

CHSE Odisha · +2 Science

INFORMATION

TECHNOLOGY

+2 1st Year (Class XI) · As per CHSE Syllabus 2023-24

Theory in simple language · Formula boxes
Solved problems · Exam Q&A · Practice & revision

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INFORMATION TECHNOLOGY

+2 1st Year · Theory 70 + Practical 30

Exam Pattern & How to Study

GOLDEN RULES FOR WRITING ANSWERS

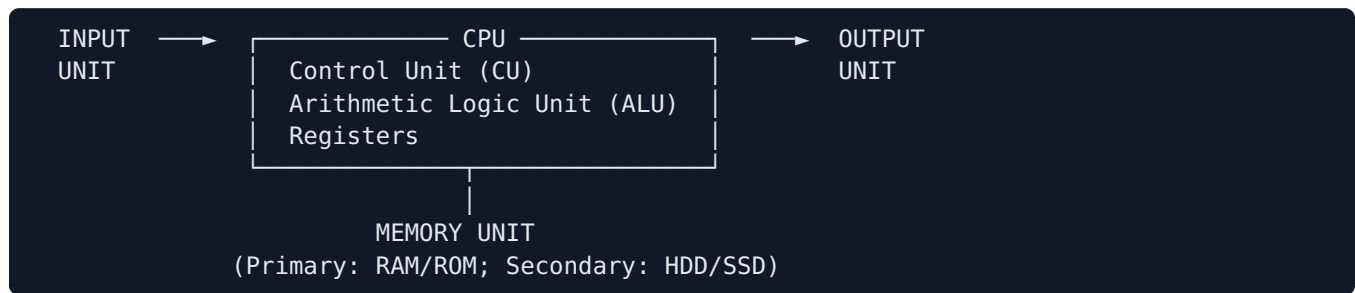
- Always write the **formula first**, then substitute values, then the answer **with units**.
- Underline or box the final answer. Examiners mark step-by-step, so even a wrong final answer earns step marks.
- For theory answers, use short points and draw a diagram wherever possible.
- Attempt questions you know best first, but keep their numbering exactly as in the paper.

Unit	Topic	Marks
1	Introduction to Computer System (Hardware 10, System & other software 10, Open source 5)	25
2	Introduction to Programming (IDE 11, Fundamentals 10, Guidelines 4)	25
3	Relational Database Management System (DBMS 10, MySQL 10)	20
4	IT Applications (e-Governance 3, e-Learning 2)	5

IT-1. Hardware Concepts

Idea: A computer is an electronic machine that takes **input**, **processes** it according to instructions, **stores** it and gives **output**. The physical parts you can touch are **hardware**; the programs are **software**.

Computer organisation (block diagram)



PARTS OF THE CPU (CENTRAL PROCESSING UNIT - THE "BRAIN")

- **ALU:** does arithmetic (+, −, ×, ÷) and logical (<, >, =, AND, OR) operations.
- **CU:** directs and coordinates all parts; fetches instructions, decodes and executes them.
- **Registers:** very small, very fast storage inside the CPU for data being processed right now.

Communication bus: a set of wires that carry signals between CPU, memory and I/O devices. **Data bus** carries data (two-way), **address bus** carries memory addresses (one-way, from CPU), **control bus** carries control signals (read/write).

Ports: connection points on the computer. **Serial port** sends data one bit at a time (older mouse, modem). **Parallel port** sends several bits at once (older printers). Modern ports: USB, HDMI, Ethernet (RJ-45), audio jack, VGA.

Input devices

Device	What it does
Keyboard	Typing text and commands (QWERTY layout)
Mouse	Pointing device; moves cursor, click and drag
Light pen	Pen-shaped device to draw or select directly on the screen
Touch screen	Screen that senses finger touch (mobiles, ATMs)
Graphic tablet	Flat pad with stylus for drawing; used by designers
Joystick	Lever used for games and controlling machines
Microphone	Inputs sound/voice
Scanner	Converts paper images/documents into digital form
OCR (Optical Character Recognition)	Reads printed text and converts it to editable text
OMR (Optical Mark Reader)	Reads pencil/pen marks on answer sheets (multiple-choice exams)
BCR (Bar Code Reader)	Reads bar codes on products in shops
MICR (Magnetic Ink Character Recognition)	Reads magnetic-ink numbers on bank cheques
Smart card reader	Reads chip cards (ATM/debit card, ID cards)
Biometric sensor	Reads fingerprint, iris or face for identification (Aadhaar)
Web camera	Captures video/images for video calls

Output devices

Device	Notes
Monitor / VDU	Visual Display Unit. Older: CRT. Newer: LCD and LED (thin, less power).
Television	Can act as a large display through HDMI
Dot Matrix Printer (DMP)	Impact printer; pins strike an inked ribbon; noisy, cheap, can print carbon copies
Inkjet / Deskjet / Bubble-jet	Non-impact; sprays tiny ink drops; good colour quality, quiet
Laser printer	Non-impact; uses laser and toner powder; fast, high quality
Plotter	Draws large, accurate drawings (maps, engineering designs) with pens
Speaker	Sound output

Memory unit

Memory size units: 1 bit (0 or 1); 4 bits = 1 nibble; 8 bits = 1 **byte**; 1 KB = 1024 bytes; 1 MB = 1024 KB; 1 GB = 1024 MB; 1 TB = 1024 GB.

Type	Full form	Features
RAM	Random Access Memory	Main working memory; read and write; volatile (data lost when power goes off)
SRAM	Static RAM	Uses flip-flops; faster; costlier; no refreshing; used in cache
DRAM	Dynamic RAM	Uses capacitors; needs constant refreshing; cheaper; main memory
ROM	Read Only Memory	Non-volatile; stores permanent instructions such as BIOS (boot program)
PROM	Programmable ROM	Can be written once by the user
EPROM	Erasable PROM	Erased by ultraviolet light and rewritten
EEPROM	Electrically Erasable PROM	Erased electrically; basis of flash memory (pen drives)

Secondary memory: hard disk, SSD, CD/DVD, pen drive, memory card — permanent, large, slower than RAM. **Cache memory:** very fast memory between CPU and RAM.

IT-2. Types of Software

Software is a set of programs (instructions) that tells the hardware what to do.

System software

Manages the computer itself. Main types: operating system, language processors, utility software.

OPERATING SYSTEM (OS)

The most important system software; it acts as an **interface between the user and the hardware**. Without an OS you cannot use a computer. Examples: Windows, Linux, macOS, Android, iOS.

Need for an OS: to make the computer easy to use, to manage hardware resources efficiently, to run application programs, and to protect data.

Major functions of an OS:

1. **Process management** – decides which program gets the CPU and for how long.
2. **Memory management** – allocates and frees RAM for programs.
3. **File management** – creates, saves, deletes, organises files and folders.
4. **Device management** – controls printers, keyboard, etc. through drivers.
5. **Security** – passwords, user accounts, permissions.
6. **User interface** – CUI (command line, e.g. MS-DOS) or GUI (icons and windows).

OS for	Examples	Features
Mainframe	IBM z/OS	Many users at once, huge data processing, high reliability
PC / Server	Windows, Linux, macOS, Windows Server	Single user (PC) or network services (server)
Mobile	Android, iOS	Touch interface, power saving, apps, wireless

Language processors (translators)

Computers understand only machine language (0s and 1s). Programs written in other languages must be translated.

Translator	Converts	How
Assembler	Assembly language → machine code	Whole program
Compiler	High-level language (C, C++) → machine code	Whole program at once; lists all errors at the end; fast execution
Interpreter	High-level language (Python, BASIC) → machine code	Line by line; stops at the first error; slower

NOTE ON JAVA

Java uses both: the compiler converts source code (.java) into **bytecode** (.class), and the Java Virtual Machine (JVM) interprets the bytecode. This is why Java is "write once, run anywhere".

Utility software

- **Compression tools** (WinZip, WinRAR, 7-Zip): reduce file size for storage or emailing.
- **Disk defragmenter**: rearranges scattered pieces of files on a hard disk so they are stored together, making the computer faster.
- **Antivirus** (Quick Heal, Norton, Windows Defender): detects and removes viruses and malware.
- Others: backup tools, disk cleanup.

Application software

General purpose:

Type	Use	Examples
Word processor	Typing and formatting documents	MS Word, LibreOffice Writer
Spreadsheet	Tables, calculations, charts	MS Excel, LibreOffice Calc
Presentation	Slide shows	MS PowerPoint, Impress
DBMS	Storing and querying data	MySQL, MS Access
IDE	Writing, compiling and debugging programs	NetBeans, Eclipse

Specific purpose (customised): Inventory Management Software (tracks stock in shops), HRMS – Human Resource Management System (employee records, attendance,

leave), Payroll system (calculates salaries, tax), Financial Management System (accounts, budgets), Reservation System (railway – IRCTC, airline tickets, hotel booking).

IT-3. Open Source Concepts

DEFINITIONS

- **Open source software:** software whose **source code is available** to everyone to view, modify and share.
- **Free software:** gives users the freedom to run, study, change and distribute it (freedom, not necessarily zero price).
- **FOSS:** Free and Open Source Software. **FLOSS:** Free/Libre and Open Source Software.
- **Proprietary software:** owned by a company; source code is secret; needs a licence (MS Windows, MS Office).

Common FOSS	Purpose
GNU/Linux (Ubuntu, Fedora)	Operating system
Mozilla Firefox	Web browser
OpenOffice / LibreOffice	Office suite
Java (OpenJDK)	Programming language
NetBeans	IDE for Java
MySQL	Database management system

Open standards: publicly available specifications that anyone can use, so different software can work together (interoperability). Examples: **WWW** (World Wide Web), **HTML** (to create web pages), **XML** (to store/transport data with user-defined tags), **DHTML** (dynamic HTML – web pages that change without reloading, using HTML + CSS + JavaScript).

Indian language computing

Character coding: every character is stored as a number. **ASCII** uses 7/8 bits and covers only English (256 characters). **ISCII** was for Indian scripts. **Unicode** gives a unique number to every character of every language (Odia, Hindi, Chinese...) — up to 16/32 bits — so Indian languages display correctly everywhere.

Fonts	Difference
TrueType (TTF)	Developed by Apple/Microsoft; outline font; widely used
OpenType (OTF)	By Microsoft and Adobe; supports Unicode and many more characters; cross-platform; better for Indian scripts
Static font	Installed on the computer; must be present to display text
Dynamic font	Downloaded with a web page from the server when needed

Entering Indian language text: (i) **Phonetic typing** – type how it sounds in English letters, e.g. "namaskar" becomes the Odia/Hindi word (Google Input Tools). (ii) **Key-map based (Inscript)** – each key is mapped to a fixed Indian-script character.

Exam Q&A - Unit 1

Q1. What is the full form of MICR? [1]

Magnetic Ink Character Recognition.

Q2. Which memory is volatile? [1]

RAM.

Q3. Name one open source operating system. [1]

GNU/Linux (e.g. Ubuntu).

Q4. Differentiate between compiler and interpreter. [2]

A compiler translates the whole program at once and shows all errors together; execution is faster. An interpreter translates line by line and stops at the first error; execution is slower.

Q5. Differentiate between SRAM and DRAM. [2]

SRAM uses flip-flops, needs no refreshing, is faster and costlier (cache). DRAM uses capacitors, needs refreshing, is slower and cheaper (main memory).

Q6. What is Unicode? Why is it important for Indian languages? [2]

Unicode is a universal character-encoding standard that gives a unique code to every character of every script. It allows Odia, Hindi and other Indian scripts to be stored, displayed and exchanged correctly on any device.

Q7. Explain the major functions of an operating system. [4]

Process management, memory management, file management, device management, security and user interface — explain each in one line as in the notes above.

Q8. What is open source software? Give its advantages. [4]

Software whose source code is freely available to use, modify and distribute. Advantages: free or low cost; can be customised; community support and quick bug fixes; no vendor lock-in; transparency and security; good for learning.

IT-4. Getting Started with Programming using IDE (Java)

Idea: A program is a set of step-by-step instructions for the computer. In this course we write programs in **Java** using the **NetBeans IDE**. An **IDE (Integrated Development Environment)** is a single software that provides a code editor, a form designer, a compiler and a debugger in one place.

RAD - RAPID APPLICATION DEVELOPMENT

With an IDE you can build the screen (form) by dragging and dropping controls like buttons and text boxes, instead of writing all the code by hand. You then write small pieces of code only for the actions (events), such as "what happens when the button is clicked". This makes development fast — hence "rapid".

Parts of the NetBeans IDE

- **Palette:** list of Swing controls to drag onto the form.
- **Design area (Form):** where you place controls.
- **Properties window:** change properties such as text, font, colour of the selected control.
- **Inspector / Navigator:** shows all controls on the form in a tree.
- **Source editor:** where you write Java code.
- **Projects window:** shows files of the project.

Java Swing user-interface components

Component	Class	Use	Common methods
Frame	JFrame	Main window that holds other controls	setTitle(), setVisible()
Dialog	JDialog	Small pop-up window	—
Option pane	JOptionPane	Ready-made message/input box	showMessageDialog()
Panel	JPanel	Container to group controls	—
Scroll pane	JScrollPane	Adds scroll bars to a big component	—
Label	JLabel	Displays fixed text (user cannot type)	getText(), setText()
Text field	JTextField	Single-line input	getText(), setText(), isEditable()
Password field	JPasswordField	Input shown as dots/stars	getPassword()
Text area	JTextArea	Multi-line text	getText(), setText(), append()
Button	JButton	Performs an action when clicked	getText(), setText()
Check box	JCheckBox	Select many options	isSelected(), setSelected()
Radio button	JRadioButton	Select only one option from a group (use ButtonGroup)	isSelected(), setSelected()
Combo box	JComboBox	Drop-down list	getSelectedItem(), getSelectedIndex()
List	JList	List showing several items	getSelectedValue()
Table	JTable	Rows and columns of data	getModel(), addRow() (via DefaultTableModel)

Common properties set in the Properties window: Background, Foreground (text colour), Font, Text, Enabled (true/false), Editable, Selected, buttonGroup.

EVENT HANDLING

Double-click a button in design view → NetBeans creates a method `jButton1ActionPerformed(...)`. Whatever you write inside runs when the button is clicked.

Developing a general application - example

Program 1. Accept a name in a text field and display "Hello, <name>" in a label when the button is clicked.

```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    String name = jTextField1.getText();
    jLabel1.setText("Hello, " + name);
}
```

Program 2. Add two numbers entered in two text fields and show the result in a third.

```
private void btnAddActionPerformed(java.awt.event.ActionEvent evt) {
    int a = Integer.parseInt(txtA.getText());
    int b = Integer.parseInt(txtB.getText());
    int sum = a + b;
    txtSum.setText(Integer.toString(sum)); // or "" + sum
}
```

Program 3. Display a message box.

```
JOptionPane.showMessageDialog(null, "Welcome to IT class");
```

IT-5. Programming Fundamentals

Data types

A **data type** tells the computer what kind of value a variable will hold and how much memory it needs.

Type	Size	Stores	Example
byte	1 byte	Integer -128 to 127	byte age = 17;
short	2 bytes	Integer -32768 to 32767	short x = 3000;
int	4 bytes	Integer (about ± 2 billion)	int marks = 450;
long	8 bytes	Very large integer	long pop = 1400000000L;
float	4 bytes	Decimal (about 7 digits)	float pi = 3.14f;
double	8 bytes	Decimal (about 15 digits)	double salary = 25500.75;
char	2 bytes	Single character (Unicode)	char grade = 'A';
boolean	1 bit (logical)	true or false	boolean pass = true;
String	class (not primitive)	Text	String city = "Cuttack";

Variables

A **variable** is a named memory location whose value can change. **Declaring:** `int total;`
Assigning: `total = 100;` **Both:** `int total = 100;`

RULES FOR NAMING VARIABLES

- Can contain letters, digits, underscore (_) and dollar (\$).
- Must not start with a digit (1num is wrong).
- No spaces or special characters like @, #, -.
- Cannot be a keyword (int, class, if, for...).
- Case-sensitive: Total and total are different.
- Use meaningful names: studentMarks rather than x.

Converting text to numbers

Text fields always return a String. To do arithmetic, convert:

```
int n    = Integer.parseInt(jTextField1.getText());
double d = Double.parseDouble(jTextField2.getText());
float f  = Float.parseFloat(jTextField3.getText());
String s = Integer.toString(n);    // number back to text
```

Operators

Category	Operators
Arithmetic	+ - * / % (remainder). Note $7/2 = 3$ for int; $7\%2 = 1$
Relational	== != < > <= >=
Logical	&& (AND) (OR) ! (NOT)
Assignment	= += -= *= /=
Increment/Decrement	++ --

Control structures

Normally statements run one after another (**sequence**). Control structures change this flow: **decision** (choose) and **looping** (repeat).

if, if...else, if...else if

```
if (marks >= 30) {
    lblResult.setText("Pass");
} else {
    lblResult.setText("Fail");
}
```

switch

```
switch (day) {
    case 1: s = "Sunday"; break;
    case 2: s = "Monday"; break;
    default: s = "Invalid day";
}
```

DON'T FORGET BREAK

Without break, execution "falls through" to the next case.

