Unique Paper Code	:	32341501
Name of the Course	:	B.Sc. (H) Computer Science
Name of the Paper	:	Internet Technologies
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Duration: Three Hours Maximum Marks: 75

Attempt any **FOUR** questions.
Each question carries equal marks.

1. Define the purpose of subnet masking. **(2.75)** ***Subnet masking, or subnetting, is used to break one large group into several smaller subnetworks.*** Consider the IP address 165.245.12.88/24, what would be the 32-bit subnet mask? **(2)** ***Subnet Mask for 165.245.12.88/24 is 255.255.255.0*** What is the class of this IP address? **(2)** ***Address is of Class B.*** Give the first IP address and last IP address of the class to which the above IP address belongs. **(2)** ***First IP address 128.X.X.X to 191.X.X.X or 128.0.0.0 to 191.255.255.255.*** Calculate the following for the above IP address with appropriate explanation: **(2+2+2+2+1+1)**

    - Maximum no. of subnets ***(256 Subnets are possible)***
    - Maximum no. of hosts per subnet ***(254 hosts per subnet)***
    - Network Address ***(166.245.12.0)***
    - Broadcast address ***(166.245.12.255)***
    - First usable IP address for host ***(166.245.12.1)***
    - Last usable IP address for host ***(166.245.12.254)***

2. How HTTPS is more secure than HTTP? **(2.75)** ***It uses SSL and TLS (transport layer security) to provide authentication and data encryption.***

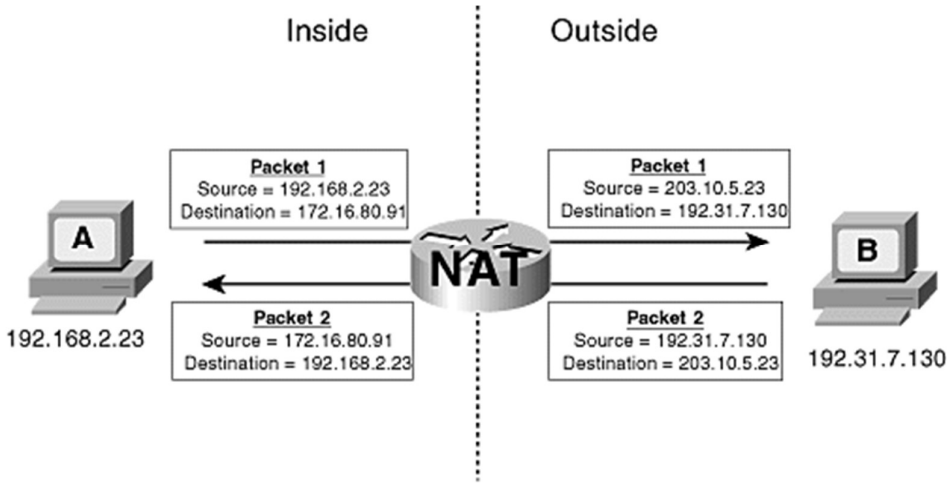
   Which technologies (at the minimum) are needed to create a fully dynamic web page?**(2)** ***(Web Server like Apache, Server side Script like php, a database like MySQL, and a client-side scripting language JavaScript).***

   What is the purpose of AJAX process? **(2)** ***Ajax is used to accessing the web server in the background. Ajax call can pull in and update a single element on a web page, such as changing your photograph on a social networking site or replacing a button that you click with the answer to a question.***

   Consider a network scenario, where computer X is connected to a LAN using a NAT router. X wants to send a packet through internet to computer Y which is connected to another LAN and is also using a NAT router. For the above scenario, describe the following concepts with the help of suitable diagram(s):

- Mapping of private and public IP addresses. **(6)**

A simple NAT function: Device A has an IP address that belongs to the private range specified by RFC 1918, whereas device B has a public IP address. When device A sends a packet to device B, the packet passes through a router that is running NAT. The NAT replaces device A's private address (192.168.2.23) in the source address field with a public address (203.10.5.23) that can be routed across the Internet, and forwards the packet. When device B sends a reply to device A, the destination address of the packet is 203.10.5.23. This packet again passes through the NAT router, and the destination address is replaced with device A's private address.



- Mapping of inside local, inside global, outside local and outside global IP addresses. **(4)**

In above figure, device A is on the inside and device B is on the outside. 192.168.2.23 is an inside local address, and 203.10.5.23 is an inside global address. 172.16.80.91 is an outside local address, and 192.31.7.130 is an outside global address.

