

HAMDARD
Imtihan

COMMERCE SCIENCE & ENTREPRENEURSHIP

**DUE TO ITS COMPREHENSIVE AND
TO THE POINT MATTER FIRST CHOICE OF
TEACHERS AND STUDENTS**

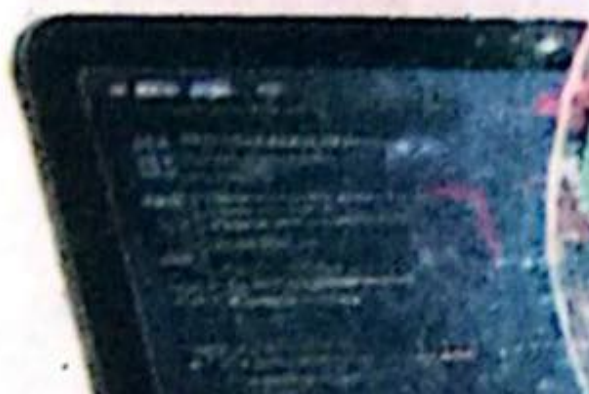
HAMDARD

IMTIHANI

COMP SCIEN & ENTREPREN

Class

NEW SYLLABUS



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- **Organization and OS Types:** File system organization and the main types of operating systems, including real time, embedded, network, and mobile OS.

1.1
Introduction to Operating System (OS)

Q.1: What is Operating system. What are the main purposes of operating system? Also give some examples of popular operating systems?

Ans.

Operating System (OS) is a type of system software that facilitates and manages all the activities of computer hardware connect via wire or wireless. It also manages and execution of application software, and provides a user interface.

Main Purposes of Operating System: The operating system works as the central controller of the computer system. It ensures smooth and secure interaction between the user and the hardware components, especially in multi-user environments.

Popular Operating Systems:

- Windows
- macOS
- Linux
- Android
- iOS

Q.2. Why operating system is called central system controller. Also discuss the role of OS in user hardware interaction.

Ans:

Operating System is also called central system controller because it decides which task should be done first when more process arrived, how the computer's memory is used, and which devices (like a printer or speakers) should be active at a given time.

Example: When you open a file, the kernel manages the process of reading it from the hard drive and sending it to the screen.

Shell: The shell is the desktop screen of the operating system which interacts with the user via pointing devices or keyboard. It receives commands from the user and passes them to the kernel. There are two types of shell:

Types:

- **Graphical shells:** It is a graphical interface like MS Windows where you click icons and use menus via pointing devices e.g. Mouse or Touch Screen
- **Command-line shells:** It is a command line interface like MS DOS or command prompt where you type instructions via keyboard.

Graphical shells	Command-line shells
1. It is based on graphical user interface	1. It is based on command line interface
2. It contain icons, menus and button control via pointing devices	2. It contain commands which are remembered and typed via keyboard
3. Easy to use	3. Difficult to use

User Applications



Operating System

Device Driver	"HID Keyboard Device" driver	Allows the operating system to communicate with and receive input from the connected keyboard.
System Library	Calculator app (Displaying numbers)	Uses a system graphics library (e.g., GDI+ or DirectX) to render numbers and buttons on the screen, instead of coding its own display method.

1.3
Process Management in Operating System (OS)

Q.7. What is process management in operating system? Also define process and resources.

Ans:

In process management, the operating system is responsible for managing all the programs (system or application) that run on a computer. Process management is one of the most important jobs of an operating system because it ensures all processes run smoothly without disturbing each other.

Example: Suppose if you are browsing on internet while listening music, operating system manages both process with all background running applications.

Process: A process is a program (or application) that is currently loaded into memory and being executed by the computer's CPU. It represents its own allocated memory space, state, and system resources. The operating system manages and schedules processes to run efficiently, even when multiple programs are active at the same time.

Resources: Resources are the physical or virtual components of a computer system that

CPU cannot run all processes at the same time, the operating system must decide which scheduling methods used by operating systems. There are many scheduling methods but one of them is First Come First served (FCFS) scheduling method.

First Come First Served Scheduling (FCFS):

In the FCFS method, the CPU processes tasks in the exact order they arrive. The first process to arrive is completed first, and the next process starts only after the previous one finishes.

Example: Like a queue at a shop counter, the first customer in line is served first, then the next, and so on.

Q.11. Explain FCFS method with the help of an example.

Ans:

Let us use some simple data to see how FCFS scheduling works in practice.

Process ID	Arrival Time	Time Needed
P1	0 seconds	5 seconds
P2	1 second	3 seconds
P3	2 seconds	2 seconds

Solution:

Step-by-Step Explanation:

1. At 0 seconds:

- **P1** arrives first, so it starts running immediately.
- It requires **5 seconds** to finish.

3. At 2 seconds:

- ◆ **P3** arrives, but P1 is still running and P2 is already waiting.
- ◆ In FCFS, P3 will also wait until both P1 and P2 have completed.

4. At 4 seconds:

- ◆ P1 finishes.
- ◆ The CPU now starts **P2**, which needs **5 seconds** to complete.
- ◆ P2 runs from **4s to 9s**.

5. At 9 seconds:

- ◆ P2 finishes.
- ◆ The CPU now starts **P3**, which needs **3 seconds**.
- ◆ P3 starts and runs from **9s to 12s**.

Execution Timeline:

[P1: 0-4] → [P2: 4-9] → [P3: 9-12]

Time (s)	0 - 4s	4s - 9s	9s - 12s
Running Process	P1	P2	P3

Answers:

1. The total time to finish the all processes is 12 seconds.
2. Even though **P3** has the shortest duration (only 3 seconds), it must still wait until **P1** and **P2** have finished because they arrived earlier.

perform multiple tasks at the same time. In multithreading operating system dividing its work into smaller units called threads. Each thread runs independently but shares the same memory (RAM) and resources of the process. Multithreading enabling faster execution, better responsiveness, and efficient use of system resources.

Benefits of Multithreading

- ◆ **Enhanced Performance:** All tasks can be divided into multiple threads and executed in parallel. It allowing complex operations to complete more quickly. It also improving overall system efficiency.
- ◆ **Improved Responsiveness:** Applications remain responsive even when one thread is busy with a specific task.

Example: A word processor enables continuous typing while another thread checks spelling in the background.

- ◆ **Support for Concurrent (parallel) Operations:** Multiple tasks can progress during the same period, which is particularly important in applications such as games, video editing, and real-time communication tools.
- ◆ **Efficient Use of Resources:** Threads share the same memory space and resources of their parent process, requiring fewer system resources compared to creating separate processes.

Q.16. What is system call? Give an example.

Ans:

even a tiny delay can cause system failure or serious consequences.

Key Feature: It processes tasks immediately as they arrive, without long waiting times.

Applications: It is used in critical systems such as air traffic control, heart-monitoring devices, or industrial robots.

Embedded Operating System (EOS): An Embedded operating system is a small and highly efficient operating system built into a specific device to control only the functions it needs. It is not meant for general-purpose computing but is optimized for one task or a small set of tasks.

Key Feature: It uses very little memory and power, and is often stored permanently inside the device.

Application: It is used in home appliances (microwaves, washing machines), printers, smart TVs, and ATMs.

Network Operating System (NOS): A Network OS manages and supports multiple computers connected through a network. It enables the sharing of resources like files, printers, and internet connections among users like windows multipoint servers.

Key Feature: It focuses on communication and coordination between computers.

Application: It is used in Offices, schools, and data centers.

Mobile Operating System: A Mobile OS is designed for smartphones, tablets, and other handheld devices. It is optimized for touch-screen use, battery saving, and mobile apps.

Key Feature: It supports wireless connectivity, cameras, sensors, and app stores.

Application: It is used in smartphones, tablets, smartwatches.

DO YOU KNOW

The very first mobile operating systems, like Symbian (used in early Nokia phones), could only run a few small apps. Today's mobile OS platforms like Android and iOS

19. Command prompt or terminal is also known as:
(A) Graphics shell (B) Graphic kernel
(C) Command line shell (D) Command line kernel
20. Resources like RAM or CPU registers are managed by:
(A) Kernel (B) Shell (C) Windows (D) OS

1.3**Process Management in Operating System (OS)**

21. When a program runs in an OS, it is called?
(A) Fetching (B) Decoding (C) Storing (D) Process
22. The most important job of an operating system:
(A) Running protocols (B) Ensure all processes run smoothly
(C) Manage memory (D) Scan virus
23. Process life cycle contains steps:
(A) 1 (B) 2 (C) 3 (D) 4
24. In which process step OS frees the resources so they can be used by others?
(A) Creation (B) Termination (C) Execution (D) Storage
25. The processes running at the same time are called:
(A) Concurrency (B) Multitasking (C) Process management (D) Execution
26. When task performed by more than one processor it is called?
(A) Multitasking (B) Multiprocessing
(C) Multithreading (D) Multi management
27. Which of the following is a scheduling technique?

1.7

File System Structure and Management

48. How many types of system calls?
(A) 1 (B) 2 (C) 3 (D) 4
49. Which of the following type of system call that open file for writing?
(A) Open (B) Read (C) Write (D) Fork
50. Which system call type send data files & output devices?
(A) Open (B) Write (C) Close (D) Fork
51. Who provide a structure way to manage program & data?
(A) File system (B) System calls (C) Kernel (D) Shell
52. File system ensure:
(A) Files are secure from being hacked
(B) Files free from virus
(C) Files easily retrievable (D) Files are free to move
53. The system can manage files in:
(A) SSD (B) RAM (C) Flash drives (D) All above
54. We can identify a file type by its:
(A) Name (B) Size (C) Extension (D) Location
55. File which access by macros:
(A) FAT32 (B) NTFS (C) APFS (D) EXT4
56. Files commonly used in Linux:
(A) FAT32 (B) NTFS (C) APFS (D) EXT4

5. Describe any two responsibilities of operating system in multi-user environment.

Ans: **User Accounts:** The creation and management of separate user accounts.

Privacy: Keeps each user's files and information private.

6. How can we create a new user account in MS windows?

Ans: A new account can be created through the Settings or Control Panel

- Open Control Panel from windows setting.
- Select User Accounts
- Click on Add New User
- Entering details like username, password, and account type (Standard, Administrative, Guest).
- Click create

1.2

Architecture Of An Operating System

7. Differentiate between kernel and shell.

Ans:

Kernel	Shell
The kernel is the core part of the operating system	The shell is the desktop screen of the operating system
It directly controls the computer's system	It interacts with the user via pointing devices or keyboard
It decides how and when different	It receives commands from the user

16. Describe advantages of FCFS.

Ans: Advantages:

- Easy to understand and implement
- As processes are served in the exact order they arrive
- No process is skipped.

17. Describe dis-advantages of FCFS.

Ans: Disadvantages:

- Short processes may have to wait a long time if they are queued
- It can affect the overall efficiency of the system.

1.4

Memory

18. How memory of computer works? Write the names of its types.

Ans: Memory of a computer system used to store data and instructions required for processing. It ensures that the CPU can access information quickly during program execution. There are two types of memory used in computer:

1. Primary Memory
2. Virtual memory

19. Differentiate between primary memory and secondary memory.

Ans:

Primary Memory	Virtual Memory
Primary memory, also called Random Access Memory (RAM)	When the RAM is full, the operating system uses part of the computer's

- APFS / HFS+ - Used by macOS.
- EXT4 - Commonly used by Linux OS.

1.8**Types of Operating System**

30. Which operating system is not for general public and optimal for one task? Also define it.

Ans: An Embedded operating system is a small and highly efficient operating system built into a specific device to control only the functions it needs. It is not meant for general-purpose computing but is optimized for one task or a small set of tasks.

Example: It is used in home appliances (microwaves, washing machines), printers, smart TVs, and ATMs.