Loops

Loop	Syntax	Feature
for	for(int i=1; i<=10; i++) { ... }	Number of repetitions known
while	while(condition) { ... }	Entry-controlled; may run zero times
do-while	do { ... } while(condition);	Exit-controlled; runs at least once

Solved programs (practical exam type)

P1. Check whether a number is even or odd.

```
int n = Integer.parseInt(txtNum.getText());
if (n % 2 == 0)
    lblOut.setText(n + " is Even");
else
    lblOut.setText(n + " is Odd");
```

P2. Find the largest of three numbers.

```
int a = Integer.parseInt(txtA.getText());
int b = Integer.parseInt(txtB.getText());
int c = Integer.parseInt(txtC.getText());
int max = a;
if (b > max) max = b;
if (c > max) max = c;
txtMax.setText("" + max);
```

P3. Calculate grade from percentage (≥ 80 A, ≥ 60 B, ≥ 45 C, ≥ 30 D, else F).

```
double p = Double.parseDouble(txtPer.getText());
String g;
if (p >= 80) g = "A";
else if (p >= 60) g = "B";
else if (p >= 45) g = "C";
else if (p >= 30) g = "D";
else g = "F";
txtGrade.setText(g);
```

P4. Display the multiplication table of a number in a text area.

```
int n = Integer.parseInt(txtN.getText());
txtArea.setText("");
for (int i = 1; i <= 10; i++) {
    txtArea.append(n + " x " + i + " = " + (n * i) + "\n");
}
```

P5. Find the factorial of a number.

```
int n = Integer.parseInt(txtN.getText());
long fact = 1;
for (int i = 1; i <= n; i++)
    fact = fact * i;
txtFact.setText("" + fact);
```

P6. Sum of digits of a number (while loop).

```
int n = Integer.parseInt(txtN.getText());
int sum = 0;
while (n > 0) {
    sum = sum + n % 10;    // last digit
    n = n / 10;           // remove last digit
}
txtSum.setText("" + sum);
```

P7. Check whether a number is prime.

```
int n = Integer.parseInt(txtN.getText());
boolean prime = (n > 1);
for (int i = 2; i <= n / 2; i++) {
    if (n % i == 0) { prime = false; break; }
}
lblOut.setText(prime ? "Prime" : "Not Prime");
```

P8. Calculate simple interest; discount on bill using radio buttons and check box.

```
double amt = Double.parseDouble(txtAmt.getText());
double disc = 0;
if (rbGold.isSelected()) disc = 0.10 * amt;    // 10% for Gold card
else if (rbSilver.isSelected()) disc = 0.05 * amt;
if (chkFestival.isSelected()) disc = disc + 0.02 * amt; // extra 2%
txtDisc.setText("" + disc);
txtNet.setText("" + (amt - disc));
```

P9. Show the selected item of a combo box.

```
String city = (String) cmbCity.getSelectedItem();
JOptionPane.showMessageDialog(null, "You selected " + city);
```

P10. Reverse a number using do-while.

```
int n = Integer.parseInt(txtN.getText()), rev = 0;
do {
    rev = rev * 10 + n % 10;
    n = n / 10;
} while (n > 0);
txtRev.setText("" + rev);
```

Commonly used methods

Class	Methods
Integer	parseInt(), toString()
Double	parseDouble(), toString()
String	concat(), length(), substring(), toLowerCase(), toUpperCase(), trim()
Math	pow(a, b), round(x), sqrt(x)

```
String s = "  Odisha  ";
s.trim()          -> "Odisha"
"Odisha".length() -> 6
"Odisha".toUpperCase() -> "ODISHA"
"Odisha".substring(0, 3) -> "Odi"
"Odi".concat("sha") -> "Odisha"
Math.pow(2, 5)      -> 32.0
Math.round(4.6)     -> 5
```

IT-6. Programming Guidelines

General concepts of a good program: correct, easy to read (indentation, comments, meaningful names), efficient, easy to modify, user-friendly (clear messages), and robust (handles wrong input).

Modular approach: divide a big program into small independent parts (modules/ methods), each doing one job. Advantages: easier to write, test, debug and reuse; teamwork is possible.

Types of errors

Error	Meaning	Example
Syntax error	Breaking the grammar rules of the language; detected by compiler	Missing semicolon; Int x; instead of int x;
Run-time error	Program compiles but crashes while running	Division by zero; parseInt("abc")
Logical error	Program runs but gives wrong answer; hardest to find	Using + instead of * ; average = a + b / 2 (should be (a + b) / 2)

Debugging: finding and removing errors. Tools: breakpoints, step-by-step execution, watching variable values.

Problem-solving procedure

1. **Understand the problem** - what is given and what is required.
2. **Identify the minimum inputs** needed to produce the output (e.g., for area of a circle, only radius).
3. **Break the problem into simple logical steps** (algorithm / flowchart).
4. Write the code, test with sample data, and correct errors.

Algorithm example: Find the area and perimeter of a rectangle.

Step 1: Start. Step 2: Input length L and breadth B. Step 3: Area = $L \times B$. Step 4: Perimeter = $2(L + B)$. Step 5: Display Area and Perimeter. Step 6: Stop.

Exam Q&A - Programming**Q1. What is the full form of IDE? [1]**

Integrated Development Environment.

Q2. Which method converts a String to an integer? [1]

Integer.parseInt().

Q3. Difference between radio button and check box. [2]

Radio buttons in a ButtonGroup allow only one choice; check boxes allow several choices at once.

Q4. Difference between while and do-while. [2]

while checks the condition first (entry-controlled, may run 0 times); do-while checks it after the body (exit-controlled, runs at least once).

Q5. What will be the output? `int x = 10; x += 5; x = x % 4;` [2]

`x = 15`, then `15 % 4 = 3`.

Q6. Find the errors: `int 2num = 5 if(num>2) System.out.println("Big")` [2]

Variable name cannot start with a digit; semicolons missing after the declaration and the println statement.

Q7. How many times will the loop run? `for(int i = 10; i > 0; i -= 3)` [2]

`i = 10, 7, 4, 1` → 4 times.

Q8. Explain three types of programming errors with examples. [4]

Syntax, run-time and logical errors — see table above.

IT-7. Relational Database Management System

Idea: A **database** is an organised collection of related data — like a well-kept register in a school office. A **DBMS** (Database Management System) is software that lets us create, store, update and retrieve that data easily (MySQL, Oracle, MS Access).

ADVANTAGES OF A DBMS OVER PAPER / FILE SYSTEM

Reduces data redundancy (duplication) · avoids inconsistency · data sharing · security through passwords · data integrity (correctness rules) · easy backup and recovery · fast searching.

Relational database terms

In a **relational database**, data is stored in **tables (relations)** made of rows and columns.

Term	Meaning	In everyday words
Relation	Table	A register page
Attribute / Field	Column	A heading like "Name"
Tuple / Record	Row	One student's full entry
Domain	Set of allowed values for a column	Gender: M/F/O
Degree	Number of columns	—
Cardinality	Number of rows	—

Sample table **STUDENT** (degree 4, cardinality 4):

RollNo	Name	Stream	Marks
101	Anita	Science	450
102	Bikash	Commerce	390
103	Chinmay	Science	475
104	Deepa	Arts	410

Keys

Key	Meaning
Primary key	Column that uniquely identifies each row; cannot be NULL or repeated (RollNo)
Candidate key	All columns that could serve as primary key (RollNo, AadhaarNo)
Alternate key	Candidate keys not chosen as primary key
Foreign key	Column in one table that refers to the primary key of another table; links tables

MySQL data types

Type	Use	Example
CHAR(n)	Fixed-length text; unused space padded	CHAR(1) for gender
VARCHAR(n)	Variable-length text up to n; saves space	VARCHAR(30) for name
INT / INTEGER	Whole numbers	Marks
DECIMAL(p, s)	Numbers with decimals; p total digits, s after point	DECIMAL(8,2) for salary
DATE	Date in 'YYYY-MM-DD'	'2007-05-14'

IT-8. Introduction to MySQL

MySQL is a free, open-source RDBMS. We talk to it using **SQL** (Structured Query Language). SQL is not case-sensitive, and each command ends with a semicolon.

Category	Commands	Purpose
DDL - Data Definition Language	CREATE, DROP, ALTER	Define structure of database/tables
DML - Data Manipulation Language	INSERT, SELECT, UPDATE, DELETE	Work with the data inside tables

Creating and using a database and table

```
CREATE DATABASE school;
USE school;
CREATE TABLE student (
    RollNo INT PRIMARY KEY,
    Name VARCHAR(30),
    Stream VARCHAR(15),
    Marks INT,
    DOB DATE
);
DESC student;           -- shows the structure of the table
INSERT INTO student VALUES (101, 'Anita', 'Science', 450, '2007-04-12');
INSERT INTO student (RollNo, Name) VALUES (105, 'Esha'); -- other columns NULL
DROP TABLE student;    -- deletes the whole table (careful!)
```

SELECT - displaying data

```
SELECT * FROM student;           -- all columns
SELECT Name, Marks FROM student; -- specific columns
SELECT Name, Marks + 10 FROM student; -- arithmetic on columns
SELECT Name, Marks/5 AS Percentage FROM student; -- column alias
SELECT DISTINCT Stream FROM student; -- remove duplicates
```

Operator precedence: * and / are done before + and -. Use brackets to change order: (Marks + 50) * 2.

WHERE clause - limiting rows

Operator	Example
=, <, >, <=, >=, <>	WHERE Marks >= 400; WHERE Stream <> 'Arts'
BETWEEN	WHERE Marks BETWEEN 400 AND 450 (both ends included)
IN	WHERE Stream IN ('Science', 'Arts')
LIKE with % and _	WHERE Name LIKE 'A%' (starts with A); LIKE '%a' (ends with a); LIKE '_i%' (second letter i)
IS NULL	WHERE Marks IS NULL
AND, OR, NOT	WHERE Stream = 'Science' AND Marks > 460

LOGICAL OPERATOR PRECEDENCE

NOT is done first, then AND, then OR. WHERE Stream='Arts' OR Stream='Science' AND Marks>460 means Arts OR (Science AND >460). Use brackets to get what you mean:
WHERE (Stream='Arts' OR Stream='Science') AND Marks>460.

Solved SQL queries (on the STUDENT table above)

1. Display names of Science students.

```
SELECT Name FROM student WHERE Stream = 'Science';
```

Output: Anita, Chinmay

2. Display name and marks of students scoring between 400 and 460.

```
SELECT Name, Marks FROM student WHERE Marks BETWEEN 400 AND 460;
```

Output: Anita 450, Deepa 410

3. Display students whose name starts with 'B' or 'D'.

```
SELECT * FROM student WHERE Name LIKE 'B%' OR Name LIKE 'D%';
```

4. Display different streams.

```
SELECT DISTINCT Stream FROM student;
```

Output: Science, Commerce, Arts

5. Show name and percentage (out of 500) with heading "Percent".

```
SELECT Name, Marks*100/500 AS Percent FROM student;
```

6. Display students who are not in Arts and have more than 400.

```
SELECT * FROM student WHERE NOT Stream = 'Arts' AND Marks > 400;
```

Output: Anita, Chinmay (Bikash has 390)

7. Display students of Science or Commerce stream.

```
SELECT Name FROM student WHERE Stream IN ('Science','Commerce');
```

8. Display students whose name has 'i' as the second letter.

```
SELECT Name FROM student WHERE Name LIKE '_i%';
```

Output: Bikash

IT-9. IT Applications

e-Governance

DEFINITION

e-Governance is the use of information and communication technology (ICT) by the government to deliver services, exchange information and interact with citizens, businesses and other departments — quickly, transparently and at low cost.

Benefits to citizens: services available 24×7 from home; less paperwork and fewer office visits; transparency reduces corruption; faster delivery; online grievance redressal; saves time and money.

Websites: india.gov.in (National Portal), odisha.gov.in, uidai.gov.in (Aadhaar), incometax.gov.in, edistrict.odisha.gov.in (certificates), passportindia.gov.in, digilocker.gov.in, irctc.co.in.

Social impact: empowers rural citizens, increases participation and trust in government, saves time, but may widen the gap for people without internet access (digital divide).

Challenges: lack of computer literacy, poor internet in rural areas, language barriers, cyber security and privacy, high setup cost, resistance to change among staff.

e-Learning

DEFINITION

e-Learning is learning with the help of electronic media — computers, internet, mobile phones, videos, online classes and digital content.

Benefits to students: learn anytime, anywhere, at own pace; repeat lessons; access to best teachers; interactive videos and quizzes; low cost.

Benefits to teachers: reach more students; easy to update content; online tests with automatic marking; training management and teacher training (e.g. DIKSHA).

Websites: swayam.gov.in, diksha.gov.in, nptel.ac.in, ePathshala, Khan Academy.

Social impact: spreads education to remote areas, supports lifelong learning; but needs devices and internet, and reduces face-to-face interaction.

Exam Q&A – DBMS, MySQL, IT Applications

Q1. What is a tuple? [1]

A row (record) of a table.

Q2. Which command shows the structure of a table? [1]

DESC (or DESCRIBE).

Q3. Which keyword removes duplicate values in output? [1]

DISTINCT.

Q4. Differentiate CHAR and VARCHAR. [2]

CHAR(n) always uses n characters of storage (fixed); VARCHAR(n) uses only as much as the actual data (variable), up to n.

Q5. What is a primary key? Can it be NULL? [2]

A column that uniquely identifies each row. It cannot be NULL or duplicate.

Q6. Differentiate DDL and DML with examples. [2]

DDL defines structure (CREATE, ALTER, DROP); DML handles data (INSERT, SELECT, UPDATE, DELETE).

Q7. Give two benefits of e-Governance to citizens. [2]

24×7 online services from home; transparency and less corruption.

Q8. Write SQL to create table EMP (EmpNo int primary key, Name varchar(25), Salary decimal(8,2)) and insert one record. [4]

```
CREATE TABLE EMP (EmpNo INT PRIMARY KEY, Name VARCHAR(25), Salary DECIMAL(8,2));  
INSERT INTO EMP VALUES (1, 'Ramesh', 35000.00);
```

IT Practical – Record Checklist (1st Year)

- At least 10 Java (NetBeans) programs — use programs P1–P10 above.
- At least 3 IT-application problem-solving frameworks (e.g. e-governance form, library form, fee form).
- At least 15 SQL queries on any database — use the queries above plus INSERT/CREATE/DESC.
- Viva: know definitions of IDE, RAD, data types, primary key, DDL/DML, OS functions.

CHAPTER-WISE QUESTION BANK

Information Technology · +2 1st Year

QUESTION PATTERN REMINDER

1-mark (very short), 2-mark (short), 4-mark (short-long). Write definitions exactly, add an example, and draw diagrams (block diagram of computer, memory hierarchy) wherever possible.

QB-1. Computer Organisation and Hardware

A. Multiple choice questions

1. The brain of the computer is (a) RAM (b) CPU (c) hard disk (d) monitor
(b).
2. Which unit performs arithmetic and logical operations? (a) CU (b) ALU (c) MU (d) register
(b).
3. Which bus carries addresses from CPU to memory? (a) data bus (b) control bus (c) address bus (d) system bus
(c).
4. Which device reads pencil marks on answer sheets? (a) OCR (b) OMR (c) MICR (d) BCR
(b).
5. MICR is used mainly in (a) shops (b) banks (c) schools (d) hospitals
(b) cheques.
6. Which is an impact printer? (a) laser (b) inkjet (c) dot matrix (d) bubble-jet
(c).
7. Which memory needs refreshing? (a) SRAM (b) DRAM (c) ROM (d) EPROM
(b).
8. EPROM is erased by (a) electricity (b) ultraviolet light (c) magnet (d) heat

(b).

9. 1 KB equals (a) 1000 bytes (b) 1024 bytes (c) 1024 bits (d) 8 bytes

(b).

10. Which is both an input and output device? (a) keyboard (b) touch screen (c) printer (d) scanner

(b).

11. Plotters are used to print (a) photographs (b) large engineering drawings (c) cheques (d) bar codes

(b).

12. Which port transmits one bit at a time? (a) parallel (b) serial (c) both (d) none

(b).

13. Fingerprint scanners are examples of (a) OCR (b) biometric sensors (c) MICR (d) plotters

(b).

14. Cache memory is located between (a) RAM and hard disk (b) CPU and RAM (c) keyboard and CPU (d) ROM and RAM

(b).

15. BIOS is stored in (a) RAM (b) ROM (c) hard disk (d) cache

(b).

B. Very short answer questions (1 mark)

1. Expand: CPU, ALU, CU.

Central Processing Unit, Arithmetic Logic Unit, Control Unit.

2. What is a register?

A very small, very fast storage location inside the CPU.

3. Name two pointing devices.

Mouse, light pen (also joystick, touch pad).

4. What is a nibble?

A group of 4 bits.

5. Which device converts printed text into editable text?

OCR (Optical Character Reader).

6. Give one example of secondary memory.

Hard disk / pen drive / CD.

7. What is the full form of VDU?

Visual Display Unit.

8. Which memory is non-volatile: RAM or ROM?

ROM.

C. Short answer questions (2 marks)

1. Differentiate between RAM and ROM.

RAM: read/write, volatile, stores current programs and data, larger. ROM: read-only, non-volatile, stores permanent start-up instructions (BIOS), smaller.

2. Differentiate between impact and non-impact printers.

Impact printers strike an inked ribbon against paper (dot matrix): noisy, cheaper, can make carbon copies. Non-impact printers use ink spray or laser and toner (inkjet, laser): quiet, faster, better quality.

3. What is the function of the control unit?

It fetches instructions from memory, decodes them and directs the ALU, memory and I/O devices to execute them; it coordinates all parts of the computer.

4. What are PROM, EPROM and EEPROM?

PROM can be programmed once by the user. EPROM can be erased with UV light and reprogrammed. EEPROM can be erased and rewritten electrically (used in flash memory).

5. What is a communication bus? Name its types.

A set of parallel wires carrying signals among computer components. Types: data bus, address bus, control bus.

6. Write two uses each of a bar code reader and a smart card reader.

BCR: billing in supermarkets, library book issue. Smart card reader: ATM/debit card transactions, ID/access control and metro cards.

D. Long answer questions (4 marks)

1. Draw the block diagram of a computer and explain each unit.

Input unit → CPU (CU + ALU + registers) → Output unit, with memory unit connected to the CPU. Input unit accepts data (keyboard, mouse); CPU processes it — ALU computes, CU controls; memory stores data and programs (primary: RAM/ROM; secondary: disks); output unit gives results (monitor, printer). Arrows show data flow and dotted lines show control signals from CU.

2. Explain the types of memory with a memory hierarchy diagram.

From fastest/costliest/smallest to slowest/cheapest/largest: registers → cache → RAM (main memory) → secondary storage (SSD/HDD) → tertiary (optical disks, tapes). Primary memory: RAM (SRAM, DRAM — volatile) and ROM (PROM, EPROM, EEPROM — non-volatile). Secondary memory is permanent and stores data for long periods.

