i.e, 128 bits. Therefore, the size of an IPv6 address is **128 bits**.

6. Read the following statements below carefully and choose the correct option.
   Statement I: In a packet switched network, the transfer of information is not only confined to voice.
   Statement II: The information in packet switched networks is transferred in the form of packets of data.

√ Both statement I and Statement II are correct.

◯ Both statement I and Statement II are incorrect.

◯ Statement I is correct, Statement II is incorrect.

◯ Statement I is incorrect, Statement II is correct.

Solution: In packet switched networks, the analog voice data is digitized and broken down into packets of information which are then sent through the wires. This means that, before being digitized, the information may be of any form, not just voice.

7. Which among the following options is incorrect about HTTP?

◯ It is a set of rules which web browsers and web servers use for communication.

◯ It is a stateless protocol.

◯ It generally uses port 80 for communication.

√ It generally uses port 25 for communication.

Solution: Hypertext Transfer Protocol (HTTP) is a set of rules that clients and servers in a network use for communication. It is a stateless protocol i.e. all the communications are independent. Server does not need to store any information about previous communication in order to respond to future requests.

Port 80 is the default port for HTTP services.

8. Which of the following is not a valid HTTP request method?

◯ GET

◯ POST

◯ DELETE

√ UPDATE

Solution: GET, POST, DELETE are HTTP methods. GET is used to ask for a resource from the server. POST is used to send data to the server. DELETE is used to delete resource on the server. UPDATE is not an HTTP method. PUT is used to replace the current representation of targeted resource with the payload.

9. Consider the server response shown below:
HTTP/2.0 200 OK
Which of the following is true?

◯ **HTTP/2.0** indicates that it is connected to Web 2.0.
◯ **200** is a version of the protocol.
◯ **OK** is a status code.
√ None of the above

Solution: HTTP/2.0 200 OK

- **HTTP/2.0** is a version of the protocol.
- **200** is a status code.
- **OK** is a status message.

10. Which of the following is/are valid IPv4 address(es)?

√ 1.2.3.4
◯ 192.102::2.1
√ 192.102.2.1
◯ 2001:db8::1234:5678

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.
192.102.2.1 and 1.2.3.4 are valid IPv4 addresses.
2001:db8::1234:5678 is a valid IPv6 address.

11. Which of the following statements is/are false?

√ A web server is a software that must be used in a web browser.
√ A web client is a software that listens to requests and respond to them.
◯ Laptop and android smartphone can act as a web server host.
◯ A browser can make a request to a server without a domain name.

Solution:

- A **web app** is a software that can be used in a web browser.
- A **web server** is a software that can listen to requests and respond to them.
- Laptop and android smartphone can act as a web server host.
- A browser can make a request to a server without a domain name.

BSCCS2003: Practice Questions with Solutions
Week 2

1. Which of the following is the correct code for referring to an external style sheet in an HTML document? [MCQ]

   ◯ <stylesheet> example.css </stylesheet>

   √ <link rel = "stylesheet" type ="text/css" href ="example.css">

   ◯ <style src = "example.css" >

   ◯ <link rel = "stylesheet" type = "text/css" src = "example.css">

   Solution: The CSS stylesheet reference must be given in a link tag with attribute href (hypertext reference).
   It specifies the location of a web resource and defines the relationship between the document and the resource.
   The src (source) attribute just embeds the resource in the document at the location of the element's definition.

2. Which of the following can be used to display a quotation mark on a web page? [MCQ]

   ◯ &dquot;

   ◯ <

   √ "

   ◯ >

   Solution: The string """ can be used to display a quotation mark on a web page.

3. Which of the following code segments will create a list starting with "b"? [MCQ]

   ◯ <ol type = "a" begin = "2">

   ◯ <ol type = "a" first = "b">

   ◯ <ol type = "a" letter = "b">

   √ <ol type = "a" start = "2">

   Solution: The value of start attribute must be an integer when it is used along with type attribute.

4. If the browser supports the audio tag and the ogg audio format but does not support the mp3 audio format, what will be the output of the following code? [MCQ]

```
<audio controls>
    <source src = "iitm.mp3" type ="audio/mp3">
    <source src = "iitm.ogg"  type ="audio/ogg">
    "unable to play"
</audio>
```

- ◯ It will display an error message.
- √ It will choose iitm.ogg.
- ◯ It will display 'unable to play'.
- ◯ It will choose iitm.mp3.

Solution: The <source> tag allows you to specify different video/audio/image files. From among these files, the browser will choose the first one in the list, that it supports. If the browser does not support the audio tag, it will display "unable to play".

5. Which of the following is/are true regarding favicon? [MSQ]

- √ A favicon is a small icon that serves as branding for a website.
- ◯ The term "favicon" refers to audio.
- ◯ The term "favicon" refers to video.
- √ `<link rel="shortcut icon" href="favicon.ico" type="image/png"/>` can be used to add favicon to a website.

Solution: Favicon is a small icon that serves as branding for a website. Its main purpose is to locate the page easily if multiple tabs are open. You can find it in places like

1. Bookmarks drop down menu.
2. Browser tabs
3. History drop down menu.
4. Browser history etc.

6. Suppose you can add a favicon only if the size of the screen is at least as big as 600px. Which of the following syntax/code will you use in the above context? [MCQ]

√ `<link rel="shortcut icon" href="favicon.ico" type="image/png" media="screen and (min-width:600px)">`

◯ `<link rel="shortcut icon" href="favicon.ico" type="image/png" media="screen and (max-width:600px)">`

◯ `<link rel="shortcut icon", href="favicon.ico", type="image/png", media="screen and (max-width:600px)">`

◯ `<link rel="shortcut icon", href="favicon.ico", type="=image/png", media="screen and (min-width:600px)">`

Solution: The media attribute specifies the media/device for which the resource is optimized. You can combine two properties to be more specific. Option 1 means that this resource is optimized for screen and the screen size is at least 600px. So, it gets loaded only when the media satisfies these conditions.