Which command is used to know the network route between computer X and Y? **(2)** ***Tracert Command is used.***

3. Suppose you are a wildlife photographer, and frequently visits national parks, wildlife and bird sanctuaries. What will you prefer among blog and forum to showcase your knowledge and talent of photography and why? **(3)** ***Blog will be preferred in the above scenario. Since, blog is more of a personal page, where it belongs to a single person or a small group.***
   Also, give reasons why the other choice is not suitable? **(3.75)** ***Whereas a forum provides an easy to use interface for members to interact with each other on a topic. The discussions are arranged in forums and sub-forums for categorization. Members share their thoughts, ideas, and interest. Besides, a forum is a valuable resource to connect with other members to get help with queries.***

Consider the following array of objects in JavaScript:

Index	Value
0	{name: Jim Corbett National Park, state: Uttrakhand, speciality: Tigers}
1	{name: Kaziranga National Park, state: Assam, speciality: Rhinos}
2	{name: Asola Bhatti Wildlife Sanctuary, state: Delhi, speciality: Birds}
3	{name: Gir National Park, state: Gujarat, speciality: Lions}

Write code for ***parks.html*** which displays the above array of objects as a table. **(6)** The webpage should also display two text boxes, one for the index and another for the property name along with a submit button.

parks.html

```
<html>
  <body>
    <h1>National Parks and Wildlife Sanctuary in India</h1>
    <table>
      <tr>
        <th>index</th><th>Value</th>
      </tr>
      <tr>
        <td>0</td>
        <td>{name :"Jim Corbett National Park", state:"Uttrakhand",speciality:
"Tigers"}</td>
      </tr>
      <tr>
        <td>1</td>
        <td>{name:"Kaziranga National Park", state:"Assam", speciality:
"Rhinos" }</td>
      </tr>
      <tr>
        <td>2</td>
        <td>{name: "Asola Bhatti Wildlife Sanctury", state:"Delhi", speciality:
"Birds"}</td>
      </tr>
      <tr>
        <td>3</td>
        <td>{name: "Gir National Park", state: "Gujrat", speciality:
"Lions"}</td>
      </tr>
    </table>
    <br><br>
    <form>
      Index: <input type=" text" id = "index" /> 
      Property Name:<input type=" text" id = "property_name" /> 
      <input type = "button" onclick = "display()" value="Submit">
      <br><span id="d1"></span>
```

```
    </form>

    <script src = "parks.js"> </script>
  </body>
</html>
```

Further, write JavaScript code for ***parks.js***, which will display the value of the property according to the index no. and the property name entered by the user on the browser **(6)**

parks.js

```
var parks = [
        {name:"Jim Corbett National Park", state:"Uttrakhand", speciality: "Tigers"},
        {name:"Kaziranga National Park", state:"Assam", speciality: "Rhinos"},
        {name: "Asola Bhatti Wildlife Sanctury", state:"Delhi", speciality: "Birds"},
        {name: "Gir National Park", state:  "Gujrat", speciality: "Lions"}];

function display(){
   var index = (document.getElementById("index").value);
   var propertyname = document.getElementById("property_name").value;
   document.getElementById('d1').textContent = 'Property Value is: ' + parks[index][propertyname];
}
```

4. Differentiate between anonymous function, function expression and immediately invoked function expression. **(6)**

A function with no name is called Anonymous Function.
If you put a function where the interpreter would expect to see an expression, then it is treated as an expression, and known as Function Expression.
Immediately Invoked Function Expression (IIFE) are the functions that are not given a name. Instead, they are executed once the interpreter come across them.

Suppose we already have an HTML file with 3 input elements of text type and 1 div type. The value of the **id** attribute of 3 input elements are: *length, breadth* and *height* and the value of **id** of div element is: *volume*.
Write JavaScript code for the following: ***(8.75)***

- To access the value of these 3 input elements and div element
  ```
  var length    = document.getElementById('t1').value;
  var breadth   = document.getElementById('t2').value;
  var height    = document.getElementById('t3').value;
  ```
- Anonymous function to calculate the volume of the cuboid
  ```
  var vol = function (l,b,h){ return l*b*h;}
  ```
- Immediately invoked function expression to display the volume of the cuboid in the html element having id "*volume*"

  ```
  var display = (function (){
  ```

```
document.getElementById('volume').innerHTML = vol;
}());
```

With the help of an example, differentiate between parameters and arguments of the JavaScript function. **(4)**

When the function is declared, the variables declared in the parenthesis are <u>parameters</u> of the function. As given above. But when we call the function, values or variables passed are <u>arguments</u>. For example:

```
function getArea(width, height) {
return width*height;
}
```

width and height are parameters.

```
getArea(5,4);
```

5 & 4 are arguments.