3. Describe any four input devices and any four output devices.

Input: keyboard (typing), mouse (pointing), scanner (digitising images), microphone (sound). Output: monitor (soft copy display), printer (hard copy), plotter (large drawings), speaker (sound). Give one line on how each works.

QB-2. System, Utility and Application Software

A. Multiple choice questions

1. Which of the following is system software? (a) MS Word (b) Windows (c) Tally (d) Photoshop

(b).

2. A program that translates the whole program at once is (a) interpreter (b) compiler (c) assembler (d) loader

(b).

3. Assembler converts (a) high-level to machine (b) assembly to machine (c) machine to assembly (d) source to bytecode

(b).

4. Disk defragmenter is (a) application software (b) utility software (c) OS (d) language processor

(b).

5. Android is an OS for (a) mainframes (b) servers (c) mobiles (d) supercomputers

(c).

6. Which is a spreadsheet package? (a) Writer (b) Calc (c) Impress (d) Base

(b).

7. IRCTC is an example of (a) payroll (b) reservation system (c) inventory (d) HRMS

(b).

8. Which OS function allocates RAM to programs? (a) file management (b) memory management (c) device management (d) security

(b).

9. WinZip is a (a) compression tool (b) antivirus (c) compiler (d) browser

(a).

10. NetBeans is an example of (a) DBMS (b) IDE (c) OS (d) antivirus

(b).

B. Very short answer questions

1. What is software?

A set of programs and instructions that tells the computer what to do.

2. Name two operating systems for PCs.

Windows, Linux (Ubuntu), macOS.

3. What is a device driver?

Software that lets the OS communicate with a hardware device.

4. Give one example of specific-purpose application software.

Payroll system / inventory management / HRMS.

5. What does an antivirus do?

Detects, blocks and removes viruses and other malware.

C. Short answer questions**1. Differentiate between system software and application software.**

System software manages hardware and provides a platform (OS, compilers, utilities); runs in the background; needed to run the computer. Application software performs specific user tasks (word processing, billing); runs on top of system software; optional.

2. Differentiate between CUI and GUI.

CUI (Character User Interface): commands typed as text (MS-DOS, Linux terminal); fast but hard to learn. GUI (Graphical User Interface): icons, windows, menus and mouse (Windows); easy for beginners.

3. What is an Inventory Management Software? Give two features.

Software that keeps track of stock (goods) in a business. Features: records purchases and sales; shows current stock and reorder alerts; generates stock reports and bills.

4. What is HRMS? Mention its functions.

Human Resource Management System manages employee information: personal records, attendance, leave, recruitment, training, performance appraisal and links to payroll.

5. What is disk defragmentation? Why is it needed?

Over time, file pieces get scattered (fragmented) on a hard disk, slowing access. A defragmenter rearranges them into contiguous blocks, improving speed.

D. Long answer questions**1. What is an operating system? Explain its functions.**

An OS is system software that acts as an interface between user and hardware and manages all resources. Functions: (1) process management — scheduling programs on the CPU; (2) memory management — allocating/freeing RAM; (3) file management — creating, saving, organising files and folders; (4) device management — controlling I/O devices through drivers; (5) security — passwords, user rights; (6) user interface — CUI/GUI; (7) error detection and job accounting.

2. Explain the three types of language processors with differences.

Assembler (assembly → machine code). Compiler (high-level → machine code at once; produces object file; faster execution; errors listed together; e.g. C, C++). Interpreter (high-level → executes line by line; no object file; slower; stops at first error; easier debugging; e.g. Python, BASIC). Java uses a compiler to bytecode and the JVM to interpret it.

QB-3. Open Source Concepts

A. Multiple choice questions

1. Which is open source? (a) MS Office (b) LibreOffice (c) Windows (d) Photoshop

(b).

2. FOSS stands for (a) Free and Open Source Software (b) Free Office Software System (c) Fast Open Source Software (d) File Open Source System

(a).

3. Unicode is used for (a) compression (b) character encoding of all languages (c) networking (d) printing

(b).

4. Which font type is cross-platform and supports Unicode well? (a) TrueType (b) OpenType (c) bitmap (d) static

(b).

5. Which is an open standard? (a) .docx (b) HTML (c) .psd (d) .exe

(b).

6. Phonetic typing means (a) typing by sound in English letters (b) using a fixed key map (c) voice typing (d) handwriting

(a).

B. Short answer questions

1. Differentiate between open source and proprietary software.

Open source: source code freely available, can be modified and shared, usually free (Linux, Firefox). Proprietary: source code hidden, owned by a company, needs a paid licence, cannot be modified (Windows, MS Office).

2. Differentiate between static and dynamic fonts.

Static fonts are installed on the computer and must be present to display text. Dynamic fonts are downloaded along with the web page from the server, so text displays correctly even if the font is not installed.

3. What is ISCII?

Indian Script Code for Information Interchange — an 8-bit encoding for Indian scripts, now largely replaced by Unicode.

4. Name the freedoms of free software.

Freedom to run the program for any purpose; to study and change it (access to source code); to redistribute copies; to distribute modified versions.

C. Long answer question**Explain Indian language computing: need, Unicode, fonts and methods of entering text.**

Need: most Indians use regional languages; e-governance, education and communication require computers to handle Odia, Hindi, etc. Unicode gives every character of every script a unique code, so text is portable across devices and software. Fonts: TrueType and OpenType (OpenType better supports complex Indian scripts); static vs dynamic fonts. Entering text: phonetic transliteration (type "odisha" in English letters to get the word in Odia script) and key-map based Inscript keyboard; also on-screen and voice typing tools.

QB-4. Programming with IDE and Java Fundamentals

A. Multiple choice questions

1. Which control allows only one selection from a group? (a) check box (b) radio button (c) list (d) text area
(b).
2. Which method gets text from a text field? (a) setText() (b) getText() (c) isSelected() (d) getValue()
(b).
3. The size of int in Java is (a) 2 bytes (b) 4 bytes (c) 8 bytes (d) 1 byte
(b).
4. Which data type stores true/false? (a) char (b) int (c) boolean (d) String
(c).
5. Which is a valid variable name? (a) 2ndMark (b) total marks (c) total_marks (d) int
(c).
6. The result of $17 \% 5$ is (a) 3 (b) 2 (c) 3.4 (d) 12
(b).
7. Which loop executes at least once? (a) for (b) while (c) do-while (d) none
(c).
8. Which keyword exits a switch case? (a) exit (b) stop (c) break (d) continue
(c).
9. Integer.parseInt("25") returns (a) "25" (b) 25 (c) 25.0 (d) error
(b).
10. Which error is found by the compiler? (a) syntax (b) logical (c) run-time (d) none
(a).
11. Which Swing control is used for multi-line text? (a) JTextField (b) JTextArea (c) JLabel (d) JButton
(b).
12. Which property makes a text field read-only? (a) enabled (b) editable (c) visible (d) text
(b) set editable = false.
13. $7/2$ in Java (both int) gives (a) 3.5 (b) 3 (c) 4 (d) 3.0
(b) integer division.
14. The operator for logical AND is (a) & (b) && (c) and (d) ||
(b).
15. JOptionPane.showMessageDialog() is used to (a) take input (b) display a message box (c) close a frame (d) clear a field
(b).

B. Very short answer questions

1. What is RAD?

Rapid Application Development — building applications quickly by dragging and dropping ready-made components in an IDE.

2. What is an event?

An action such as a button click or key press that triggers code.

3. Name the method to check whether a check box is selected.

isSelected().

4. What is a keyword? Give two examples.

A reserved word with special meaning: int, if, while, class.

5. What is the default value of a boolean variable (class member)?

false.

6. Write the output: `System.out.println(10 + 20 + "IT");`

30IT (addition happens left to right before concatenation).

7. Write the output: `System.out.println("IT" + 10 + 20);`

IT1020.

C. Short answer questions

1. Differentiate between a label and a text field.

A label displays fixed text and the user cannot type in it; a text field accepts single-line input from the user.

2. Differentiate between = and ==.

= is the assignment operator (x = 5 stores 5); == is the relational operator to compare (x == 5 checks equality, giving true/false).

3. Rewrite using switch: `if (ch == 1) s = "Red"; else if (ch == 2) s = "Green"; else s = "Blue";`

```
switch (ch) {  
    case 1: s = "Red"; break;  
    case 2: s = "Green"; break;  
    default: s = "Blue";  
}
```

4. Convert the for loop to while: `for (int i = 1; i <= 5; i++) sum += i;`

```
int i = 1;  
while (i <= 5) {  
    sum += i;  
    i++;  
}
```

5. Find the output: `int a = 5, b = 10; a = a + b; b = a - b; a = a - b; (print a and b)`

a = 15, b = 5, a = 10. Output a = 10, b = 5 (values swapped).

6. How many times will "Hello" be printed? `int x = 10; while (x > 0) { print("Hello"); x = x - 3; }`

`x = 10, 7, 4, 1` → 4 times.

7. Identify errors: `int x = 5 ; if x > 3 { System.out.println("Big") }`

Condition must be in brackets: `if (x > 3)`; missing semicolon after `println(...)`.

D. Long answer questions

1. Explain the types of control structures in Java with examples.

(1) Sequence: statements run one after another. (2) Selection/decision: `if`, `if-else`, `if-else-if` ladder, `switch` — choose a path based on a condition. (3) Iteration/looping: `for` (fixed count), `while` (entry-controlled), `do-while` (exit-controlled). Give one code example for each (see notes).

2. Explain the steps of problem solving with an example.

Understand the problem; identify minimum inputs and expected output; break into steps (algorithm/flowchart); code; test with sample data; debug. Example: compute simple interest — inputs `P`, `R`, `T`; output `SI = P × R × T/100`; steps: read inputs → compute → display.

Solved Java Programs Bank (for Practical Record)

All programs are written as the code inside a button's `ActionPerformed` event in NetBeans. Control names: `txt...` for text fields, `lbl...` for labels, `txtArea` for a text area, `rb...` for radio buttons, `chk...` for check boxes, `cmb...` for combo boxes.

Program 1. Area and perimeter of a rectangle.

```
double l = Double.parseDouble(txtL.getText());
double b = Double.parseDouble(txtB.getText());
txtArea1.setText("" + (l * b));
txtPeri.setText("" + (2 * (l + b)));
```

Program 2. Area and circumference of a circle.

```
double r = Double.parseDouble(txtR.getText());
double area = Math.PI * r * r;
double circ = 2 * Math.PI * r;
txtArea1.setText(String.format("%.2f", area));
txtCirc.setText(String.format("%.2f", circ));
```

Program 3. Simple interest.

```
double p = Double.parseDouble(txtP.getText());
double r = Double.parseDouble(txtR.getText());
double t = Double.parseDouble(txtT.getText());
double si = p * r * t / 100;
txtSI.setText("" + si);
txtAmt.setText("" + (p + si));
```

Program 4. Positive, negative or zero.

```
int n = Integer.parseInt(txtN.getText());
if (n > 0) lblOut.setText("Positive");
else if (n < 0) lblOut.setText("Negative");
else lblOut.setText("Zero");
```

Program 5. Eligibility to vote.

```
int age = Integer.parseInt(txtAge.getText());
if (age >= 18)
    JOptionPane.showMessageDialog(null, "Eligible to vote");
else
    JOptionPane.showMessageDialog(null, "Not eligible. Wait " + (18 - age) + " years");
```

Program 6. Total, percentage and division from marks of 5 subjects.

```
int m1 = Integer.parseInt(txtM1.getText()), m2 = Integer.parseInt(txtM2.getText());
int m3 = Integer.parseInt(txtM3.getText()), m4 = Integer.parseInt(txtM4.getText());
int m5 = Integer.parseInt(txtM5.getText());
int total = m1 + m2 + m3 + m4 + m5;
double per = total / 5.0;
String div;
if (per >= 60) div = "First";
else if (per >= 45) div = "Second";
else if (per >= 30) div = "Third";
else div = "Fail";
txtTotal.setText("" + total);
txtPer.setText("" + per);
txtDiv.setText(div);
```

Program 7. Sum of first N natural numbers.

```
int n = Integer.parseInt(txtN.getText());
int sum = 0;
for (int i = 1; i <= n; i++) sum += i;
txtSum.setText("" + sum);
```

Program 8. Sum of even numbers from 1 to N.

```
int n = Integer.parseInt(txtN.getText()), sum = 0;
for (int i = 2; i <= n; i += 2) sum += i;
txtSum.setText("" + sum);
```

Program 9. Display numbers 1 to 10 and their squares in a text area.

```
txtArea.setText("");
for (int i = 1; i <= 10; i++)
    txtArea.append(i + "\t" + (i * i) + "\n");
```

Program 10. Count the digits of a number.

```
int n = Integer.parseInt(txtN.getText()), count = 0;
do { count++; n = n / 10; } while (n != 0);
txtCount.setText("" + count);
```

Program 11. Armstrong number (e.g. $153 = 1^3 + 5^3 + 3^3$).

```
int n = Integer.parseInt(txtN.getText()), t = n, s = 0;
while (t > 0) { int d = t % 10; s += d * d * d; t /= 10; }
lblOut.setText(s == n ? "Armstrong" : "Not Armstrong");
```

Program 12. GCD (HCF) of two numbers.

```
int a = Integer.parseInt(txtA.getText()), b = Integer.parseInt(txtB.getText());
while (b != 0) { int r = a % b; a = b; b = r; }
txtGCD.setText("" + a);
```

Program 13. Pizza order with radio buttons (size) and check boxes (toppings).

```
int price = 0;
if (rbSmall.isSelected()) price = 150;
else if (rbMedium.isSelected()) price = 250;
else if (rbLarge.isSelected()) price = 350;
if (chkCheese.isSelected()) price += 50;
if (chkOlive.isSelected()) price += 30;
if (chkPaneer.isSelected()) price += 60;
txtBill.setText("Rs " + price);
```

Program 14. Commission on sales using a combo box for region.

```
double sales = Double.parseDouble(txtSales.getText());
String region = (String) cmbRegion.getSelectedItem();
double rate;
switch (region) {
    case "East": rate = 0.05; break;
    case "West": rate = 0.06; break;
    case "North": rate = 0.07; break;
    default:     rate = 0.04;
}
txtComm.setText("" + sales * rate);
```

Program 15. Display the selected value of a list in a label.

```
String item = (String) lstCourse.getSelectedValue();
lblOut.setText("You selected: " + item);
```

Program 16. Clear all fields and exit buttons.

```
// Clear button
txtName.setText(""); txtAge.setText(""); chkAgree.setSelected(false);
// Exit button
System.exit(0);
```

Program 17. Reverse a string and check palindrome.

```
String s = txtWord.getText().trim();
String rev = "";
for (int i = s.length() - 1; i >= 0; i--) rev = rev + s.charAt(i);
txtRev.setText(rev);
lblOut.setText(s.equalsIgnoreCase(rev) ? "Palindrome" : "Not palindrome");
```

Program 18. Display a pattern of stars.

```
txtArea.setText("");
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i; j++) txtArea.append("* ");
    txtArea.append("\n");
}
```

Output: 1 star in line 1, 2 in line 2 ... 5 in line 5 (a right triangle).

Program 19. Calculate net salary: DA = 40% of basic, HRA = 15%, PF = 12%.

```
double basic = Double.parseDouble(txtBasic.getText());
double da = 0.40 * basic, hra = 0.15 * basic, pf = 0.12 * basic;
double gross = basic + da + hra;
double net = gross - pf;
txtGross.setText("" + gross);
txtNet.setText("" + net);
```

Program 20. Find the largest of N numbers entered one by one (using JOptionPane input).

```
int n = Integer.parseInt(JOptionPane.showInputDialog("How many numbers?"));
int max = Integer.MIN_VALUE;
for (int i = 1; i <= n; i++) {
    int x = Integer.parseInt(JOptionPane.showInputDialog("Enter number " + i));
    if (x > max) max = x;
}
lblOut.setText("Largest = " + max);
```

QB-5. Database Concepts and MySQL

A. Multiple choice questions

1. A row in a table is called (a) attribute (b) tuple (c) domain (d) degree
(b).
2. Number of columns in a relation is its (a) cardinality (b) degree (c) domain (d) key
(b).
3. Which key uniquely identifies each row? (a) foreign (b) primary (c) alternate (d) composite only
(b).
4. CREATE TABLE is a (a) DML (b) DDL (c) DCL (d) TCL command
(b).
5. Which command adds rows? (a) ADD (b) INSERT (c) UPDATE (d) ALTER
(b).
6. Which keyword removes duplicates? (a) UNIQUE (b) DISTINCT (c) DIFFERENT (d) ONLY
(b).
7. % in LIKE stands for (a) one character (b) zero or more characters (c) a digit (d) a space
(b).
8. _ in LIKE stands for (a) exactly one character (b) many characters (c) nothing (d) a number
(a).
9. BETWEEN 10 AND 20 includes (a) 10 and 20 (b) neither (c) only 10 (d) only 20
(a).
10. Which data type is best for a 6-digit PIN code? (a) INT (b) CHAR(6) (c) DATE (d) DECIMAL
(b) PIN codes are not used for arithmetic.
11. Which command displays the structure of a table? (a) SHOW (b) DESC (c) SELECT (d) VIEW
(b).
12. NOT, AND, OR — which is evaluated first? (a) OR (b) AND (c) NOT (d) left to right
(c).
13. To select a database we use (a) OPEN (b) USE (c) SELECT DATABASE (d) GO
(b).
14. A column alias is given using (a) AS (b) ALIAS (c) RENAME (d) NAME
(a).

B. Very short answer questions

1. Define a database.

An organised collection of related data.

2. What is a DBMS? Give an example.

Software to create and manage databases; e.g. MySQL.

3. What is data redundancy?

Unnecessary duplication of data.

4. What is a foreign key?

A column that refers to the primary key of another table.

5. What is a candidate key?

Any column (or set) that can uniquely identify rows; one of them becomes the primary key.

