



Bangladesh Bank
Banker's Selection Committee Secretariat (BSCS)
Officer (IT), Grade-10, (Job ID-25105)
Exam Date: 31/07/2026

Part A: MCQ Questions: Time 01 hours

English

1. What is the correct spelling of Committee?
2. Choose the correct sentence:
3. Bread and butter is/are my favourite breakfast.
4. Tag ques-Let's..... & He heardly.....
5. Voice- Let....

Bangla Language & Literature

1. “গরিমা” শব্দের সন্ধি বিচ্ছেদ কী?
2. “নীলপদ্ম” কোন সমাস?
3. “মা মম কদা কহন্তি” - এক কথায় প্রকাশ কী?
4. “অন্যা মোরেল” শব্দের অর্থ কী?
5. “সারা দেশ” - এখানে “সারা” কোন পদ? (বিশেষণ)
6. নিচের কোনটি শুদ্ধ বানান?
 - a. মুমূর্ষু
7. “করব” কবিতাটি কার লেখা?
8. পরীক্ষার সঠিক সন্ধি বিচ্ছেদ
9. যা দমন করা কষ্টকর

General Knowledge

1. রবীন্দ্রনাথ ঠাকুর কত সালে নোবেল পুরস্কার লাভ করেন?
2. মহান মুক্তিযুদ্ধের সময় প্রথম কোন সেক্টরের অধীনে ছিল?
3. প্রবাল দ্বীপ (Coral Island) কোথায় অবস্থিত?
4. SAARC-এর সদর দপ্তর কোথায় অবস্থিত?
5. চেন্সি খান-এর আসল নাম কী?
6. বাংলাদেশের কোন প্রতিষ্ঠানকে "Clearing House" বলা হয়?
 - (a) Sonali Bank
 - (b) Ministry of Finance
 - (c) Ministry of অর্থ
 - (d) Bangladesh Bank
7. First commercial private bank?

Mathematics & Mental Ability

1. A hexagon has a total interior angle of কত ডিগ্রি?



2. The present age ratio of a father (or parent) and his son is 4:1. After 5 years, the ratio becomes 3:1. Find the son's present age.
3. If $x + y = A$ and $x - y = B$, find the value of xy .
4. One person can complete a job in 6 days and another in 10 days. How many days will they take together?
5. A car crosses a bridge at a speed of 15 km/h in 15 minutes. Find the length of the bridge. v
6. Two fair coins are tossed simultaneously. What is the probability of getting exactly one Head?
7. Which fraction is the largest among the given options?
8. LCM of 12,15,20
9. Find the value of x if $2^{x+3} = 32$.

Computer Science & Information Technology

1. Which memory provides the fastest access?
2. Which storage device provides the fastest data access?
 - (a) DVD
 - (b) USB Flash Drive
 - (c) HDD
 - (d) SSD
3. Where is BIOS stored?
4. In Microsoft Excel, every formula starts with which symbol?
5. First commercial private bank?
6. 8086 microprocessor koto bit?
7. Neural network function.
8. Which is the fastest? SSD/RAM/cache/HDD.
9. Http full form
10. Video compression method name
11. What is the time complexity of inserting an element at the beginning of a singly linked list?
12. What is the time complexity of inserting and deleting the first element of a linked list?
13. Which traversal of a Binary Search Tree (BST) returns the elements in ascending order?
14. What are the different tree traversal methods?
15. Which protocol is used to receive emails?
16. Which protocol is generally used for real-time streaming that is connectionless and provides less security?
17. What is the purpose of NAT (Network Address Translation)?
18. Which cable is commonly used to connect an analog CCTV camera?
19. Internet packet/circuit swithcing.



20. What does CIA stand for in Cyber Security?
21. Which activation function is generally used in the hidden layers of deep learning models?
22. Which SQL query is used to sort student records in descending order (largest to smallest)?
23. Which printer is generally used at a bank cash counter?
24. Which type of printer is commonly used in banks and offices?
25. Which camera is commonly used in banks for surveillance?
26. Object oriented programming based on?
27. Python function.

Part B: Written Questions: Time: 02 Hours

There are 6 (six) questions. Answer ALL. The symbols have their usual meanings. Marks of each question are written in brackets. Assume any reasonable value if required.