31. Describe the key features and applications of real time operating system.

Ans: Key Feature: It processes tasks immediately as they arrive, without long waiting times.

Applications: It is used in critical systems such as air traffic control, heart-monitoring devices, or industrial robots.

32. What is network operating system? Also write its applications.

Ans: A Network OS manages and supports multiple computers connected through a network. It enables the sharing of resources like files, printers, and internet connections among users like windows multipoint servers.

Application: It is used in Offices, schools, and data centers.

4. How is kernel different from shell.

Ans:

Kernel	Shell
The kernel is the core part of the operating system	The shell is the desktop screen of the operating system
It directly controls the computer's system	It interacts with the user via pointing devices or keyboard
It decides how and when different programs can use the system resources.	It receives commands from the user and passes them to the kernel

5. Give one example of a system library and its purpose.

Ans:

Example: The C Standard Library e.g., libc on Unix/Linux or the C Runtime Library on Windows.

Purpose: It provides a collection of pre-written, essential functions for common programming tasks, such as: Input/Output operation, memory management etc.

6. Explain one advantage and one disadvantage of FCFS scheduling.

Ans: Advantage:

Sequential Access: As processes are served in the exact order they arrive

Dis-advantage:

Waiting Queue: Short processes may have to wait a long time if they're queued

7. Why is virtual memory slower than RAM?

Ans: When several programs are open simultaneously, the operating system may transfer data from less active programs to virtual memory. This frees up space in RAM for

Virtual Memory:

- When the RAM is full, the operating system uses part of the computer's storage drive like Hard drives (HDD) or Solid-State drives (SSD), or Non-Volatile Memory Express (NVMe) as virtual memory.
- This extra space acts like temporary RAM.
- Allowing more programs to run at the same time.
- Storage drives operate at lower data transfer speeds and have higher access times as compared to RAM.

That's why the use of virtual memory can result in reduced system performance.

Multithreading:

Multithreading is an operating system technique that allows a single process to perform multiple tasks at the same time. In multithreading operating system dividing its work into smaller units called threads. Each thread runs independently but shares the same memory (RAM) and resources of the process. Multithreading enabling faster execution, better responsiveness, and efficient use of system resources.

Benefits of Multithreading:

- **Enhanced Performance:** All tasks can be divided into multiple threads and executed in parallel. It allowing complex operations to complete more quickly. It also improving overall system efficiency.
- **Improved Responsiveness:** Applications remain responsive even when one thread is busy with a specific task.

Example: A word processor enables continuous typing while another thread checks spelling in the background.

• **Support for Concurrent (parallel) Operations:** Multiple tasks can progress

**UNIT
2****System Recovery and
Advanced Maintenance****Student Learning Outcomes**

By the end of this chapter, you will be able to:

- Define post-troubleshooting maintenance and explain its role in preventing recurring system issues.
- Use Task Manager, Resource Monitor, and Event Viewer to monitor CPU, memory, and disk usage, and terminate unresponsive applications by reviewing system logs.
- Start Windows in Safe Mode and explain when this mode is useful.
- Create and use a restore point to return the system to a previous working state.
- Distinguish between System Restore and System Reset, and identify when to use each.
- Explain the purpose of bootable recovery media and when it is required.
- Create a bootable USB using Rufus or built-in Windows tools, choosing the correct partition style (GPT or MBR).
- Identify the differences between GPT and MBR and check a disk's partition style.
- Explain the role of BIOS and UEFI in system startup.
- Describe the Power-On Self-Test (POST) process and its importance.
- Access BIOS/UEFI settings to change boot order or reset defaults.

- **System Failures:**

If important system updates are not installed, the computer may stop working properly. It can freeze, crash, or fail to start.

- **Security Risks:**

When the system or apps are not updated, harmful software like viruses can enter the computer more easily.

- **Data Loss:**

Without backups, important files can be lost during crashes or hardware failure.

- **Hardware Damage:**

Dust and overheating can damage the hardware components if the system is not cleaned or properly ventilated.

Q.3. What is system health monitoring? Describe activities follow by different tools for health check? Also describe advantage of system health monitoring?

Ans:

For the smooth running of a system, it is important to check its performance regularly. This process is known as system health monitoring.

Health check activities by different tools:

Modern operating systems, such as Microsoft Windows, include built-in tools that help monitor system activity. These tools allow you to:

- **Memory Check:**

Program responses and Handling: Select a program from the processes tab of task manager and click End Task to close it if it is not working properly.

Background programs: View programs running silently in the background.

Performance tab: The Performance tab displays real time graphs and data showing how your computer is performing.

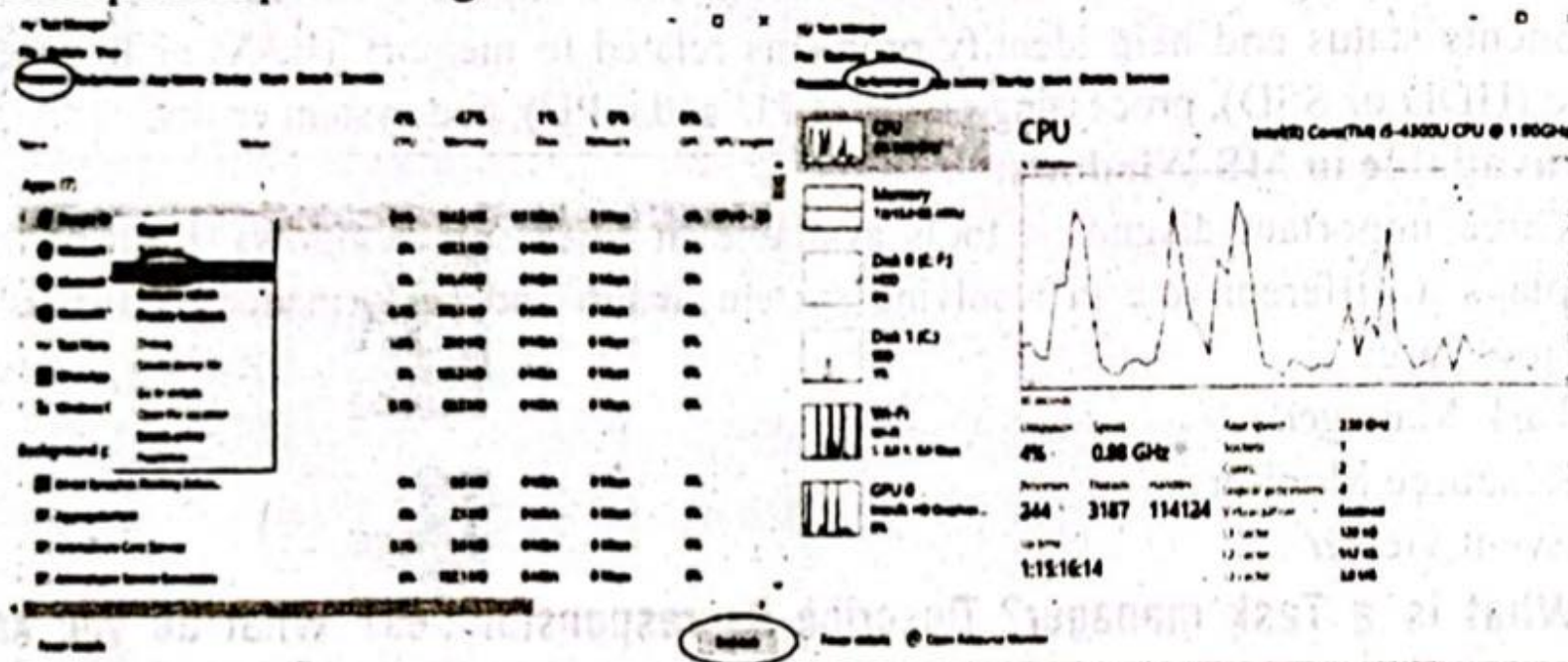


Figure 2.1: Task Manager Showing Active Processes and System Performance in Windows

Q.7. What is a resource monitor? Describe its responsibilities? Describe its advantages over task manager.

Ans:

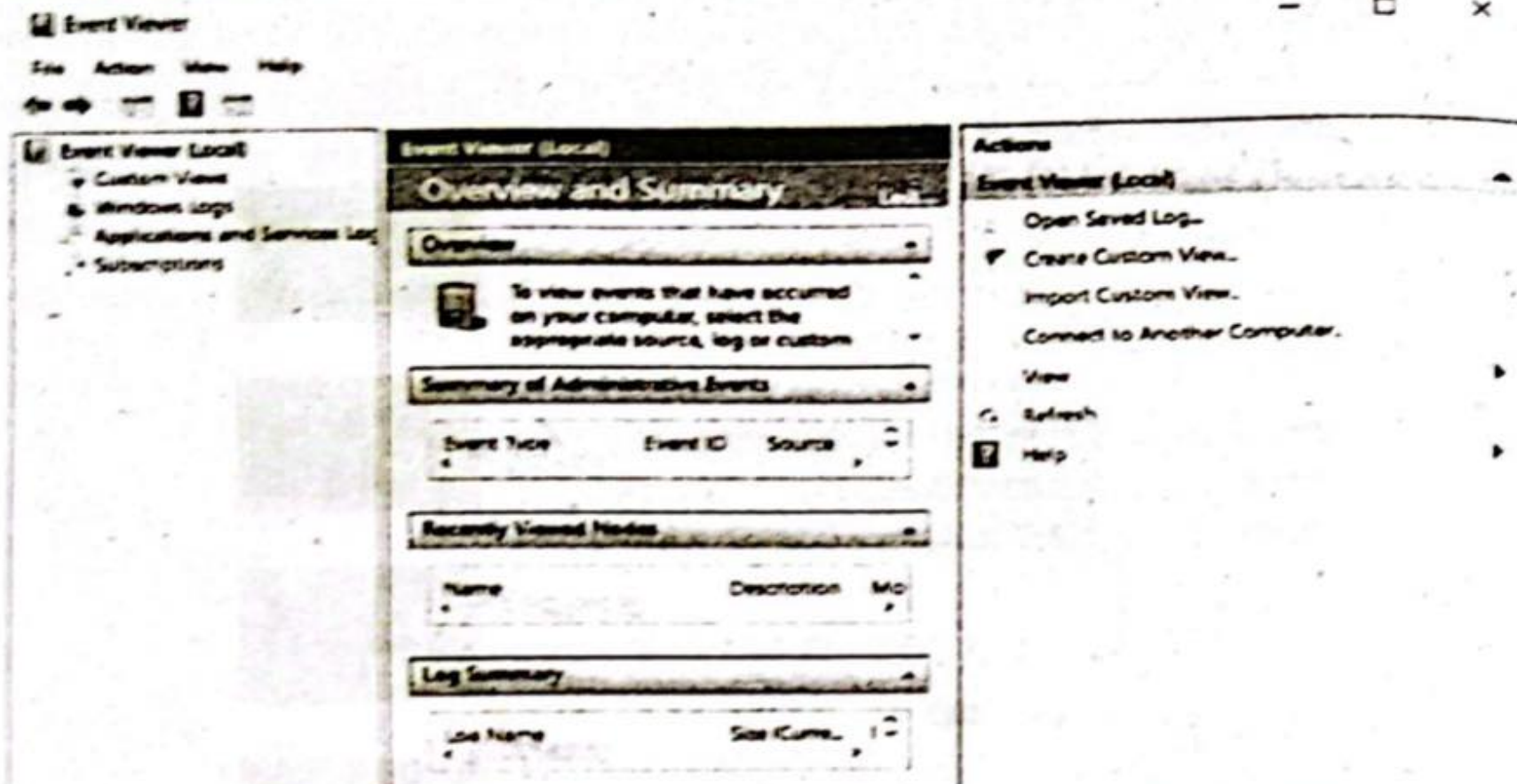


Figure 2.3: The Event Viewer to View Upcoming Events Related to System Maintenance

ACTIVITY

Objective: Use Task Manager to identify and end an unnecessary background program.