6. Write the command to create a database named LIBRARY.

CREATE DATABASE library;

C. Short answer questions

1. Differentiate between primary key and foreign key.

Primary key uniquely identifies each row in its own table, cannot be NULL or repeated. Foreign key is a column in one table that refers to the primary key of another, can repeat, and links tables.

2. Differentiate between degree and cardinality with an example.

Degree = number of columns; cardinality = number of rows. A table with 5 columns and 20 rows has degree 5 and cardinality 20.

3. Give four advantages of a DBMS.

Reduced redundancy, consistency, data sharing, security, integrity, backup and recovery.

4. What is the difference between WHERE Salary = NULL and WHERE Salary IS NULL?

"= NULL" never evaluates to true (NULL cannot be compared with =), so it returns no rows; "IS NULL" correctly finds rows where Salary is missing.

SQL Query Bank (60 queries with answers)

Use table **BOOK**:

BookId	Title	Author	Subject	Price	Qty	PubDate
B01	Easy Physics	R. Sahu	Physics	350	10	2021-06-15
B02	Fun Maths	S. Das	Maths	280	25	2020-01-10
B03	Organic Made Simple	P. Nayak	Chemistry	420	8	2022-03-05
B04	Java for Beginners	A. Mishra	IT	500	15	2023-07-20
B05	Calculus Guide	S. Das	Maths	320	12	2019-11-30
B06	MySQL Handbook	K. Rath	IT	450	NULL	2022-09-01

1. Show all records. SELECT * FROM book;

2. Show title and price. `SELECT Title, Price FROM book;`
3. Books costing more than 400. `SELECT * FROM book WHERE Price > 400;` → B03, B04, B06
4. Maths books. `SELECT Title FROM book WHERE Subject = 'Maths';` → Fun Maths, Calculus Guide
5. Books by S. Das costing less than 300. `SELECT Title FROM book WHERE Author = 'S. Das' AND Price < 300;` → Fun Maths
6. IT or Physics books. `SELECT Title FROM book WHERE Subject IN ('IT','Physics');`
7. Price between 300 and 450. `SELECT Title, Price FROM book WHERE Price BETWEEN 300 AND 450;` → 350, 420, 320, 450
8. Titles starting with 'M'. `SELECT Title FROM book WHERE Title LIKE 'M%';` → MySQL Handbook
9. Titles containing 'Simple'. ... `WHERE Title LIKE '%Simple%';` → Organic Made Simple
10. Titles whose 2nd letter is 'a'. ... `WHERE Title LIKE '_a%';` → Easy Physics, Java for Beginners, Calculus Guide
11. Books whose Qty is unknown. ... `WHERE Qty IS NULL;` → B06
12. Books whose Qty is known. ... `WHERE Qty IS NOT NULL;`
13. Different subjects. `SELECT DISTINCT Subject FROM book;` → Physics, Maths, Chemistry, IT
14. Different authors. `SELECT DISTINCT Author FROM book;` → 5 names
15. Title and total value (Price × Qty) as "Value". `SELECT Title, Price * Qty AS Value FROM book;` (NULL for B06)
16. Title and price after 10% discount. `SELECT Title, Price * 0.9 AS "Discounted Price" FROM book;`
17. Books not of Maths. ... `WHERE Subject <> 'Maths';` or `WHERE NOT Subject = 'Maths'`
18. Books published after 2021. ... `WHERE PubDate > '2021-12-31';` → B03, B04, B06
19. Books published in 2022. ... `WHERE PubDate BETWEEN '2022-01-01' AND '2022-12-31';` → B03, B06
20. Books with price not between 300 and 400. ... `WHERE Price NOT BETWEEN 300 AND 400;` → B02, B03, B04, B06
21. Books whose author's name ends with 'h'. ... `WHERE Author LIKE '%h';` → K. Rath
22. Books of IT with price above 460 or Maths books. ... `WHERE (Subject = 'IT' AND Price > 460) OR Subject = 'Maths';` → B04, B02, B05
23. Books with quantity less than 10. ... `WHERE Qty < 10;` → B03
24. Title in a column named "Book Name". `SELECT Title AS "Book Name" FROM book;`
25. Price increased by 50 for display. `SELECT Title, Price + 50 FROM book;`

Use table **STUDENT** (RollNo, Name, Class, Stream, Marks, City):

RollNo	Name	Class	Stream	Marks	City
1	Asha	XI	Science	78	Cuttack
2	Bijay	XII	Commerce	65	Puri
3	Chandan	XI	Arts	55	Balasore
4	Deepika	XII	Science	91	Cuttack
5	Elina	XI	Science	84	Bhubaneswar
6	Firoj	XII	Arts	47	Puri

1. Create the table. `CREATE TABLE student (RollNo INT PRIMARY KEY, Name VARCHAR(20), Class CHAR(4), Stream VARCHAR(10), Marks INT, City VARCHAR(15));`
2. Insert the first row. `INSERT INTO student VALUES (1, 'Asha', 'XI', 'Science', 78, 'Cuttack');`
3. Insert a row with only roll and name. `INSERT INTO student (RollNo, Name) VALUES (7, 'Gita');`
4. Show the table structure. `DESC student;`
5. Students of class XI. `SELECT Name FROM student WHERE Class = 'XI';` → Asha, Chandan, Elina
6. Science students with marks above 80. → Deepika, Elina
7. Students from Puri or Cuttack. ... `WHERE City IN ('Puri', 'Cuttack');` → Asha, Bijay, Deepika, Firoj
8. Students not from Puri. → Asha, Chandan, Deepika, Elina
9. Students whose name ends with 'a'. ... `WHERE Name LIKE '%a';` → Asha, Deepika, Elina
10. Name and marks out of 100 converted to grade points (Marks/10). `SELECT Name, Marks/10 AS GP FROM student;`
11. Different streams. → Science, Commerce, Arts
12. Students with marks from 50 to 80. → Asha, Bijay, Chandan
13. Students of Arts or Commerce stream in class XII. ... `WHERE Class = 'XII' AND (Stream = 'Arts' OR Stream = 'Commerce');` → Bijay, Firoj
14. Students whose name has exactly 5 letters. ... `WHERE Name LIKE '_____';` → Bijay, Elina, Firoj
15. Name and city of students with marks less than 60. → Chandan Balasore, Firoj Puri

Use table **EMP** (EmpNo, Ename, Job, Sal, Comm, DeptNo):

EmpNo	Ename	Job	Sal	Comm	DeptNo
101	Mohan	Clerk	18000	NULL	10
102	Sita	Manager	55000	NULL	20
103	Ravi	Salesman	25000	3000	30
104	Lina	Salesman	24000	0	30
105	Arun	Analyst	45000	NULL	20

1. Annual salary of each employee. `SELECT Ename, Sal * 12 AS Annual FROM emp;`

2. Employees who earn commission (non-NULL). → Ravi, Lina
3. Employees with commission greater than 0. → Ravi
4. Salesmen in department 30. → Ravi, Lina
5. Employees not in department 20. → Mohan, Ravi, Lina
6. Employees whose job is Clerk or Analyst. → Mohan, Arun
7. Employees with salary between 20000 and 50000. → Ravi, Lina, Arun
8. Names of employees starting with 'S' or 'L'. → Sita, Lina
9. Total earnings Sal + Comm (NULL issue). `SELECT Ename, Sal + IFNULL(Comm, 0) FROM emp;`
10. Different departments. → 10, 20, 30
11. Employees with no commission information. → Mohan, Sita, Arun
12. Employees whose salary is more than 20000 and job is not Manager. → Ravi, Lina, Arun
13. Employees whose name contains 'a' anywhere. → Mohan, Sita, Ravi, Lina, Arun (case-insensitive in MySQL)
14. Employees whose name's 3rd letter is 'n'. ... `WHERE Ename LIKE '__n%';` → Lina
15. Employees with DeptNo 10 or Sal > 50000. → Mohan, Sita
16. Show Ename with heading "Employee Name". `SELECT Ename AS "Employee Name" FROM emp;`
17. Show salary after a raise of 5%. `SELECT Ename, Sal * 1.05 FROM emp;`
18. Employees whose job is not Salesman and salary below 50000. → Mohan, Arun
19. Show all columns for EmpNo 104. `SELECT * FROM emp WHERE EmpNo = 104;`
20. Show operator precedence: `SELECT 10 + 20 * 3, (10 + 20) * 3;` → 70, 90

QB-6. Programming Guidelines

1. What is debugging?

The process of finding and correcting errors (bugs) in a program.

2. Classify the error: (a) missing semicolon (b) dividing by zero (c) using $\text{area} = 2 \times r$ instead of $\pi \times r \times r$.

(a) syntax (b) run-time (c) logical.

3. What is a modular approach? Give its advantages.

Dividing a program into small modules each doing one task. Advantages: easy to understand, write, test and debug; modules can be reused; team members can work on different modules.

4. Give four characteristics of a good program.

Correctness, readability (comments, indentation, meaningful names), efficiency, robustness (handles wrong input), user-friendliness, maintainability.

5. Write an algorithm to find whether a number is even or odd.

Step 1 Start. Step 2 Read N. Step 3 If $N \bmod 2 = 0$, print "Even", else print "Odd". Step 4 Stop.

6. What are comments? How are they written in Java?

Non-executable notes for readers. Single line: `// comment`. Multi-line: `/* comment */`.

7. Identify the minimum inputs needed to calculate the compound interest.

Principal, rate of interest, time (and compounding frequency, if not yearly).

QB-7. IT Applications - e-Governance and e-Learning

A. Multiple choice questions

1. Which is an e-governance portal? (a) amazon.in (b) india.gov.in (c) youtube.com (d) wikipedia.org

(b).

2. SWAYAM is a platform for (a) e-banking (b) e-learning (c) e-shopping (d) e-ticketing

(b).

3. Which is a challenge of e-governance? (a) transparency (b) digital divide (c) 24×7 service (d) speed

(b).

4. DigiLocker is used to (a) store digital documents (b) play games (c) send SMS (d) shop

(a).

B. Short answer questions

1. Define e-governance and give two examples of e-governance services in Odisha.

Use of ICT by government to provide services and information to citizens efficiently and transparently. Examples: e-District (certificates like income, caste, residence), online land records (Bhulekh), online scholarship portal, e-Abhijoga (grievances).

2. What is the social impact of e-governance?

Citizens save time and money, corruption reduces, rural people access services through Common Service Centres, participation increases; but people without internet or computer skills may be left behind (digital divide).

3. Give two benefits of e-learning for students and teachers each.

Students: learn anytime anywhere at their own pace; access to recorded lectures and quizzes. Teachers: reach large numbers; easy to update and reuse content; online assessment and teacher training (DIKSHA).

4. Name four e-learning websites.

swayam.gov.in, diksha.gov.in, nptel.ac.in, epathshala.nic.in (also Khan Academy).

5. What are the limitations of e-learning?

Needs devices and good internet; less face-to-face interaction; requires self-discipline; practical/lab skills are harder to teach; screen fatigue.

IT Sample Paper 1 (1st Year) with Answers

A. Very short (1 mark each)

1. Expand OMR.
2. Which memory is used to store BIOS?
3. Name the device used to read bar codes.
4. What is 1 GB in MB?
5. Name one utility software.
6. Give an example of a mobile OS.
7. Name the method that converts a string to an integer.
8. Name one FOSS browser.
9. Which SQL command shows the structure of a table?
10. Which keyword is used to avoid duplicate rows in output?
11. Which operator is used for pattern matching in SQL?
12. Name one e-learning portal of the Government of India.

Answers: 1. Optical Mark Reader 2. ROM 3. Bar Code Reader 4. 1024 MB 5. Antivirus / WinZip 6. Android 7. Integer.parseInt() 8. Mozilla Firefox 9. DESC 10. DISTINCT 11. LIKE 12. SWAYAM / DIKSHA.

B. Short (2 marks each)**13. Differentiate between SRAM and DRAM.**

See notes: SRAM — flip-flops, no refresh, faster, costlier (cache). DRAM — capacitors, needs refresh, slower, cheaper (main memory).

14. Differentiate between compiler and interpreter.

Compiler translates the whole program at once and lists errors; interpreter translates and executes line by line, stopping at the first error.

15. What are payroll systems?

Specific-purpose software that calculates employees' salaries, allowances, deductions (PF, tax), generates pay slips and salary reports.

16. What is the difference between a check box and a radio button?

Many check boxes can be selected together; only one radio button in a group can be selected.

17. Give the output: `int x = 7; x += 3; x *= 2; display x.`

20.

18. What is a primary key? Can a table have two primary keys?

A column that uniquely identifies each row. A table has only one primary key (it may consist of more than one column — composite key).

19. Write two benefits of e-governance to citizens.

24×7 services online; transparency and reduced corruption.

20. What is Unicode?

A universal character-encoding standard giving each character of every language a unique number.

C. Long (4 marks each)**21. Explain any four input devices with their uses.**

Keyboard, mouse, scanner, MICR — with one use each (see notes).

22. Explain the functions of an operating system.

Process, memory, file, device management, security, user interface (see QB-2).

23. What is open source software? Write four advantages.

See QB-3 and notes.

24. Write a Java program (button code) to accept a number and display its multiplication table in a text area.

```
int n = Integer.parseInt(txtN.getText());
txtArea.setText("");
for (int i = 1; i <= 10; i++)
    txtArea.append(n + " x " + i + " = " + (n * i) + "\n");
```

25. Consider table ITEM(Code, Name, Price, Qty). Write SQL to: (a) create the table (b) show items with price above 100 (c) show names starting with 'P' (d) show distinct prices.

```
(a) CREATE TABLE item (Code INT PRIMARY KEY, Name VARCHAR(20), Price DECIMAL(8,2), Qty INT);
(b) SELECT * FROM item WHERE Price > 100;
(c) SELECT Name FROM item WHERE Name LIKE 'P%';
(d) SELECT DISTINCT Price FROM item;
```

IT Sample Paper 2 (1st Year) with Answers

A. Very short (1 mark each)

1. Which unit of the CPU controls all operations?
2. Name an output device that produces hard copy.
3. How many bits make a byte?
4. Name a language processor that converts assembly language into machine code.
5. Expand FLOSS.
6. Which control is used to enter a password?
7. What is the size of a char in Java?
8. Which loop is called exit-controlled?
9. What is the degree of a table with 6 columns and 12 rows?
10. Write a query to display all records of table EMP.
11. Expand HRMS.
12. What is IRCTC an example of?

Answers: 1. Control unit 2. Printer 3. 8 4. Assembler 5. Free/Libre and Open Source Software 6. JPasswordField 7. 2 bytes 8. do-while 9. 6 10. SELECT * FROM emp; 11. Human Resource Management System 12. Reservation system (e-governance/e-commerce application).

B. Short (2 marks each)

13. What are OCR and MICR?

OCR reads printed characters and converts them into editable text; MICR reads characters printed in magnetic ink on cheques.

14. What is the need of an operating system?

To act as an interface between user and hardware, manage resources efficiently and provide an environment to run application programs.

15. Differentiate between TrueType and OpenType fonts.

TrueType (Apple/Microsoft) supports limited characters; OpenType (Microsoft/Adobe) supports Unicode with many more glyphs and is cross-platform, better for Indian scripts.

16. Write the output: for (int i = 1; i <= 10; i += 3) display i.

1 4 7 10.

17. What are syntax errors? Give an example.

Errors in the grammar of the language, detected by the compiler; e.g. writing "Int" instead of "int" or missing a semicolon.

18. What is the difference between CHAR and VARCHAR?

CHAR is fixed-length; VARCHAR is variable-length (saves space).

19. Write a query to display names of employees whose salary is between 20000 and 30000.

```
SELECT Name FROM emp WHERE Salary BETWEEN 20000 AND 30000;
```

20. What are the challenges of e-governance?

Digital illiteracy, poor connectivity, cyber security and privacy, cost, language barriers, resistance to change.

C. Long (4 marks each)**21. Explain the types of ROM.**

Mask ROM (written at manufacture), PROM (written once by user), EPROM (UV-erasable), EEPROM (electrically erasable; basis of flash memory). All are non-volatile.

22. Explain general-purpose application software with examples.

Word processor (MS Word, Writer), spreadsheet (Excel, Calc), presentation (PowerPoint, Impress), DBMS (MySQL, Access), IDE (NetBeans) — each with its use.

23. Explain if-else and switch with examples.

See notes and QB-4 short answer 3.

24. Write a Java program to calculate grade from marks (≥ 90 A+, ≥ 75 A, ≥ 60 B, ≥ 45 C, else D).

```
int m = Integer.parseInt(txtMarks.getText());
String g;
if (m >= 90) g = "A+";
else if (m >= 75) g = "A";
else if (m >= 60) g = "B";
else if (m >= 45) g = "C";
else g = "D";
txtGrade.setText(g);
```

25. On table STUDENT(Roll, Name, Stream, Marks) write SQL to: (a) display Science students (b) display names with second letter 'a' (c) display students with marks not between 40 and 60 (d) display name and marks + 5 as "New Marks".

```
(a) SELECT * FROM student WHERE Stream = 'Science';
(b) SELECT Name FROM student WHERE Name LIKE '_a%';
(c) SELECT * FROM student WHERE Marks NOT BETWEEN 40 AND 60;
(d) SELECT Name, Marks + 5 AS "New Marks" FROM student;
```

MORE JAVA PROGRAMS & OUTPUT QUESTIONS

Information Technology · +2 1st Year · Practical exam preparation

Form Design Guide (how to build a NetBeans application)

1. Open NetBeans → File → New Project → Java → Java Application. Give a name and untick "Create Main Class".
2. Right-click the project → New → JFrame Form → name it (e.g. SalaryForm).
3. From the Palette, drag Labels, Text Fields, Buttons etc. onto the form.
4. Right-click each control → Change Variable Name (txtBasic, btnCalc ...). Set the Text property in the Properties window.
5. Double-click a button to open its ActionPerformed event and type code.
6. Press F6 (Run) to test the application.

RECORD WRITING FORMAT FOR EACH PROGRAM

Aim · Form design (sketch with control names) · Controls and properties table · Code · Sample input and output · Result.

