ZAHID NOTES • BAHAWALPUR BOARD

10th Class Computer Science Notes Bahawalpur Board (BISE) Full Book Notes

Complete chapter-wise study notes, key terms and original practice questions for Class 10 Computer Science.

About these notes

These notes follow the 8 chapters of the Punjab book *Computer Science and Entrepreneurship* (PCTB / PECTAA, 2026-27), used for Class 10 in all Punjab boards including BISE Bahawalpur:

1. Operating Systems: Structure and Services • 2. System Recovery and Advanced Maintenance • 3. Introduction to Python Programming • 4. Control Structures in Python • 5. Data Science • 6. Introduction to Artificial Intelligence (AI) and Machine Learning (ML) • 7. Applications of AI • 8. Digital Entrepreneurship

Each chapter contains study notes, key terms, and original practice questions (multiple-choice, short and long questions) written for these notes, with an MCQ answer key at the end of the book.

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End	Revision Checklist and MCQ Answer Key (all chapters)

How to Use These Notes

- Read one chapter's notes first, then try its practice questions without looking back.
- Learn the key terms at the end of each chapter — they are the short-question answers.
- Practise the Python programs by typing them yourself. Reading code is not enough; run it and change it.
- Check your MCQs against the answer key at the end. For every wrong answer, re-read that part of the notes.
- Revise one chapter a day in the last week, using the revision checklist on the final pages.

> **For Bahawalpur Board students:** this book and paper pattern are the same for all nine Punjab boards (Lahore, Gujranwala, Faisalabad, Rawalpindi, Multan, Sargodha, DG Khan, Bahawalpur, Sahiwal). There is no Bahawalpur-only paper scheme. BISE Bahawalpur covers Bahawalpur, Bahawalnagar and Rahim Yar Khan districts. Check official announcements on bisebwp.edu.pk for your session.

Paper Pattern — What to Expect

The paper pattern below is a third-party reproduction of the PECTAA 2027 scheme for the new 2026-27 book. It is a guide to the shape of the paper, not an official promise. Confirm the current scheme with your board's announcements before the examination.

Paper	Marks
Theory — MCQs (10 questions, 1 mark each)	10
Theory — Short questions (Questions 2, 3 and 4)	24
Theory — Long questions (3 offered, attempt any 2, 8 marks each)	16
Theory total	**50**
Practical (lab work and board practical examination)	50
Subject total	**100**

Practical: the practical component carries 50 marks in total. It is examined separately from the theory paper, and theory and practical must be passed separately. Practise the Python programs and the spreadsheet work in this book hands-on — the practical tests what you can do, not only what you can write.

Long questions: three long questions are offered (one from Chapter 1, one from Chapter 4, and one from Chapter 6 or Chapter 8), each carrying 8 marks. You attempt any two, for 16 marks.

Short questions: Question 2 covers Chapters 1 to 3, Question 3 covers Chapters 4 and 5, and Question 4 covers Chapters 6 to 8. Attempt any 4 out of 6 in each group.

> **Warning — the old book is gone.** The previous Class 10 Computer Science book (5 units: Introduction to Programming, User Interaction, Conditional Logic, Data and Repetition, Functions — programming in C, with a 75-mark theory paper) has been replaced by the new 8-chapter book *Computer Science and Entrepreneurship*. Old pairing schemes, old guess papers and old past papers from the C-programming book do NOT match the current paper. Do not prepare from them. The chapter-wise distribution of MCQs in third-party pairing schemes is not printed in this book, because different reproductions disagree on it (one gives Chapter 7 one MCQ, another gives it two) — prepare all eight chapters.

Chapter 1: Operating Systems: Structure and Services

An operating system (OS) is the most important program on a computer. It manages the hardware and provides the services that programs and users need, so that every program does not have to control the hardware itself.

1.1 What is an operating system?

- An operating system is system software that manages the computer's hardware and provides the services programs and users need.
- The OS sits between the user, the programs and the hardware. It starts when the computer is switched on (booting) and keeps running until the computer is switched off.
- Common operating systems: Microsoft Windows, macOS, Linux, Android and iOS.
- Without an operating system, every program would have to control the processor, memory and devices itself.

1.2 Structure of an operating system

- The kernel is the core of the OS. It runs in privileged mode and controls the processor, memory and devices directly.
- The shell (command interpreter) is the outer layer that takes commands from the user or programs and passes them to the kernel.
- System calls are the interface through which programs ask the kernel for services, such as reading a file or creating a process.
- The OS is layered: hardware at the bottom, the kernel above it, system programs and the shell above the kernel, and user programs at the top.

1.3 Services of an operating system

- Process management: starting, stopping and switching between running programs (processes), and giving each its share of processor time.
- Memory management: giving each program the memory it needs, and protecting one program's memory from another.
- File management: creating, reading, writing, deleting and organising files and folders on storage devices.
- Device management: controlling printers, keyboards, screens and disks through small programs called drivers.
- Security and protection: user accounts, passwords and permissions that decide who can use or change a file or program.
- User interface: the graphical user interface (GUI) with windows, icons and menus, or a command-line interface (CLI) where commands are typed.