Steps:

1. Open Task Manager using Ctrl + Shift + Esc.
2. Go to the Processes tab.
3. Find a program running in the background that you are not using (e.g., Music app, update service).

Q.12. What is meant by system restore? What is restore point? Write down the steps to create and use restore point?

Ans:

System Restore allows a user to take his/her computer back to an earlier state when crashing or window corrupting issue arise. The big advantage is that it will not deleting personal files. It works by using restore points, which are saved versions of your system created before major changes.

Restore point:

A restore point is a saved setting of your system's programs and files. It helps you to return your computer to an earlier, working state, if something goes wrong, such as after installing a faulty program or driver. Restore points are made automatically before system updates or driver installations, or manually by the user when it is needed.

Steps to Create a Restore Point:

Follow these steps to create a restore point manually:

- Click the start button and open the control panel.
- Go to system and security option, then click system.
- On the left, click system protection.
- In the new window, under the system protection tab, click the create button.
- Type a name for your restore point
- click create.

Wait a few seconds for confirmation. Your restore point is now saved with your

SMART TIPS

If your computer uses GPT, but you create the USB in MBR format, it might not boot at all. The same happens if your system uses MBR and you use a GPT USB.

ACTIVITY**Objective:**

Learn how to create a bootable recovery drive using built-in Windows tools.

Requirements:

- A Windows 10 or 11 PC
- An empty USB drive (at least 16 GB)

Steps:

- I. Insert the USB into the computer.
- II. Press the Windows key, type Recovery Drive, and open it.
- III. Check "Backup system files to the recovery drive" and click Next.
- IV. Select your USB drive and click Next (Do not click "Create" in class unless permitted).

Answer the question: What does Windows say this recovery drive will help you with?

Solution:**Answer the question:**

Windows says that a recovery drive can help you troubleshoot and fix problems with your PC, even if it won't start. It allows you to access advanced startup options, system restore, and other recovery tools to restore your computer to a working state.

Q.17. What is boot order and boot repair? Describe the steps to change boot order?

Ans:

Boot order: Boot order means the sequence in which the computer looks for a device to load the operating system. For example, it may try the USB drive first, then the hard drive.

Boot repair: Sometimes the computer cannot start due to missing files or errors. This can be fixed by using Startup Repair from Windows recovery USB or DVD

Steps to change boot order:

- Enter BIOS/UEFI settings.
- Go to the Boot tab or menu.
- Move your desired device (e.g., USB) to the top of the list.
- Save changes and exit.

2.5

Data Recovery Techniques

Q.18. Describe data recovery tools and techniques used in MS Windows?

Ans: Sometimes, we delete files by mistake or lose them due to system problems. In many cases, it is possible to recover lost files using built-in tools or with the help of special third-party software. There are two main ways to recover deleted files:

- Using built-in tools.
- Using third-party software.

Built-in tools: These tools are already part of the windows operating system, which is why we call them built-in tools. In window, three built-in tools are available for data

ACTIVITY**Objective:**

To help students understand how file recovery works by using Tenor Share on a test file.

Steps:

1. Create a text file named "TestFile.txt" on the Desktop.
2. Delete it and empty the Recycle Bin.
3. Open Tenor Share → Select All Files → Choose Desktop as location.
4. Click Scan ? When the file appears, select and click Recover.
5. Save it to another folder (e.g., Documents).

Answer the questions:

1. Were you able to recover the file?
2. Why should you avoid saving new files to the same drive after deletion?

Solution:**Answer # 1:**

Yes, the file was successfully recovered in new location **C:\This PC\Documents** because it was deleted from desktop using Tenor Share and had not been overwritten by new data at new location.

Answer # 2:

Saving new files to the same drive can overwrite the space where the deleted file was stored, making recovery impossible. This reduces the chance of successfully restoring lost data.

Objective Type Questions

Additional MCQ's

Multiple Choice Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

Introduction

1. How can you define maintenance?
(A) Safe Mode Setting (B) Troubleshooting
(C) Security Checking (D) All above
2. What is the full form of UEFI?
(A) Unified External File Interaction (B) Unified Extensible Firmware Interface
(C) Unified Extensible File Interface (D) Unified External Firmware Interface
3. Which of the following is not included in System Maintenance?
(A) Disk Cleanup (B) Virus Scan (C) Windows Installation (D) Updates
4. System Recovery is done using ____ device?
(A) CD (B) USB Flash Drive (C) SSD (D) All above

2.1

Introduction to Post Troubleshooting

5. Post troubleshooting means:
(A) Identify Problem (B) Check Connectivity
(C) Learn what action is taken (D) Complete the troubleshooting

26. Which key feature display free or reserved memory?
(A) CPU Tab (B) Memory Tab (C) Disk Tab (D) Network Tab
27. Which Tab responsible for reading or writing from hard drive in R.M [Resource Monitor]?
(A) CPU Tab (B) Network Tab (C) Disk Tab (D) Memory Tab
28. Detailed logs of system is monitored by:
(A) Event Viewer (B) Resource Monitor
(C) Control Panel (D) Task Manager
29. Which short key is used to open Run command in Windows?
(A) Alt + R (B) Ctrl + R (C) Shift + R (D) Window + R
30. Important activities related to security monitored by:
(A) Resource Monitor (B) Control Panel
(C) Event Viewer (D) Task Manager
31. Which keyword is used to open Event Viewer?
(A) resmon (B) %temp% (C) recent (D) eventvwr

2.3**System Recovery Options**

32. When it is necessary to open fewer programs & files, window used?
(A) Task Manager (B) Resource Monitor
(C) Event Viewer (D) Safe Mode
33. Which option in Windows use to open & set safe mode?
(A) Updates & Security (B) Start Menu

2.6 Best Practice for Preventive Maintenance

57. Which tool help to remove file safely?
(A) Recycle Bin (B) File History (C) Disk Cleanup (D) Disk Manager
58. Which of the following is a temporary file?
(A) Windows updates (B) Recover files
(C) Virus scan files (D) System cache
59. Software updates are also know as:
(A) Cache files (B) Temporary files (C) Patches (D) Latches

2.7 System Documentation and Logs

60. Keeping important records is important because:
(A) Installing software (B) Fixing issues
(C) Performing updates (D) All above

Answers

- | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|
| 1. D | 2. B | 3. C | 4. B | 5. C | 6. A | 7. B |
| 8. D | 9. B | 10. C | 11. D | 12. C | 13. B | 14. C |
| 15. A | 16. D | 17. C | 18. B | 19. A | 20. B | 21. A |
| 22. C | 23. D | 24. C | 25. B | 26. B | 27. C | 28. A |
| 29. D | 30. C | 31. D | 32. D | 33. A | 34. C | 35. B |
| 36. C | 37. D | 38. B | 39. C | 40. D | 41. C | 42. A |
| 43. C | 44. A | 45. B | 46. D | 47. A | 48. B | 49. A |

Program responses and Handling:

Select a program from the processes tab of task manager and click End Task to close it if it is not working properly.

11. What is resource monitor describing its responsibilities?

Ans: Resource Monitor is an advanced system tool in Microsoft Windows that gives a deeper view of how your computer's resources (memory, CPU, and disk) are being used.

Responsibilities:

While Task Manager gives a quick overview, Resource Monitor provides more detailed information about which programs and background services are using system resources

12. Write down the procedure to open resource monitor.

Ans: There are two common ways to open Resource Monitor:

- Open Task Manager, go to the Performance tab, and click on Open Resource Monitor at the bottom.

OR

- press the shortcut key Windows + R, type the command resmon in the dialog box that appears, and press Enter

13. Explain any two key features of resource monitor.

Ans: Some key features of the resource monitor are listed below:

- **CPU Tab:**

Shows which processes and services are using the processor.

- **Memory Tab:**

24. Explain any two built-in recovery tools used in MS Windows.

Ans: After starting the system, you can use built-in recovery tools such as:

Startup Repair: It is used to fix problems that prevent Windows from loading.

System Restore: To go back to a working state using a restore point

25. When we use bootable recovery media?

Ans: We use this media in such cases where the system:

- Safe Mode is not accessible
- You need to repair or reinstall the operating system

26. Write down the procedure to check the partitioned style.

Ans: To check the Partition Style, you need to:

- Press Win + X and select **Disk Management**.
- Find the drive where Windows is installed (usually Disk 0).
- Right-click on the disk label (e.g., Disk 0), then choose **Properties**.
- Go to the **Volumes** tab.

Look at Partition Style:

It will show either:

- GUID Partition Table (GPT)
- Master Boot Record (MBR)

2.4

BIOS/UEFI and Process Awareness

27. What is a boot process and firmware?

Ans: Boot Process: When a user press the power button of his/her computer, several hidden steps take place before the desktop of operating system appears on the

in the future. These tasks can improve your computer's speed, keep it secure, and help it last longer. Just like we take care of our health or maintain our vehicles, computers also need regular attention to keep working properly.

37. Define disk cleanup.

Ans: Disk Cleanup is a built-in Windows tool that helps remove unnecessary files such as temporary internet files, system cache, Windows update files, and items in the Recycle Bin. These files take up space and may slow down system performance.

38. What is software update? Describe the method to check system update.

Ans: Software updates, also known as patches, are released regularly by developers to fix bugs, add features, and improve security. Keeping your system updated helps to protect it from viruses and security threats.

Method to check for updates in Windows:

- Open Settings > Update & Security.
- Click Check for updates.
- Install the updates if available.

39. What are the responsibilities of window's defender?

Ans: Windows Defender also provides real-time protection, which means it keeps watching your system in the background and alerts you if anything suspicious happens.

2.7

System Documentation and Logs

40. Why keeping maintenance calendar is important?

Ans: Keeping maintenance calendar:

4. What happens during the Power-On Self-Test (POST)?

Ans: POST stands for Power-On Self-Test. It is the first thing the firmware does after the computer is turned on.

Importance:

POST checks the most important hardware to make sure everything is working properly. If all parts are fine, the computer continues to load the operating system. If something is wrong, it may beep or show an error message on the screen.

5. Why is the boot order setting important when using recovery tools from a USB drive?

Ans: Boot order means the sequence in which the computer looks for a device to load the operating system. If the boot order setting is not set the operating system does not get started and display the message "No bootable storage media found".

6. List the two benefits of running regular disk cleanup.

Ans: Improve efficiency:

This task can improve your computer's speed and performance.

Security: Using disk cleanup, you can keep secure of your system from unnecessary corrupted files

7. How does Windows Defender help in maintaining system health?

Ans: Windows Defender helps maintain system health by constantly scanning and removing viruses and malware. It also protects your computer from harmful

3. Briefly explain any two preventive maintenance techniques that help to keep a computer running smoothly.

Ans: Boot Process:

When a user press the power button of his/her computer, several hidden steps take place before the desktop of operating system appears on the screen. This process is known as boot process. By default in every operating system boot process is gone through internal storage drive either it is HDD or SSD.

Firmware:

All computers have special software built into the motherboard called firmware. It is not stored on the hard drive and does not get deleted when the computer is turned off. Firmware gives the computer basic instructions on how to start.

Types of Firmware:

Two common types of firmware are:

BIOS: Older firmware software shows a basic, text-only menu and works with the keyboard only.

UEFI: Newer type of firmware software, supports a graphical menu that uses both mouse and keyboard, and larger hard drives

Post Test:

POST stands for Power-On Self-Test. It is the first thing the firmware does after the computer is turned on.