7. Two words and their ASCII encoding are given below. Observe the given conversions carefully.

bet :: 01100010 01100101 01110100

CAB :: 01000011 01000001 01000010

Based on the conversions given above, what will be the ASCII code for "cat"? [MCQ]

◯ 01000011 01100001 01110100

√ 01100011 01100001 01110100

◯ 01100011 01000001 01110100

◯ 01100011 01100001 01010100

Solution:
As the ASCII encoding of small and capital letters differ by only **one** bit, we will consider two letters in the given example to find out at which bit the codes differ.
Consider 'b' from word 'bet' and 'B' from word 'CAB'.
From the ASCII codes of 'b' and 'B', we observe that they differ at only the third bit from the left. Thus, changing the third bit from the left of a lower case letter will convert it into a capital letter and vice versa.
Using this deduction, we can find the ASCII code for "cat" as:
c :: 01100011
a :: 01100001
t :: 01110100 (No change for t as it is already in lower case).

8. Consider the following code segment written in the <head> of an HTML document;

```
<link href= "https://fonts.myfonts.com/family=font_A"
rel= "stylesheet">
<link href= "https://fonts.myfonts.com/family=font_B"
rel= "stylesheet">
<style>
.Myclassone{
          font-family: 'font_B';
          }
.Myclasstwo{
          font-family: 'font_A';
          }
  </style>
```

Which of the following is/are true? [MSQ]

- ◯ The content of elements having class 'Myclassone' will be displayed in font A.
- √ The content of elements having class 'Myclassone' will be displayed in font B.
- √ The content of elements having class 'Myclasstwo' will be displayed in font A.
- ◯ The content of elements having class 'Myclasstwo' will be displayed in font B.

Solution: If a specific font style is to be applied to the text in the element represented by a class or an id, the same font-family has to be assigned to that particular class or id in the <style>.

9. The correct syntax to use radio buttons that help in specifying the gender of an applicant in an HTML form is [MCQ]

- ◯ Gender: <input type="radiobutton" name="Gender" value = "Male" /> Male
  <input type="radiobutton" name="Gender" value = "Female" /> Female
- √ Gender: <input type="radio" name="Gender" value = "Male" /> Male
  <input type="radio" name="Gender" value = "Female" /> Female
- ◯ <Gender: <input__type="radio" name="Gender" value = "Male" /> Male
  <input type="radio" name="Gender" value = "Female" /> Female>
- ◯ Gender: <input type:"radio" name="Gender" value = "Male" /> Male <input type:"radio" name="Gender" value = "Female" /> Female

Solution: The correct syntax to use a radio button is, Category_name: <input type="radio" name="Category_name" value = "value_name" >"Option_name". So, option B is correct.

10. How will the following styling affect an entity having id "Myelement" in an HTML document?

```
#Myelement{
          color: black;
          border-style: solid;
          border-width: 5px 20px;
      }
```

[MCQ]

- ◯ The element with id 'Myelement' will have left and right border of 5 pixels each and top and bottom border of 20 pixels each.
- √ The element with id 'Myelement' will have top and bottom border of 5 pixels each and left and right border of 20 pixels each.
- ◯ The element with id 'Myelement with Id 'Myelement' will add borders from all sides with a width of 5 pixels and 20 pixels will be ignored by the compiler.
- ◯ The element with id 'Myelement' will add borders from all sides with the width of 20 pixels, and 5 pixels will be overwritten by the compiler.

Solution: If there are only two attributes associated with border-width, the first one refers to the width at **top and bottom together** while the latter refers to width at **right and left together**.

11. How will the following code affect the styling of an element having id "Myelement" in an HTML document?

```
#Myelement{
          color: black;
          border-style: solid;
          border-width: 5px 20px 15px 10px;
      }
```

[MCQ]

- ◯ The element with Id 'Myelement' will have border-width of 5 pixels at left; 20 pixels at right; 15 pixels at top and 10 pixels at bottom.

◯ The element with Id 'Myelement' will have border-width of 5 pixels at right; 20 pixels at left; 15 pixels at top and 10 pixels at bottom.

√ The element with Id 'Myelement' will have border-width of 5 pixels at top; 20 pixels at right; 15 pixels at bottom and 10 pixels at left.

◯ The element with Id 'Myelement' will have border-width of 5 pixels at top; 20 pixels at bottom; 15 pixels at left and 10 pixels at right.

Solution:
If there are four attributes associated with border-width,
the first one refers to the width at **top**.
the second one refers to the width at **right**.
the third one refers to the width at **bottom**.
the fourth one refers to the width at **left**.

12. Compute the UTF-8 representation of Unicode code point U+543A9 with the help of image given below.
Note : No white spaces are allowed in the answer.

1st Byte	2nd Byte	3rd Byte	4th Byte	Free Bits	Maximum Expressible Unicode Value
0xxxxxxx				7	007F hex (127)
110xxxxx	10xxxxxx			(5+6)=11	07FF hex (2047)
1110xxxx	10xxxxxx	10xxxxxx		(4+6+6)=16	FFFF hex (65535)
11110xxx	10xxxxxx	10xxxxxx	10xxxxxx	(3+6+6+6)=21	10FFFF hex (1,114,111)

[NAT]

√ F1948EA9

Solution: This will be discussed in the live session.

BSCCS2003: Practice Questions with Solutions
Week 3

1. Which of the following is correct syntax to get the length of a list in jinja2 template? [MCQ]

   ◯ {{ list | len }}

   √ {{ list | length }}

   ◯ {{ len(list) }}

   ◯ None of the above

Solution: The correct syntax to get the length of a list variable in jinja2 template is: {{ list | length }}.

2. A Python string template is given below,

```
from string import Template
my_statement = Template("Today is $today and tomorrow is
                         $tomorrow.")
out = my_statement.substitute(today = "Monday")
print(out)
```

Which of the following is the correct output for the above code? [MCQ]

   ◯ Today is Monday and tomorrow is $tomorrow.

   ◯ Today is $today and tomorrow is $tomorrow.

   ◯ Today is $today and tomorrow is Monday.

   √ Error

Solution: The method substitute will throw an error as only one argument is provided. However, two were expected. This can be resolved by using the safe_substitute method of the Template class.