Write all your answers within the space provided in the separate answer script.

1. Focus Writing in Bangla (10 Marks)

“বাংলাদেশের ব্যাংকিং খাতে খেলাপি ঋণ: কারণ, প্রভাব ও উত্তরণের উপায়”

2. Focus Writing in English (10 Marks)

"The Role of Sustainable Banking in Achieving the UN Sustainable Development Goals (SDGs) in Bangladesh."

3. Translate the following passage into English (10 Marks)

“এক ক্ষুধার্ত শিয়াল একটি আঙুর ক্ষেতের পাশ দিয়ে যাচ্ছিল। উঁচুতে ঝোলানো আঙুর দেখে সে তা খাওয়ার চেষ্টা করল, কিন্তু বারবার লাফিয়েও ব্যর্থ হলো। অবশেষে সে হতাশ হয়ে চলে গেল। যাওয়ার সময় বলল, আঙুরগুলো আসলে টক।”

4. Translate the following passage into Bangla (10 Marks)

"The boy found a lost wallet on his way to school. Instead of keeping it, he looked for the owner and returned it. The owner, impressed by his honesty, offered him a reward. The boy politely refused, saying that honesty is its own reward."

5. General Knowledge (10 Marks)

- 5.1 Which river is known as the "Lifeline of Bangladesh"?
- 5.2 What is the name of the international organization that monitors global health standards and coordinates the response to pandemics?
- 5.3 What is the name of Bangladesh's first deep-sea port?
- 5.4 Where is the headquarters of the International Monetary Fund (IMF) located?
- 5.5 Which country has the world's longest coastline?
6. Subject Related Questions (15 × 10 = 150 Marks)
- 6.1 An organization has been assigned the IPv4 network address



192.168.1.0/24. As part of the network deployment, the network administrator is required to divide the address space into four equal-sized subnets to support different departments. Determine the Network Address, Subnet Mask (both CIDR and dotted-decimal notation)

6.2 Differentiate between a **Fuse** and a **Miniature Circuit Breaker (MCB)**.

Which one is more suitable for modern office electrical installations and why?

6.3 Explain the working principle of a **PN junction diode**. Draw its symbol and describe the difference between **forward bias** and **reverse bias**.

6.4 Differentiate between a **Computer Virus** and a **Computer Worm** based on how they spread and replicate across host networks.

6.5 Draw the circuit schematic diagrams to build an **Exclusive-OR (XOR)** logic function using only universal **NAND** gates.

6.6 What is the difference between a **Multiplexer** and a **Demultiplexer**? Explain one practical application of each in digital systems.

6.7 Explain the concepts of **Inheritance** and **Polymorphism** in Java. Write a Java program to demonstrate **method overriding**.

6.8 Describe any **two key differences** between the **HTTP GET** and **HTTP POST** methods used for communication between a web browser and a web server.

6.9 A physical server has **32 CPU cores, 96 GB RAM, and 4 TB storage**. Each virtual machine (VM) requires **4 CPU cores, 16 GB RAM, and 500 GB storage**. Calculate the maximum number of VMs that can be hosted on the server without overcommitting resources. Identify which hardware resource limits the number of VMs.

6.10 What is **JDBC**? Explain the steps required to connect a Java application to a **MySQL** database.

6.11 Describe the **SQL Injection** and **Cross-Site Scripting (XSS)** web security threats and suggest preventive measures for each.

6.12 Describe the functions of a **Switch** and a **Router** and explain **two key differences** between these networking devices.

6.13 A system has three processes with the following arrival times and CPU burst times:

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	5
P2	1	3
P3	2	2

Using the **First-Come, First-Served (FCFS)** CPU scheduling algorithm, calculate the **average waiting time** and the **average turnaround time**.

6.14 An institute wants to create a database table named **STUDENT** to store student information. The table should include the columns **Roll Number, Name, Department, Email, and Admission Date**. Specify the most appropriate SQL data



type for each column and identify which column should be defined as the **Primary Key**, giving a brief justification for your choice.