Importance:

POST checks the most important hardware to make sure everything is working

computer how to perform a task. These instructions are written in a programming language that the computer can understand and execute.

Example: Installing mobile app from play store when we click on install button of any mobile app, we give clear and precise instructions to the computer to perform specific tasks.

TOOL TIP

When installing Python, make sure to check the box that says "Add Python to PATH." This makes it easier to run Python from the command line. We can also use online services to write and run Python program.

Q.3. What is setting up python development environment? Also describe the procedure to set python IDE?

Ans: The development environment refers to the process of preparing a computer to write, run, and debug Python code effectively. This involves installing and configuring the necessary software, tools, and libraries that make development smoother and more efficient. We can download and install Python from <https://www.python.org/>

1. **Download Python:** Visit <https://www.python.org/> Navigate to the "Downloads" section and click on the latest version of Python (e.g., Python 3.13.x) for your operating system (Windows, macOS, or Linux).

4. Testing the configuring:

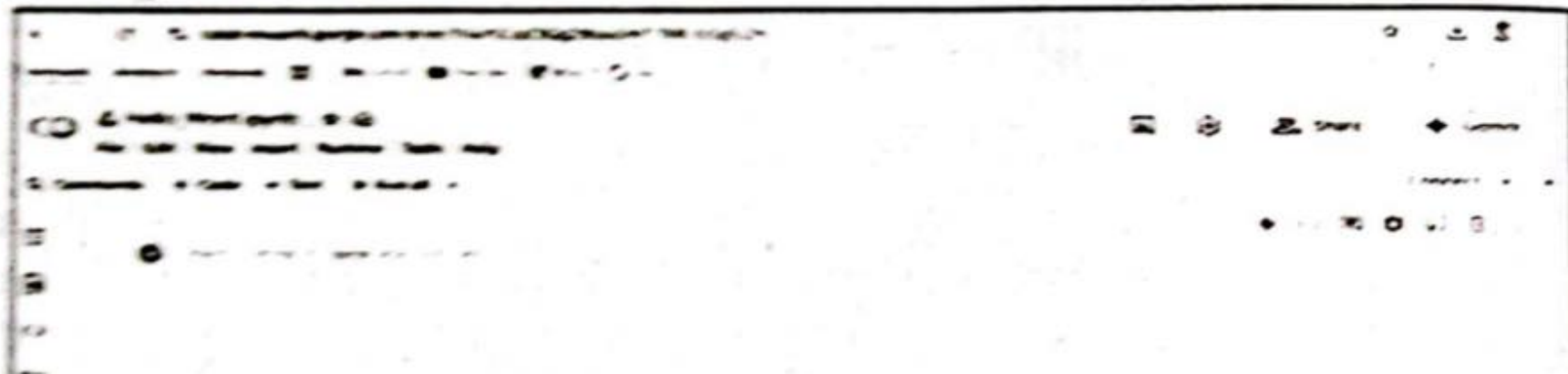
- Create a new file (e.g., test.py) in your IDE.
- Write a simple script: `print("Hello, Python!")`.
- Run the script (use the "Run" button in PyCharm/IDLE or F5 in VS Code after setting up a task).
- If the output appears (e.g., "Hello, Python!"), your IDE is correctly configured.

Q.4. What is google colab? Also write the method to use google colab

Ans: Another excellent option for using Python is Google Colab. It is a free cloud-based platform that provides a Jupyter notebook environment with pre-installed Python and popular libraries like NumPy, Pandas, and Matplotlib.

How to use google colab:

To get started, visit <https://colab.research.google.com/>, sign in with a Google account, and create a new notebook. No local installation is required, making it ideal for beginners or those working on machines with limited resources. You can write and execute Python code in cells.



Variable Naming Rules in Python:

Variable names in Python must adhere to the following rules:

Starting:

The name must begin with a letter (a-z, A-Z) or an underscore (_).

Subsequent characters:

Subsequent characters can include letters, digits (0-9), or underscores (_).

Variable names:

Variable names are case-sensitive, meaning age and Age are considered two different variables.

Reserved Words:

Python's reserved keywords, such as for, while, if, etc., cannot be used as variable names.

DO YOU KNOW

Following are some of the reserved words in Python:

- if, else, elif, for, while, break, continue, and, or, not, in, is, True, False, None.
- We cannot use them as a variable name.

Q.8. Describe the types of variables used in python.**Ans: Types of variables:**

In Python, you can create variables of different types to store various kinds of data. Here are some common types of variables:

- Integer (int):

DO YOU KNOW

In Python indentation defines structure and scope of your code. Incorrect indentation may cause errors in your code.

3.3**Operators and Expressions**

Q.11. Define operator and expression. Also explain types of operators in detail.

Ans: Operators:

Operators are the symbols which are used to perform different operations on operands.

Expression: An expression is a combination of operators, operands and values to produce the results.

Types of Operators:

Arithmetic Operators: Arithmetic operators are used to perform basic mathematical operations such as addition, subtraction, multiplication, division, modulus, exponentiation, and floor division.

Example:

Define variables

a = 10

b = 3

Perform all arithmetic operations on these numeric variables and print results

print(a, "+", b, "=", a + b) # Output: 10 + 3 = 13

starts by assigning a value to a variable "a". It then demonstrates various assignment operations including addition, subtraction, multiplication, division, floor division, modulus, and exponentiation. Each operation updates the value of "a" and the results are printed with the updated values. The code comments show the output of each operation.

Logical Operators:

Logical operators are used to combine multiple conditions or expressions. The most common logical operators are "and", "or", and "not"; they are used to perform logical operations and return Boolean values based on the evaluation of the expressions involved.

Example:

Define variables

```
x = True
```

```
y = False
```

Logical AND

```
logical_and = x and y
```

```
print(x, "and", y, "=", logical_and)
```

Output: True and False = False

Logical OR

```
logical_or = x or y
```

```
print(x, "or", y, "=", logical_or)
```

Output: True or False = True

Logical NOT

```
logical_not_x = not x
```

```
print("not" x, "=", logical_not_x)
```

Output: not True = False

Objective Type Questions

Additional MCQ's

Multiple Choice Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

Introduction

1. Python is popular due to:
(A) Simplicity (B) Readability (C) Easy understanding (D) All above
2. Finding problems in Python code is called:
(A) Test (B) Debug (C) Checking (D) None of them

3.1

Introduction to Python Programming

3. As compare to other languages Python is:
(A) More complex (B) Easy to Debug
(C) Quickly to Execution (D) Efficient Language
4. Why python more successful now a days?
(A) It is easy to understand (B) Difficult to handle complex problems
(C) Versatile applications (D) Professional Language
5. Which of the following Python Programming have?

29. A variable can have alphabets, digits and ____:
(A) symbol (B) characters (C) reports (D) underscore
30. In Python programming age and Age are:
(A) Two different variable (B) Two same variables
(C) Consume same memory (D) Have different data type
31. In input function, if data-type of variable is not mentioned, then Python considered it as ____ type?
(A) int (B) float (C) string (D) bool
32. Which of the following is an output function?
(A) print() (B) input() (C) int() (D) float()
33. To handle numeric input we use:
(A) int() (B) float() (C) Both a, b (D) None of them

3.3**Operator & Expressions**

34. Guess the output of $10 \% 3$?
(A) 0 (B) 3 (C) 1 (D) 10
35. Symbol of integral division:
(A) / (B) // (C) % (D) **
36. Which of the following is a power operator?
(A) / (B) // (C) % (D) **
37. Comparison operator gives answer in:
(A) Integer form (B) Exponential form

- Select "Install Now" or customize the installation if needed (e.g., choose the installation directory).
 - Wait for the installation to complete, then click "Close".
7. Define google colab.

Ans: It is a free cloud-based platform that provides a Jupyter notebook environment with pre-installed Python and popular libraries like NumPy, Pandas, and Matplotlib.

8. How google colab is used online?

Ans: To get started, visit <https://colab.research.google.com/>, sign in with a Google account, and create a new notebook. No local installation is required, making it ideal for beginners or those working on machines with limited resources. You can write and execute Python code in cells.

3.2

Basic Python Syntax and Structure

9. Explain the basic python syntax and structure.

Ans: Python language is popular due to its simplicity and readability. Look at the following example:

```
print("Hello! World")
```

Explanation: In this example, the print function is utilized to output the message enclosed in double quotation marks. This illustrates Python's straightforward syntax, where functions like print are used to perform actions, such as displaying text.

10. Define single line comment with example

3.	What will be the output of: print(10 // 3)?	(a) 3.333 (b) 3 (c) 1 (d) 4
4.	What is the data type of variable x in x = "123"	(a) Integer (b) Float (c) String (d) Boolean
5.	Which operator has the highest precedence in Python?	(a) Addition (+) (b) Multiplication (*) (c) Exponentiation (**) (d) Parentheses ()
6.	What is the result of 5 > 3 and 2 < 1?	(a) True (b) False (c) Error (d) None
7.	What does the += operator do?	(a) Adds two numbers (b) Compares values (c) Adds and assigns (d) Multiplies values
8.	What is the output of the below code? age = 25; print("Age : ", age)	(a) Age: 25 (b) 25 (c) Age (d) age
9.	Which symbol is used for comments in Python?	(a) // (b) /* (c) # (d) --

Answers

1.	(d)
2.	(c)
3.	(b)
4.	(c)
5.	(d)
6.	(b)
7.	(c)
8.	(a)
9.	(c)

Short Questions

1. Why are comments important in programming?

Ans: Comments are important because:

- They help us to understand the logic of our code to other users.
- They help us to understand our own code after the years of writing it.

2. Discuss three basic data types in python.

Ans:

- **Integer (int):**

This data type is used to store whole numbers.

Example: age = 17

- **Floating-point (float):**

This data type is used to store decimal numbers.

Example: Price = 19.99

- **String (str):**

It is the default data type used in python. This data type is used to store text.

Example: name = "Ali"

3. Describe the difference between integer and float data types in python.

Ans:

Integer Data Type	Float Data Type
Represents whole numbers (positive, negative, or zero)	Represents real numbers that require a decimal point or are expressed in exponential form.

4. Explain how comparison and logical operators work together in conditional statements. Provide a practical example

Ans: For Answer See Q No. 11.

5. Write a program in python that will take a name from user and display greeting message to the given name.

Ans: Code:

```
# Program to take user's name and display a greeting message
```

```
# Taking input from the user
```

```
name = input("Please enter your name: ")
```

```
# Displaying the greeting message
```

```
print("Hello, " + name + "! Welcome to Python programming.")
```

6. Write a program in python that takes two numbers from user and display their sum.

Ans: Code:

```
num1 = input("Enter first number: ")
```

```
num2 = input("Enter second number: ")
```

```
print("The sum is: " + num1 + num2)
```

7. Write a program in python that five numbers from user and display their sum.

Ans: Code:

UNIT**4****Control Structures in Python****Student Learning Outcomes**

By the end of this chapter, you will be able to:

- Implement control structures such as decision-making statements and loops in Python.
- Work with Python modules, functions, and built-in data structures like lists.
- Apply modular programming techniques and object-oriented programming concepts in Python.
- Handle exceptions, perform file operations, and apply testing and debugging techniques in Python.

Subjective Type Questions

Long Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

Introduction

Q. Describe the importance of control structure.

Ans: In programming, we often need to control the flow of our program based on

else:

```
print("It's not a hot day")
```

Output: It's not a hot day

Q.4. Define Nested condition with its syntax? Write an example.

Ans:

Sometimes, we need to check multiple conditions inside another condition. This is called nesting.

So, if statement with the body of another if statement is called nested if. This structure is used to apply complex multiple conditions.