Programs 21-40

21. Convert distance in kilometres to metres and centimetres.

```
double km = Double.parseDouble(txtKm.getText());  
txtM.setText("" + km * 1000);  
txtCm.setText("" + km * 100000);
```

22. Calculate the BMI and display a message (weight in kg, height in m).

```
double w = Double.parseDouble(txtW.getText());
double h = Double.parseDouble(txtH.getText());
double bmi = w / (h * h);
String msg;
if (bmi < 18.5) msg = "Underweight";
else if (bmi < 25) msg = "Normal";
else if (bmi < 30) msg = "Overweight";
else msg = "Obese";
lblOut.setText(String.format("BMI = %.1f (%s)", bmi, msg));
```

23. Find the largest of three numbers using nested if.

```
int a = Integer.parseInt(txtA.getText());
int b = Integer.parseInt(txtB.getText());
int c = Integer.parseInt(txtC.getText());
int max;
if (a > b) { if (a > c) max = a; else max = c; }
else { if (b > c) max = b; else max = c; }
txtMax.setText("" + max);
```

24. Show the day of the week using switch (1-7).

```
int d = Integer.parseInt(txtDay.getText());
String s;
switch (d) {
    case 1: s = "Sunday"; break;   case 2: s = "Monday"; break;
    case 3: s = "Tuesday"; break; case 4: s = "Wednesday"; break;
    case 5: s = "Thursday"; break; case 6: s = "Friday"; break;
    case 7: s = "Saturday"; break; default: s = "Invalid";
}
lblDay.setText(s);
```

25. Check whether a character is a vowel or consonant.

```
char ch = Character.toLowerCase(txtCh.getText().charAt(0));
switch (ch) {
    case 'a': case 'e': case 'i': case 'o': case 'u':
        lblOut.setText("Vowel"); break;
    default:
        lblOut.setText("Consonant");
}
```

26. Print odd numbers from 1 to N in a text area.

```
int n = Integer.parseInt(txtN.getText());
txtArea.setText("");
for (int i = 1; i <= n; i += 2) txtArea.append(i + " ");
```

27. Sum and average of N numbers taken through input dialogs.

```
int n = Integer.parseInt(JOptionPane.showInputDialog("How many?"));
double sum = 0;
for (int i = 1; i <= n; i++)
    sum += Double.parseDouble(JOptionPane.showInputDialog("Number " + i));
lblOut.setText("Sum = " + sum + ", Average = " + (sum / n));
```

28. Display the factors of a number.

```
int n = Integer.parseInt(txtN.getText());
txtArea.setText("");
for (int i = 1; i <= n; i++)
    if (n % i == 0) txtArea.append(i + " ");
```

29. Check perfect number (sum of proper factors = number, e.g. 6, 28).

```
int n = Integer.parseInt(txtN.getText()), s = 0;
for (int i = 1; i < n; i++) if (n % i == 0) s += i;
lblOut.setText(s == n ? "Perfect" : "Not perfect");
```

30. Power of a number using a loop and using Math.pow.

```
int b = Integer.parseInt(txtBase.getText()), e = Integer.parseInt(txtExp.getText());
long p = 1;
for (int i = 1; i <= e; i++) p *= b;
txtLoop.setText("" + p);
txtPow.setText("" + (long) Math.pow(b, e));
```

31. Sum of the series $1 + 1/2 + 1/3 + \dots + 1/n$.

```
int n = Integer.parseInt(txtN.getText());
double s = 0;
for (int i = 1; i <= n; i++) s += 1.0 / i;
txtSum.setText(String.format("%.4f", s));
```

32. Telephone bill: first 100 calls free, next 100 at Rs 1, rest at Rs 1.50; rental Rs 200.

```
int c = Integer.parseInt(txtCalls.getText());
double bill = 200;
if (c > 200) bill += 100 * 1 + (c - 200) * 1.5;
else if (c > 100) bill += (c - 100) * 1;
txtBill.setText("" + bill);
```

33. Count words in a sentence.

```
String s = txtSentence.getText().trim();
int words = 0;
if (s.length() > 0) {
    words = 1;
    for (int i = 0; i < s.length(); i++)
        if (s.charAt(i) == ' ' && s.charAt(i - 1) != ' ') words++;
}
lblOut.setText("Words: " + words);
```

34. Convert a name to uppercase, lowercase and find its length.

```
String s = txtName.getText();
txtUpper.setText(s.toUpperCase());
txtLower.setText(s.toLowerCase());
txtLen.setText("" + s.length());
```

35. Display the initials of a full name (e.g. "Sachin Ramesh Tendulkar" → "S.R.T.").

```
String s = "" + txtName.getText().trim();
String ini = "";
for (int i = 0; i < s.length() - 1; i++)
    if (s.charAt(i) == ' ') ini = ini + s.charAt(i + 1) + ".";
txtInitials.setText(ini.toUpperCase());
```

36. Hotel bill using combo box (room type) and check boxes (services).

```
int days = Integer.parseInt(txtDays.getText());
int idx = cmbRoom.getSelectedIndex(); // 0 Single, 1 Double, 2 Suite
int rate = (idx == 0) ? 1500 : (idx == 1) ? 2500 : 5000;
double amt = rate * days;
if (chkFood.isSelected()) amt += 500 * days;
if (chkLaundry.isSelected()) amt += 200;
txtAmt.setText("Rs " + amt);
```

37. Fibonacci terms less than a limit.

```
int lim = Integer.parseInt(txtLim.getText());
int a = 0, b = 1;
txtArea.setText("");
while (a < lim) { txtArea.append(a + " "); int c = a + b; a = b; b = c; }
```

38. Prime numbers between 1 and N.

```
int n = Integer.parseInt(txtN.getText());
txtArea.setText("");
for (int x = 2; x <= n; x++) {
    boolean prime = true;
    for (int i = 2; i * i <= x; i++)
        if (x % i == 0) { prime = false; break; }
    if (prime) txtArea.append(x + " ");
}
```

39. Number pattern: 1 / 1 2 / 1 2 3 / 1 2 3 4.

```
txtArea.setText("");
for (int i = 1; i <= 4; i++) {
    for (int j = 1; j <= i; j++) txtArea.append(j + " ");
    txtArea.append("\n");
}
```

40. Toggle enable/disable of a text field using a check box.

```
txtRemarks.setEnabled(chkRemarks.isSelected());
```

Output-Based and Error-Finding Questions

1. `int i = 0; while (i < 3) { txtArea.append(i + ","); i++; }`

0,1,2,

2. `int s = 0; for (int i = 1; i <= 10; i += 2) s += i; — value of s?`

1 + 3 + 5 + 7 + 9 = 25.

3. `int a = 10, b = 3; display a / b, a % b, (double) a / b.`

3, 1, 3.3333...

4. `String s = "Odisha"; display s.substring(2), s.length(), s.charAt(0).`

"isha", 6, 'O'.

5. `int x = 5; x++; ++x; x--; — value of x?`

6.

6. `boolean f = (5 > 3) && (2 > 4); — value of f?`

false.

7. `int k = 1; do { k = k * 3; } while (k < 50); — value of k?`

1 → 3 → 9 → 27 → 81; k = 81.

8. `switch (2) { case 1: s = "A"; case 2: s = "B"; case 3: s = "C"; } — value of s?`

"C" (no break, falls through).

9. Find errors: `Int n = Integer.parseint(txt.getText()) ; if (n = 5) lbl.setText("Five");`

Int → int; parseint → parseInt; n = 5 should be n == 5; setText → setTextColor.

10. Find errors: for (i = 1, i <= 10, i++) sum + i;

i not declared (int i); commas should be semicolons; sum + i should be sum += i.

11. Rewrite using a for loop: int i = 10; while (i >= 1) { txtArea.append(i + " "); i = i - 2; }

for (int i = 10; i >= 1; i -= 2) txtArea.append(i + " ");

12. Rewrite using if-else: grade = (marks >= 33) ? "Pass" : "Fail";

if (marks >= 33) grade = "Pass"; else grade = "Fail";

13. How many times is the loop executed: for (int i = 5; i <= 50; i *= 2)?

i = 5, 10, 20, 40 → 4 times.

14. What will Math.round(-2.5) return?

-2 (rounds toward positive infinity at .5).

15. What is the value of "abc".compareTo("abd")?

-1 ('c' - 'd').

ONE-MARK BANK & VIVA GUIDE

Information Technology · +2 1st Year

120 One-Mark Questions with Answers

#	Question	Answer
1	Who is called the father of the computer?	Charles Babbage
2	What does CPU stand for?	Central Processing Unit
3	What is the smallest unit of data?	Bit
4	1 TB = ? GB	1024 GB
5	Expand ROM	Read Only Memory
6	Expand EEPROM	Electrically Erasable Programmable ROM
7	Fastest memory in a computer	Registers (then cache)
8	Which memory is volatile?	RAM
9	Which device converts paper images to digital?	Scanner
10	Which device is used in ATMs to read cards?	Smart card / magnetic card reader
11	Which input device is used in games?	Joystick
12	Expand BCR	Bar Code Reader
13	Expand LCD	Liquid Crystal Display
14	Expand LED	Light Emitting Diode
15	Which printer uses toner?	Laser printer
16	Which printer uses an inked ribbon?	Dot matrix printer
17	Which device draws engineering drawings?	Plotter
18	Which bus is bidirectional?	Data bus
19	Name a modern port for connecting pen drives	USB
20	Expand USB	Universal Serial Bus
21	What is the interface between user and hardware?	Operating system
22	Name a CUI operating system	MS-DOS
23	Name an OS for servers	Linux / Windows Server
24	What converts high-level code all at once?	Compiler
25	What executes code line by line?	Interpreter
26	Java compiler output is called	Bytecode
27	Expand JVM	Java Virtual Machine
28	Name a compression utility	WinZip / 7-Zip
29	Name an antivirus	Quick Heal / Windows Defender
30	Which software arranges scattered file parts?	Disk defragmenter
31	Name a presentation software	PowerPoint / Impress

32	Name a word processor	MS Word / Writer
33	Expand IDE	Integrated Development Environment
34	Expand DBMS	Database Management System
35	Expand FOSS	Free and Open Source Software
36	Expand GNU	GNU's Not Unix
37	Name an open-source office suite	LibreOffice / OpenOffice
38	Name an open-source DBMS	MySQL
39	Expand HTML	HyperText Markup Language
40	Expand XML	eXtensible Markup Language
41	Expand WWW	World Wide Web
42	Expand ASCII	American Standard Code for Information Interchange
43	Unicode was designed to represent	Characters of all world languages
44	Keyboard layout for Indian scripts	Inscript
45	Expand RAD	Rapid Application Development
46	Name the main window control in Swing	JFrame
47	Control for single-line input	TextField
48	Control for multi-line text	TextArea
49	Control for drop-down list	ComboBox
50	Control to group radio buttons	ButtonGroup
51	Method to set text of a control	setText()
52	Method to check a radio button selection	isSelected()
53	Method to get selected item of combo box	getSelectedItem()
54	Method to get selected index of combo box	getSelectedIndex()
55	Method to get selected value of a list	getSelectedValue()
56	Method to show a message box	JOptionPane.showMessageDialog()
57	Method to take input in a dialog	JOptionPane.showInputDialog()
58	Method to close the application	System.exit(0)
59	Data type for decimal numbers (8 bytes)	double
60	Data type for a single character	char
61	Size of long	8 bytes
62	Size of byte	1 byte
63	Size of short	2 bytes
64	Range of byte	–128 to 127
65	Is String a primitive type?	No, it is a class
66	Method to convert String to double	Double.parseDouble()

67	Method to convert int to String	Integer.toString() or "" + n
68	Operator for remainder	%
69	Operator for logical OR	
70	Operator for not equal	!=
71	Increment operator	++
72	Entry-controlled loops	for, while
73	Exit-controlled loop	do-while
74	Keyword to skip to next iteration	continue
75	Keyword to come out of a loop	break
76	Default branch of switch	default
77	Error caught during compilation	Syntax error
78	Error causing wrong output	Logical error
79	Error during execution	Run-time error
80	Single-line comment symbol in Java	//
81	Expand SQL	Structured Query Language
82	Row of a table	Tuple / record
83	Column of a table	Attribute / field
84	Number of rows	Cardinality
85	Number of columns	Degree
86	Set of possible values of a column	Domain
87	Key referring to another table	Foreign key
88	Candidate keys not chosen as primary	Alternate keys
89	DDL commands	CREATE, ALTER, DROP
90	DML commands	INSERT, SELECT, UPDATE, DELETE
91	Command to select a database	USE
92	Command to see the table structure	DESC / DESCRIBE
93	Keyword to remove duplicates	DISTINCT
94	Keyword for column alias	AS
95	Clause to filter rows	WHERE
96	Wildcard for any number of characters	%
97	Wildcard for one character	_ (underscore)
98	Operator to check a range	BETWEEN
99	Operator to check a list of values	IN
100	Correct way to check missing values	IS NULL
101	Data type for dates in MySQL	DATE ('YYYY-MM-DD')
102	Fixed-length text data type	CHAR

103	Variable-length text data type	VARCHAR
104	Data type for money with 2 decimals	DECIMAL(p, 2)
105	Command to delete a table completely	DROP TABLE
106	Statement terminator in SQL	Semicolon (;)
107	Text values in SQL are enclosed in	Single quotes
108	Expand e-governance	Electronic governance
109	National portal of India	india.gov.in
110	Portal for digital documents	DigiLocker
111	Aadhaar is issued by	UIDAI
112	Government e-learning portal for teachers	DIKSHA
113	Online courses platform by Government of India	SWAYAM
114	Expand NPTEL	National Programme on Technology Enhanced Learning
115	Gap between people with and without IT access	Digital divide
116	Centres providing e-services in villages	Common Service Centres (CSC)
117	Main benefit of e-learning	Learning anytime, anywhere
118	Expand ICT	Information and Communication Technology
119	Expand OTP	One Time Password
120	Expand UPI	Unified Payments Interface

Practical Examination Guide

Component	Marks	How to score full marks
Problem solving using Java	10	Neat form design, meaningful control names, correct code, test with sample input, show output to examiner.
SQL queries (5 queries on 1-2 tables)	5	Write exact syntax with semicolons; check spelling of table/column names; run each query and show output.
Practical record	10	At least 10 Java programs, 3 IT application frameworks, 15 SQL queries — neat, signed by teacher.
Viva voce	5	Answer in one or two clear sentences; use correct technical words.

IT application framework (sample for record)

Problem: Online scholarship application (e-governance).

Front end (form): Name (text field), Roll no. (text field), Class (combo box), Gender (radio buttons), Annual family income (text field), Category (combo box), Bank account no. (text field), Declaration (check box), Submit and Reset buttons.

Validations: all fields filled; income numeric; account number 11–16 digits; declaration ticked.

Back end (table): scholarship(AppNo INT PRIMARY KEY, Name VARCHAR(30), RollNo VARCHAR(10), Class VARCHAR(5), Gender CHAR(1), Income DECIMAL(10,2), Category VARCHAR(10), AccountNo VARCHAR(16), Status VARCHAR(10)).

Output: application number and message "Application submitted".

Common viva questions

1. What is the extension of a Java source file and compiled file?

.java and .class.

2. What is the difference between JLabel and JTextField?

JLabel only displays text; JTextField accepts input.

3. Why do we use parseInt()?

getText() returns a String; parseInt() converts it to an integer for calculation.

4. What is an event handler?

A method that runs in response to an event, e.g. jButton1ActionPerformed.

5. What is the difference between a frame and a dialog?

A frame is the main window of an application; a dialog is a temporary pop-up window.

6. What is a database server?

A computer/software (like MySQL server) that stores databases and answers queries from clients.

7. What is the use of the WHERE clause?

To select only the rows that satisfy a condition.

8. Can a primary key contain NULL?

No.

9. What is the default sort order in SQL (2nd year topic)?

Ascending.

10. What is open source? Name one open-source tool you used in the lab.

Software with freely available source code; NetBeans / MySQL / Ubuntu.

LONG-ANSWER MODEL ANSWERS

Information Technology · +2 1st Year · Write these in 150–250 words

Unit 1 – Computer System

1. What is a computer? Explain its characteristics.

A computer is an electronic device that accepts data (input), processes it under the control of stored instructions, stores data and produces information (output).

Characteristics: (1) **Speed** — performs millions of instructions per second. (2) **Accuracy** — gives correct results if data and program are correct (GIGO: garbage in, garbage out). (3) **Storage** — stores huge amounts of data permanently on secondary memory. (4) **Diligence** — does not get tired or bored; works for hours with the same efficiency. (5) **Versatility** — can do different kinds of tasks: calculation, typing, games, communication. (6) **Automation** — once a program is given, it works automatically. **Limitations:** no intelligence or common sense of its own, cannot take decisions beyond its program, depends on electricity.

2. Explain the working of a CPU with the instruction cycle.

The CPU executes programs instruction by instruction in a cycle: (1) **Fetch** — the CU fetches the next instruction from memory using the program counter. (2) **Decode** — the CU interprets what operation is required. (3) **Execute** — the ALU performs the operation (e.g. addition) using data in registers. (4) **Store** — the result is written back to a register or memory. The control unit sends timing and control signals over the control bus, addresses travel over the address bus and data over the data bus. Registers such as the accumulator, program counter and instruction register hold data temporarily for fast access.

3. Compare primary and secondary memory.

Primary memory (RAM, ROM, cache): directly accessed by CPU, faster, costlier per byte, smaller capacity; RAM is volatile. **Secondary memory** (hard disk, SSD, CD/DVD,

pen drive): not directly accessed by CPU (data is first loaded into RAM), slower, cheaper, much larger, non-volatile — used for permanent storage. Programs are stored on secondary memory and loaded into primary memory for execution.