6.15 A software company has been hired to develop an **Online Library Management System** for a university. The librarian wants the system to be delivered in phases so that feedback from users can be incorporated after each release. As a software developer, identify the most suitable **Software Development Life Cycle (SDLC)** model for this project. Justify your choice by mentioning **two advantages** of the selected model.

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“বাংলাদেশের ব্যাংকিং খাতে খেলাপি ঋণ: কারণ, প্রভাব ও উত্তরণের উপায়”

বাংলাদেশের অর্থনীতির অন্যতম প্রধান চালিকাশক্তি হলো ব্যাংকিং খাত। শিল্পায়ন, ব্যবসা-বাণিজ্য, কৃষি, রপ্তানি এবং অবকাঠামো উন্নয়নে ব্যাংকের ঋণ গুরুত্বপূর্ণ ভূমিকা পালন করে। কিন্তু সাম্প্রতিক সময়ে খেলাপি ঋণের পরিমাণ উদ্বেগজনকভাবে বৃদ্ধি পাওয়ায় ব্যাংকিং খাতের স্থিতিশীলতা ও দেশের অর্থনৈতিক প্রবৃদ্ধি চ্যালেঞ্জের মুখে পড়েছে। তাই খেলাপি ঋণের কারণ, এর প্রভাব এবং উত্তরণের উপায় নিয়ে গুরুত্বসহকারে ভাবা প্রয়োজন।

খেলাপি ঋণ বৃদ্ধির প্রধান কারণগুলোর মধ্যে রয়েছে যথাযথ যাচাই-বাছাই ছাড়া ঋণ বিতরণ, রাজনৈতিক ও প্রাতিষ্ঠানিক প্রভাব, দুর্বল তদারকি, ঋণের অর্থ যথাযথ খাতে ব্যবহার না করা, দুর্নীতি এবং দীর্ঘসূত্রিতাপূর্ণ আইনি প্রক্রিয়া। এছাড়া অনেক সময় ব্যবসায়িক মন্দা, প্রাকৃতিক দুর্যোগ এবং বৈশ্বিক অর্থনৈতিক সংকটের কারণেও ঋণগ্রহীতার সমসাময়িক ঋণ পরিশোধ করতে ব্যর্থ হন।

খেলাপি ঋণের ফলে ব্যাংকের তারল্য সংকট সৃষ্টি হয় এবং নতুন উদ্যোক্তাদের ঋণ প্রদান ব্যাহত হয়। ব্যাংকের মুনাফা কমে যায়, আমানতকারীদের আস্থা হ্রাস পায় এবং সামগ্রিক আর্থিক ব্যবস্থায় ঝুঁকি বৃদ্ধি পায়। একই সঙ্গে সরকারের ওপর আর্থিক চাপ সৃষ্টি হয় এবং দেশের বিনিয়োগ ও অর্থনৈতিক প্রবৃদ্ধি নেতিবাচকভাবে প্রভাবিত হয়। এই সমস্যা সমাধানে কয়েকটি কার্যকর পদক্ষেপ গ্রহণ করা জরুরি। প্রথমত, ঋণ অনুমোদনের আগে ঋণগ্রহীতার আর্থিক সক্ষমতা ও প্রকল্পের সম্ভাব্যতা কঠোরভাবে যাচাই করতে হবে। দ্বিতীয়ত, বাংলাদেশ ব্যাংকের তদারকি আরও শক্তিশালী করতে হবে এবং ঝুঁকিভিত্তিক ঋণ ব্যবস্থাপনা নিশ্চিত করতে হবে। তৃতীয়ত, ইচ্ছাকৃত ঋণখেলাপীদের বিরুদ্ধে দ্রুত ও কার্যকর আইনি ব্যবস্থা গ্রহণ করতে হবে। পাশাপাশি প্রযুক্তিনির্ভর ক্রেডিট রেটিং, নিয়মিত ঋণ পর্যবেক্ষণ, সুশাসন প্রতিষ্ঠা এবং দুর্নীতি দমনে কঠোর পদক্ষেপ নিতে হবে। ক্ষুদ্র ও মাঝারি উদ্যোক্তাদের জন্য প্রয়োজনীয় পরামর্শ ও পুনঃতফসিলের সুযোগও বিবেচনা করা যেতে পারে।