Syntax of nested if statement:

if condition1:

 if condition2:

 code to run if both condition1 and condition2 are true

 else:

 code to run if condition1 is true but condition2 is false

else:

 code to run if condition1 is false

Example: If the weather is rainy and the temperature is below 15 degrees, we wear a raincoat. If it is only rainy, we take an umbrella. If the weather is not rainy, we just enjoy the day.

Code:

```
weather = "rainy"
```

```
temperature = 10
```


Syntax of range function:`range(start)``range(start, stop)``range(start, stop, step)`**Example: Print First 5 Whole Numbers.**

```
for i in range(5):
```

```
    print(i)
```

Output:`0``1``2``3``4`**End Statement:**

In Python, the end statement is not a separate command, but rather an optional parameter of the `print()` function. By default, every `print()` in Python ends with a newline character, but you can change what gets printed at the end using the end parameter.

Example 1: Print two Strings on same line using "end" statement.**Code:**

```
print("Azhar Shah", end=" ")
```

```
print("Ahsan")
```



```
i=2, j=0
```

```
i=2, j=1
```

```
i=2, j=2
```

```
i=2, j=3
```

```
---
```

Example 2: Nested loops to print stars (asterisk) in Triangular Pattern

Code:

```
print("=== Right-Angled Triangle ===")
```

```
n = 5
```

```
for i in range(1, n+1):
```

```
    for j in range(i): # Inner loop runs 'i' times
```

```
        print("*", end=" ")
```

```
    print() # New line after each row
```

Output:

```
*
```

```
* *
```

```
* * *
```

```
* * * *
```

```
* * * * *
```

4.3

Libraries in Python

Q.9. What is a data structure and Library in python? Apply different libraries used

Example: Access and print the second item from the list of fruits.

Code:

```
fruits = ["Mango", "Apple", "Banana"]  
print(fruits[1])
```

Output:

Apple

Explanation: The code initializes a list 'fruits' containing 'Mango', 'Apple', and 'Banana', then prints the second item, 'Apple', using the index '1'.

Modifying a List:

You can modify list items by accessing them via their index and assigning a new value.

Example: Change the first item in the list to "Orange" and add a new fruit "Pineapple".

Code:

```
fruits = ["Mango", "Apple", "Banana"]  
fruits[0] = "Orange"  
fruits.append("Pineapple")  
print(fruits)
```

Output:

['Orange', 'Apple', 'Banana', 'Pineapple']

Explanation: The code modifies the first element of the fruits list to 'Orange'. It then

Example: Sort a list of numbers in ascending order.

Code:

```
numbers = [34, 12, 89, 5, 23]
```

```
numbers.sort()
```

```
print(numbers)
```

Output:

```
[5, 12, 23, 34, 89]
```

Explanation: The code creates a list of numbers, sorts them in ascending order using the `sort()` method, and prints the sorted list.

4. `reverse()` function;

This operation is used to reverse the order of items of a list

Example 4: Reverse the order of fruits in a list.

Code:

```
fruits = ["Apple", "Banana", "Orange", "Mango"]
```

```
fruits.reverse()
```

```
print(fruits)
```

Output:

```
['Mango', 'Orange', 'Banana', 'Apple']
```

Explanation: The code creates a list of fruits, reverses the order of elements using the `reverse()` method, and prints the reversed list.

2. Repetition structure is also called:

- (A) iteration (B) loop (C) Both a, b (D) None

4.1**Decision Making**

3. How many Types of conditional statement?

- (A) 1 (B) 2 (C) 3 (D) 4

4. Decision making allow programmer to choose different action based on:

- (A) Condition (B) Expression (C) Evaluation (D) Loop

5. Output of if (5 > 7): is using if statement structure:

- (A) True (B) False (C) No output (D) Yes

6. In Python _____ define structure or block of your code:

- (A) syntax (B) operator (C) Block (D) Indentation

7. If incorrect indentation exist it may cause?

- (A) Logical Error (B) Syntax error (C) Runtime Error (D) Logical Error

8. Syntax of if statement:

- (A) if condition then: Block (B) if condition: Block
(C) if block: condition (D) if condition do: Block

9. The else keyword is used to display:

- (A) True statement (B) False statement
(C) Parallel to it (D) Perpendicular to it

10. Output of if temp > 30 is:

- (A) True (B) False (C) Error (D) 30

11. In Python int() is a:

35. **Randint()** is a:
(A) Function (B) Library (C) Modulus (D) compiler
36. **Statistics.mean(data)** in this line of code **data** is a:
(A) Function (B) Library (C) List (D) Array

4.4

List in Python

37. **List** is a:
(A) Array (B) Function (C) Modulus (D) Data Structure
38. **List** can contain:
(A) Same items (B) Single items (C) different items (D) None of them
39. In a **List**, every element have:
(A) index (B) value (C) access (D) position
40. In a **List** starting index number is:
(A) 1 (B) 2 (C) 0 (D) -1
41. We can access element in a by its:
(A) value (B) Name (C) index (D) All
42. Which function is used delete elements from **List**?
(A) **append()** (B) **remove()** (C) **sort()** (D) **reverse()**
43. Which function is used to arrange items in a specific order?
(A) **append()** (B) **remove()** (C) **sort()** (D) **reverse()**
44. Which function is used to add element in **List**?
(A) **append()** (B) **remove()** (C) **sort()** (D) **reverse()**

5. What is the limitation of if statement?

Ans: if statement shows output if the certain condition becomes true if the condition becomes false nothing will displayed on the screen.

6. Write the syntax of if-else statement.

Ans:

if condition:

code to run if the condition is true

else:

code to run if the condition is false

7. Define Nested if.

Ans: if statement with the body of another if statement is called nested if. This structure is used to apply complex multiple conditions.

Syntax of nested if statement:

if condition1:

if condition2:

code to run if both condition1 and condition2 are true

else:

code to run if condition1 is true but condition2 is false

else:

code to run if condition1 is false

4.4

Lists in Python

16. Explain creating a list.

Ans: A list is created by placing items inside square brackets [], separated by commas. Lists can contain items of different types, such as numbers, strings, or even other lists.

Example: Create a list of your favorite fruits.

Code:

```
fruits = ["Mango", "Apple", "Banana"]  
print(fruits)
```

Output:

```
['Mango', 'Apple', 'Banana']
```

17. Describe modifying a list element.

Ans: You can modify list items by accessing them via their index and assigning a new value.

Example: Change the first item in the list to "Orange" and add a new fruit "Pineapple".

Code:

```
fruits = ["Mango", "Apple", "Banana"]  
fruits[0] = "Orange"  
fruits.append("Pineapple")  
print(fruits)
```

Output:

```
['Orange', 'Apple', 'Banana', 'Pineapple']
```


9. The type of testing which checks how different parts of the code work together is:
- (a) Unit testing (b) Integration testing
(c) Functional testing (d) Regression testing
10. Which debugging technique involves adding output statements?
- (a) Unit testing (b) Print statements
(c) Error messages (d) Integration testing

Answers

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (b) | 2. (c) | 3. (b) | 4. (b) | 5. (c) |
| 6. (a) | 7. (c) | 8. (b) | 9. (b) | 10. (b) |

Short Questions

1. Explain the use of range() function in for loop?

Ans: We can use the range() function to generate a sequence of numbers, which is often used in for loops.

Example: Print First 5 Whole Numbers.

```
for i in range(5):  
    print(i)
```

2. What is the difference between append and remove methods in Python list?

Ans: append() function:

This operation add new item at the end of the list.

Example: Add a new student to the list of students and print the list.

Output:

77

11. How do you modify an existing item in a list?

Ans: You can modify list items by accessing them via their index and assigning a new value.

Example: Change the first item in the list to "Orange" and add a new fruit "Pineapple".

Code:

```
fruits = ["Mango", "Apple", "Banana"]  
fruits[0] = "Orange"  
fruits.append("Pineapple")  
print(fruits)
```

Output:

['Orange', 'Apple', 'Banana', 'Pineapple']

Long Questions

1. Explain the different types of decision-making statements in Python with examples for each.

Ans: Decision making in programming allows the program to choose different actions based on conditions. This is similar to how we make decisions in real life.

Types of Decision statements:

- if statement
- if else statement

if Statement:

4. **Explain the Importance of testing and debugging in programming. Discuss different debugging techniques.**

Ans: Testing is the process of running your code with various inputs to check if it behaves as expected. The goal is to find and fix any issues before the code is used in real-world applications.

Debugging is the process of finding and fixing errors (bugs) in your code. It involves identifying the root cause of problems and making the necessary changes.

Common Debugging Techniques:

- **Print Statements:** Adding print statements to check the values of variables at different stages of the code.
- **Debugging Tools:** Using tools like pdb (Python Debugger) to step through the code, inspect variables, and understand the flow of execution.
- **Error Messages:** Reading and interpreting error messages to locate the source of the problem.

5. **How do Python libraries enhance programming efficiency? Provide an example.**

Ans: Code:

For Answer See Q No. 9.

6. **Write a Python program using a loop that prints all the odd numbers between 1 and 20.**

Ans: Code:

Print odd numbers using step parameter

UNIT

5

Data Science

Student Learning Outcomes

By the end of this chapter, you will be able to:

- Explain the concept and importance of data science in everyday life.
- Describe each step in the Data Science Life Cycle (DSLCL).
- Identify and define real-world problems that can be solved using data.
- Collect data using surveys, online forms, and observational techniques.
- Perform data cleaning and validation to improve accuracy.
- Use simple SQL queries (SELECT, INSERT) to retrieve and store data from databases.
- Analyze data using basic algorithms (sorting, classification, clustering).
- Create bar charts and dashboards to visually represent data insights.
- Communicate results clearly using charts and written summaries.

 Subjective Type Questions

Long Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

- Analyzing Data
- Interpreting Data
- Visualizing and Communication Results

Q.4. Explain Understanding the problem in DSLC?

Ans:

Understanding the problem is the most important step in DSLC. Before we start talking about collecting data, it is necessary to clearly understand the problem under consideration. In case, we do not understand the problem properly, we may collect the wrong data resulting in useless or wrong results. In this initial step, we need to ask questions such as:

- What are we trying to find out?
- Why is this problem important?
- Who will use the results?

Sub-sections of Understanding the Problem:

Identifying and Defining a Problem:

First, we need to identify a problem that we want to solve using data. The problem can be related where decisions are made based on information. Once a problem is identified, then we must define it clearly and simply. When defining a problem, we need to consider the following:

- (i) Use clear and simple words

Example:

To find out which sports students enjoy, we can create a survey with questions using Google form and share its link with students for response.

DO YOU KNOW

Surveys can be done using Google Forms (online), and Printed paper forms (manual).

APIs and Online Sources:

Application Programmer Interface (APIs) allow software collect data from websites or applications (apps in short) automatically.

Example:

A school may use an attendance API to pull daily attendance data into a report.

IoT and Sensor Data:

Internet of Things (IoT) devices like smart watches, water dispensers, or temperature sensors can automatically collect data.

Example:

To study water drinking habits, schools can place smart water meters near fountains.

TIDBIT

IoT devices are useful in Health, safety, and environmental monitoring.

Web Scraping:

Data Validation Techniques:

Data validation means checking if the data:

- (i) Follows correct rules (e.g., only valid sport names)
- (ii) Has the right type of values (e.g., numbers where numbers are expected)
- (iii) Is not fake or silly.

Example Validation Rule:

Only allow one of these values for "Favorite Sport": Football, Cricket, Badminton, Hockey.

Data Cleaning Methods:

Once we find mistakes, we need to fix or remove them. This is called data cleaning. The following are a few basic steps to clean data:

- Fix spelling errors: "Footbell" → "Football"
- Standardize formats: "CRICKET" → "Cricket"
- Remove duplicates (redundancy): Delete repeated entries for the same student.
- Handle missing values: Ask the person again OR remove the row.
- Fix invalid data: If frequency is written as "ten hundred", fix it or remove it.