1.4 Types of operating systems

- Single-user, single-task: one user and one program at a time (early personal computers).
- Multi-user: many users share one computer at the same time, each with their own account (servers).
- Multitasking: several programs run at once, sharing the processor in short turns.
- Real-time: responds to events within a fixed time limit — used in traffic lights, medical monitors and factory robots.
- Embedded: built into a device such as a washing machine, a car or a microwave, doing one job reliably.
- Mobile: Android and iOS are designed for phones and tablets, with touch screens and app stores.

Key terms

- OS — operating system, the software that manages the whole computer. Kernel — the core of the OS. Shell — the outer layer that takes commands.
- System call — a program's request to the kernel for a service. GUI — graphical user interface. CLI — command-line interface.
- Process — a program that is running. Driver — software that controls a device. Booting — starting the operating system. Multitasking — running several programs at once.

Chapter 1: Operating Systems: Structure and Services — Practice Questions

Multiple-Choice Questions

Q1. The main purpose of an operating system is to:

(A) write documents (B) manage hardware and provide services to programs (C) connect to the internet (D) print pages

Q2. The core of an operating system is called the:

(A) shell (B) driver (C) kernel (D) file

Q3. Which of these is a graphical user interface?

(A) MS-DOS prompt (B) Terminal (C) BIOS screen (D) Windows desktop

Q4. A program that controls a printer is called a:

(A) driver (B) kernel (C) shell (D) virus

Q5. Booting is the process of:

(A) shutting down the computer (B) installing a new program (C) starting the operating system when the computer is switched on (D) formatting a disk

Q6. Which operating system is used on most Android phones?

(A) Android (B) Windows (C) macOS (D) Linux desktop

Q7. Multitasking means:

(A) one user and one program (B) a computer with two screens (C) printing while scanning (D) several programs running at once

Q8. A system call is:

(A) a phone call to the manufacturer (B) a request by a program to the kernel for a service (C) an error message (D) a user password

Q9. Which of these is an example of file management?

(A) printing a photo (B) charging a battery (C) creating a folder (D) playing music

Q10. A real-time operating system is used in:

(A) a traffic-light controller (B) a school library computer (C) a video game (D) a home laptop

Short Questions

Q1. Define an operating system and give two examples.

Q2. What is the difference between the kernel and the shell?

Q3. State two services of an operating system.

Q4. What is the difference between a GUI and a CLI?

Q5. Why is an operating system called system software?

Long Questions

Q1. Describe the structure of an operating system, explaining the roles of the kernel, the shell and system calls.

Q2. Explain any four services of an operating system, giving one example of each.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Chapter 2: System Recovery and Advanced Maintenance

Computers fail: a disk dies, a virus strikes, an update goes wrong, or a file is deleted by mistake. This chapter is about preparing for failure — backups, restore points and recovery tools — and about the routine maintenance that keeps a computer healthy.

2.1 Why systems fail

- Hardware failure: a hard disk, memory module or power supply can stop working.
- Software failure: a faulty update, a virus, or a program crash can stop the system from starting.
- Human error: deleting an important file or changing a setting by mistake.
- Power problems: a sudden cut can damage open files and the operating system itself.

2.2 Backup: the first line of defence

- A backup is a copy of important data kept in another place, so it can be restored after a loss.
- Full backup: copies everything. It is slow but complete.
- Incremental backup: copies only what changed since the last backup. It is fast, but restoring needs all the parts.
- Differential backup: copies everything that changed since the last full backup.
- The 3-2-1 rule: keep 3 copies of data, on 2 different types of storage, with 1 copy off-site (for example, on a cloud drive).
- Backup media: external hard disk, USB drive, cloud storage.

2.3 System restore and recovery

- A restore point is a saved copy of system files and settings at a particular time.
- System Restore returns the computer to an earlier restore point without deleting personal files.
- A recovery drive (or recovery partition) can reinstall the operating system when it will not start.
- Safe Mode starts Windows with only the essential drivers, so a faulty driver or program can be removed.
- A system image is a complete copy of the whole drive, including the operating system, programs and settings.

2.4 Routine maintenance

- Keep the operating system and drivers updated; updates fix security holes and errors.
- Run antivirus scans regularly and keep virus definitions up to date.
- Use Disk Cleanup to remove temporary files, and uninstall programs you no longer use.
- Defragment a hard disk (HDD) so files are stored in order. Do NOT defragment an SSD.
- Check disk health and free space; keep at least 10 to 15 percent of the disk free.
- Clean dust from vents and fans; overheating shortens the life of parts.

2.5 Troubleshooting steps

- Identify the problem: what changed just before it appeared?
- Restart the computer — it clears temporary faults.
- Check cables, power and connections first for hardware problems.
- Use built-in tools: Task Manager, Event Viewer, Device Manager, Startup Repair.
- If a recent change caused the problem, undo it — uninstall the update or driver, or use System Restore.
- Keep a record of the fault and the fix, so the same problem is solved faster next time.

Key terms

- Backup — a copy of data kept for recovery. Restore point — a saved copy of system files and settings. Safe Mode — Windows started with only essential drivers.
- System image — a complete copy of the whole drive. Defragmentation — arranging files on a disk in order. Driver — software that controls a device.
- 3-2-1 rule — 3 copies, 2 types of storage, 1 copy off-site. Troubleshooting — finding and fixing a fault step by step.