পরিশেষে বলা যায়, খেলাপি ঋণ শুধু ব্যাংকিং খাতের নয়, সমগ্র অর্থনীতির জন্য একটি বড় চ্যালেঞ্জ। সরকার, বাংলাদেশ ব্যাংক, বাণিজ্যিক ব্যাংক এবং ঋণগ্রহীতাদের সম্মিলিত প্রচেষ্টার মাধ্যমে সুশাসন, জবাবদিহিতা ও



স্বচ্ছতা নিশ্চিত করা গেলে খেলাপি ঋণ উল্লেখযোগ্যভাবে হ্রাস পাবে এবং দেশের ব্যাংকিং খাত আরও শক্তিশালী ও টেকসই হবে।

2. Focus Writing in English (10 Marks)

"The Role of Sustainable Banking in Achieving the UN Sustainable Development Goals (SDGs) in Bangladesh."

The Role of Sustainable Banking in Achieving the UN Sustainable Development Goals (SDGs) in Bangladesh

Sustainable banking is a banking approach that integrates environmental, social, and governance (ESG) principles into financial decision-making. It aims not only to generate profit but also to promote social welfare and environmental protection. In Bangladesh, sustainable banking plays a vital role in achieving the United Nations Sustainable Development Goals (SDGs).

Banks contribute to sustainable development by financing green projects such as renewable energy, energy-efficient industries, waste management, and environmentally friendly agriculture. They also support small and medium enterprises (SMEs), women entrepreneurs, and rural businesses, which create employment, reduce poverty, and promote inclusive economic growth. In addition, digital banking services improve financial inclusion by providing secure and convenient banking facilities to people in remote areas.

Sustainable banking also encourages responsible lending practices. Banks assess environmental and social risks before approving loans, ensuring that financed projects comply with environmental regulations and ethical standards. This helps reduce pollution, protect natural resources, and support climate resilience. Bangladesh Bank has introduced sustainable finance and green banking guidelines, encouraging commercial banks to invest in environmentally responsible projects.

Despite its progress, sustainable banking in Bangladesh faces several challenges, including limited awareness, inadequate green investment opportunities, and climate-related financial risks. Strong regulatory support, technological innovation, and cooperation among banks, businesses, and the government are essential to overcome these challenges.

In conclusion, sustainable banking is a powerful tool for achieving the SDGs in Bangladesh. By promoting green finance, financial inclusion, responsible investment, and social development, banks can contribute significantly to building a resilient, inclusive, and sustainable economy for future generations.

3. Translate the following passage into English (10 Marks)

“এক ক্ষুধার্ত শিয়াল একটি আঙুর ক্ষেতের পাশ দিয়ে যাচ্ছিল। উঁচুতে ঝোলানো আঙুর দেখে সে তা খাওয়ার চেষ্টা করল, কিন্তু বারবার লাফিয়েও ব্যর্থ হলো। অবশেষে সে হতাশ হয়ে চলে গেল। যাওয়ার সময় বলল, আঙুরগুলো আসলে টক।”



A hungry fox was passing by a vineyard. He saw some bunches of grapes hanging high above and tried to eat them. However, despite jumping again and again, he failed to reach them. At last, disappointed, he walked away. As he was leaving, he said, "The grapes are probably sour anyway."

4. Translate the following passage into Bangla (10 Marks)

"The boy found a lost wallet on his way to school. Instead of keeping it, he looked for the owner and returned it. The owner, impressed by his honesty, offered him a reward. The boy politely refused, saying that honesty is its own reward."

ছেলেটি স্কুলে যাওয়ার পথে একটি হারিয়ে যাওয়া মানিব্যাগ খুঁজে পেল। সেটি নিজের কাছে রেখে না দিয়ে সে প্রকৃত মালিককে খুঁজে বের করে মানিব্যাগটি ফিরিয়ে দিল। তার সততায় মুগ্ধ হয়ে মালিক তাকে একটি পুরস্কার দিতে চাইলেন। কিন্তু ছেলেটি বিনয়ের সঙ্গে তা প্রত্যাখ্যান করে বলল, "সততাই সর্বোত্তম পুরস্কার।"

5. General Knowledge (10 Marks)

5.1 Which River is known as the "Lifeline of Bangladesh"?

Answer: The Padma River.