3. Consider the image given below and identify the correct pyhtml code that generates the corresponding HTML code. [MCQ]

√
```
from pyhtml import *

t = html(
    head(title('IIT Madras Image')),
    body(
        img(src='https://www.iitm.ac.in/sites/default
        /files/2020-04/static-campus_life_overview_entrance.jpg')
        )

        )

print (t.render())
```

◯
```
from pyhtml import *

t = html(
    head(
        title('IIT Madras Image')
        ),
    body(
        img(ref='static-campus_life_overview_entrance.jpg')
        )
        )

print (t.render())
```

◯
```
from pyhtml import *
```

```
t = html(
    head(
        title('IIT Madras Image')
        ),
    body(
        img(source='https://www.iitm.ac.in/sites/default/
        files/iitm.jpg')
        )
        )

print (t.render())
```

◯ None of the above

Solution:
Option 1: The first pyhtml code snippet will result in a similar view as shown in the image if rendered.
Option 2: The second pyhtml code snippet is almost similar to the first code except for an invalid ref attribute.
Option 3: The third pyhtml code snippet is also similar to the first code except for an invalid source attribute.

4. Which of the following Python codes will generate the HTML code given below? [MCQ]

```
<!DOCTYPE html>
<html>
  <head>
    <title>
      My website
    </title>
  </head>
  <body>
    <h1>
      This is my Website
    </h1>
    <h2>
      My content will begin here
    </h2>
  </body>
</html>
```

◯
```
import pyhtml
T = h.html(h.head(h.title("My website")),
            h.body(h.h1("This is my Website"),
            h.h2("My content will begin here")))
out = T.render()
print(out)
```

√
```
import pyhtml as h
T = h.html(h.head(h.title("My website")),
    h.body(h.h1("This is my Website"),
    h.h2("My content will begin here")))
out = T.render()
print(out)
```

◯
```
import pyhtml as h
T = h.html(h.head(h.title("My website")),
    h.body(h.h1("This is my Website"),
    h.h1("My content will begin here")))
out = T.render()
print(out)
```

◯
```
import pyhtml as h
T = pyhtml.html(h.head(h.title("My website")),
    h.body(h.h1("This is my Website"),"My content will begin here"))
out = T.render(pyhtml)
print(out)
```

Solution:
option 1 will produce error "NameError: name 'h' is not defined".

The HTML code generated by the python code in option 2 is:

```
<!DOCTYPE html>
<html>
  <head>
    <title>
      My website
    </title>
  </head>
  <body>
    <h1>
      This is my Website
    </h1>
    <h2>
      My content will begin here
    </h2>
  </body>
</html>
```

This is the required code. Hence, **option 2** is correct.

The HTML code generated by the python code in option 3 is:

```
<!DOCTYPE html>
<html>
  <head>
    <title>
      My website
    </title>
  </head>
  <body>
    <h1>
      This is the first heading
    </h1>
    <h1>
      This is the second heading
    </h1>
  </body>
</html>
```

It is not the required output.

Finally, option 4 will produce error "NameError: name 'pyhtml' is not defined".

5. Which of the following python codes will give error? [MCQ]

◯
```
import pyhtml
T = pyhtml.html(pyhtml.head(pyhtml.title("My website")),
       pyhtml.body(pyhtml.h1("This is the first heading"),
              pyhtml.h1("This is the second heading")))
out = T.render()
print(out)
```

◯
```
import pyhtml as h
T = h.html(h.head(h.title("My website")),
           h.body(h.h1("This is the first heading"),
                  h.h1("This is the second heading")))
out = T.render()
print(out)
```

◯
```
from pyhtml import *
T = html(head(title("My website")),
       body(h1("This is the first heading"),
              h1("This is the second heading")))
out = T.render()
print(out)
```

√
```
from pyhtml import *
T = pyhtml.html(pyhtml.head(pyhtml.title("My website")),
       pyhtml.body(pyhtml.h1("This is the first heading"),
              pyhtml.h1("This is the second heading")))
out = T.render()
print(out)
```

Solution: Options 1, 2 and 3 are the different ways which can be used to import and use pyhtml. In option 4, all the functions of pyhtml are already called. Therefore, there is no need to initiate a tag by writing pyhtml.<tag name>().

6. What will be the correct syntax for nesting a tag and a tag in a <body> tag using pyhtml library? [MCQ]

◯
```
import pyhtml as ph
file = ph.html(ph.body(ph.div("This is div.")),
       ph.body(ph.span("This is span.")))
```

√
```
import pyhtml as ph
file = ph.html(ph.body(ph.div("This is div."),
       ph.span("This is span.")))
```

◯
```
import pyhtml as ph
file = ph.html(ph.body(ph.span("This is div.")),
       ph.body(ph.div("This is span.")))
```

◯
```
import pyhtml as ph
file = ph.body(ph.div("This is div."),
       ph.span("This is span."))
```

Solution: The correct syntax for nesting a tag and tag in a <body> tag is given by:

```
import pyhtml as ph
file = ph.html(ph.body(ph.div("This is div."),
       ph.span("This is span.")))
```

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

```
from jinja2 import Template
my_statement = Template("The special series is: {% for n in
                        range(1,15)%} {{n%3}}" "{% endfor %}")
out = my_statement.render()
print(out)
```

[MCQ]

◯ The special series is: 1 0 1 0 1 0 1 0 1 0 1 0 1 0

√ The special series is: 1 2 0 1 2 0 1 2 0 1 2 0 1 2

◯ The special series is: 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 series is: 0.33 0.67 1.0 1.33 1.67 2.0 2.33 2.67 3.0 3.33 3.67 4.0 4.33 4.67

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.

8. A Python string template is given below:

```
from string import Template
my_statement = Template("All squares are $color1, all circles are $color2
                        and all triangles are $color3.")
```

Which of the following substitute statements will render the output string as "All squares are blue, all circles are red, and all triangles are green."? [MCQ]

- ◯ `out = my_statement.substitute(color1 = blue, color2 = red, color3 = green)`
- ◯ `out = my_statement.substitute(color1 = "blue", color2 = "green", color3 = "red")`
- √ `out = my_statement.substitute(color1 = "blue", color2 = "red", color3 = "green")`
- ◯ `out = my_statement.substitute(color1 = "red",color2 = "green", color3 = "yellow")`

Solution: The Template function of the string module allows the dummy content denoted by $variable in the output string to be replaced by the actual content. It takes the actual content through the substitute method, whose argument is a dictionary with key = dummy variable and value = actual content.

