JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech-III Semester (CSE)

COURSE CODE (CREDITS): 24B11CI312 (3) MAX. MARKS: 25

COURSE NAME: INFORMATION AND CYBER SECURITY FOUNDATIONS

COURSE INSTRUCTORS: AAYUSH SHARMA MAX. TIME: 1 Hour 30 Min

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Calculator is allowed.

Q.No	Question	CO	Marks
Q1	You are a journalist working on a sensitive story and need to protect your identity while accessing a whistleblower website. A) Explain the difference between using a VPN and Tor (Onion Routing) for anonymous browsing. Which provides better anonymity and why? B) You decide to use both: connect to a TOR first, then use VPN. Draw a simple diagram showing the path of your connection from your computer to the destination website, labeling each layer also is this a good way to protect your identity. If yes why and if no why and how we can improve it.	[CO1] [CO2]	[3 + 3]
Q2	You are conducting a security audit of a remote server. You can only access the server via SSH, but the target web application runs on localhost:8080 of that server and is not exposed to the external network. A) Write the SSH command you would use to create a local port forwarding tunnel that allows you to access the remote web application on your local machine at http://localhost:9000. Assume the server IP is 192.168.1.50 and your username is auditor. B) What is the difference between Direct and Reverse Port Forwarding and which is better for this scenario.	[CO1] [CO2]	[1 + 2]
Q3	You are setting up a cybersecurity lab on your Windows 10 physical machine with the following configuration: Host: Windows 10 (physical machine) VM Layer 1: Ubuntu Linux (running on Windows using VirtualBox) VM Layer 2: Kali Linux (running inside the Ubuntu VM using nested virtualization) Each virtualization layer adds 1 unit of overhead time to every operation. A) Draw the OS Stack B) For the following bash script if each echo statement takes 1 base unit of time to execute on a physical machine, calculate the total time this script will take to complete on your Kali VM, accounting for the virtualization overhead at each layer. Show your calculation. **#!/bin/bash** **n=20** **count=0** **echo "Processing matrix data..."**	[CO3]	[2 + 6]

```
for i in $(seq 1 $n); do
  for j in $(seq 1 $n); do
    if [ $((i % 2)) -eq 0 ]; then
      for k in $(seq 1 5); do
        echo "Cell[$i,$j] batch $k"
        ((count++))
      done
    else
      echo "Cell[$i,$j]"
      ((count++))
    fi
  done
done
echo "Total: $count operations"
echo "Environment: Layer2-VM/Layer1-VM/Physical-Host"
```

Q4 A small e-commerce website has a search feature. The URL looks like this when you search for "laptop": http://shop.example.com/search?query=laptop

[CO2] [CO3] [1 + 2 + 5]

Following is the code for the website:

```
<!DOCTYPE html>
<html>
<head>
  <title>Product Search</title>
</head>
<body>
  <h2>ShopFast Search</h2>
  <input type="text" id="searchInput" placeholder="Search products...">
  <button onclick="search()">Search</button>
  <div id="results" style="margin-top:20px; padding:10px;
background:#f0f0f0;"></div>
  <script>
    function getParam(name) {
      var regex = new RegExp('[?&]' + name + '=([^&#]*)');
      var results = regex.exec(location.search);
      return results ? decodeURIComponent(results[1]) : '';
    }
    window.onload = function() {
      let query = getParam('query');
      if (query) {
        document.getElementById('results').innerHTML = "Results for: " + query;
      }
    };
    function search() {
      let q = document.getElementById('searchInput').value;
      if (q) window.location.href = '?query=' + encodeURIComponent(q);
    }
    function sanitize(input) { return input.replace(/[<>]/g, ''); }
  </script>
</body>
</html>
```

Identify the security vulnerability present in this code. Name the type of attack and write a malicious URL that could exploit this vulnerability