Chapter 2: System Recovery and Advanced Maintenance — Practice Questions

Multiple-Choice Questions

Q1. A restore point saves:

(A) personal photos only (B) system files and settings at a particular time (C) the whole internet (D) printer settings only

Q2. Which backup copies only the changes since the last backup?

(A) full backup (B) differential backup (C) incremental backup (D) system image

Q3. Safe Mode starts the computer with:

(A) only essential drivers (B) all programs running (C) no screen (D) the internet switched off

Q4. Defragmentation is the process of:

(A) deleting all files (B) installing updates (C) scanning for viruses (D) arranging files on a disk in order

Q5. The 3-2-1 rule of backup means keeping:

(A) 3 copies of data (B) 2 copies of data (C) 1 copy of data (D) no copies of data

Q6. A system image is:

(A) a photo of the computer (B) a complete copy of the whole drive (C) a screenshot (D) a printer driver

Q7. A good first step when a computer misbehaves is to:

(A) buy a new computer (B) format the disk (C) delete all files (D) restart the computer

Q8. An SSD should NOT be defragmented because:

(A) it has no files (B) defragmentation is useless and wears it out (C) it is too small (D) it cannot be opened

Q9. A differential backup copies the changes since the:

(A) last incremental backup (B) last full backup (C) first backup (D) last restart

Q10. Virus definitions should be:

(A) deleted every day (B) ignored (C) kept up to date (D) shared with friends

Short Questions

Q1. What is a restore point? How does System Restore use it?

Q2. State the difference between a full backup and an incremental backup.

Q3. What is Safe Mode and when is it used?

Q4. Why should an SSD not be defragmented?

Q5. State the 3-2-1 rule of backup.

Long Questions

Q1. Explain a complete backup and recovery plan for a school computer lab, covering backup types, the 3-2-1 rule and system recovery tools.

Q2. Describe a routine maintenance schedule for a home computer and explain why each task matters.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Chapter 3: Introduction to Python Programming

Python is a high-level, interpreted programming language. It is one of the most popular languages in the world because its code is short, readable and close to plain English. Python is used for web development, data analysis, artificial intelligence and automation.

3.1 What is Python?

- Python is a high-level, general-purpose programming language created by Guido van Rossum and first released in 1991.
- It is interpreted: the program runs line by line, without a separate compilation step.
- Python code is easy to read because it uses simple English-like words and indentation instead of braces.
- It is used for web development, data analysis, artificial intelligence, automation and teaching programming.
- Python is free and open source, with a very large library of ready-made modules.

3.2 Installing Python and writing the first program

- Download Python from python.org and install it. On Windows, tick 'Add Python to PATH' during installation.
- IDLE is the simple editor that comes with Python. It has a shell for typing single lines and an editor for saving programs.
- The first program is: print("Hello, World!") — print() displays text on the screen.
- A Python program is saved in a file ending in .py and run from the command line or from IDLE.

3.3 Variables and data types

- A variable is a named place in memory that stores a value, for example name = "Ali" or age = 15.
- Python decides the type from the value — no type declaration is needed. This is called dynamic typing.
- int: whole numbers, for example 15 or -3. float: numbers with a decimal point, for example 3.14.
- str: text in quotes, for example "Lahore". bool: True or False.
- list: an ordered collection, for example [1, 2, 3]. The type() function shows a value's type.

3.4 Input, output and comments

- print() shows output. input() reads text typed by the user, for example name = input("Enter your name: ").
- input() always returns a string. Convert it with int() or float() before doing maths with it.
- A comment starts with # and is ignored by Python. Comments explain the code to a human reader.
- Strings can be joined with + and repeated with *. An f-string, for example f"Age is {age}", puts values inside text.

3.5 Operators

- Arithmetic: + - * / // (floor division) % (remainder) ** (power).
- Comparison: == != > < >= <= — they give True or False.
- Logical: and, or, not — they combine conditions.
- Assignment: = gives a value; += and -= add to or subtract from a variable.
- Operator precedence: brackets first, then **, then * / // %, then + -, then comparisons.

Key terms

- Python — a high-level, interpreted programming language. Interpreter — a program that runs code line by line. IDLE — the simple editor that comes with Python.
- Variable — a named place in memory that stores a value. int — whole number. float — number with a decimal point. str — text. bool — True or False.
- list — an ordered collection. input() — reads text from the user. print() — shows output. Comment — text starting with # that Python ignores. Operator — a symbol that performs an operation.

```
print("Hello, World!")
name = input("Enter your name: ")
age = int(input("Enter your age: "))
print("Hello", name, "you are", age, "years old.")
```

Chapter 3: Introduction to Python Programming — Practice Questions

Multiple-Choice Questions

Q1. Python was created by:

(A) Guido van Rossum (B) Bill Gates (C) James Gosling (D) Dennis Ritchie

Q2. Python is:

(A) a compiled language only (B) an interpreted language (C) a machine language (D) a markup language

Q3. The correct way to display text in Python is:

(A) echo("Hi") (B) printf("Hi") (C) print("Hi") (D) write("Hi")

Q4. A comment in Python starts with:

(A) // (B) /* (C) -- (D) #

Q5. The input() function always returns a:

(A) string (B) integer (C) float (D) list

Q6. Which of these is a float value?