5.2 What is the name of the international organization that monitors global health standards and coordinates the response to pandemics?

Answer: The World Health Organization (WHO). World Health Organization

5.3 What is the name of Bangladesh's first deep-sea port?

Answer: Matarbari Deep Sea Port (located in Maheshkhali, Cox's Bazar). It is Bangladesh's first deep-sea port.

5.4 Where is the headquarters of the International Monetary Fund (IMF) located?

Answer: Washington, D.C., USA.

5.5 Which country has the world's longest coastline?

Answer: Canada.

6. Subject Related Questions (15 × 10 = 150 Marks)

6.2 An organization has been assigned the IPv4 network address

192.168.1.0/24. As part of the network deployment, the network administrator is required to divide the address space into four equal-sized subnets to support different departments. Determine the Network Address, Subnet Mask (both CIDR and dotted-decimal notation)

Given:

- Network Address = **192.168.1.0/24**
- Required Subnets = **4**

Step 1: Find New Prefix

To create 4 subnets:

$$2^n = 4 \Rightarrow n = 2 \text{ bits}$$



Borrow **2 bits** from the host portion.

- Original Prefix = /24
- New Prefix = /26

Step 2: Subnet Mask

- **CIDR: /26**
- **Dotted Decimal: 255.255.255.192**

Block Size:

$$256 - 192 = 64$$

Subnets increase by **64**.

Subnet	Network Address	Host Range	Broadcast Address
Subnet-1	192.168.1.0/26	192.168.1.1 – 192.168.1.62	192.168.1.63
Subnet-2	192.168.1.64/26	192.168.1.65 – 192.168.1.126	192.168.1.127
Subnet-3	192.168.1.128/26	192.168.1.129 – 192.168.1.190	192.168.1.191
Subnet-4	192.168.1.192/26	192.168.1.193 – 192.168.1.254	192.168.1.255

6.2 Differentiate between a Fuse and a Miniature Circuit Breaker (MCB). Which one is more suitable for modern office electrical installations and why?

Fuse	MCB
Uses a metal wire that melts during overload.	Uses an automatic switch that trips during overload.
Must be replaced after operation.	Can be reset and reused.
Slower and less convenient.	Faster and more reliable.
Lower cost.	Higher initial cost.

Which is better?

MCB is more suitable for modern offices because:

- It automatically trips during overload or short circuit.
- It can be reset without replacement.
- Provides better protection and reliability.

6.3 Explain the working principle of a PN junction diode. Draw its symbol and describe the difference between forward bias and reverse bias.

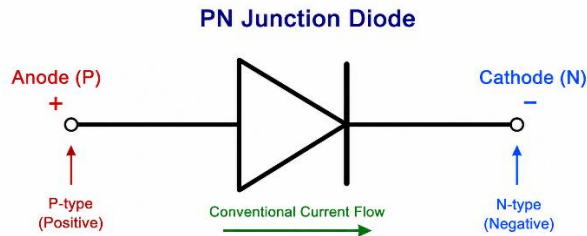
Working Principle



A PN junction diode is formed by joining **P-type** and **N-type** semiconductors.

- At equilibrium, a depletion region is formed.
- Current flows only when forward biased.

Symbol



Forward Bias

- P connected to +ve
- N connected to -ve
- Depletion layer decreases.
- Current flows.

Reverse Bias

- P connected to -ve
- N connected to +ve
- Depletion layer increases.
- Almost no current flows.

6.4 Differentiate between a Computer Virus and a Computer Worm based on how they spread and replicate across host networks.

Basis of Comparison	Worms	Viruses
Definition	A Worm is a form of <u>malware</u> that replicates itself and can spread to different computers via a Network.	A Virus is a malicious executable code attached to another executable file that can be harmless or can modify or delete data.
Objective	The main objective of worms is to eat the system's resources. It consumes system resources such as memory and bandwidth and makes the system slow in speed to such an extent that it stops responding.	The main objective of viruses is to modify the information.
Host	It doesn't need a host to replicate from one computer to another.	It requires a host is needed for spreading.