9. Which of the following Python codes will generate the HTML code given below? [MCQ]

```
<!DOCTYPE html>
<html>
    <head>
      <title>
         Modern Application Development
      </title>
    </head>
    <body>
        <h1>
            This is First level heading.
        </h1>
        <div>
          <h2>
             This is level 2 heading.
          </h2>
          <div>
             This is a nested div section.
```

```
        </div>
      </div>
      <div>
        <h3>
          This is some more text.
        </h3>
        <p>
          This is a paragraph.
        </p>
      </div>
    </body>
</html>
```

◯
```
import pyhtml as h
t=h.html(h.head(h.title("Modern Application Development")
),
h.body(
   h.h1("This is first level heading"),
   h.div(h.h2("This is level 2 heading"),
   h.div("This is a nested div section"),
   h.div(h.h3('This is some more text'),
   h.p("This is a paragraph")),
))
print(t.render())
```

√
```
import pyhtml as h
t=h.html(h.head(h.title("Modern Application Development")
),
h.body(
   h.h1("This is first level heading"),
   h.div(h.h2("This is level 2 heading"),
   h.div("This is a nested div section")),
   h.div(h.h3('This is some more text'),
   h.p("This is a paragraph")),
))
print(t.render())
```

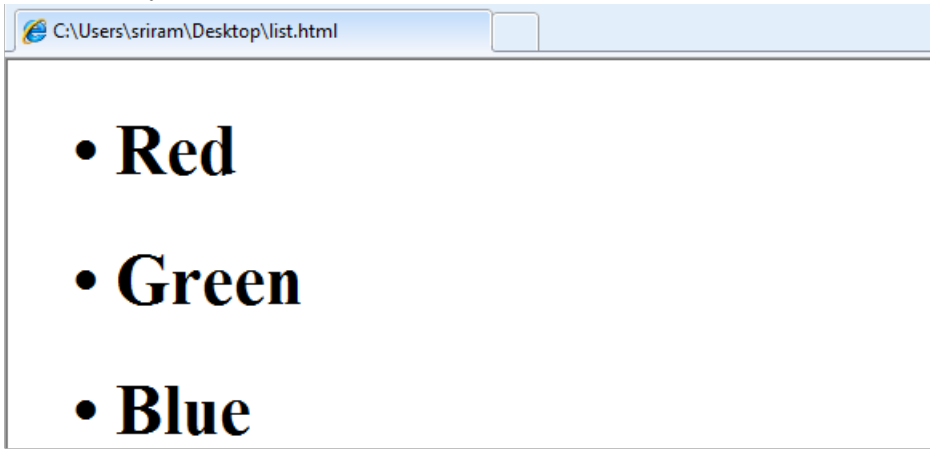
◯
```
import pyhtml as h
t=h.html(h.head(h.title("Modern Application Development")
)
h.body(
   h.h1("This is first level heading"),
   h.div(h.h2("This is level 2 heading"),
   h.div("This is a nested div section")),
   h.div(h.h3('This is some more text'),
   h.p("This is a paragraph")),
```

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

◯
```
import pyhtml as h
t=h.html(h.head(h.title("Modern Application Development")
),
h.body(
   h.h1("This is first level heading"),
   h.div(h.h2("This is level 2 heading"),
   h.div("This is a nested div section")),
   h.div(h.h3('This is some more text'),
   h.p("This is a paragraph")),
)
print(t.render())
```

Solution:
For options (i), (iii) and (iv), in some places the commas are misplaced while in other places the brackets are missing. So, if we compile them, they would either not generate a valid HTML code or throw error. This does not happen in option (ii). It produces a correct HTML document as depicted in question. Hence, option II is correct.

10. Identify the correct pyhtml code that will generate the following HTML output when rendered by a browser. [MCQ]



◯
```
from pyhtml import *

t = html(
    body(
        ul(h1(li('Red'))),
        ol(h1(li('Green'))),
        ul(h1(li('Blue')))
```

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

√
```
from pyhtml import *

t = html(
    body(
        ul(h1(li('Red')),h1(li('Green')),h1(li('Blue')))
        )
        )

print (t.render())
```

◯
```
from pyhtml import *

t = html(
    body(
        ul(h1(li('Red'))),
        ul(h1(li('Green'))),
        ul(h1(li('Blue')))
        )
        )
print (t.show())
```

◯ None of the above

Solution:
Option 1: The first code snippet will result in wrong output, as an ordered list is used.
Option 2: The second code snippet is the correct code and will result in the same view as in the given image.
Option 3: The third code snippet is not valid, as there is no such method called show().

11. Which of the following Python codes will generate the HTML code given below? [MCQ]

```
<!DOCTYPE html>
<html>
  <head>
    <title>
      Table
    </title>
  </head>
  <body>
    <dl>
      <dt>
        HTML
      </dt>
      <dd>
        Hyper Text Markup Language
      </dd>
      <dt>
        CSS
      </dt>
      <dd>
        Cascading Style Sheets
      </dd>
    </dl>
  </body>
</html>
```

√
```
from pyhtml import *

t = html(
    head(
        title('Table'),
        ),
    body(
        dl(dt('HTML'),dd('Hyper Text Markup Language')
           dt('CSS'),dd('Cascading Style Sheets')
          ),
        )
        )

print (t.render())
```

◯
```
from pyhtml import *
t = html(
    head(
```

```
        title('Definition List'),
     ),
    body(

           dl(dt('HTML'),dd('Hyper Text Markup Language')),
           dl(dt('CSS'),dd('Cascading Style Sheets'))

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

◯
```
from pyhtml import *

t = html(
    head(
        title('Table'),

    ),
    body(

           dd('HTML'),dt('Hyper Text Markup Language')
           ,dd('CSS'),dt('Cascading Style Sheets')

    )
)

print (t.render())
```

◯
```
from pyhtml import *

t = html(
    head(
        title('Table'),

    ),
    body(

           dl(dt('CSS'),dt('Cascading Style Sheets'),
           dt('HTML'),dt('Hyper Text Markup Language')),

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

Solution:
Option 1: Generates the required HTML code.
Option 2: Invalid because two dl() are written separately.
Option 3: Invalid because dt() and dd() order is incorrect.
Option 4: Invalid because no dd() is used.