(A) 15 (B) 3.14 (C) "3.14" (D) True

Q7. The // operator in Python means:

(A) division (B) remainder (C) floor division (D) power

Q8. The operator for 'equal to' in Python is:

(A) = (B) == (C) === (D) :=

Q9. A list in Python is written with:

(A) {} (B) [] (C) () (D) <>

Q10. Python program files end in:

(A) .py (B) .txt (C) .java (D) .html

Short Questions

Q1. What is Python? State two of its features.

Q2. What is the difference between a compiler and an interpreter?

Q3. What does the input() function return? How do you read a number from the user?

Q4. State the use of the # symbol in Python.

Q5. Write the Python statement to print your name and age in one line.

Long Questions

Q1. Write a Python program that reads two numbers from the user and prints their sum, difference, product and quotient. Explain each line.

Q2. Explain variables and the data types int, float, str and bool, giving one example of each.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Chapter 4: Control Structures in Python

A program that only runs top to bottom can do very little. Control structures let a program make decisions and repeat work: selection chooses a path, and iteration repeats a block. Together with sequence, these three structures build every program.

4.1 Sequence, selection and iteration

- Sequence: statements run one after another in the order they are written.
- Selection: the program chooses a path based on a condition (if, if-else, elif).
- Iteration: a block of statements repeats (for, while).
- Indentation — spaces at the start of a line — shows which statements belong to a block in Python.

4.2 The if statement

- if marks >= 40: print("Pass") — the indented line runs only when the condition is True.
- if-else gives two paths: if age >= 18: print("Adult") else: print("Minor").
- elif chains test several conditions in order; the first True branch runs.
- Conditions use comparison operators (==, !=, >, <) and logical operators (and, or, not).
- Nested if means an if inside another if, for decisions with two levels.

4.3 The for loop

- for i in range(5): repeats 5 times with i = 0, 1, 2, 3, 4.
- range(n) gives 0 to n-1. range(1, 11) gives 1 to 10. range(0, 21, 2) gives the even numbers up to 20.
- A for loop can go through a list or a string, one item at a time.
- Use a for loop when the number of repetitions is known in advance.

4.4 The while loop

- while count < 5: repeats as long as the condition stays True.
- The loop must change the condition inside the body, or it will run forever (an infinite loop).
- Use a while loop when the number of repetitions is not known in advance.
- break stops a loop immediately. continue skips the rest of the current round and starts the next one.

4.5 Writing programs with control structures

- Plan first: write the steps (the algorithm) in plain words before coding.
- Test with sample values, including boundary values such as 0 and negative numbers.
- Common patterns: finding the largest of three numbers, checking even or odd, summing the first n numbers, factorial, and the multiplication table.

Key terms

- Sequence — statements running in order. Selection — choosing a path by a condition. Iteration — repeating a block.
- if — tests a condition. elif — tests the next condition. else — the path when no condition is True. for — a counted loop. while — a loop that repeats while a condition is True.
- break — stops a loop at once. continue — skips to the next round. range() — produces a sequence of numbers. Indentation — spaces that mark a block. Condition — an expression that is True or False.

```
# Largest of three numbers
a = int(input("Enter first number: "))
b = int(input("Enter second number: "))
c = int(input("Enter third number: "))
if a >= b and a >= c:
    print("Largest is", a)
elif b >= a and b >= c:
    print("Largest is", b)
else:
    print("Largest is", c)
```

Chapter 4: Control Structures in Python — Practice Questions

Multiple-Choice Questions

Q1. Indentation in Python is used to:

(A) make the code colourful (B) show which statements belong to a block (C) speed up the program (D) add comments

Q2. Which statement tests several conditions in order?

(A) if (B) while (C) for (D) elif

Q3. range(5) produces:

(A) 0, 1, 2, 3, 4 (B) 1, 2, 3, 4, 5 (C) 0, 1, 2, 3, 4, 5 (D) 5, 4, 3, 2, 1

Q4. The break statement:

(A) skips one round (B) restarts the loop (C) stops the loop immediately (D) pauses the program

Q5. A while loop is best when the number of repetitions is:

(A) known in advance (B) exactly one (C) not needed (D) not known in advance

Q6. The continue statement:

(A) skips the rest of the current round (B) stops the loop (C) restarts the program (D) prints a message

Q7. Which operator checks whether two values are equal?

(A) = (B) != (C) == (D) <=

Q8. A nested if means:

(A) two loops (B) an if inside another if (C) if and else together (D) a loop inside a loop

Q9. A loop that never ends is called:

(A) infinite loop (B) for loop (C) nested loop (D) empty loop

Q10. To repeat an action for each item in a list, use:

(A) while only (B) if (C) range only (D) for

Short Questions

Q1. What is the difference between selection and iteration?

Q2. Write the Python code for: if a number is even, print 'Even', otherwise print 'Odd'.

Q3. What does range(1, 11) produce? Why?

Q4. State the difference between break and continue.

Q5. What is an infinite loop? How can it be avoided?

Long Questions

Q1. Write a Python program to find the factorial of a number entered by the user, using a loop. Explain each line.

Q2. Write a Python program to print the multiplication table of a number entered by the user. Explain how the loop works.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Chapter 5: Data Science

Data science turns raw data into useful information. Every exam result, weather record, shop sale and hospital file is data. A data scientist collects data, cleans it, analyses it and presents the results, so that better decisions can be made.