4. Describe different types of printers.

Impact printers strike the paper: *dot matrix* — a print head with pins strikes an inked ribbon forming characters from dots; cheap to run, noisy, can print multi-part forms (used in banks, railway tickets). **Non-impact printers:** *inkjet/deskjet/bubble-jet* — spray tiny ink droplets through nozzles (bubble-jet heats ink to form bubbles); good colour, quiet, slower and costly ink. *Laser* — a laser beam forms an electrostatic image on a drum, toner powder sticks to it and is fused onto paper by heat; very fast, high quality, used in offices. **Plotters** draw large precise drawings with pens.

Unit 1 – Software and Open Source

5. Classify software with examples.

(1) **System software** controls the computer: operating systems (Windows, Linux, Android), language processors (assembler, compiler, interpreter), device drivers. (2) **Utility software** maintains the system: antivirus, compression tools, disk defragmenter, backup, disk cleanup. (3) **Application software** does user tasks — general purpose (word processor, spreadsheet, presentation, DBMS, IDE) and specific purpose (inventory, HRMS, payroll, financial management, reservation systems). A diagram showing "Software → System / Utility / Application" with examples earns marks.

6. Explain OS for mainframe, PC and mobile.

Mainframe OS (IBM z/OS): supports thousands of users and transactions simultaneously, batch processing, very high reliability and security; used by banks, airlines. **PC/server OS** (Windows, macOS, Linux; Windows Server): PC OS gives a GUI for a single user, multitasking; server OS manages network resources, users, files and web services. **Mobile OS** (Android, iOS): touch-based interface, power management to save battery, support for sensors (GPS, camera), app stores, wireless connectivity (Wi-Fi, Bluetooth, 4G).

7. What are open standards? Why are they important?

Open standards are publicly available specifications that anyone can implement without paying royalties — e.g. HTML, XML, WWW, Unicode, ODF, TCP/IP. Importance: (1) interoperability — documents and data can be exchanged between different software and devices; (2) no vendor lock-in — users can choose any software; (3) long-term access to data; (4) encourage competition and innovation; (5) lower cost for government and citizens. Example: a web page written in HTML opens in any browser on any OS.

Unit 2 – Programming

8. Explain the components of the NetBeans IDE and the steps to create an application.

Components: Projects window, Palette (Swing controls), Design/Source view, Properties window, Navigator/Inspector, Output window. Steps: create project → add JFrame Form →

design the form with controls → rename controls and set properties → write event code (double-click buttons) → run (F6) → test and debug → save. RAD makes development fast because the visual design is done by drag-and-drop and NetBeans writes the layout code automatically.

9. Explain Java data types with sizes and examples.

Primitive types: integer types byte (1 B), short (2 B), int (4 B), long (8 B); floating types float (4 B), double (8 B); char (2 B, Unicode); boolean (true/false). Reference type: String (class) for text. Choose the smallest suitable type: age → byte, marks → int, population → long, salary → double, grade → char, pass status → boolean, name → String. Examples of declarations should be written.

10. Explain the three loops of Java with syntax, flow and example.

for: for(init; condition; update) {body} — used when number of repetitions is known (print 1-10). **while:** while(condition) {body} — entry-controlled; checks first; may run 0 times (sum of digits). **do-while:** do {body} while(condition); — exit-controlled; runs at least once (menu programs). All loops have initialisation, condition, body and update; an infinite loop results if the condition never becomes false.

Unit 3 – RDBMS

11. Explain the relational model and its terms with an example table.

In the relational model data is stored in tables (relations) of rows and columns. Terms: relation (table), tuple (row), attribute (column), domain (set of allowed values), degree (no. of columns), cardinality (no. of rows), keys — primary, candidate, alternate, foreign. Draw a sample table (e.g. STUDENT with RollNo, Name, Class, Marks) and label each term. Relationships between tables are formed by matching primary and foreign keys.

12. Explain the SELECT statement with all its clauses studied in the 1st year.

SELECT [DISTINCT] column-list or * [AS alias] FROM table [WHERE condition]; Column list chooses columns; * selects all; arithmetic expressions can be used (Sal*12); AS gives column alias; DISTINCT removes duplicate rows; WHERE filters using relational (=, <, >, <=, >=, <>), range (BETWEEN), list (IN), pattern (LIKE with % and _), NULL check (IS NULL) and logical operators (NOT, AND, OR with precedence NOT > AND > OR). Give two example queries with outputs.

Unit 4 – IT Applications

13. Explain e-governance, its benefits, websites, social impact and challenges.

Definition: use of ICT to provide government services and information. Benefits: convenience, speed, transparency, reduced corruption, cost saving, citizen participation. Websites: india.gov.in, odisha.gov.in, uidai.gov.in, incometax.gov.in, edistrict.odisha.gov.in, digilocker.gov.in, passportindia.gov.in. Social impact: empowers rural citizens, women and elderly through CSCs; increases accountability; may increase digital divide. Challenges: infrastructure, literacy, language, security/privacy, cost, resistance to change.

14. Explain e-learning with benefits to students and teachers.

Definition: learning through electronic media — computers, internet, mobile apps, videos, virtual classrooms. Students: flexible time and place, self-paced, multimedia content, repeat lessons, instant feedback through quizzes, low cost, access to expert teachers. Teachers: wider reach, reusable and updatable content, online assessment and record keeping, professional training (training management systems like DIKSHA). Websites: SWAYAM, DIKSHA, NPTEL, ePathshala. Social impact: education in remote areas and lifelong learning, but needs devices and internet.

Short Notes (2–4 marks)

Cache memory

Very fast, small memory between CPU and RAM that keeps frequently used data and instructions, reducing the time the CPU waits for main memory. Made of SRAM. Levels L1, L2, L3.

Biometric devices

Input devices that identify people by physical traits — fingerprint, iris, face, voice. Used in Aadhaar authentication, attendance systems, mobile phone unlocking and bank KYC. They are secure because traits are unique and hard to copy.

Touch screen

A display that senses touch by finger or stylus; works as both input and output device. Types: resistive (pressure) and capacitive (electrical charge of finger). Used in smartphones, ATMs, kiosks.

Reservation system

Specific-purpose software for booking seats/rooms — railway (IRCTC), airline, bus, hotel. Shows availability, books tickets, takes online payment, generates e-tickets and handles cancellations and waiting lists.

Financial Management System

Software used by organisations to manage accounts, budgets, income and expenditure, payments and financial reports (e.g. Tally, government PFMS). Improves accuracy and transparency.

SQL PRACTICE WORKSHEETS

Information Technology · +2 1st Year · Five tables, 75 queries with answers

Worksheet 1 - Table HOSPITAL

PNo	PName	Age	Dept	AdmDate	Charges	Gender
1	Ananya	35	Surgery	2026-01-23	3000	F
2	Bikram	62	ENT	2026-02-10	1500	M
3	Chitra	28	Cardiology	2026-01-05	5000	F
4	Dinesh	45	Surgery	2026-03-12	3000	M
5	Eshan	19	Orthopaedic	2026-02-28	2500	M

1. Show all female patients. → `SELECT * FROM hospital WHERE Gender = 'F';` → Ananya, Chitra
2. Show patients older than 40. → Bikram, Dinesh
3. Show names of Surgery patients. → Ananya, Dinesh
4. Show patients admitted in February 2026. → `... WHERE AdmDate BETWEEN '2026-02-01' AND '2026-02-28';` → Bikram, Eshan
5. Show patients with charges 2500 to 3000. → Ananya, Dinesh, Eshan
6. Show different departments. → Surgery, ENT, Cardiology, Orthopaedic
7. Show names starting with a vowel. → `... WHERE PName LIKE 'A%' OR PName LIKE 'E%' OR PName LIKE 'I%' OR PName LIKE 'O%' OR PName LIKE 'U%';` → Ananya, Eshan
8. Show name and charges with 5% GST as "Total". → `SELECT PName, Charges * 1.05 AS Total FROM hospital;`
9. Show male patients not in Surgery. → Bikram, Eshan
10. Show patients whose department name has 'o' as the 2nd letter. → `... WHERE Dept LIKE '_o%';` → no rows (none of the departments match)
11. Show patients in Cardiology or ENT with charges above 2000. → Chitra
12. Show the patient whose age is less than 20. → Eshan
13. Show patients whose names end with 'a'. → Ananya, Chitra

14. Show patients not admitted in January. → ... WHERE AdmDate NOT BETWEEN '2026-01-01' AND '2026-01-31'; → Bikram, Dinesh, Eshan
15. Insert a new patient: 6, 'Farida', 50, 'ENT', '2026-04-01', 1500, 'F'. → INSERT INTO hospital VALUES (6, 'Farida', 50, 'ENT', '2026-04-01', 1500, 'F');

Worksheet 2 - Table GAMES

GCode	GameName	Type	Players	PrizeMoney	ScheduleDate
101	Carom Board	Indoor	2	5000	2026-01-23
102	Badminton	Outdoor	2	12000	2025-12-12
103	Table Tennis	Indoor	4	8000	2026-02-14
105	Chess	Indoor	2	9000	2026-01-01
108	Lawn Tennis	Outdoor	4	25000	2026-03-19

- Indoor games. → Carom Board, Table Tennis, Chess
- Games with prize money above 7000. → Badminton, Table Tennis, Chess, Lawn Tennis
- Games scheduled in 2026. → 101, 103, 105, 108
- Games with 'Tennis' in the name. → ... WHERE GameName LIKE '%Tennis%'; → Table Tennis, Lawn Tennis
- Outdoor games with 4 players. → Lawn Tennis
- Name and prize money for each of 2 winners (prize/2) as "PerHead". → SELECT GameName, PrizeMoney/2 AS PerHead FROM games;
- Different numbers of players. → 2, 4
- Games with GCode in (101, 105, 108). → Carom Board, Chess, Lawn Tennis
- Games whose name has 5 letters. → LIKE '_____' → Chess
- Games not of indoor type. → Badminton, Lawn Tennis
- Prize money between 8000 and 12000. → Badminton, Table Tennis, Chess
- Games scheduled before 2026-01-15. → Badminton, Chess
- Show game names in a column titled "Event". → SELECT GameName AS Event FROM games;
- Show games where players = 2 and prize < 10000. → Carom Board, Chess
- Show games whose name starts with 'C'. → Carom Board, Chess

Worksheet 3 – Table SHOP

ItemNo	Item	Company	Qty	Rate	Category
11	Soap	Lux	150	40	Toiletries
12	Toothpaste	Colgate	80	95	Toiletries
13	Rice 5kg	Fortune	40	320	Grocery
14	Biscuit	Parle	200	10	Snacks
15	Oil 1L	Fortune	60	150	Grocery
16	Chips	Lays	NULL	20	Snacks

- Items of company Fortune. → Rice 5kg, Oil 1L
- Item and stock value (Qty × Rate). → SELECT Item, Qty * Rate AS StockValue FROM shop; → 6000, 7600, 12800, 2000, 9000, NULL
- Items with unknown quantity. → Chips
- Items with rate less than 50. → Soap, Biscuit, Chips
- Grocery items costing more than 200. → Rice 5kg
- Distinct categories. → Toiletries, Grocery, Snacks
- Items whose name contains a space. → LIKE '% %' → Rice 5kg, Oil 1L
- Items not in Snacks category. → Soap, Toothpaste, Rice 5kg, Oil 1L
- Item and rate after Rs 5 discount. → SELECT Item, Rate – 5 FROM shop;
- Items with quantity more than 100 or rate more than 300. → Soap, Biscuit, Rice 5kg
- Items whose company name starts with 'L'. → Soap (Lux), Chips (Lays)
- Items with ItemNo from 12 to 14. → Toothpaste, Rice 5kg, Biscuit
- Items in Grocery or Snacks with quantity known. → Rice 5kg, Biscuit, Oil 1L
- Delete the table. → DROP TABLE shop;
- Create SHOP with suitable data types. → CREATE TABLE shop (ItemNo INT PRIMARY KEY, Item VARCHAR(20), Company VARCHAR(15), Qty INT, Rate DECIMAL(7,2), Category VARCHAR(15));

Worksheet 4 – Table TEACHER

TId	TName	Subject	Salary	DOJ	Gender
T1	Mr. Behera	Physics	48000	2015-07-01	M
T2	Mrs. Panda	Chemistry	52000	2012-06-15	F
T3	Ms. Swain	IT	40000	2019-08-20	F
T4	Mr. Patra	Maths	55000	2010-01-10	M
T5	Mr. Dash	English	45000	2018-04-05	M

- Female teachers. → Mrs. Panda, Ms. Swain
- Teachers who joined before 2015. → Mrs. Panda, Mr. Patra
- Teachers with salary above 45000. → Behera, Panda, Patra

4. Teachers of science subjects (Physics, Chemistry, Maths). → ... WHERE Subject IN ('Physics', 'Chemistry', 'Maths');
5. Annual salary as "Yearly". → SELECT TName, Salary * 12 AS Yearly FROM teacher;
6. Teachers whose name starts with "Mr.". → LIKE 'Mr.%' → Behera, Patra, Dash (note: "Mrs." also starts with "Mr" but the 3rd character is 's', so LIKE 'Mr.%' excludes it)
7. Teachers who joined between 2015 and 2019. → Behera, Swain, Dash
8. Male teachers earning less than 50000. → Behera, Dash
9. Teachers not teaching IT or English. → Behera, Panda, Patra
10. Subject list without duplicates. → SELECT DISTINCT Subject FROM teacher;
11. Name and salary after 8% increment. → SELECT TName, Salary * 1.08 FROM teacher;
12. Teachers whose name contains "Pa". → Mrs. Panda, Mr. Patra
13. Teachers with TId T2 or T4. → Panda, Patra
14. Teachers with salary not between 45000 and 50000. → Panda, Swain, Patra
15. Insert a teacher with only TId, TName, Subject. → INSERT INTO teacher (TId, TName, Subject) VALUES ('T6', 'Mrs. Sahoo', 'Biology');

Worksheet 5 - Mixed Questions on Any Table

1. Create a database SCHOOL and open it. → CREATE DATABASE school; USE school;
2. Show the databases available. → SHOW DATABASES;
3. Show the tables in the current database. → SHOW TABLES;
4. Display the current date. → SELECT CURDATE();
5. Calculate $25 \times 4 + 10$ without a table. → SELECT 25 * 4 + 10; → 110
6. What will SELECT $10 + 5 * 2 - 4 / 2$ return? → 18
7. Write a condition for "marks above 90 or below 33". → WHERE Marks > 90 OR Marks < 33
8. Write a condition for "name has exactly 4 characters and ends with 'a'". → WHERE Name LIKE '____a'
9. Write a condition for "city is not Puri and not Cuttack". → WHERE City NOT IN ('Puri', 'Cuttack')
10. Correct the query: SELECT * FROM student WHERE Name = NULL; → WHERE Name IS NULL;
11. Correct: SELECT Name Marks FROM student; (two columns intended) → SELECT Name, Marks FROM student;
12. Correct: SELECT * FROM student WHERE Marks BETWEEN 60, 80; → BETWEEN 60 AND 80
13. Correct: INSERT INTO student VALUES (1, Ravi, 70); → text must be quoted: (1, 'Ravi', 70)
14. Correct: SELECT DISTINCT * Stream FROM student; → SELECT DISTINCT Stream FROM student;
15. Correct: SELECT Name FROM student WHERE Name LIKE "A*"; → LIKE 'A%'

MORE SAMPLE PAPERS

Information Technology · +2 1st Year · Papers 3 and 4 with answers

IT Sample Paper 3

A. Very short (1 × 12)

1. Which memory is placed between CPU and RAM?
2. Name the device used for reading answer sheets of objective exams.
3. What is the full form of DMP?
4. Name one language that uses an interpreter.
5. What is the function of a disk defragmenter?
6. Name a Java IDE.
7. What is the output of $15 / 4$ in Java (both int)?
8. Name the property used to make a control inactive.
9. Which SQL operator matches a list of values?
10. Write the SQL wildcard for a single character.
11. What is the cardinality of a table with 8 rows and 3 columns?
12. Name a website for Aadhaar services.

Answers: 1. Cache 2. OMR 3. Dot Matrix Printer 4. Python / BASIC 5. Rearranges fragmented files to speed up access 6. NetBeans 7. 3 8. enabled 9. IN 10. _ 11. 8 12. uidai.gov.in.

B. Short (2 × 10)

13. Write two differences between LCD and CRT monitors.

LCD: thin and light, low power, flat screen, no radiation flicker. CRT: bulky and heavy, high power, curved screen, uses electron gun.

14. What is an assembler? Why is it needed?

A language processor converting assembly language (mnemonics like ADD, MOV) to machine code, because the computer understands only binary.

15. Name four FOSS software and their uses.

Linux (OS), Firefox (browser), LibreOffice (office suite), MySQL (database), NetBeans (IDE).

16. What is the difference between getText() and setText()?

getText() reads the current text of a control; setText() changes/displays text in a control.

17. Write the output: `int s = 0; for (int i = 1; i <= 4; i++) s = s + i * i;`

$1 + 4 + 9 + 16 = 30$.

18. What is a logical error? Give an example.

An error in program logic that gives wrong output without crashing; e.g. $\text{avg} = a + b / 2$ instead of $(a + b) / 2$.

19. Differentiate between DDL and DML.

DDL defines/changes structure (CREATE, ALTER, DROP). DML handles data (INSERT, SELECT, UPDATE, DELETE).

20. Write a query to display names of students whose names start with 'S' and end with 'a'.

`SELECT Name FROM student WHERE Name LIKE 'S%a';`

21. Write any two e-learning websites and their purpose.

SWAYAM — free online courses for school and college students; DIKSHA — digital content and teacher training.

22. What is the role of the address bus?

It carries the memory address (location) from the CPU to memory or I/O devices; it is unidirectional.

C. Long (4 × 6)**23. Explain the memory unit: types of RAM and ROM.**

See notes and QB-1 long answer 2.

24. Explain the three types of programming errors with an example of each.

Syntax (missing semicolon), run-time (division by zero, `parseInt("abc")`), logical (wrong formula). Syntax errors are found by the compiler; run-time errors crash the program during execution; logical errors give wrong results and must be found by testing.