12. Which of the following Python codes will generate the HTML document below? [MCQ]

```
<!DOCTYPE html>
<html>
  <head>
    <title>
    My html document
    </title>
  </head>
  <body>
    <div>
      <div>
        <div>
          <div>
            <h1>
               Hello World 1
            </h1>
          </div>
        </div>
        <p>
           My name is rohan verma
        </p>
        <h2>
           Hello World 2
        </h2>
      </div>
    </div>
  </body>
</html>
```

◯
```
from pyhtml import *
t=html(head(title('My html document')),
body(
  div(div(div(h1('Hello World 1')))),
  p('My name is rahul verma.'),
  h2('Hello World 2')))
)
```

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

√
```
from pyhtml import *
t=html(head(title('My html document')),
body(
  div(div(div(div(h1('Hello World 1')))),
  p('My name is rahul verma.'),
  h2('Hello World 2')))
)
)
print(t.render())
```

◯
```
from pyhtml import *
t=html(head(title('My html document')),
body(
  div(div(div(div(h1('Hello World 1')))
  p('My name is rahul verma.')
  h2('Hello World 2')))
)
)
print(t.render())
```

◯ None of these

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: Practice Questions with Solutions
Week 4

1. Consider the following two tables: [MCQ]

Table 1: Instructors

Instructor_ID	Instructor_Name
101	Amit Dubey
102	Sarthak Gaur
103	Neha Sharma
104	Sumit Kumar
105	Himanshi Mehra

Table 2: Teaches

Instructor_ID	Course_ID
102	CS-206
104	CS-208
103	CS-202
101	CS-206
105	CS-202

Which of the following queries will list the names of those instructors who teach a course having Course ID = "206"?

- ◯ SELECT Instructor_Name FROM Instructors, Teaches
  WHERE Course_ID = 'CS-206';
- √ SELECT Instructor_Name FROM Instructors, Teaches
  WHERE Instructors.Instructor_ID = Teaches.Instructor_ID
  and Course_ID = 'CS-206';
- ◯ SELECT Instructor_Name FROM Instructors
  WHERE Instructors.Instructor_ID = Teaches.Instructor_ID
  and Course_ID = 'CS-206';
- ◯ All of the above

Solution:
Option 1: The first query will do a cartesian product and generate spurious information in result.
Option 2: The second query will result only in the names of those instructors who teach the course with Course_ID = 'CS206'.
Option 3: The third query will generate an error as the table "Teaches" is not in FROM clause.

2. Consider the following table: [MCQ]

Table 1: Instructors

Instructor_ID	Instructor_Name
101	Amit Dubey
102	Sarthak Gaur
103	Neha Sharma
104	Sumit Kumar
105	Himanshi Mehra
106	Minakshi Mehta
107	Pushkar Kashyap
108	Siya Mishra

Which of the following queries will list the names of those instructors who have 'i' as the second alphabet and 'r' as the second last alphabet in their names?

√ SELECT Instructor_Name FROM Instructors
WHERE Instructor_Name LIKE '_i%r_';

◯ SELECT Instructor_Name FROM Instructors
WHERE Instructor_Name LIKE '%i%r%';

◯ SELECT Instructor_Name FROM Instructors
WHERE Instructor_Name LIKE '%i_r%';

◯ None of the above

Solution:
Option 1: The first query will result in the names of all those instructors who have 'i' as second alphabet and 'r' as second last alphabet in their names.
Option 2: The second query will result in the names of all those instructors whose name has alphabets 'i' and 'r'.
Option 3: The third query will result in the names of all those instructors whose name has alphabets 'i' and 'r' separated by any character.

3. What will be the output of the following code snippet?

```
class Student:
    idnext=0
    def __init__(self, name):
        self.name=name
        self.idnext=Student.idnext
        Student.idnext=Student.idnext+1
s1=Student("Rohan")
s2=Student("Karthik")
s3=Student("Saurav")
print(Student.idnext)
```

[MCQ]

- ◯ 0
- ◯ 1
- √ 3
- ◯ None of the above

Solution: The 'idnext' is a class variable. So it can be called directly from a class.

Whenever an object of the class Student is created, the value of the class variable idnext increases by 1.

4. Which of these programs is/are used to create spreadsheets? [MCQ]

- ◯ Google Sheets
- ◯ Microsoft Excel
- √ Both A and B
- ◯ None of the above

Solution: These programs like Google sheets and Microsoft Excel are used to create spreadsheets. They are used by many businesses to manage, display, and manipulate data.

5. Which of the following statements is/are correct about CSV file in Python? [MCQ]

- √ A CSV file stores tabular data, in which each data field is generally separated by a delimiter (comma).
- ◯ To save a CSV file, it must be saved with a **.csv** extension.
- ◯ Both A and B
- ◯ None of the above

Solution: CSV (Comma Separated Values) is a simple file format accustomed to store tabular data, like a spreadsheet or database.

6. Which of the following is/are valid join(s) in SQL? [MSQ]

- √ INNER JOIN
- √ FULL JOIN
- √ LEFT JOIN
- √ RIGHT JOIN

Solution: JOINS in SQL are commands which are used to combine rows from two or more tables, based on a common column between those tables.
There are mainly four types of joins: INNER JOIN, FULL JOIN, LEFT JOIN, RIGHT JOIN.

7. Which of the following is/are valid syntax(es) of the INNER JOIN? [MSQ]

√ Select table1.column1,
table2.column2
FROM table2
INNER JOIN table1
ON table1.common_field = table2.common_field;

◯ SELECT table1.column2, table2.column2
From table1
Inner join table1
UPON table2.common_field = table2.common_field;

√ SELECT table1.column1,
table2.column2
FROM table1
INNER JOIN table2
ON table1.common_field = table2.common_field;

◯ None of the above

Solution: Both option i and iii, are valid syntax of the INNER JOIN.
The INNER JOIN creates a new result table by combining column values of two tables (table1 and table2) based upon the join-predicate.
When the join-predicate is satisfied, column values for each matched pair of rows of A and B are combined into a result row.

8. Consider the following tables. [MCQ]

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 produce the name of the batsman with highest "highest_score" in odi?

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

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

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

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

Solution:
Option 1 will produce the name of the player with highest "highest_score" in odi.
Option 2 will produce the name of the player with lowest "highest_score" in odi.
Option 3 and 4 will produce an error because ORDER BY should come after the WHERE clause.

9. Consider the following tables. [MCQ]

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 produce the name of the batsman with lowest "highest_score" in test?