5.1 What is data science?

- Data science is the study of data: collecting it, cleaning it, analysing it and presenting results so that decisions can be made.
- Data is everywhere: exam marks, weather records, shop sales, hospital records and social media posts.
- A data scientist uses statistics, spreadsheets and programming to find patterns in data.
- The data science process: ask a question, collect data, clean data, analyse, present results, decide.

5.2 Types of data

- Structured data is organised in rows and columns, like a table of student marks.
- Unstructured data has no fixed shape: text messages, photos, videos and audio.
- Semi-structured data has some organisation, such as a web page or a JSON file.
- Quantitative data is measured in numbers (marks, height, temperature). Qualitative data describes qualities (colour, grade, opinion).

5.3 Collecting and cleaning data

- Data is collected from surveys, forms, sensors, websites and existing records.
- Real data is often messy: missing values, typing errors and duplicate entries.
- Cleaning means removing errors, filling or dropping missing values, and making formats consistent.
- Clean data gives trustworthy results. Dirty data gives wrong answers — 'garbage in, garbage out'.

5.4 Analysing data: simple statistics

- Mean (average): add all values and divide by how many there are.
- Median: the middle value when the data is sorted.
- Mode: the value that appears most often.
- Range: the difference between the largest and smallest values.
- A bar chart compares categories. A line chart shows change over time. A pie chart shows parts of a whole.

5.5 Spreadsheets for data work

- A spreadsheet (MS Excel or Google Sheets) stores data in cells arranged in rows and columns.
- Formulas calculate with cell values. For example, =SUM(A1:A5) adds five cells, and =AVERAGE(B1:B5) finds the mean.
- Sorting arranges data in order. Filtering shows only the rows that match a condition.
- Charts turn a table into a picture that is easy to read and explain.
- Spreadsheets are the simplest practical tool for a beginner data analyst.

Key terms

- Data science — turning raw data into useful information. Structured data — data in rows and columns. Unstructured data — data with no fixed shape.
- Quantitative data — measured in numbers. Qualitative data — describing qualities. Mean — average. Median — middle value. Mode — most frequent value.
- Range — largest value minus smallest value. Spreadsheet — a grid of cells for data work. Chart — a picture of data.

Chapter 5: Data Science — Practice Questions

Multiple-Choice Questions

Q1. The first step of the data science process is to:

(A) ask a question (B) draw a chart (C) clean the data (D) collect the data

Q2. Which of these is structured data?

(A) a photo (B) a table of student marks (C) a voice recording (D) a video

Q3. The mean of 4, 6 and 8 is:

(A) 5 (B) 7 (C) 6 (D) 18

Q4. The median of 3, 7 and 9 is:

(A) 3 (B) 9 (C) 19 (D) 7

Q5. The mode of 2, 3, 3 and 5 is:

(A) 3 (B) 2 (C) 5 (D) 4

Q6. Which chart best shows change over time?

(A) pie chart (B) line chart (C) bar chart (D) table

Q7. The formula =SUM(A1:A5) in a spreadsheet:

(A) finds the mean (B) counts cells (C) adds five cells (D) sorts cells

Q8. 'Garbage in, garbage out' means:

(A) computers make garbage (B) data should be deleted (C) charts are useless (D) dirty data gives wrong results

Q9. Qualitative data is data that:

(A) describes qualities (B) is in numbers (C) is in tables (D) comes from sensors

Q10. Filtering in a spreadsheet:

(A) deletes all data (B) shows only rows that match a condition (C) sorts data (D) draws a chart

Short Questions

Q1. What is data science? List its main steps in order.

Q2. State the difference between structured and unstructured data, giving one example of each.

Q3. Find the mean, median and mode of 5, 8, 8, 10 and 12.

Q4. What is the purpose of cleaning data before analysis?

Q5. Write two spreadsheet formulas and state what each one does.

Long Questions

Q1. Explain the data science process from asking a question to making a decision, using the example of a school checking why marks fell in one subject.

Q2. Explain mean, median, mode and range with a small data set of your own, and say which chart you would use to show the data and why.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Chapter 6: Introduction to Artificial Intelligence (AI) and Machine Learning (ML)

Artificial intelligence is the ability of a machine to do tasks that normally need human intelligence: recognising speech and images, translating languages, playing games and answering questions. Machine learning is the part of AI in which a computer learns from data instead of being given fixed rules.

6.1 What is artificial intelligence?

- AI is the branch of computer science that builds machines and programs able to learn, reason and solve problems.
- AI systems can recognise speech and images, translate languages, play games and answer questions.
- The Turing test (Alan Turing, 1950) asks whether a machine can hold a conversation so well that a human cannot tell it is a machine.
- AI is already around us: voice assistants, face unlock, spam filters and video recommendations.

6.2 Types of AI

- Narrow AI (weak AI) does one task well, such as playing chess or recognising faces. All AI today is narrow AI.
- General AI (strong AI) would think and learn like a human across many tasks. It does not exist yet.
- Superintelligence would be smarter than humans in every way. It is a topic of debate, not a present reality.
- Reactive machines respond to the current situation only. Limited-memory AI learns from past data; most current AI is of this kind.