Q.8. Explain Analyzing Data? Describe simple tools for analysis?

Ans:

Now that our data is collected, and cleaned properly, we can move on to the analysis steps. This is where we look at the data to find patterns, trends, and answers to the questions. Analyzing data means carefully examining data to (i) Summarize it, (ii) Compare different groups, (iii) Find patterns.

5.3

Tools for Visualization

Q.10. Describe tools for visualization? Write down the procedure to draw a chart?

Ans:

Once you know which type of chart to use, the next step is to create it using tools. In this step, we create charts make it easier to understand and present data. It is easy to create chart and graphs using specific softwares.

Google Sheets and Microsoft Excel are simple yet powerful tools to create charts and graphs from tables.

Steps to Create a Chart in Google Sheets:

- i. Enter your data into rows and columns.
- ii. Select the data range.
- iii. Click on the "Insert" menu ? choose "Chart."
- iv. Pick the chart type (bar, pie, line).
- v. Customize the chart with a title, label, and color.

Advantages of Spreadsheet software:

We make use of spreadsheets because they are:

- (i) Easy to use
- (ii) No installation needed (for Google Sheets)
- (iii) Good for small to medium-sized projects.

Frequency or No. of Students

- **INSERT INTO Sports (Name, Favorite_Sport) VALUES ('Ali', 'Football');**

This query adds a new entry.

These basic SQL statements help in managing and retrieving specific data from large databases efficiently.

REMEMBER

1. Data should be stored in a structured way for easy access and analysis.
2. **Spreadsheets** are useful for small datasets.
3. **Databases** are used for bigger and more complex data.
4. A **table** stores data using **records (rows)** and **fields (columns)**.
5. Organized data reduces duplication errors and makes analysis easier.

Objective Type Questions

Additional MCQ's

Multiple Choice Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

Introduction

1. **Purpose of data Science:**

(A) Represent data in Formal way

(B) Convert data into information

(C) Both a, b

(D) None of them

22. Which allow software to collect data from websites or applications?
 (A) Surveys (B) IoT & Sensor Data
 (C) APIs (D) Web scraping
23. IoT is useful in:
 (A) Transportation (B) Health and safety
 (C) Education (D) online shopping
24. Public data collection method is:
 (A) Surveys (B) IoT & Sensors (C) Web scraping (D) APIs
25. Data only shows part of truth and miss the full picture:
 (A) Incomplete (B) Bias (C) Reliable (D) relevant
26. Raw data is often:
 (A) Messy (B) Incomplete (C) Irrelevant (D) All above
27. Data Validation is important for:
 (A) Cleaning (B) Arrangement (C) Analysis (D) Relevant
28. Data which has not been checked or cleaned:
 (A) Raw Data (B) Reliable Data (C) Relevant Data (D) Complete Data
29. How many types of common Data Errors?
 (A) 1 (B) 2 (C) 3 (D) 4
30. How many type of Data validation techniques are there?
 (A) 1 (B) 2 (C) 3 (D) 4
31. _____ tool help to validate data:
 (A) Ms word (B) Ms-Excel (C) Google sheet (D) Both b. c

Additional Short Question's

Short Answer Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

Introduction

1. Define Data Science.

Ans: Data science is the process of using data to understand problems, discover patterns, and make smart decisions.

Example: Daraz online shopping app use data science to increase their sales.

2. Why data science is important?

Ans: Data Science helps us turn this raw data into useful information. Whether it is predicting weather, understanding interests of students, or improving healthcare, Data Science is transforming the way we live, learn, and work.

3. How data science techniques used by business organizations?

Ans: Organizations across the whole world use data to improve:

- Decision-making
- Save costs
- Create better services.

4. Write down the names of steps of DSLC.

Ans: Data Science life Cycle include:

13. What are the advantages of clear understand a problem?

Ans:

- Good defining problems are solvable using data.
- Clear objectives help in collecting the right data and reaching useful results.

14. Define data collection and name the steps of data collection methods.

Ans: Data is like raw material, and we must gather the right kind of data before we can clean, store, or analyze it.

Data Collection Methods:

- Survey
- APIs and online source
- IoT and Sensors
- Web scraping

15. Define surveys with example.

Ans: Surveys are the easiest and most common method. We ask people questions and record their answers.

Example:

To find out which sports students enjoy, we can create a survey with questions using Google form and share its link with students for response.

16. What is the purpose of APIs and online sources?

Ans: Application Programmer Interface (APIs) allow software collect data from websites or applications (apps in short) automatically.

Example:

A school may use an attendance API to pull daily attendance data into a report.

5.3

Tools for visualization

28. Write down the steps to create a chart using google sheet.

Ans: Steps to Create a Chart in Google Sheets:

- i. Enter your data into rows and columns.
- ii. Select the data range.
- iii. Click on the "Insert" menu → choose "Chart."
- iv. Pick the chart type (bar, pie, line).
- v. Customize the chart with a title, label, and color.

29. What are advantages of spreadsheet software?

Ans: We make use of spreadsheets because they are:

- (i) Easy to use
- (ii) No installation needed (for Google Sheets)
- (iii) Good for small to medium-sized projects.

30. Describe the uses of DSLC in real life.

Ans: The standard DSLC consists of 6 main steps, however, in some real-world applications/ scenarios, some additional steps may be added. One such step can be Storing and Organizing Data, especially in large projects or team settings where databases and structured storage are important. These are usually managed through systems like DBMS and SQL.

5.4

Databases and Storing Data

31. Define Database.

Short Questions

1. What is the importance of understanding a problem before collecting data?

Ans: Before we start talking about collecting data, it is necessary to clearly understand the problem under consideration. In case, we do not understand the problem properly, we may collect the wrong data resulting in useless or wrong results.

2. Name any two methods of collecting data and give examples of each.

Ans: Survey:

we can create a survey with questions using Google form and share its link with students for response.

APIs: A school may use an attendance API to pull daily attendance data into a report.

3. What do we mean by "cleaning" data?

Ans: Remember that earlier we collected data using surveys and other methods. Now, we need to check if that data is correct, complete, and ready for use. This process is called Data Cleaning. This step ensures that the data we analyze later is trustworthy.

4. Why it is important to validate data before using it?

Ans: Data validation important because it checking if the data:

- (i) Follows correct rules (e.g., only valid sport names)
- (ii) Has the right type of values (e.g., numbers where numbers are expected)
- (iii) Is not fake or silly.

5. What is the purpose to visualizing data using charts?

Ans: People usually understand pictures better than numbers, which is why we use data visualizations. Data Visualization is important because it

- (i) makes data easier to understand

Strengths	Easy to read and compare individual categories. Good for showing exact differences.	Visually simple and effective for showing simple proportions at a glance.	Excellent for displaying trends, patterns, and rates of change over time.
Weaknesses	Can become cluttered if there are too many categories.	Difficult to compare individual slices if there are many small slices. Cannot show trends over time.	Can be misleading if the time intervals are not consistent. Not good for comparing discrete categories.
Example	Comparing the population of five different countries: USA, India, China, Brazil, and Nigeria.	Showing the market share of smartphone operating systems: Android (70%), iOS (28%), Others (2%).	Showing the monthly sales of a company from January to December.

3. Differentiate between DBMS and SQL.

Ans:

Feature/Aspect	DBMS (Database Management System)	SQL (Structured Query Language)
Basic Definition	It is a software system used to create, manage, and organize databases.	It is a programming language used to communicate with and manipulate databases.
Nature	It is a software application or a system.	It is a query language or a syntax.

is where AI and ML come in. These technologies learn from data and help machines think, decide, and improve but faster and more consistently.

Definition of AI:

AI is the ability of a machine or computer program to perform tasks that normally require human thinking and ability. AI means teaching machines to do tasks that usually require human intelligence such as understanding speech, recognizing images, or making decisions.

Real life examples of AI use:

- Urdu speech-to-text apps used in educational institutes including schools
- Chatbots used by banks like HBL and JazzCash for customer support
- Traffic control systems in big cities such as one introduced by Safe City Authority in Lahore.

Definition of Machine Learning:

Machine Learning (ML) is a method where computers learn from past data to predict or decide something. Machine Learning is a part of AI. It means training a machine to learn from data and make decisions on its own without being programmed every time.

Real life examples of ML use:

- Netflix or YouTube recommend videos based on watching history of users.
- A weather app uses past temperatures to predict weather for next day.

Q.2. Differentiate between artificial intelligence (AI) and Machine Learning (ML)?

Ans:

Q.4. Differentiate between supervised and unsupervised learning?

Ans:

Feature	Supervised Learning	Unsupervised Learning
Labelled Data?	Yes machine is told the correct answers	No machine finds patterns on its own
Main Task	Predict or classify	Group or cluster similar data
Example	Predict student results using marks and study hours	Group customers based on shopping behaviour
Uses in School	Identify students who need help	Make automatic student groups for projects

TIDBIT

Think of **Supervised Learning** as learning with a teacher, and **Unsupervised Learning** as exploring on your own.

REMEMBER

- Supervised Learning** uses labeled data to predict or classify.
- Unsupervised Learning** uses unlabeled data to find 'hidden patterns'.
- Both are used in schools, businesses, apps, and government systems in Pakistan. If the system is learning from examples with correct answers, it is supervised. If it is grouping without given answers, it is unsupervised.

Best Practice:

- Ask for user permission
- Protect data using encryption
- Do not collect more than needed

Responsibility of Humans:

Humans must use AI wisely as it is just a tool. If an AI powered system makes a wrong decision, the responsibility lies with the humans who created or used it.

Example:

If a facial recognition system wrongly accuses system should be fixed and detect.

REMEMBER

Always use diverse and balanced data to reduce bias.

REMEMBER

- AI is used in smart assistants, shopping apps, and chatbots.
- Businesses use them for customer service and sales analysis.
- We must always consider ethics: fairness, privacy, and responsibility.

6.4**Supervised and Unsupervised Algorithms**

Q.8. Define and explain supervised and unsupervised algorithms?

Ans:

DO YOU KNOW

- Simple linear regression uses just one independent variable (input) to predict one outcome. However, in real life, outcomes usually depend on many things.
- Multiple linear regression helps the computer understand more complex patterns and improve prediction accuracy.

6.5**Evaluating Model Performance**

Q.10. What is Evaluating Model Performance? Also explain Confusion Matrix and Accuracy?

Ans:

Once a ML model is trained, then we are required to measure the performance of the model. This helps in deciding if the model is accurate and reliable. We will explore four important performance metrics with simple definitions and examples.

Confusion Matrix:

A confusion matrix is a simple table that shows how many predictions/classifications were correct or incorrect. Table 6.6 shows a simple confusion matrix considering whether a student will pass or fail (classification problem). The confusion matrix helps in understand whether a model is making classification or prediction mistakes and helps in calculating the accuracy (an important measure) of the model.