◯
```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
WHERE records.format = "test"
ORDER BY records.highest_score DESC
LIMIT 1;
```

√
```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
WHERE records.format = "test"
ORDER BY records.highest_score
LIMIT 1;
```

◯
```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
ORDER BY records.highest_score
WHERE records.format = "test"
LIMIT 1;
```

◯
```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
ORDER BY records.highest_score DESC
WHERE records.format = "test"
LIMIT 1;
```

Solution: Option 1 will produce the name of the player with highest "highest_score" in test matches.
Option 2 will produce the name of the player with lowest "highest_score" score in test matches.
Option 3 and 4 will produce an error because ORDER BY should come after the WHERE clause.

10. What will be the correct syntax to create a table called 'Persons' that contains five columns: PersonID, LastName, FirstName, Address, and City? [MCQ]

◯
```
CREATE TABLE Persons (
    PersonID int
    LastName varchar(255)
    FirstName varchar(255)
    Address varchar(255)
    City varchar(255)
);
```

√
```
CREATE TABLE Persons (
    PersonID int,
    LastName varchar(255),
    FirstName varchar(255),
    Address varchar(255),
    City varchar(255)
);
```

◯
```
CREATE TABLE (Persons) (
    PersonID int,
    LastName varchar(255),
    FirstName varchar(255),
    Address varchar(255),
    City varchar(255)
);
```

◯ `CREATE TABLE AS Persons (PersonID, LastName, FirstName, Address, City);`

Solution: The correct syntax to create a table in SQL is:

```
CREATE TABLE table_name (
    column1 datatype,
    column2 datatype,
    column3 datatype,
   ....
);
```

In options I, III and IV, this syntax is violated.

11. The SQL syntax for BETWEEN operator is given below:

```
SELECT Prices
FROM Grocery
WHERE Prices BETWEEN 1000 AND 1500;
```

What will the code segment given above do? [MCQ]

- ◯ It will select all the records from the 'Prices' column of table 'Grocery' between 1000 and 1500, both 1000 and 1500 exclusive.
- √ It will select all the records from the 'Prices' column of table 'Grocery' between 1000 and 1500, both 1000 and 1500 inclusive.
- ◯ It will select all the records from the 'Prices' column of table 'Grocery' between 1000 and 1500 and is applicable only if values are numbers.
- ◯ It will throw an error, as BETWEEN operator is applicable only if the values are dates.

Solution: The operator BETWEEN selects all the values from the given fields that is/are between the given range, with both the extreme values included. The values can be numbers, texts or dates.

BSCCS2003: Practice Questions with Solutions
Week 5

1. Which of the following statements is/are correct about APIs? [MSQ]

   √ APIs let your application or service communicate with other applications and services without having to know how they are implemented.

   √ It is an intermediary software that allows two application to talk to each other.

   √ It is a standardized way to communicate with the server.

   √ API is the acronym for Application Programming Interface.

   Solution: All of the above options are correct about API.

2. In the URL:- http://www.example.com:80, the set of characters written between forward slashes (//) and colon (:) on the right denote the _____. [MCQ]

   ◯ Parameters

   ◯ Path

   ◯ Port

   √ Domain name

   Solution: In the URL: http://www.example.com:80, the domain name is located in between // and colon (:). It indicates which web server is being requested.

3. In the URL:- http://www.example.com:80, the set of characters located to the immediate right of the second colon(:) is _____. [MCQ]

   ◯ Domain name

   ◯ Parameters

   √ Port

   ◯ Scheme

   Solution: The port is located just after the second colon. The domain name (e.g., www.example.com) and port (80) are separated by a colon.

4. What will be the output of the following Python code? [MCQ]

```
def func(x):
    def func1():
        print("I am a decorator")
        x()
    return func1
@func
def func2():
    print("I am an ordinary function")
func2()
```

◯ I am a decorator
I am a decorator

◯ I am an ordinary function
I am an ordinary function

√ I am a decorator
I am an ordinary function

◯ I am an ordinary function
I am a decorator

Solution: The code shown above first prints the word "I am a decorator" and then "I am an ordinary function". Hence, the output of this code is:
I am a decorator
I am an ordinary function

5. Which one of the following option will be the output of the Python code given below? [MCQ]

```
def func1(func):
    def wrapper_func(a, b):
        print("Hey There!")
        if b==0:
            print("Hello!")
            return
    return  wrapper_func
@func1
def f2(a, b):
    return a%b
f2(2,5)
```

◯ Hello!
Hey There!

√ Hey There!

◯ Hey There!
Hello!

◯ Hello!

Solution: The output of this code is:
Hey There!

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

```
def double(func):
    def wrapper():
        func()
        func()
        func()
    return wrapper
@double
def f1():
    print("Hello There")
f1()
```

◯ Hello There

◯ Hello There
Hello There

√ Hello There
Hello There
Hello There

◯ Error

Solution: The code shown above prints "Hello There" three times. Hence output of this code is:
Hello There
Hello There
Hello There

7. Web is different from standalone GUI applications because_____. [MSQ]

√ In web applications, the server and the client are not required to be on the same machine.

√ Web applications can be accessed from anywhere, whereas the standalone GUI applications can only be accessed from machines they are installed in.

◯ All the GUI applications can be separated explicitly according to MVC design pattern, which is not possible for web applications.

◯ Web applications and GUI applications are different with respect to their appearances.

Solution: The web is different from a GUI application because:

- The web applications do not have location constraint. Thus they can be accessed from anywhere whereas, a standalone GUI application is confined only to the machine it is installed in.
- The MVC design pattern is not capable of accommodating the designing of all the web applications. As a result, we have variants of architectures.
- The MVC design pattern was designed for GUI applications and hence, it is capable enough to define any GUI application.