6.3 Machine learning

- Machine learning (ML) is a part of AI in which a computer learns from data instead of being given fixed rules.
- Training data is the set of examples the model learns from. The model is the program that results from training.
- After training, the model is tested on new data it has never seen.
- Traditional programming: rules + data gives answers. Machine learning: data + answers gives rules (the model).

6.4 Types of machine learning

- Supervised learning: the model learns from labelled examples, for example photos labelled 'cat' or 'dog'.
- Unsupervised learning: the model finds patterns in data with no labels, for example grouping customers by buying habits.
- Reinforcement learning: the model learns by trial and error, receiving rewards for good actions, for example a game-playing program.
- Each type suits different problems. Choosing the right type is part of the data scientist's job.

6.5 Benefits and concerns

- Benefits: faster diagnosis in medicine, safer cars, help for disabled people, and handling boring or dangerous work.
- Concerns: biased data can produce unfair decisions; personal data can be misused; some jobs may change or disappear.
- Responsible AI means using data fairly, protecting privacy, and keeping humans in charge of important decisions.

Key terms

- AI — artificial intelligence, machines doing tasks that need human intelligence. Turing test — a test of whether a machine can converse like a human.
- Narrow AI — AI that does one task well. General AI — human-like intelligence across tasks (does not exist yet).
- Machine learning — learning from data instead of fixed rules. Training data — the examples a model learns from. Model — the program that results from training.
- Supervised learning — learning from labelled examples. Unsupervised learning — finding patterns in unlabelled data. Reinforcement learning — learning by trial, error and reward.

Chapter 6: Introduction to Artificial Intelligence (AI) and Machine Learning (ML) — Practice Questions

Multiple-Choice Questions

Q1. Artificial intelligence is best described as:

(A) machines doing tasks that normally need human intelligence (B) a faster computer (C) a new programming language (D) a type of robot only

Q2. The Turing test checks whether a machine can:

(A) play chess (B) hold a conversation like a human (C) run fast (D) store data

Q3. All AI in use today is:

(A) general AI (B) superintelligence (C) narrow AI (D) strong AI

Q4. In machine learning, the model learns from:

(A) fixed rules (B) the internet only (C) the user manual (D) training data

Q5. Supervised learning uses:

(A) data with no labels (B) labelled examples (C) rewards only (D) no data

Q6. Unsupervised learning finds:

(A) patterns in unlabelled data (B) the fastest route (C) labelled answers (D) rewards

Q7. Reinforcement learning learns by:

(A) reading books (B) copying a teacher (C) trial and error with rewards (D) memorising rules

Q8. A spam filter is an example of:

(A) general AI (B) a database (C) a spreadsheet (D) narrow AI

Q9. One concern about AI is that:

(A) biased data can cause unfair decisions (B) computers become slower (C) screens get brighter (D) keyboards wear out

Q10. In traditional programming, the computer is given:

(A) data and answers (B) rules and data (C) only answers (D) only questions

Short Questions

Q1. Define artificial intelligence and give two everyday examples.

Q2. What is the Turing test?

Q3. State the difference between narrow AI and general AI.

Q4. What is training data? What is a model?

Q5. State the difference between supervised and unsupervised learning.

Long Questions

Q1. Explain machine learning using the example of a spam filter, covering training data, the model and testing.

Q2. Describe the three types of machine learning with one example of each, and discuss one benefit and one concern of AI.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Chapter 7: Applications of AI

AI is already at work in hospitals, schools, farms, banks and homes. This chapter looks at what AI actually does in each area — and at the responsibility that comes with it.

7.1 AI in healthcare

- AI reads medical images (X-rays and scans) and helps doctors spot disease earlier.
- It can predict outbreaks by studying patterns in health data.
- Chatbots answer basic health questions and remind patients to take medicine.
- AI speeds up the search for new medicines by testing millions of compounds quickly.

7.2 AI in education

- Adaptive learning apps change the difficulty of questions to match each student's level.
- AI tutors give instant feedback and extra practice where a student is weak.
- Automatic marking saves teachers time on routine checking.
- Translation tools help students read material in other languages.

7.3 AI in agriculture

- Drones and satellite images show which parts of a field need water or fertiliser.
- AI predicts crop disease and weather, helping farmers plan sowing and harvesting.
- Smart irrigation systems water crops only when the soil is dry, saving water.
- In Pakistan, where agriculture employs a large share of people, these tools can raise yields and incomes.

7.4 AI in business and finance

- Chatbots answer customer questions day and night.
- Recommendation systems suggest products and films people are likely to enjoy.
- Banks use AI to detect fraud by spotting unusual transactions.
- AI forecasts demand so that shops stock the right amount of goods.

7.5 AI in transport and daily life

- Self-driving cars use cameras and sensors to see the road and make decisions.
- Maps and ride-hailing apps predict traffic and the fastest route.
- Voice assistants (Siri, Google Assistant, Alexa) understand spoken commands.
- Smart homes use AI to control lights, heating and security.
- Every application brings a responsibility: data must be protected and decisions must be fair.

Key terms

- Chatbot — a program that answers questions in conversation. Recommendation system — software that suggests products or films a person may like.
- Fraud detection — spotting unusual transactions. Adaptive learning — teaching that adjusts to each student's level.
- Smart irrigation — watering crops only when the soil is dry. Voice assistant — software that understands spoken commands. Self-driving car — a car that drives itself using cameras and sensors.