	Predicted: pass	Predicted: fail
Actual: pass	True Positive (TP)	False Negative (FN)

12. **Main goal of AI:**
(A) Make predictions (B) Help customers
(C) Perform smart task (D) Store data
13. **Which of the following always need data?**
(A) AI (B) ML (C) Chatbots (D) Google
14. **Which of the following application of AI?**
(A) Hiring (B) Speech & understand
(C) Conversion (D) None of them

6.2**Machine Learning Types**

15. **How many types of machine learning?**
(A) 1 (B) 2 (C) 3 (D) 4
16. **Who Compare its own results with correct results?**
(A) Supervised learning (B) Machine learning
(C) Un-supervised learning (D) AI
17. **Give data without any label?**
(A) Supervised learning (B) Machine learning
(C) Chatbots (D) Un-supervised learning
18. **Which of the following provide high accuracy?**
(A) SL (B) USL (C) AI (D) ML
19. **When grouped or unlabeled data is arrived, we used?**
(A) Supervised learning (B) Un-Supervised learning
(C) Machine learning (D) All above

15. B	16. A	17. D	18. A	19. B	20. D	21. C
22. D	23. B	24. D	25. B	26. C	27. C	28. D
29. A	30. C	31. B	32. C	33. B	34. A	35. B
36. D	37. A	38. B	39. D	40. A		

Additional Short Question's

**Short Answer Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)**

Introduction

1. Name two fields of modern era used in every technology.

Ans: The existing fields of today's modern era are:

- Artificial Intelligence
- Machine Learning

2. Name the fields in which AI and ML are used now a days.

Ans: These are powerful technologies behind many commonly used things such as:

- Voice assistants like google assistant
- ChatGPT
- video recommendations on YouTube
- predicting the weather.

3. Why AI and ML are important for us?

14. Describe the responsibility of human when use AI?

Ans: Humans must use AI wisely as it is just a tool. If an AI powered system makes a wrong decision, the responsibility lies with the humans who created or used it.

Example:

If a facial recognition system wrongly accuses system should be fixed and detect.

6.4

Supervised and Unsupervised Algorithms

15. Define S.L and U.S.L algorithms.

Ans: Data science uses various algorithms to find patterns, make predictions, or analyze large data. Choosing the right algorithm depends on the type of data and the kind of problem you are trying to solve.

16. Why to choose right algorithm is important?

Ans: These algorithms help organizations solve real-world problems such as predicting exam results, grouping customers for better marketing and identifying patterns in fraud or health data

17. Name some common data science algorithms. Also define them.

Ans: Some common data science algorithms are:

Linear Regression:

Predicts future values based on a straight-line relationship (e.g., predicting student scores from study hours).

Decision Trees:

Uses a tree-like model to make decisions based on yes/no questions (e.g., predicting

7. Google Assistant is an example of:
(a) A game app (b) A word processor
(c) A smart assistant using AI (d) A calculator
8. AI is mostly used for:
(a) Handwriting notes (b) Making phone calls
(c) Charging phones (d) Smart decision making and automation
9. A chatbot on JazzCash is an example of:
(a) Cloud computing (b) Data visualization
(c) AI in business (d) Unsupervised learning

Answers

1. (b) 2. (a) 3. (b) 4. (c) 5. (c)
6. (d) 7. (c) 8. (d) 9. (c)

Short Questions

1. What is the difference between AI and ML?

Ans:

Feature	AI	ML
Definition	Making machines smart enough to copy human behaviour	Teaching machines to learn from data and improve decision making
Main Goal	To perform smart task like human did	To make predications or decision making based on data.

2. Give one real-life example of AI used in Pakistan.

UNIT

7

Applications of AI

Student Learning Outcomes

By the end of this chapter, you will be able to:

- Explain how AI can be applied to specific applications in areas like NLP, Robotics, Speech Recognition.
- Conduct a technology recognition experiment where students interact with products based on NLP, Robotics, Speech Recognition.
- Discuss the benefits and limitations of NLP, Robotics, Speech Recognition, and others.
- Show that there are instances where use of AI causes social injustices.
- Develop critical thinking skills to assess situations where AI has led to social injustices and identify potential areas of improvement.
- Effectively communicate the social implications of AI, particularly regarding injustices and ethical responsibilities, both in writing and verbally.
- Exhibit an awareness of ethical considerations in AI development and usage, as well as the potential consequences of overlooking these considerations.
- Analyze case studies or scenarios where AI has caused social injustices, and discuss the underlying factors contributing to these issues.

Subjective Type Questions



7.2

Data and AI

Q.2. Why Data is important in AI? Describe automated data collection? Also describe types of data?

Ans:

Data is the most important part of AI. AI learns from data, just like a student learns by reading books. If the data is large and correct, the AI system becomes smarter and gives better results. AI systems depend on data to learn and improve. When they receive a large amount of information from different sources, they can find patterns and learn how to make better choices.

Automatic Data Collection:

Automatic data collection means gathering information without needing a person to enter it by hand. Many devices and applications can collect data on their own. With automatic collection, AI can adjust and respond to user needs quickly. It also saves time, reduces errors, and allows systems to work without needing human input all the time.

Example:

Mobile phones collect location, usage, and search history automatically. Online websites also collect user clicks, views, and preferences.

Types of Data:

Quantity data type:

Quantity refers to how much data is available". When an AI system receives a large number of examples, it becomes more familiar with different situations.

TIDBIT

Smartphones can now unlock using your voice, no need to touch anything.

DO YOU KNOW

Some cars now respond to voice commands to turn on music, make calls, or give directions.

Q.5. Define and explain recommendation systems with examples?

Ans: Importance of recommendation system:

Recommendation systems are a part of AI that give users suggestions based on their likes and past actions. These systems study what a person has viewed, searched, or selected before, and then show similar options.

Example:

Online shopping:

On an online shopping website, if someone looks at school bags, the AI may suggest other types of bags or related items.

Videos:

In education, a website can suggest helpful videos or articles based on a student's learning history.

User Experience:

Recommendation systems improve the user experience by making content more personal and useful.

Safety:

works. Users should know what data is being used and how decisions are made. Ethical design builds trust between people and technology.

DO YOU KNOW

AI is only as good as the people who build it, that's why designers must act responsibly.

Objective Type Questions

Additional MCQ's

**Multiple Choice Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)**

Introduction

- NLP helps computer to:**
(A) Safe Search through web
(B) Understand human language
(C) Secure Private Data
(D) Reduce Load
- Which of the following is not the part of NLP?**
(A) Chatbots
(B) Text Analysis tools
(C) Translation apps
(D) Web Browsers
- Which of the following is a voice assistant?**
(A) Web Browsers
(B) All Gaming apps
(C) Google Assistant
(D) All above

26. AI can help in:
(A) Surgeries (B) Fighting heavy items
(C) Help disable persons (D) All above
27. Which of the following is a voice assistant?
(A) IoT sensors (B) IoT System (C) Alexa (D) Chatbot
28. In Smart homes, people control devices by:
(A) Touch control (B) Gestures (C) Voice (D) Remote
29. Recommendation system give suggestion based on:
(A) User history (B) Download files (C) Web browsing (D) All above
30. In which platform Recommendation system are used?
(A) Online websites (B) YouTube
(C) Netflix (D) All above
31. Recommendation are helpful:
(A) To find more customers (B) Making system more secure
(C) Both A & B (D) None of these
32. AI learn your interest which you?
(A) Watch a video (B) Like a video
(C) Both a, b (D) None of these
33. Which help autonomous cars to move safely on roads?
(A) GPS (B) Software
(C) Sensors (D) Traffic lights
34. Advantage of autonomous cars:

7.2

Data and AI

8. Explain briefly the use of AI for large data sets.

Ans: Data is the most important part of AI. AI learns from data, just like a student learns by reading books. If the data is large and correct, the AI system becomes smarter and gives better results. AI systems depend on data to learn and improve

9. Define automated data collection using AI.

Ans: Automatic data collection means gathering information without needing a person to enter it by hand. Many devices and applications can collect data on their own.

Example:

Mobile phones collect location, usage, and search history automatically. Online websites also collect user clicks, views, and preferences

10. Differentiate between quantitative and Qualitative data.

Ans:

Quantitative Data	Qualitative Data
1. It refers to data that can be counted or measured in numerical form (quantity).	1. It refers to descriptive data that deals with characteristics or qualities (non-numerical).
2. It answers questions like "How much?" or "How many?" and can be used for statistical analysis.	2. It answers questions like "Why?" or "How?" and helps understand reasons and motivations.

7.3

Real-World Applications of AI

11. Explain shortly the uses of AI.

22. Why is important in today's world?

Ans: This is important in systems that make decisions about input Human Rights school admissions, job interviews, or legal cases. To ensure fairness, AI must be trained on data that includes all related types of people and situations.

23. Define Transparency in AI.

Ans: Transparency means that people should understand how an AI system works and why it made a certain decision.

Example:

If an AI rejects a loan application or selects a student, users have the right to know what rules or steps the system followed.

24. What is Social equity?

Ans: AI should be used in a way that helps all people equally, including the poor, disabled, and those living in remote areas. Sometimes, new technologies like AI are only available to rich or educated groups, while others are left behind. This creates a gap between people. To support fairness in society, AI tools should be designed so everyone can benefit, not just a few.

25. Explain shortly privacy.

Ans: Privacy means keeping personal information safe and not sharing it without permission. Many AI systems collect data from users, such as names, addresses, location, or search history. If this data is not protected, it can be stolen or misused.

Exercise Questions (Solved)



Multiple Choice Questions

1. What does AI stand for?

3. **Speech Technology and Voice Control:**

Speech technology is a type of AI that allows computers to listen and understand spoken words. It helps machines turn voice into text and respond with answers.
Voice assistants:

Like those used in phones or smart devices are examples of this technology.

Customer Service Centers:

In customer service, it helps answer calls and guide users without a human operator.

Smart Home systems:

In smart homes, people can control lights or devices just by speaking.

3. **Explain the ethical issues in AI. Why are fairness, privacy, and transparency important?**

Ans: Ethics in AI means using AI in a way that is fair, honest, and safe for everyone. Since AI can make decisions, it is important to make sure those decisions do not hurt people or treat anyone unfairly.

Example:

If an AI system gives better service to one group of people and ignores others, it is not fair. AI should be developed with care, keeping in mind fairness, safety, and respect for human rights.

Bias in AI and Algorithms:

Bias in AI happens when the system gives unfair results because of the data it was trained on. If the data only represents one group of people, the AI may not understand or

UNIT

8

Digital Entrepreneurship

Student Learning Outcomes:

By the end of this chapter, you will be able to:

- Explain the significance of legal compliance and ethical practices in digital entrepreneurship.
- Identify and describe key data privacy laws.
- Apply ethical decision-making to resolve conflicts of interest and ensure fairness in business operations.
- Recognize responsible marketing practices and explain the necessity of truthful advertising and obtaining user consent for targeted marketing.
- Use structured problem-solving methods, such as root cause analysis and SWOT analysis, to address business challenges.
- Explain the concept of data-driven marketing, including setting measurable goals, defining Key Performance Indicators (KPIs), using analytics tools, and measuring Return on Investment (ROI).
- Describe the role of Customer Relationship Management (CRM) systems in building long-term customer loyalty through personalized communication and loyalty programs.
- Explain how marketing automation tools can improve efficiency, reduce operational costs, and expand customer reach.

Q.4. What is structured problem solving? Explain Root Cause Analysis and SWOT Analysis?

Ans:

Structured problem-solving means using a step-by-step approach to identify a problem, understand why it is happening, and decide the best solution. This avoids guesswork and helps prevent the same issue from happening again.

Root Cause Analysis:

Every problem has a main reason behind it, called the root cause. If we only fix the surface problem, it may return. Root cause analysis helps in finding and addressing the main reason, so the solution is long-lasting.

Example:

If an online shop receives many complaints, the owner should investigate whether the cause is late delivery, unclear product descriptions, or poor packaging. Once the root cause is found, it can be corrected.

SWOT Analysis:

SWOT analysis helps businesses understand their current situation and plan wisely for the future. SWOT is a simple tool that stands for:

- Strengths, things the business does well (e.g., high-quality products).
- Weaknesses, areas that need improvement (e.g., slow customer service).
- Opportunities, chances to grow or improve (e.g., high demand for a new product).
- Threats, outside factors that can harm the business (e.g., new competitors).

earn more money at first. However, customers lose trust, and the business suffers in the future.