8. What will the following python code do? [MCQ]

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

@app.route('/page1')
def generate():
    return '<p> This is first page of my flask document </p>'

@app.route('/page2')
def generate():
    return '<p> This is second page of my flask document </p>'

app.run()
```

◯ It will create a local web server with an endpoint 'page1'.

◯ It will create a local web server with an endpoint 'page2'.

√ It will throw an assertion error.

◯ None of the above

Solution: Here, view function mapping is overwriting an existing endpoint function: generate. Hence, an assertion error will be thrown. The end point 'page2' should be defined by a new function.

9. Which of the following is/are correct regarding URL?

[MSQ]

- √ URL is an abbreviation for uniform resource locator.
- √ A URL points to a unique resource on the web.
- ◯ A URL can point to multiple resources on the web.
- ◯ `https://www.google.com is not an example of URL.`

Solution: "URL" is an abbreviation for Uniform Resource Locator. It points to a unique resource on the web. For example. https://www.google.com.

10. Which of the following options is/are true? [MSQ]

- √ "enctype" attribute is used in the form element only if request method is POST.
- ◯ "enctype" attribute is used in the form element only if request method is GET.
- √ If enctype = "multipart/form-data", each value is sent as a block of data.
- ◯ If enctype = "multipart/form-data", each of the values are sent as key-value pair separated by & and = in between key and value.

Solution: "enctype" attribute is used in the form element to specify how the data should be encoded, while submitting it to the server, if the method is "POST". It cannot be used with GET method. enctype = "multipart/form-data" specifies that each value is sent as a block of data. enctype = "multipart/form-data" is mandatory if user is submitting a file using form.

11. Which of the following lines of code will change the default port of Flask to 8000? [MCQ]

- ◯ app.run(debug = True, port=8080)
- √ app.run(debug = True, port=8000)
- ◯ app.set(port=8000)
- ◯ app(debug = True, port=8000)

Solution: Flask default port is 5000. It is changed by passing the values to port parameter while calling run method on the app.

12. The syntax for adding an image in the HTML document is given below.

```
<img src="static/img_name.png">
```

The correct syntax for doing the same using template in the flask app using url_for function is [MCQ]

- √ `<img src="{{ url_for('static', filename='img_name.png') }}">`
- ◯ `<img src="{{ url_for('static', 'img_name.png') }}">`
- ◯ `<img src="{{ url_for(filename='img_name.png') }}">`
- ◯ `<img src="{{ url_for('static/img_name.png') }}">`

Solution: The url_for() function builds URL for any function and its syntax to add an image is given b:

```
<img src="{{ url_for('<folder_name>', filename='<filename>') }}">
```

BSCCS2003: Practice Questions with Solutions
Week 6

1. As per the normal convention, what does "v1" represent in the following URL: https://en.wikipedia.org/w/rest.php/v1/search/page?q=earthlimit=1 [MCQ]

   ◯ verbose

   √ version

   ◯ virtual

   ◯ None of the above

Solution: Here, "v1" represents the version of the API (Reference: timeframe 3:15 in Lecture 6.4).

2. Which of the following statements is true about REST APIs? [MCQ]

   ◯ A REST API is an API that corresponds to the design principles of the REST (representational state transfer).

   ◯ REST APIs communicate via HTTP requests that can be used to perform database functions like creating, reading, updating, and deleting (or CRUD) records within a resource.

   ◯ A resource is delivered to a client in any format including JavaScript Object Notation (JSON), HTML, XML, or plain text.

   √ All of the above

Solution: All of the above statements are correct about REST APIs.

3. Which of the following statements is/are valid about the REST? [MSQ]

   ◯ REST is a programming language.

   √ REST adheres to stateless communication.

   √ Every resource is identified using unique identifiers also called as URI (or uniform resource identifier).

   √ In the REST architecture, clients send requests to retrieve resources, and servers send responses to these requests.

Solution: REST is not a programming language. It is an architectural style for defining standards between computer systems on the internet, which makes easier for systems to communicate with each other.

4. Which of the following statements is/are true about caching in REST APIs? [MSQ]

- √ Caching allows storing server response in proxy frontend so that a client needs not to make request to the server for same resources repeatedly.
- √ Caching improves the overall quality of service and reduce load on the servers.
- ◯ Browsers treat all GET and POST requests cacheable by default.
- ◯ Caching optimizes the network by increasing the latency.

Solution: Option 3) This statement is partially correct. As GET requests are cacheable by default, whereas POST requests are not cacheable by default.
Option 4) Caching optimizes the network by reducing the latency.

5. Which of the following statements is/are true about the proxy server? [MCQ]

- ◯ Proxy server can be used to control what part of the application is accessible to an unauthorized user.
- ◯ A proxy server is a server application that acts as an intermediary between a client requesting a resource and the server providing that resource.
- √ Both option 1 and 2
- ◯ None of the above.

Solution: Both option 1 and 2 are true about proxy server.

6. Which of the following statements is/are true about client-server computing? [MSQ]

- √ The client-server computing works with a system of request and response.
- ◯ The client and server are not bound to follow common protocol to establish communication.
- √ The client requests services from the server. The server processes the request and returns the result to the client.
- ◯ All of the above

Solution: Option 2) In client-server computing, both the client and server should communicate via a computer network and should follow a common protocol to communicate.

7. Which of the following is/are true regarding GET HTTP Method? [MSQ]

- √ It should be safe in context of REST.
- √ It should be idempotent in context of REST.
- √ It is allowed in HTML forms.
- ◯ GET Request has a body.

Solution: An HTTP method is safe if it does not alter the state of the server. GET request is used to get the representation of a resource. It does not alter the state of the server. It is idempotent because single or multiple GET request has the same impact on the state of the server. It is allowed in the HTML forms. And GET request does not have body. Data is embedded in URL.

8. Which of the following is true regarding the DELETE HTTP method? [MCQ]

- ◯ It should be safe in context of REST.
- √ It should be idempotent in context of REST.
- ◯ It is allowed in HTML forms.
- ◯ It should be cacheable in context of REST.

Solution: An HTTP method is safe if it does not change the state of the server. DELETE request is used to delete the resource. It changes the state of a server. So it is not safe. It is idempotent because single or multiple identical DELETE request to delete a resource will have the same impact. It is not cacheable because its response can not be cached.

9. Which of the following is an invalid JSON object? [MCQ]

◯
```
{
  "Name" : "xyz",
  "Age" : 21,
  "place" : "chennai"
}
```

◯
```
{
  "Name" : "xyz",
  "Over18" : true,
  "place" : "chennai"
}
```

√
```
{
  1 : "xyz",
  "Age" : 21,
  "place" : "chennai"

}
```

◯
```
{
  "1" : "xyz",
  "Age" : 21,
  "place" : "chennai"

}
```

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, true, false, array or null.

10. Consider the following Python code and choose the correct statements.