25. Write a program (button code) to accept the cost price and selling price and display profit or loss with the amount.

```
double cp = Double.parseDouble(txtCP.getText());
double sp = Double.parseDouble(txtSP.getText());
if (sp > cp) lblOut.setText("Profit of Rs " + (sp - cp));
else if (cp > sp) lblOut.setText("Loss of Rs " + (cp - sp));
else lblOut.setText("No profit, no loss");
```

26. Write a program to print the sum of the digits and the reverse of a number.

```
int n = Integer.parseInt(txtN.getText()), sum = 0, rev = 0;
while (n > 0) {
    int d = n % 10;
    sum += d;
    rev = rev * 10 + d;
    n /= 10;
}
txtSum.setText("" + sum);
txtRev.setText("" + rev);
```

27. Consider table CLUB(MemberId, Name, Age, Sport, Fee). Write SQL for: (a) members playing Cricket (b) members aged 18-25 (c) names containing 'an' (d) members whose fee is unknown (e) sports without duplicates (f) name and fee with 10% discount as "NewFee".

```
(a) SELECT * FROM club WHERE Sport = 'Cricket';
(b) SELECT * FROM club WHERE Age BETWEEN 18 AND 25;
(c) SELECT Name FROM club WHERE Name LIKE '%an%';
(d) SELECT * FROM club WHERE Fee IS NULL;
(e) SELECT DISTINCT Sport FROM club;
(f) SELECT Name, Fee * 0.9 AS NewFee FROM club;
```

28. What is e-governance? Explain its benefits and challenges.

See long-answer section.

IT Sample Paper 4

A. Very short (1 × 12)

1. Expand MICR.
2. Name an output device that produces sound.
3. Which memory loses data when power is switched off?

4. Name the OS used in most smartphones.
5. What type of software is Tally?
6. Expand GUI.
7. Which Java data type is used for "Yes/No" values?
8. Which method returns the length of a string?
9. What will "Hello".toUpperCase() return?
10. Which SQL clause is used to give a temporary name to a column?
11. Write the SQL command to delete a database named TEST.
12. Which government portal stores certificates digitally?

Answers: 1. Magnetic Ink Character Recognition 2. Speaker 3. RAM 4. Android 5. Application (financial/accounting) software 6. Graphical User Interface 7. boolean 8. length() 9. "HELLO" 10. AS (alias) 11. DROP DATABASE test; 12. DigiLocker.

B. Short (2 × 10)

13. What are serial and parallel ports?

Serial port sends data one bit at a time over a single line (older mice, modems); parallel port sends several bits at once over multiple lines (older printers).

14. What is the need of utility software?

To maintain, protect and optimise the computer — remove viruses, compress files, clean and defragment disks, back up data.

15. Give two differences between free software and freeware.

Free software gives freedom to study, modify and share source code; freeware is free of cost but source code is closed and modification is not allowed.

16. Write the purpose of JOptionPane.

To display ready-made dialog boxes — message, input and confirm dialogs.

17. Find the output: `int a = 8; if (a % 2 == 0 && a > 5) lbl.setText("Big even"); else lbl.setText("Other");`

Big even.

18. Convert to do-while: `int i = 1; while (i <= 3) { append(i); i++; }`

`int i = 1; do { append(i); i++; } while (i <= 3);`

19. What is a domain in a relation? Give an example.

The set of allowed values for an attribute; e.g. domain of Gender = {M, F, O}.

20. Write a query to show records of employees not living in Delhi or Mumbai.

`SELECT * FROM emp WHERE City NOT IN ('Delhi', 'Mumbai');`

21. What is the digital divide?

The gap between people who have access to computers and the internet and the skills to use them, and those who do not.

22. What is a GUI-based application?

An application with windows, buttons, text boxes and menus that users operate with mouse/touch rather than typed commands.

C. Long (4 × 6)**23. Describe the output devices: monitor, printer, plotter, speaker.**

See notes.

24. Explain language processors and the steps of executing a Java program.

Compiler/interpreter/assembler (see notes). Java: write source (.java) → compile with javac to bytecode (.class) → JVM loads and interprets/JIT-compiles bytecode → program runs on any OS with a JVM.

25. Write a program to check whether a year entered is a leap year, and display the number of days in February.

```
int y = Integer.parseInt(txtYear.getText());
boolean leap = (y % 400 == 0) || (y % 4 == 0 && y % 100 != 0);
lblOut.setText(leap ? "Leap year: Feb has 29 days" : "Not leap: Feb has 28 days");
```

26. Write a program for a shopping bill: if bill ≥ 5000 discount 15%, ≥ 2000 discount 10%, else 5%; display discount and net amount.

```
double bill = Double.parseDouble(txtBill.getText());
double rate = (bill >= 5000) ? 0.15 : (bill >= 2000) ? 0.10 : 0.05;
double disc = bill * rate;
txtDisc.setText("" + disc);
txtNet.setText("" + (bill - disc));
```

27. Write SQL to create table LIBRARY(BookNo, Title, Author, Price, IssueDate) with BookNo as primary key, insert two rows, and display books costing below 300 issued after 1 Jan 2026.

```
CREATE TABLE library (BookNo INT PRIMARY KEY, Title VARCHAR(30),
    Author VARCHAR(20), Price DECIMAL(7,2), IssueDate DATE);
INSERT INTO library VALUES (1, 'Wings of Fire', 'A.P.J. Abdul Kalam', 250,
    '2026-02-10');
INSERT INTO library VALUES (2, 'Gitanjali', 'R. Tagore', 350, '2025-12-05');
SELECT * FROM library WHERE Price < 300 AND IssueDate > '2026-01-01';
```

28. Explain e-learning: definition, benefits to students and teachers, websites and social impact.

See long-answer section.

REVISION, COMPARISONS & ALGORITHMS

Information Technology · +2 1st Year

Important Comparison Tables

Topic	Item 1	Item 2
Hardware vs Software	Physical parts you can touch (keyboard, CPU)	Programs/instructions (Windows, Word)
Input vs Output device	Sends data into computer (mouse)	Gives results from computer (printer)
RAM vs ROM	Volatile, read/write, temporary	Non-volatile, read-only, permanent
SRAM vs DRAM	Flip-flops, fast, costly, no refresh	Capacitors, slower, cheap, needs refresh
Primary vs Secondary memory	Directly accessed by CPU, fast, small	Indirect, slow, large, permanent
Impact vs Non-impact printer	Strikes ribbon, noisy (DMP)	Ink/toner, quiet (laser, inkjet)
Serial vs Parallel port	One bit at a time	Many bits at a time
System vs Application software	Runs the computer	Does user tasks
Compiler vs Interpreter	Whole program, fast execution	Line by line, slower, easy debugging
CUI vs GUI	Typed commands	Icons, windows, mouse
Open source vs Proprietary	Source code open, free to modify	Code hidden, licensed
Free software vs Freeware	Freedom (source available)	Only free of cost
TrueType vs OpenType	Limited glyphs	Unicode-rich, cross-platform
Static vs Dynamic font	Installed on computer	Downloaded with the page
Phonetic vs Key-map typing	Type by sound in English letters	Fixed key → character (Inscript)
Label vs Text field	Display only	Accepts input
Text field vs Text area	Single line	Multiple lines
Radio button vs Check box	One choice in a group	Many choices
Combo box vs List	Drop-down, shows one item	Shows several items
= vs ==	Assignment	Comparison
while vs do-while	Entry-controlled	Exit-controlled, runs at least once
break vs continue	Ends the loop	Skips to next iteration
Syntax vs Logical error	Grammar mistake, compiler finds	Wrong logic, wrong output
CHAR vs VARCHAR	Fixed length	Variable length
Primary vs Foreign key	Unique in own table	Refers to other table's primary key
Degree vs Cardinality	Columns	Rows

DDL vs DML	Structure (CREATE/ALTER/DROP)	Data (INSERT/SELECT/UPDATE/DELETE)
% vs _ in LIKE	Any number of characters	Exactly one character
e-Governance vs e-Learning	Government services online	Education online

Algorithms and Flowcharts

FLOWCHART SYMBOLS

Oval — Start/Stop · Parallelogram — Input/Output · Rectangle — Process · Diamond — Decision · Arrows — flow of control · Small circle — connector.

1. Algorithm: find the sum and average of three numbers.

1. Start 2. Read A, B, C 3. $\text{Sum} = A + B + C$ 4. $\text{Avg} = \text{Sum}/3$ 5. Print Sum, Avg 6. Stop.

2. Algorithm: find the largest of two numbers.

1. Start 2. Read A, B 3. If $A > B$ then print "A is larger" else print "B is larger" 4. Stop.
(Flowchart: Start → Input A, B → diamond " $A > B$?" → Yes: print A; No: print B → Stop.)

3. Algorithm: print numbers 1 to N.

1. Start 2. Read N 3. $I = 1$ 4. While $I \leq N$ repeat: print I; $I = I + 1$ 5. Stop.

4. Algorithm: factorial of N.

1. Start 2. Read N 3. $F = 1$, $I = 1$ 4. While $I \leq N$: $F = F \times I$; $I = I + 1$ 5. Print F 6. Stop.

5. Algorithm: check whether a number is prime.

1. Start 2. Read N 3. Flag = 1 4. For $I = 2$ to $N/2$: if $N \bmod I = 0$ then Flag = 0 and exit loop 5. If Flag = 1 and $N > 1$ print "Prime" else print "Not prime" 6. Stop.

6. Algorithm: calculate electricity bill with slabs.

1. Start 2. Read Units 3. If $\text{Units} \leq 100$, $\text{Bill} = \text{Units} \times 3$; else if $\text{Units} \leq 200$, $\text{Bill} = 300 + (\text{Units} - 100) \times 5$; else $\text{Bill} = 800 + (\text{Units} - 200) \times 7$ 4. Print Bill 5. Stop.

Glossary of IT Terms

Term	Meaning
Data	Raw facts and figures.
Information	Processed, meaningful data.
Program	Set of instructions to perform a task.
Algorithm	Step-by-step method to solve a problem.
Bug	An error in a program.
Firmware	Software stored permanently in ROM (e.g. BIOS).
Bootling	Starting the computer and loading the OS into memory.
Multitasking	Running several programs at the same time.
Source code	Program as written by the programmer in a high-level language.
Object code	Machine-code output of a compiler.
Variable	Named memory location whose value can change.
Constant	Value that does not change (final in Java).
Operator	Symbol that performs an operation (+, >, &&).
Expression	Combination of operands and operators that gives a value.
Control	A GUI component such as a button or text field.
Property	A characteristic of a control (text, font, colour).
Method	A function belonging to a class/object (getText()).
Event	An action like a click that a program responds to.
Query	A request to a database for information.
Record	A complete row of information in a table.
NULL	Missing or unknown value in a database.
Portal	A website giving access to many services/information.

Last-Day Revision Checklist

- Block diagram of computer, memory hierarchy and all abbreviations.
- Input/output devices with one use each.
- OS functions; compiler vs interpreter; utility software examples.
- Open source: definitions, examples, Unicode, fonts, typing methods.
- Swing controls and their methods; data types with sizes; operators; if/switch/loops syntax.
- Error types and debugging; problem-solving steps.
- Database terms and keys; MySQL data types; CREATE, INSERT, DESC, SELECT with WHERE, DISTINCT, AS, LIKE, BETWEEN, IN, IS NULL, AND/OR/NOT.
- e-Governance and e-Learning definitions, benefits, websites, impacts, challenges.

OBJECTIVE PRACTICE SETS

Information Technology · +2 1st Year · MCQ, fill in the blanks, true/false, matching

Set A – Multiple Choice (50 questions)

1. Which is not an input device? (a) scanner (b) microphone (c) plotter (d) light pen
2. Which unit stores data permanently? (a) RAM (b) cache (c) hard disk (d) register
3. Which is the fastest printer? (a) DMP (b) inkjet (c) laser (d) daisy wheel
4. OCR is used to read (a) magnetic ink (b) printed text (c) pencil marks (d) bar codes
5. Webcam is a/an (a) output device (b) input device (c) storage device (d) processor
6. Which memory is erased by UV light? (a) PROM (b) EPROM (c) EEPROM (d) RAM
7. 1 byte = (a) 4 bits (b) 8 bits (c) 16 bits (d) 1024 bits
8. Which is a utility? (a) MS Word (b) antivirus (c) Java (d) Linux
9. Which is an interpreter-based language? (a) C (b) Python (c) C++ (d) assembly
10. Which OS is open source? (a) Windows (b) macOS (c) Ubuntu (d) iOS
11. HRMS deals with (a) hospitals (b) employees (c) hotels (d) inventory
12. Which is not a function of an OS? (a) memory management (b) file management (c) document typing (d) device management
13. Which standard is used to create web pages? (a) XML (b) HTML (c) PDF (d) JPEG
14. Unicode can represent (a) only English (b) only Indian languages (c) all languages (d) numbers only
15. Which is an IDE? (a) MySQL (b) NetBeans (c) Firefox (d) Linux
16. Which control shows a drop-down list? (a) JList (b) JComboBox (c) JTextArea (d) JLabel
17. Which method sets the text of a label? (a) getText() (b) setText() (c) text() (d) putText()
18. Which data type has size 8 bytes? (a) int (b) float (c) double (d) char
19. The value of $10 \% 3$ is (a) 3 (b) 1 (c) 0 (d) 3.33
20. Which is a relational operator? (a) && (b) + (c) >= (d) =
21. Which loop is best when the number of iterations is known? (a) for (b) while (c) do-while (d) none

22. Which statement is used for multi-way selection? (a) if (b) switch (c) for (d) while
23. What does Double.parseDouble("2.5") return? (a) "2.5" (b) 2.5 (c) 2 (d) error
24. Which error stops compilation? (a) syntax (b) logical (c) run-time (d) all
25. A module is (a) a type of loop (b) a part of a program doing one task (c) a variable (d) an error
26. In DBMS, a table is also called a (a) tuple (b) relation (c) domain (d) key
27. Which key links two tables? (a) primary (b) candidate (c) foreign (d) alternate
28. Which command removes a table permanently? (a) DELETE (b) DROP (c) REMOVE (d) CLEAR
29. Which command is DML? (a) CREATE (b) DROP (c) INSERT (d) ALTER
30. Which data type stores '2026-10-04'? (a) CHAR (b) DATE (c) INT (d) DECIMAL
31. LIKE 'A%' finds names that (a) end with A (b) start with A (c) contain A (d) equal A
32. LIKE '%A' finds names that (a) end with A (b) start with A (c) have A second (d) none
33. Which returns rows where City is Puri or Cuttack? (a) City = 'Puri' AND City = 'Cuttack' (b) City IN ('Puri','Cuttack') (c) City BETWEEN 'Puri' AND 'Cuttack' (d) City LIKE 'Puri%Cuttack'
34. Which operator has the highest precedence among NOT, AND, OR? (a) NOT (b) AND (c) OR (d) all equal
35. Which is the correct alias syntax? (a) SELECT Name AS StudentName (b) SELECT Name ALIAS StudentName (c) SELECT AS Name (d) SELECT Name = StudentName
36. Which function shows current date in MySQL? (a) DATE() (b) CURDATE() (c) TODAY() (d) NOWDATE()
37. e-Governance improves (a) corruption (b) transparency (c) paperwork (d) queues
38. Which is a challenge of e-learning? (a) flexibility (b) need of internet (c) self-pace (d) low cost
39. Bhulekh portal of Odisha provides (a) land records (b) exam results (c) bus tickets (d) movies
40. Which is an e-learning portal for engineering courses? (a) NPTEL (b) IRCTC (c) UIDAI (d) EPFO
41. Which port is used to connect a monitor (modern)? (a) PS/2 (b) HDMI (c) RJ-45 (d) audio
42. RJ-45 connector is used for (a) printer (b) network cable (c) monitor (d) speaker
43. Which is secondary memory? (a) cache (b) RAM (c) SSD (d) register
44. BIOS stands for (a) Basic Input Output System (b) Binary Input Output System (c) Basic Integrated OS (d) none
45. Which is a mobile OS? (a) Linux Mint (b) Android (c) MS-DOS (d) Windows XP
46. Which file extension is a compiled Java file? (a) .java (b) .class (c) .exe (d) .jar only
47. Which keyword ends a switch case? (a) stop (b) end (c) break (d) exit
48. What is printed: 5 + 3 + "A"? (a) 53A (b) 8A (c) A8 (d) error
49. Which SQL statement shows all tables? (a) SHOW TABLES (b) DESC TABLES (c) LIST TABLES (d) SELECT TABLES
50. Which is an example of open standard? (a) .doc (b) ODF (c) .psd (d) .cdr

Answers: 1 c · 2 c · 3 c · 4 b · 5 b · 6 b · 7 b · 8 b · 9 b · 10 c · 11 b · 12 c · 13 b · 14 c · 15 b · 16 b · 17 b · 18 c · 19 b · 20 c · 21 a · 22 b · 23 b · 24 a · 25 b · 26 b · 27 c · 28 b · 29 c · 30 b · 31 b · 32 a · 33 b · 34 a · 35 a · 36 b · 37 b · 38 b · 39 a · 40 a · 41 b · 42 b · 43 c · 44 a · 45 b · 46 b · 47 c · 48 b · 49 a · 50 b.

Set B – Fill in the Blanks (25)

1. The _____ unit fetches and decodes instructions.
2. _____ memory is used to speed up data transfer between CPU and RAM.
3. A _____ printer is suitable for printing carbon copies.
4. Cheques are processed using _____.
5. The software that translates assembly language is called _____.
6. _____ is a free and open-source operating system.
7. _____ encoding gives a unique code to every character of all languages.
8. In NetBeans, the _____ window shows the available Swing controls.
9. To make a text field read-only, set its _____ property to false.
10. The _____ data type stores a single character.
11. The method _____ converts a string to an integer.
12. The _____ loop checks the condition after executing the body.
13. _____ errors are detected while the program is running.
14. Breaking a big program into small parts is called the _____ approach.
15. The number of rows in a table is called its _____.
16. A _____ key cannot have duplicate or NULL values.
17. _____ is a DDL command used to create a table.
18. The _____ keyword is used to eliminate duplicate rows.
19. The _____ operator is used for pattern matching.
20. The wildcard _____ matches any number of characters.
21. BETWEEN includes _____ end values.
22. Missing values are checked using IS _____.
23. _____ is the use of ICT in government functioning.
24. _____ is India's national e-learning MOOC platform.
25. The gap between people with and without digital access is called the _____.