Digital Ethics:

Digital ethics means using the internet and digital tools responsibly and respectfully. Businesses keep customer information safe, provide accurate details, and interact politely online. Customers also follow rules, treat others with respect, and avoid harmful actions. Businesses maintain safe online spaces by setting clear rules and taking quick action against harassment or bullying.

Responsible Marketing:

Responsible marketing means promoting products and services honestly and fairly, providing customers with correct and complete information, and avoiding false promises. This approach helps customers make informed decisions and builds trust in the business.

- Every business advertisement must present truthful and clear information, without exaggerations or hidden conditions that may mislead customers.
- When a business collects personal data of users to show targeted advertisements, businesses must obtain clear permission from customers and explain how the information will be used.

Q.8. Define Data Privacy laws? Explain the key points of "Personal Data Protection Bill"?

Ans:

Data privacy laws are rules that protect personal information collected by businesses, such as names, addresses, phone numbers, or payment details.

using the following URL (<https://secp.gov.pk/>).

- **Documentation:**

Prepare the required documents, such as the Memorandum and Articles of Association for companies or a partnership deed for partnerships.

- **Apply online:**

Get the Certificate of Incorporation, which proves that the business is officially registered.

Q.11. Explain processes of obtain NTN, Tax filling and record keeping and industry specification Regulation?

Ans: Obtain National Tax Number:

The NTN is an identification number for taxpayers in Pakistan. It is issued by the Federal Board of Revenue (FBR). Process to obtain an NTN:

- Apply through the FBR's "Iris" online portal.
- Provide SECP registration documents, proof of address, and business activity details.
- Once approved, the NTN allows the business to open bank accounts, issue invoices, and meet tax obligations.

Tax Filing and Record-Keeping:

Registered businesses must:

- File annual income tax returns and, if applicable, monthly sales tax returns.
- Keep accurate records of sales, purchases, salaries, and expenses.
- Avoid late or incorrect filings, as these can lead to fines or legal actions.

8.5**Intellectual Property Rights (IPRs)**

Q.14. Explain Intellectual Property Rights? Explain the originations who are responsible for registration all IPR in Pakistan?

Ans:

IPRs are legal rights that protect the creations of a person or business. These creations can include inventions, books, songs, artwork, brand names, or logos. IPR ensures that no one can use or copy these creations without permission. This protection encourages people to be creative and helps businesses keep their unique identity.

Registration of Intellectual Property in Pakistan.

The following fundamentals are required to register an intellectual property in Pakistan:

Trademarks:

Protect brand names, logos, or symbols used to identify goods or services.

- Apply at the Intellectual Property Organization of Pakistan (IPO Pakistan).
- Apply with the name or logo, description of goods or services, and the required fee.
- Once approved, the trademark stops others from using a similar name or logo.

Copyrights:

Protect original creative works such as books, songs, computer programs, or drawings.

- Apply to the Copyright Office under IPO Pakistan.

- **How CRM Tools Work?**

Example:

A sports shop in Islamabad uses Zoho CRM to store customer names, contact details, shoe sizes, and purchase history in one system. When a new sports shoe arrives in the size a customer usually buys, the shop can send them a quick message or email about it.

- **Retaining Customers:**

Example:

A coffee shop in Karachi uses a loyalty program where customers get a free drink after every 10 purchases. They also send personalized emails with the customer's name and favorite drink offers, making customers feel valued and more likely to return.



Figure 8.1: CRM organizes customer data to build lasting relationships.

Q 17 Explain Customer Relationship management? Explain How CRM Tools works?

9. A bakery changes its recipe after receiving complaints about taste and invites customers back. This is an example of:
- (A) Strategic marketing (B) Setback recovery and resilience
(C) Data privacy (D) Conflict of interest
10. Netflix changing from a DVD-by-mail service to a streaming giant is a classic example of:
- (A) Data privacy laws (B) Adopting a unique business name
(C) Adapting to changes in technology/ideas
(D) Intellectual Property Rights
11. In SWOT, "slow customer service" would be categorized as a:
- (A) Strength (B) Weakness (C) Opportunity (D) Threat
12. A "Root Cause" is best described as:
- (A) The most expensive part of a problem
(B) The first person to report a problem
(C) The main reason a problem occurs (D) The final result of a problem

8.2**Ethics Business Practices and Digital Ethics**

13. What does "Ethics" in business mean?
- (A) Maximizing profit at any cost
(B) Following moral principles and doing what is right and fair
(C) Only following laws when the government is watching
(D) Copying a competitor's successful ideas
14. A shop owner hiring a cousin for a job without giving other skilled people a

8.4

Legal Framework and Compliance

27. A process where a business is checked to see if it is following all required laws is called a:
- (A) SWOT analysis
 - (B) Compliance audit
 - (C) Marketing strategy
 - (D) Loyalty program
28. Google and YouTube were fined \$170 million in 2019 for breaking which law?
- (A) GDPR
 - (B) SECP Registration rules
 - (C) COPPA
 - (D) Income tax laws
29. When a school portal uses student data, they follow privacy rules by:
- (A) Posting it on a public notice board
 - (B) Protecting the information with passwords
 - (C) Sharing it with local bookstores for marketing
 - (D) Deleting it every single day
30. Personal data includes which of the following?
- (A) The business's bank balance
 - (B) Names, addresses, and payment details
 - (C) The color of the business logo
 - (D) The total number of employees
31. What is the primary purpose of data privacy laws?
- (A) To help businesses sell more products
 - (B) To protect personal information collected by businesses
 - (C) To increase the speed of the internet

47. Private business information like a recipe or list of customers is a:
(A) Patent (B) Copyright (C) Trade Secret (D) Trademark

8.5**Strategic Marketing and Branding**

48. What is an "NDA" (Non-Disclosure Agreement) used for?
(A) To register a business with the SECP
(B) To ensure partners/employees cannot share private information
(C) To apply for a National Tax Number
(D) To calculate the Return on Investment (ROI)
49. In a contract, "Acceptance" means:
(A) One side offers a service
(B) The other side agrees to the offer without changes
(C) Money is paid immediately
(D) The contract is written in English
50. If a contract is for something illegal, it fails which basic element?
(A) Offer (B) Legal Purpose (C) Consent (D) Consideration
51. Digital contracts can be signed:
(A) Only on paper (B) Only with a witness present
(C) Both on paper and electronically (D) Only by the government
52. Registering a trademark helps a business by:
(A) Reducing the cost of electricity
(B) Stopping others from using a similar name or logo

Additional Short Question's

**Short Answer Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)**

Introduction

1. Why legal, ethical and strategic skills are important in business?

Ans: Legal, ethical, and strategic skills that are important to operate a successful digital business. It explains how entrepreneurs can comply with relevant data privacy laws, such as Pakistan's Data Protection Bill, the General Data Protection Regulation (GDPR), and the Children's Online Privacy Protection Act (COPPA).

8.1

From Basic to Advance Entrepreneurship

2. Define Advance Entrepreneurship Concepts.

Ans: We build upon that foundation to explore advanced skills required in the competitive digital business environment. These include:

Legal Compliance:

Ethical framework:

Strategic Marketing:

3. What is strategic Marketing?

Ans: Strategic marketing, to strengthen a business's presence and relationship with its customers.

15. What is regulatory awareness?

Ans: Regulatory awareness means knowing which laws and rules apply to your business and making sure you follow them. This involves:

- Stay Updated:
- Compliance Audits:

8.4

Legal framework and Compliance

16. How do you define the concept of legal framework?

Ans: Legal Framework & Compliance means the laws and rules a business must follow to operate legally. It includes registering the business, paying taxes, protecting customer data, and meeting industry requirements.

17. Why it is important to registered a business in Pakistan?

Ans: Registration makes the business official, allows it to work without legal problems, and helps gain the trust of customers, banks, and other businesses.

18. Write the process to obtain NTN in Pakistan.

Ans:

- i) Apply through the FBR's "Iris" online portal.
- ii) Provide SECP registration documents, proof of address, and business activity details.
- iii) Once approved, the NTN allows the business to open bank accounts, issue invoices, and meet tax obligations.

19. What type of documents need to understand before register a business?

Ans:

5. Which of the following is an example of personal data?
(a) Office address (b) Employee ID card number
(c) Store opening hours (d) Website theme color
6. A conflict of interest occurs when:
(a) Employees share company goals
(b) Personal benefit affects a business decision
(c) A business increases profits (d) Customers give feedback
7. Which is part of digital ethics?
(a) Using false information in ads (b) Protecting customer data respectfully
(c) Cyberbullying (d) Avoid online presence
8. Which of the following is a CRM tool?
(a) Photoshop (b) to Zoho (c) Google Maps (d) Canva
9. Which tool is used for marketing automation?
(a) Mailchimp (b) PowerPoint (c) MS Word (d) Paint
10. In marketing, RoI means:
(a) Return on Investment (b) Rate of Information
(c) Revenue on Ideas (d) Reach of Internet

Answers

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (b) | 2. (b) | 3. (c) | 4. (c) | 5. (b) |
| 6. (b) | 7. (b) | 8. (b) | 9. (a) | 10. (a) |

Example: A sports shop in Islamabad uses Zoho CRM to store customer names, contact details, shoe sizes, and purchase history in one system. When a new sports shoe arrives in the size a customer usually buys, the shop can send them a quick message or email about it.

Marketing automation:

Marketing automation means using special software to handle marketing tasks automatically, without needing to do each step manually. This helps businesses save time, work more efficiently, and stay connected with customers.

Examples:

- Mailchimp can automatically send welcome emails to new customers, share special offers, and post updates on social media.
- HubSpot can track customer activity, send follow-up messages, and create reports on marketing performance.

Benefits for Small Businesses:

- Saves time by handling routine tasks automatically.
- Reduces costs by lowering the need for extra staff.
- Sends timely updates to customers, improving engagement.
- Helps reach a wider audience with less effort.
- Tracks campaign results to see what works best.

Pairing Scheme/ Instructions for Preparation of Exam Paper of Computer Science & Entrepreneurship for Grade-10**ESSENTIAL INSTRUCTIONS FOR PAPER SETTERS**

The paper of Computer Science & Entrepreneurship for class 10 will consist of 50 marks. The duration for the Multiple-Choice Questions (MCQs) section will be 15 minutes, while the time allocated for the short and long questions section will be 1 hour and 45 minutes. The paper will be made as per following details:

Part-I: Objective:	Q-1: 10 Multiple-Choice Questions. MCQs will be developed from the entire content of the textbook. • One MCQ will be asked from each Chapters No. 1, 3-6 and 8. • Two MCQs will be asked from each Chapter No. 2 and 7.	(1×10=10)
Part-II: Subjective:	This section will contain three short answer questions. Each short answer-question will be asked from the content of the textbook. The detail is as follows:	(2×4=8)
	Q-2: Four short answer questions have to be answered out of 6. The detail is as follows: • One short answer question should be asked from Chapter No. 1 • Two short answer questions should be asked from Chapter No. 2	(2×4=8)

Time Allowed: 1:45 Hrs

Subjective

Q.2: Write short answers to any four (0

- (i) How does the OS act as a translator b
- (ii) Why is virtual memory slower than R
- (iii) List the two benefits of running regul
- (iv) Why is it important to setup Python D
- (v) Write down two variable naming rule
- (vi) Differentiate between arithmetic and

Q.3: Write short answers to any four (0

- (i) How does the if-statement differ from
- (ii) What is the purpose of append operat
- (iii) Write down two real world applicatio
- (iv) Why is it important to validate data b
- (v) Write the important to choose right s
- (vi) What is the purpose of visualizing d



کتاب خانہ

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ENTREPRENEURSHIP

ہارڈ کاپ امتحانی اسلامیات (لازمی)

ہارڈ کاپ امتحانی ترجمہ القرآن المجید

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