Harmful	It is less harmful as compared.	It is more harmful.
Detection and Protection	They can be detected and removed by the <u>Antivirus</u> and firewall.	<u>Antivirus</u> software is used for protection against viruses.
Controlled by	They can be controlled by remote.	They can't be controlled by remote.
Execution	They are executed via weaknesses in the system.	They are executed via <u>executable files</u> .
Comes from	Worms generally come from the downloaded files or through a network connection.	They generally come from shared or downloaded files.
Symptoms	1. Hampering computer performance by slowing down it 2. Automatic opening and running of programs 3. Sending of emails without your knowledge	1. Pop-up windows linking to malicious websites 2. Hampering computer performance by slowing down it 3. After booting, starting of unknown programs.

6.5 Draw the circuit schematic diagrams to build an Exclusive-OR (XOR) logic function using only universal NAND gates.

Expression of XOR gate: $A'B + AB'$

To convert the expression into NAND form perform the following:

Apply double complement: $[(A'B + AB')]'$

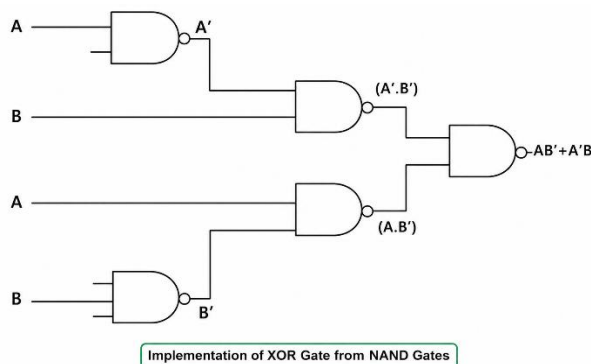
Operate internal complement: $[(A'B)' \cdot (AB')']'$

Now, expression is obtained in NAND form.

Pass Input A through the first NAND Gate to get A' , now pass this A' and B through the second NAND Gate to get $(A'B)'$. Similarly, pass Input B through the third NAND Gate to get B' , now pass this B' and A through the fourth NAND Gate to get $(AB')'$. Pass both the output $(A'B)'$ and $(AB')'$ through the fifth NAND Gate to get our desired expression of XOR Gate $((A'B)' \cdot (AB')')' = A'B + AB'$ (By De-Morgans Law).

Logic diagram

The Logical Diagram of the Following Expression is shown below
XOR Gate from NAND Gate



6.6 What is the difference between a Multiplexer and a Demultiplexer? Explain one practical application of each in digital systems.

Multiplexer (MUX)	Demultiplexer (DEMUX)
Multiplexer processes the digital information from various sources into a single source.	Demultiplexer receives digital information from a single source and converts it into several sources
It is known as Data Selector	It is known as Data Distributor
Multiplexer is a digital switch	Demultiplexer is a digital circuit
It follows combinational logic type	It also follows <u>combinational logic type</u>
It has 2^n input data lines	It has single input line
It has a single output data line.	It has 2^n output data lines
Efficiently uses bandwidth by combining many signals into a single line for transmission.	Divides a single signal into several parts, so bandwidth is less efficiently used.
Needs control lines to select which input signal to send to the output.	Needs control lines to determine which output line should receive the input signal.
It works on many to one operational principle	It works on one to many operational principle.
May consume more power due to the need for control logic and multiple input connections.	Typically uses less power, especially when splitting a single signal to multiple destinations.
In time division Multiplexing, multiplexer is used at the transmitter end.	In time division Multiplexing, demultiplexer is used at the receiver end.

Applications

**MUX**

- CPU data selection
- Communication systems

DEMUX

- Signal routing
- Memory address decoding

6.7 Explain the concepts of Inheritance and Polymorphism in Java. Write a Java program to demonstrate method overriding.

Inheritance

Inheritance allows one class to inherit properties and methods from another class.

Polymorphism

Polymorphism allows the same method name to perform different tasks.

```
class Animal {
    void sound() {
        System.out.println("Animal makes sound");
    }
}
```

```
class Dog extends Animal {
    @Override
    void sound() {
        System.out.println("Dog barks");
    }
}
```

```
public class Test {
    public static void main(String args[]) {
        Animal a = new Dog();
        a.sound();
    }
}
```

Output: Dog barks

6.8 Describe any two key differences between the HTTP GET and HTTP POST methods used for communication between a web browser and a web server.