```
import json
My_dictionary = {
                    "name": "John",
                    "age": 28,
                    "city": "Chennai"
                  }
out = json.dumps(My_dictionary)
```

[MSQ]

- √ The Python object 'My_dictionary' will be converted into a JSON string.
- ◯ The method 'json.dumps()' converts every Python object into a JSON string.
- √ The Python object 'My_dictionary.keys()' will be converted into JSON array.
- ◯ None of the above.

Solution: The method 'json.dumps' converts a Python object into its equivalent JSON object. A python dictionary gets converted into string, while a list gets converted into an array.

11. Which of the following is/are true for API authentication? [MSQ]

- √ Many APIs are protected to avoid abuse by overloading servers.
- √ An authenticated user requires a token to be able to work with the API.
- ◯ The API key is the most secure way to protect the API.
- √ API keys can be easily retrieved.

Solution: Many APIs are meant only for specific users and are often protected to prevent their abuse due to server overloading. An authenticated user of the API possesses a token that it needs to provide during logging in into the API. This can also be done by API keys, which is a one time key to log in. However, API keys can be copied and are therefore less secure unless they are combined by some other protection.

12. Which of the following is a valid JSON? [MCQ]

◯
```
{
  "Age": 27,
  "firstName": "John",
  "lastName": Smith,
  "married": true,
  "phone_numbers": [
    "212-555-1234",
    "212-666-5678"
  ]
}
```

√
```
{
  "Age": 27,
  "firstName": "John",
  "lastName": "Smith",
  "married": true,
  "phone_numbers": [
    "212-555-1234",
    "212-666-5678"
  ]
}
```

◯
```
{
  "Age": "27",
  "firstName": "John",
  "lastName": "Smith",
  "married": True,
  "phone_numbers": [
    "212-555-1234",
    "212-666-5678"
  ]
}
```

◯
```
{
  "Age": "27",
  "firstName": "John",
  "lastName": "Smith",
  "married": true,
  "phone_numbers": (
    "212-555-1234",
    "212-666-5678"
  )
}
```

Solution: Option 1: The 'lastName' is a string object and should have a string value. Here, it acts as a defined variable.
Option 2: It is a valid JSON file.
Option 3: The boolean output 'True' is converted to 'true' according to javascript.
Option 4: The tuple object in python is stored as array in JSON. In option 4, it is stored in a tuple.

Week 7 Practice Questions with Solutions

1] You have a DRAM module with bus width of 64 bits, clock speed of 1 GHz, and operating in DDR (double-data-rate or two values per clock cycle) mode. What is the maximum bandwidth (in Giga-bytes per second) of data transfer achievable with this module?

1. 8 GigaBytes/s
2. 16 GigaBytes/s
3. 24 GigaBytes/s
4. None of the above

Answer : Option 2.

Solution: 64 (bus-width) x 2 (DDR) x 1 (GHz) = 128 Gbps = 16 GigaBytes/s.

2] A magnetic disk operating at 7200 rpm is being used to store data. The disk can only spin in one direction at a constant speed of 7200 revolutions per minute. If the operating system sends a request to the disk controller to fetch data from the disk, what is the worst case latency before it can start retrieving data? (NAT)

Answer: 8.33 milliseconds.

Solution: In the worst case, the data is in the part of the disk that has just passed under the read head. This means it will have to wait till that part comes under the read head again (one full rotation) before it can access the data. Since the disk is turning at 7200rpm, the time for one rotation is 60s/7200rpm = 8.33 milliseconds. This is the worst case latency.

3] You have two search functions, one of which takes time t1(N) = 1000N+200 nanoseconds, while the other takes t2(N) = N^3 + 5 nanoseconds to operate on an input of size N. Which function is better if you are sure that the input size N is always less than 10?

1. t1(N)
2. t2(N)
3. Both will take same time.
4. cannot be decided.

Answer: Option 2.

Answer: use the second algorithm. Though it is cubic, it is faster for N less than 10.

4] Your application is such that most of the time you need to look up a database entry given the first name of a person. Which of the following indexes will be helpful?

1. Index on Rollno
2. Index on Firstname
3. Index on (Lastname,Firstname)
4. Index on (Firstname,Lastname)

Answer: Option 2 and Option 4.

Solution: The most helpful index will be index on Firstname followed by Index on (Firstname,Lastname).

5] Which of the following types of columns is it most difficult to create an index for?

1. varchar
2. integer
3. BLOB
4. timestamp

Answer: Option 3.

Solution: BLOB - this is general binary data and may be difficult to even find a suitable sorting function - searching such objects in general is difficult.

6] To store photos of users in a database, what type of field would be used?

1. int
2. varchar
3. blob
4. timestamp

Answer: Option 3.

Solution: BLOB is used to store photos in the database.

7] If a database server runs completely from RAM and does not store any data on permanent storage like HDD, then which ACID condition will it not be able to fulfill?

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

Answer: Option 4.

Solution: D - durability since this requires saving data against power outages also.

8] Which of the following is better suited for storing connection information in a social network?

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

Answer: Option 3.

Solution: Graphs are good at capturing connections between people in social networks.

9] You have a datacenter where each server has a 1 gigabit per second network connection, but the overall datacenter has a 10 gigabit per second connection. As your app becomes more popular, you start getting 10,000 requests per second, and each request needs a 50 Kbyte response. Which of the following is a better option?

1) scale up on a single server
2) scale out to multiple servers in the datacenter

1. Option 1
2. Option 2
3. Both will produce similar results.
4. None of the two given

Answer: Option 2.

Solution: The total response bandwidth is more than can be handled by a single server, so you have no option but to scale out.

10] SQL injection refers to ___

1. feeding SQL queries through a web form.
2. hacking into servers of a foreign country.
3. processing SQL queries in a NoSQL database.
4. None of the above

Answer: Option 1.

Solution: SQL injection refers to feeding SQL queries through a web form.

11] Sanitizing data in the context of SQL queries refers to ___

1. making sure invalid data or symbols are not allowed in the query.
2. applying Covid protocols to the datacenter.
3. cleaning up HTML forms so only essential data is submitted from the web page.
4. using compression to reduce the amount of data transmitted.

Answer: Option 1.

Solution: Sanitizing data does not refer to medical sanitization. Cleaning HTML forms and compressing files are not sufficient to ensure invalid data cannot reach the DB.

12] Sanitizing data of an SQL query is the responsibility of ___.

1. end user of application
2. application developer
3. database administrator
4. data center operator

Answer: Option 2

Solution: App developer must ensure invalid data is filtered out before going to the DB - other parts of the chain do not have enough information to know what is acceptable and what is not.