Chapter 7: Applications of AI — Practice Questions

Multiple-Choice Questions

Q1. AI helps doctors mainly by:

(A) replacing hospitals (B) reading medical images and spotting disease earlier (C) writing prescriptions alone (D) building hospitals

Q2. Adaptive learning means:

(A) all students get the same questions (B) teachers stop teaching (C) books are printed faster (D) questions change to match each student's level

Q3. Drones in farming help by:

(A) showing which parts of a field need water (B) planting seeds by hand (C) selling crops (D) making rain

Q4. Banks use AI to:

(A) print money (B) open branches (C) detect fraud (D) hire staff

Q5. A chatbot is:

(A) a program that answers questions in conversation (B) a robot that cleans (C) a type of computer (D) a video game

Q6. Self-driving cars see the road with:

(A) mirrors only (B) the driver's eyes (C) cameras and sensors (D) radio only

Q7. A recommendation system:

(A) sells computers (B) writes books (C) repairs phones (D) suggests products people may like

Q8. Smart irrigation saves:

(A) seeds (B) water (C) tractors (D) sunlight

Q9. Voice assistants understand:

(A) typed letters (B) handwriting (C) spoken commands (D) pictures only

Q10. One risk of AI in daily life is that:

(A) personal data can be misused (B) computers get heavier (C) roads get longer (D) books get thicker

Short Questions

Q1. Give two examples of AI in healthcare.

Q2. What is adaptive learning? How does it help a student?

Q3. How can AI help a farmer in Pakistan?

Q4. What is a chatbot? Give one example of where it is used.

Q5. How do banks use AI to detect fraud?

Long Questions

Q1. Describe how AI is used in two different sectors (for example healthcare and agriculture), giving the benefits and one risk in each.

Q2. Explain how AI is changing daily life through voice assistants, recommendation systems and smart homes, and state one responsibility that comes with these uses.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Chapter 8: Digital Entrepreneurship

A digital entrepreneur builds a business on the internet: selling products, offering services, or creating content online. A digital business needs less money to start than a shop, because there is no rent for a physical store — but it needs a real skill, honest dealing and hard work.

8.1 What is digital entrepreneurship?

- An entrepreneur is a person who starts a business, takes risks and creates value.
- A digital entrepreneur does this online: selling products, offering services, or creating content on the internet.
- Digital businesses need less money to start than a shop, because there is no rent for a physical store.
- Examples: an online store, a freelancing service, a YouTube channel, a mobile app.

8.2 Online business models

- E-commerce: selling physical products through a website or marketplace (Daraz, Amazon).
- Freelancing: selling a skill — writing, design, programming, video editing — to clients worldwide (Fiverr, Upwork).
- Digital products: selling e-books, courses, photos or software that can be copied at almost no cost.
- Content creation: earning from videos, blogs and social media through advertising and sponsorships.
- Services: online tutoring, digital marketing, or managing social media for other businesses.

8.3 Starting an online business

- Find an idea: solve a real problem for a real group of people.
- Research the market: who are the customers, and what do competitors offer?
- Make a simple business plan: what you will sell, at what price, and how customers will find you.
- Build an online presence: a website or a page on a marketplace or social platform.
- Start small, take feedback, and improve step by step.

8.4 Money, marketing and trust

- Digital payments: mobile wallets (JazzCash, Easypaisa), bank transfers and cards make online selling possible.
- Digital marketing: social media posts, search results and online ads reach customers cheaply.
- Trust is the currency of online business: clear prices, honest descriptions, quick replies and good reviews.
- Keep records of income and expenses from the first day.

8.5 Challenges and success habits

- Challenges: strong competition, slow internet, payment problems, and customers who fear online fraud.
- Success habits: learn continuously, be honest, deliver on time, and keep improving the product.
- Never copy someone else's work or mislead customers — a good reputation is the most valuable asset.
- Many Pakistani freelancers and small online sellers already earn from global clients. The path is open to anyone with a skill and a plan.

Key terms

- Entrepreneur — a person who starts a business and takes risks. E-commerce — selling products online. Freelancing — selling a skill to clients, usually online.
- Digital marketing — reaching customers through social media, search and online ads. Business plan — what you will sell, at what price, and how customers will find you.
- Marketplace — a website where many sellers sell (Daraz, Amazon). Digital payment — paying online by wallet, card or bank transfer. Online presence — a website or page where customers can find the business.

Chapter 8: Digital Entrepreneurship — Practice Questions

Multiple-Choice Questions

Q1. A digital entrepreneur builds a business:

(A) only in a shop (B) on the internet (C) only in factories (D) only in banks

Q2. Which of these is a freelancing platform?