GET	POST
Retrieves data	Sends data
Data appears in URL	Data sent in request body
Less secure	More secure
Can be bookmarked	Cannot be bookmarked



6.9 A physical server has 32 CPU cores, 96 GB RAM, and 4 TB storage. Each virtual machine (VM) requires 4 CPU cores, 16 GB RAM, and 500 GB storage. Calculate the maximum number of VMs that can be hosted on the server without overcommitting resources. Identify which hardware resource limits the number of VMs.

Given

CPU:

$$32/4 = 8$$

RAM:

$$96/16 = 6$$

Storage:

$$4000/500 = 8$$

Maximum VMs:

6

Limiting Resource: RAM

6.10 What is JDBC? Explain the steps required to connect a Java application to a MySQL database.

JDBC (Java Database Connectivity) is a Java API used to connect Java applications with relational databases.

Steps

1. Import JDBC package.
2. Load MySQL JDBC Driver.
3. Create Connection.
4. Create Statement/PreparedStatement.
5. Execute SQL query.
6. Process ResultSet.
7. Close connection.

6.11 Describe the SQL Injection and Cross-Site Scripting (XSS) web security threats and suggest preventive measures for each.

SQL Injection

Definition

An attacker inserts malicious SQL code into input fields.

Prevention

- PreparedStatement



- Parameterized queries
- Input validation
- Least privilege database accounts

Cross Site Scripting (XSS)

Definition

Attacker injects malicious JavaScript into web pages.

Prevention

- Input validation
- Output encoding
- Content Security Policy (CSP)
- HttpOnly cookies

6.12 Describe the functions of a **Switch** and a **Router** and explain **two key differences** between these networking devices.

Switch

- Connects devices within the same LAN.
- Uses **MAC Address**.
- Operates at **Layer 2**.

Router

- Connects different networks.
- Uses **IP Address**.
- Operates at **Layer 3**.

Differences

Switch	Router
Uses MAC address	Uses IP address
Connects devices in same LAN	Connects different networks

6.13 A system has three processes with the following arrival times and CPU burst times:

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	5
P2	1	3
P3	2	2

Using the First-Come, First-Served (FCFS) CPU scheduling algorithm, calculate the average waiting time and the average turnaround time.

Process	Arrival	Burst	Start	Finish	Waiting	Turnaround
P1	0	5	0	5	0	5
P2	1	3	5	8	4	7
P3	2	2	8	10	6	8

Average Waiting Time



$$= \frac{0 + 4 + 6}{3} = \frac{10}{3} = 3.33 \text{ ms}$$

Average Turnaround Time

$$= \frac{5 + 7 + 8}{3} = \frac{20}{3} = 6.67 \text{ ms}$$

Answer

- Average Waiting Time = 3.33 ms
- Average Turnaround Time = 6.67 ms

6.14 An institute wants to create a database table named **STUDENT** to store student information. The table should include the columns **Roll Number**, **Name**, **Department**, **Email**, and **Admission Date**. Specify the most appropriate SQL data type for each column and identify which column should be defined as the **Primary Key**, giving a brief justification for your choice.

Column	Data Type
Roll Number	INT
Name	VARCHAR(100)
Department	VARCHAR(50)
Email	VARCHAR(100)
Admission Date	DATE

Primary Key

Roll Number

Justification

- Unique for every student.
- Cannot be NULL.
- Identifies each record uniquely.

6.15 A software company has been hired to develop an **Online Library Management System** for a university. The librarian wants the system to be delivered in phases so that feedback from users can be incorporated after each release. As a software developer, identify the most suitable **Software Development Life Cycle (SDLC)** model for this project. Justify your choice by mentioning two advantages of the selected model.

Suitable Model:

Incremental Model (Iterative SDLC)

Advantages



1. Software is delivered in phases, allowing users to provide feedback after each release.
2. New features and improvements can be added easily with lower risk and reduced development cost.

Answer: The **Incremental SDLC Model** is the most appropriate because it supports phased delivery, incorporates user feedback continuously, and enables gradual enhancement of the Online Library Management System.