5. Create an HTML form in a file called ***car.html*** to get the following details of the car:
   - Name of the manufacturer
   - Name of the model
   - Manufacturing Year
   - Fuel type (petrol/diesel)
   - Color
   - Seating capacity
   - Cubic capacity **(6)**

<u>car.html</u>

```
<!DOCTYPE html>
<html>
<head>
    <meta charset="utf-8">
    <title>Car Details</title>
</head>
  <body>
    <h1>Car JSON Object and JavaScript Object</h1>
    <form>
        Name of Manufacturer: <input type=" text" id = "manufacturer" /><br>
        Name of Model:<input type=" text" id = "model" /><br>
        Manufacturing Year: <input type=" text" id = "year" /><br>
        Fuel Type (Petrol/Diesel):<input type="text" id = "fuel"/><br>
        Color:<input type=" text" id = "color" /><br>
        Seating Capacity: <input type=" text" id = "seating" /><br>
        Cubic Capacity:<input type=" text" id = "cubic" /><br>
        <input type = "submit" id="submit"/>
    </form>
```

```
    <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>
    <script src = "car.js">
    </script>
  </body>
</html>
```

Write JQuery code in a JavaScript file ***car.js*** to get the details of the car from the ***car.html*** on pressing submit button. Also write the JavaScript code in ***car.js*** to make a JavaScript object and JSON object from the above details and print both the JavaScript and JSON object on the console. **(6.75)**

car.js

```
$(function(){
   $form = $('form');
   $form.on('submit', function(e){
      e.preventDefault();
      var manufacturer = $('#manufacturer').val();
      var model = $('#model').val();
      var year = $('#year').val();
      year = Number(year)
      var fuel = $('#fuel').val();
      var clr = $('#color').val();
      var seating = $('#seating').val();
      var cubic = $('#cubic').val();
      cubic = Number(cubic)
      const car = {
         cManufacturer:manufacturer,
         cModel:model,
         cYear:year,
         cFuel:fuel,
         cClr:clr,
         cSeating:seating,
         cCubic:cubic
      };
      var jcar = JSON.stringify(car);
      console.log('JSON Object is ', jcar);
      var car2 = JSON.parse(jcar);
      console.log('JavaScript Object is ', car2);
   })
})
```

Differentiate between innerHTML, textContent and innerText property of the JavaScript. **(6)**

The innerHTML property sets or returns the HTML content (inner HTML) of an element.

The textContent property sets or returns the text content of the specified node, and all its descendants.

This property is similar to the textContent property, however there are some differences:

- ***textContent returns the text content of all elements, while innerText returns the content of all elements,*** *except* ***for <script> and <style> elements.***
- ***innerText will not return the text of elements that are hidden with CSS (textContent will).***

6. Describe the purpose of the code given below with proper explanation of each statement and method used. **(7)**

Line1. This code first includes the Node.js http module.

Line 2. The server is set to listen on the specified port 3000

Line 3. The createServer() method of http creates a new HTTP server and returns it. Those 2 objects are essential to handle the HTTP call. The first provides the request details. The second is used to return data to the caller.

Line 4. Setting the statusCode property to 200, to indicate a successful response.

Line 5. Setting the Content-Type header.

Line 6. Write "Hello World" on webpage.

Line 7. Closing the response.

Line 9-11. The server is set to listen on the specified port and host name. When the server is ready, the callback function is called, in this case informing us that the server is running.

Is there any callback function used in the code? **(2)**
Yes.
If yes, then give the line number(s) where it is being called, and if not then give an example of callback function: **(2)**
Line no 3 and 9

```
1. const http = require('http');
2. const port = 3000;
3. const server = http.createServer(function(req, res){
4. res.statusCode = 200;
5. res.setHeader('Content-Type', 'text/html');
6. res.write("Hello World...");
7. res.end();
8. });
9. server.listen(port, () => {
10. console.log('Server is listening on port ' + port);
11. });
```

Suppose we have a mysql database with the name "*mydb*" having a table named "*customer*". The fields of the table are: *CustID, CustName, CustCity*. Write NodeJs commands to connect to the database "*mydb*" and print all the details of customers who are living in Delhi. **(7.75)**

```
var mysql = require('mysql');
var con = mysql.createConnection({
  host: "localhost",
  user: "root",
  password: "password" ,
  database: "mydb"
});
con.connect(function(err) {
   con.query("select * from customer where CustCity = 'Delhi' ",
function(err, result){
       console.log(result);
   })
 });
```