(A) Daraz (B) YouTube (C) Google Maps (D) Fiverr

Q3. E-commerce means:

(A) selling products online (B) selling in a market stall (C) sending emails (D) making films

Q4. A business plan should state:

(A) only the name (B) only the logo (C) what you sell, at what price, and how customers find you (D) only the owner's age

Q5. Digital marketing reaches customers through:

(A) social media and online ads (B) newspapers only (C) radio only (D) posters only

Q6. In Pakistan, common mobile wallets are:

(A) Daraz and Amazon (B) JazzCash and Easypaisa (C) Fiverr and Upwork (D) YouTube and Facebook

Q7. The most valuable asset of an online business is:

(A) a big office (B) many employees (C) a good reputation (D) expensive ads

Q8. A digital product is:

(A) a physical toy (B) a shop building (C) a delivery van (D) an e-book that can be copied at almost no cost

Q9. The first step in starting an online business is to:

(A) find an idea that solves a real problem (B) buy expensive ads (C) rent a shop (D) hire ten people

Q10. Trust in online business comes from:

(A) hidden prices (B) slow replies (C) honest descriptions and quick replies (D) fake reviews

Short Questions

Q1. What is a digital entrepreneur? Give two examples.

Q2. State the difference between e-commerce and freelancing.

Q3. What should a simple business plan contain?

Q4. Name two digital payment methods used in Pakistan.

Q5. Why is trust important in an online business?

Long Questions

Q1. Explain the steps of starting an online business, from finding an idea to making the first sale.

Q2. Compare freelancing and e-commerce as ways for a young person to earn online, giving the advantages and challenges of each.

> Write each answer in your own words, in full sentences. For long questions, give an introduction, the main points with examples, and a short conclusion.

Revision Checklist

Use this page in the last week before the examination. Tick each item only when you can explain it without looking at the notes.

- Chapter 1: kernel, shell and system calls; the six services of an operating system; types of operating systems.
- Chapter 2: full, incremental and differential backup; the 3-2-1 rule; restore points, Safe Mode and system image; routine maintenance.
- Chapter 3: Python features; variables and data types; input() and print(); comments; operators and their precedence.
- Chapter 4: if, elif and else; for and while loops; range(); break and continue; the largest-of-three and factorial programs.
- Chapter 5: the data science process; structured and unstructured data; mean, median, mode and range; spreadsheet formulas and charts.
- Chapter 6: narrow AI and general AI; the Turing test; machine learning; supervised, unsupervised and reinforcement learning.
- Chapter 7: one AI application in each of healthcare, education, agriculture, business and daily life, with its benefit and risk.
- Chapter 8: e-commerce, freelancing, digital products and content creation; the steps of starting an online business; trust and reputation.
- Practical: type and run every Python program in Chapters 3 and 4; practise SUM, AVERAGE, sorting and filtering in a spreadsheet.
- Paper: 10 MCQs in the first 15 minutes; short questions from all groups; two long questions — do not leave any question blank.

> Good luck. Revise the key terms, practise the questions again, and check the current PECTAA model paper and your board's announcements on bisebwp.edu.pk before your examination.

MCQ Answer Key

Answers to all multiple-choice questions, chapter by chapter.

Chapter 1	Ch 1 Q1: B · Ch 1 Q2: C · Ch 1 Q3: D · Ch 1 Q4: A · Ch 1 Q5: C · Ch 1 Q6: A · Ch 1 Q7: D · Ch 1 Q8: B · Ch 1 Q9: C · Ch 1 Q10: A
Chapter 2	Ch 2 Q1: B · Ch 2 Q2: C · Ch 2 Q3: A · Ch 2 Q4: D · Ch 2 Q5: A · Ch 2 Q6: C · Ch 2 Q7: D · Ch 2 Q8: B · Ch 2 Q9: B · Ch 2 Q10: C
Chapter 3	Ch 3 Q1: A · Ch 3 Q2: B · Ch 3 Q3: C · Ch 3 Q4: D · Ch 3 Q5: A · Ch 3 Q6: B · Ch 3 Q7: C · Ch 3 Q8: D · Ch 3 Q9: B · Ch 3 Q10: A
Chapter 4	Ch 4 Q1: B · Ch 4 Q2: D · Ch 4 Q3: A · Ch 4 Q4: C · Ch 4 Q5: D · Ch 4 Q6: A · Ch 4 Q7: C · Ch 4 Q8: B · Ch 4 Q9: A · Ch 4 Q10: D
Chapter 5	Ch 5 Q1: A · Ch 5 Q2: B · Ch 5 Q3: C · Ch 5 Q4: D · Ch 5 Q5: A · Ch 5 Q6: B · Ch 5 Q7: C · Ch 5 Q8: D · Ch 5 Q9: A · Ch 5 Q10: B
Chapter 6	Ch 6 Q1: A · Ch 6 Q2: B · Ch 6 Q3: C · Ch 6 Q4: D · Ch 6 Q5: B · Ch 6 Q6: A · Ch 6 Q7: C · Ch 6 Q8: D · Ch 6 Q9: A · Ch 6 Q10: B
Chapter 7	Ch 7 Q1: B · Ch 7 Q2: D · Ch 7 Q3: A · Ch 7 Q4: C · Ch 7 Q5: A · Ch 7 Q6: C · Ch 7 Q7: D · Ch 7 Q8: B · Ch 7 Q9: C · Ch 7 Q10: A
Chapter 8	Ch 8 Q1: B · Ch 8 Q2: D · Ch 8 Q3: A · Ch 8 Q4: C · Ch 8 Q5: A · Ch 8 Q6: B · Ch 8 Q7: C · Ch 8 Q8: D · Ch 8 Q9: A · Ch 8 Q10: C

End of book. These notes are original study material written for Bahawalpur Board students, following the PCTB / PECTAA 2026-27 book. They are not the textbook and not an official board publication.