Answers: 1. control 2. Cache 3. dot matrix 4. MICR 5. assembler 6. Linux (Ubuntu) 7. Unicode 8. Palette 9. editable 10. char 11. Integer.parseInt() 12. do-while 13. Run-time 14. modular 15. cardinality 16. primary 17. CREATE TABLE 18. DISTINCT 19. LIKE 20. % 21. both 22. NULL 23. e-Governance 24. SWAYAM 25. digital divide.

Set C – True or False (20)

1. ROM is a volatile memory.
2. A touch screen is both an input and an output device.
3. Laser printers are impact printers.

4. An interpreter translates the whole program at once.
5. Linux is proprietary software.
6. OpenType fonts support Unicode.
7. A JLabel can accept user input.
8. Radio buttons in a ButtonGroup allow multiple selections.
9. In Java, "int" and "Int" are the same.
10. A do-while loop executes at least once.
11. Logical errors are caught by the compiler.
12. A table can have more than one candidate key.
13. A foreign key must be unique in its table.
14. DESC is used to display table structure.
15. LIKE '_a%' finds names whose second letter is 'a'.
16. NULL is the same as zero.
17. CHAR(10) always occupies 10 characters of space.
18. SQL commands must end with a semicolon in MySQL.
19. e-Learning removes the need for internet.
20. DigiLocker is an e-governance service.

Answers: 1 F · 2 T · 3 F · 4 F · 5 F · 6 T · 7 F · 8 F · 9 F · 10 T · 11 F · 12 T · 13 F · 14 T · 15 T · 16 F · 17 T · 18 T · 19 F · 20 T.

Set D – Match the Following

Column A	Column B
1. MICR	a. Answer sheets
2. OMR	b. Supermarket billing
3. BCR	c. Bank cheques
4. Plotter	d. Engineering drawings
5. Biometric sensor	e. Fingerprint attendance
6. Compiler	f. Translates whole program
7. Interpreter	g. Translates line by line
8. Defragmenter	h. Arranges file fragments
9. DISTINCT	i. Removes duplicates
10. SWAYAM	j. Online courses

Answers: 1-c, 2-a, 3-b, 4-d, 5-e, 6-f, 7-g, 8-h, 9-i, 10-j.

IT APPLICATION FRAMEWORKS & MINI PROJECTS

Information Technology · +2 1st Year · For the practical record

The syllabus asks for at least three IT application problem-solving frameworks in the record. Each framework below gives: the problem, the form design (front end), validations, the table design (back end) and the core code.

Framework 1 – Student Admission Form (e-Governance / e-Learning)

Form design

Control	Name	Purpose
TextField	txtName	Student name
TextField	txtMarks10	Class 10 percentage
JRadioButton ×2 (ButtonGroup)	rbMale, rbFemale	Gender
JComboBox	cmbStream	Science / Commerce / Arts
JCheckBox	chkHostel	Hostel required
JButton	btnSubmit, btnReset, btnExit	Actions
JTextArea	txtSummary	Shows admission summary

Validations

- Name not empty.
- Percentage between 0 and 100.
- Science requires at least 60%, Commerce 50%, Arts 35%.
- Gender must be selected.

Code (Submit button)

```
String name = txtName.getText().trim();
if (name.isEmpty()) { JOptionPane.showMessageDialog(null, "Enter name"); return; }
double p = Double.parseDouble(txtMarks10.getText());
if (p < 0 || p > 100) { JOptionPane.showMessageDialog(null, "Invalid percentage");
return; }
if (!rbMale.isSelected() && !rbFemale.isSelected()) {
    JOptionPane.showMessageDialog(null, "Select gender"); return; }
String stream = (String) cmbStream.getSelectedItemAt();
double cutoff = stream.equals("Science") ? 60 : stream.equals("Commerce") ? 50 : 35;
String result = (p >= cutoff) ? "ELIGIBLE" : "NOT ELIGIBLE";
int fee = 5000 + (chkHostel.isSelected() ? 12000 : 0);
txtSummary.setText("Name: " + name + "\nStream: " + stream
    + "\nResult: " + result + "\nFee payable: Rs " + (p >= cutoff ? fee : 0));
```

Back-end table

```
CREATE TABLE admission (AppNo INT PRIMARY KEY, Name VARCHAR(30), Gender CHAR(1),
    Percent DECIMAL(5,2), Stream VARCHAR(10), Hostel CHAR(1), Status VARCHAR(15));
```

Framework 2 – Electricity Bill Payment (e-Governance)

Control	Name	Purpose
JTextField	txtConsumer	Consumer number
JTextField	txtPrev, txtCurr	Previous and current meter readings
JRadioButton	rbDomestic, rbCommercial	Connection type
JButton	btnCalc	Calculate bill
JTextField	txtUnits, txtBill	Output

Rates: Domestic — first 50 units Rs 3, next 150 units Rs 4.80, above 200 Rs 5.80. Commercial — flat Rs 7 per unit. Fixed charge Rs 50.

```
int prev = Integer.parseInt(txtPrev.getText());
int curr = Integer.parseInt(txtCurr.getText());
if (curr < prev) { JOptionPane.showMessageDialog(null, "Current reading cannot be less");
return; }
int u = curr - prev;
double bill;
if (rbCommercial.isSelected()) bill = u * 7;
else if (u <= 50) bill = u * 3;
else if (u <= 200) bill = 50 * 3 + (u - 50) * 4.80;
else bill = 50 * 3 + 150 * 4.80 + (u - 200) * 5.80;
bill += 50;
txtUnits.setText("" + u);
txtBill.setText(String.format("%.2f", bill));
```

Test: Domestic, 250 units → 150 + 720 + 290 + 50 = Rs 1210.

```
CREATE TABLE ebill (ConsumerNo VARCHAR(12) PRIMARY KEY, Name VARCHAR(30), Type
    VARCHAR(12),
    PrevReading INT, CurrReading INT, Amount DECIMAL(9,2), DueDate DATE, Paid CHAR(1));
```

Framework 3 – Online Library Book Issue (e-Learning)

Control	Name	Purpose
TextField	txtMember, txtBook	Member ID, Book ID
TextField	txtDays	Days kept
ComboBox	cmbMember	Student / Teacher
Button	btnFine	Calculate fine

Rule: Students may keep a book 14 days, teachers 30 days. Fine Rs 2 per extra day for the first 10 days, Rs 5 per day after that.

```
int days = Integer.parseInt(txtDays.getText());
int allowed = cmbMember.getSelectedIndex() == 0 ? 14 : 30;
int late = days - allowed;
int fine = 0;
if (late > 0) fine = (late <= 10) ? late * 2 : 20 + (late - 10) * 5;
lblFine.setText("Late by " + Math.max(late, 0) + " days. Fine = Rs " + fine);
```

```
CREATE TABLE issue (IssueNo INT PRIMARY KEY, MemberId VARCHAR(10), BookId VARCHAR(10),
IssueDate DATE, ReturnDate DATE, Fine INT);
```

Framework 4 – Railway Ticket Fare (Reservation System)

```
// Controls: txtKm, cmbClass (Sleeper, 3AC, 2AC), chkSenior, txtPassengers, btnFare
double km = Double.parseDouble(txtKm.getText());
int n = Integer.parseInt(txtPassengers.getText());
double rate;
switch (cmbClass.getSelectedIndex()) {
    case 0: rate = 0.50; break; // Sleeper per km
    case 1: rate = 1.20; break; // 3AC
    default: rate = 1.80; // 2AC
}
double fare = km * rate * n;
if (chkSenior.isSelected()) fare = fare * 0.60; // 40% concession
fare += 40 * n; // reservation charge
txtFare.setText("Rs " + Math.round(fare));
```

Test: 500 km, Sleeper, 2 passengers, not senior → $500 \times 0.5 \times 2 + 80 = \text{Rs } 580$.

Framework 5 – Employee Payroll (HRMS)

```
// Controls: txtName, txtBasic, cmbGrade (A, B, C), btnPay, txtGross, txtTax, txtNet
double basic = Double.parseDouble(txtBasic.getText());
String grade = (String) cmbGrade.getSelectedItem();
double daRate = grade.equals("A") ? 0.50 : grade.equals("B") ? 0.40 : 0.30;
double da = basic * daRate, hra = basic * 0.20, pf = basic * 0.12;
double gross = basic + da + hra;
double tax = gross > 50000 ? gross * 0.10 : 0;
txtGross.setText("" + gross);
txtTax.setText("" + tax);
txtNet.setText("" + (gross - pf - tax));
```

Test: Basic 30000, Grade A → DA 15000, HRA 6000, Gross 51000, PF 3600, Tax 5100, Net 42300.

Framework 6 – Quiz Application (e-Learning)

```
// Three questions with radio-button groups bg1, bg2, bg3; btnSubmit shows score.
int score = 0;
if (rbQ1Correct.isSelected()) score++;
if (rbQ2Correct.isSelected()) score++;
if (rbQ3Correct.isSelected()) score++;
String remark = (score == 3) ? "Excellent" : (score == 2) ? "Good" : "Practise more";
JOptionPane.showMessageDialog(null, "Your score: " + score + "/3. " + remark);
```

How to Present a Framework in the Record

1. **Problem statement** (2–3 lines).
2. **Input and output** list.
3. **Form sketch** with labelled controls.
4. **Controls table** (control type, name, property values).
5. **Validation rules**.
6. **Code** for each button.
7. **Back-end table design** (CREATE TABLE statement).
8. **Sample run** with input and output.

PRACTICE WORKSHEETS

Information Technology · +2 1st Year · With answers

Worksheet 1 - Hardware

1. Classify as input, output or both: keyboard, monitor, touch screen, printer, scanner, speaker, microphone, modem, headset with mic, webcam.
2. Arrange in increasing order of speed: RAM, hard disk, register, cache.
3. Convert: (i) 2 GB to MB (ii) 4096 KB to MB (iii) 32 bits to bytes.
4. Name the device used at: (i) petrol pump card payment (ii) Aadhaar enrolment (iii) library book issue (iv) bank cheque clearing.
5. Which memory type is used in a pen drive?

Answers: 1. Input: keyboard, scanner, microphone, webcam; Output: monitor, printer, speaker; Both: touch screen, modem, headset with mic 2. hard disk < RAM < cache < register 3. 2048 MB; 4 MB; 4 bytes 4. smart/magnetic card reader; biometric sensors (fingerprint, iris) and webcam; bar code reader; MICR 5. Flash memory (EEPROM type).

Worksheet 2 - Software and Open Source

1. Classify: Windows 11, Tally, WinRAR, MS Excel, Android, Quick Heal, NetBeans, IRCTC app, Linux, Disk Cleanup.
2. Give the open-source alternative for: MS Office, Internet Explorer, Windows, Oracle database, Photoshop.
3. Write two advantages and two disadvantages of open-source software.
4. Which typing method would a beginner prefer to type in Odia — phonetic or Inscript? Why?

Answers: 1. System: Windows 11, Android, Linux; Utility: WinRAR, Quick Heal, Disk Cleanup; Application: Tally, MS Excel, NetBeans, IRCTC app 2. LibreOffice; Firefox; Ubuntu Linux; MySQL/PostgreSQL; GIMP 3. Advantages: free, modifiable, community support, no vendor lock-in. Disadvantages: support may be informal, some software may

lack polish/compatibility, need technical skill to customise 4. Phonetic — one types words by sound using a normal English keyboard, no need to memorise a new key layout.

Worksheet 3 - Java Basics

1. Which are invalid identifiers and why: total_marks, 2ndName, \$amount, class, my name, _count?
2. Choose suitable data types for: roll number, percentage, grade, name, is_passed, population of India.
3. Evaluate (int a = 10, b = 4): a / b, a % b, a + b * 2, (a + b) * 2, a > b && b > 5, !(a == b).
4. Write the statement to display "Welcome" in a message box.
5. Write statements to read a number from txtNum and display its square in lblOut.

Answers: 1. 2ndName (starts with digit), class (keyword), my name (space) are invalid 2. int, double (or float), char, String, boolean, long 3. 2, 2, 18, 28, false, true 4. JOptionPane.showMessageDialog(null, "Welcome"); 5. int n = Integer.parseInt(txtNum.getText()); lblOut.setText("" + (n * n));

Worksheet 4 - Control Structures

1. Write an if-else-if ladder: temperature < 15 → "Cold", 15-30 → "Pleasant", > 30 → "Hot".
2. Write a switch statement that displays the month name for 1-3 and "Other" for others.
3. Write a for loop to print 10, 20, 30, ..., 100.
4. Write a while loop to print the multiples of 7 less than 50.
5. What is wrong: for (int i = 1; i > 0; i++) {} ?

Answers:

```
1. if (t < 15) s = "Cold";
   else if (t <= 30) s = "Pleasant";
   else s = "Hot";
2. switch (m) { case 1: s = "January"; break; case 2: s = "February"; break;
               case 3: s = "March"; break; default: s = "Other"; }
3. for (int i = 10; i <= 100; i += 10) txtArea.append(i + " ");
4. int i = 7; while (i < 50) { txtArea.append(i + " "); i += 7; }
5. Infinite loop: i always remains greater than 0 (until integer overflow).
```

Worksheet 5 - SQL

Table ORDERS(OrderId, Customer, Product, Qty, Price, OrderDate, City).

1. Write the CREATE TABLE command (OrderId primary key).
2. Insert one order.
3. Show orders from Bhubaneswar for quantity more than 5.
4. Show the total amount (Qty × Price) of each order as "Amount".

5. Show customers whose names start with 'R' and have at least 4 letters.
6. Show orders placed in March 2026.
7. Show different products ordered.
8. Show orders where price is not known.

```
1. CREATE TABLE orders (OrderId INT PRIMARY KEY, Customer VARCHAR(25), Product
   VARCHAR(20),
      Qty INT, Price DECIMAL(8,2), OrderDate DATE, City VARCHAR(15));
2. INSERT INTO orders VALUES (1, 'Rakesh', 'Pen Drive', 2, 450, '2026-03-05',
   'Bhubaneswar');
3. SELECT * FROM orders WHERE City = 'Bhubaneswar' AND Qty > 5;
4. SELECT OrderId, Qty * Price AS Amount FROM orders;
5. SELECT Customer FROM orders WHERE Customer LIKE 'R___%';
6. SELECT * FROM orders WHERE OrderDate BETWEEN '2026-03-01' AND '2026-03-31';
7. SELECT DISTINCT Product FROM orders;
8. SELECT * FROM orders WHERE Price IS NULL;
```

Worksheet 6 – IT Applications

1. Name the e-governance services you can use for: (i) applying for a passport (ii) filing income tax (iii) storing your Class 10 marksheet digitally (iv) getting a residence certificate in Odisha.
2. Write any three precautions while using e-governance websites.
3. List three e-learning resources you can use to prepare for CHSE exams.

Answers: 1. passportindia.gov.in; incometax.gov.in; DigiLocker; e-District Odisha 2. Use only official .gov.in websites; never share OTP/password; log out after use, especially on shared computers; check for HTTPS (lock symbol) 3. DIKSHA, SWAYAM, ePathshala (also YouTube channels of reputed teachers).

FINAL MOCK TEST & CASE STUDIES

Information Technology · +2 1st Year

Final Mock Test (Full Syllabus) - Theory 70

Group A - 1 mark each (12)

1. Which register holds the address of the next instruction?
2. Name the memory that holds data only while power is on.
3. Which device is used to input a signature or drawing on a tablet?
4. Expand HDMI.
5. What type of software is a reservation system?
6. Name the Linux-based OS used on most phones.
7. What is the output of "Info".length() + 2?
8. Which statement terminates a loop immediately?
9. What will be the value of $2 + 3 * 4$ in Java?
10. Name the SQL keyword used with WHERE to check a missing value.
11. Which data type is suitable for storing a date of birth?
12. Name an Odisha government portal for certificates.

Answers: 1. Program counter 2. RAM 3. Graphic tablet / stylus 4. High-Definition Multimedia Interface 5. Specific-purpose application software 6. Android 7. 6 8. break 9. 14 10. IS NULL 11. DATE 12. e-District Odisha.

Group B - 2 marks each (8)

1. Distinguish between primary and secondary memory.
2. Why do we need language processors?
3. What are open standards? Give two examples.
4. What is the difference between isSelected() and setSelected()?
5. Write the output: `int x = 2; for (int i = 1; i <= 3; i++) x = x * i;` (value of x)

6. Give two differences between a table and a database.
7. Write a query to show names of students with marks above 80 in Science stream.
8. Give two features of an e-learning website.

Answers: 13. Primary: direct CPU access, fast, small, (RAM) volatile. Secondary: indirect, slow, large, permanent. 14. Computers understand only machine code; programs in other languages must be translated. 15. Public specifications free for anyone to use; HTML, XML, Unicode. 16. isSelected() checks whether the control is selected (returns true/false); setSelected(true/false) selects or deselects it. 17. $2 \times 1 \times 2 \times 3 = 12$. 18. A database is a collection of related tables and other objects; a table is a single relation of rows and columns within it. 19. SELECT Name FROM student WHERE Stream = 'Science' AND Marks > 80; 20. Video lectures, quizzes/assignments, discussion forums, certificates, anytime access.

Group C – 4 marks each (8)

1. Explain the communication bus and its types with a diagram.
2. Explain the major functions of an OS.
3. Explain Indian language computing.
4. Explain the Swing controls: JTextField, JTextArea, JRadioButton, JCheckBox, JComboBox, JList with one method each.
5. Write a program to calculate and display the sum of the series $1 + 2 + 4 + 8 + \dots$ up to n terms.
6. Explain keys in a relational database with an example.
7. Write SQL to create a table PRODUCT(PCode, PName, Price, Stock), insert two rows, and show products with stock less than 10.
8. Discuss the benefits and challenges of e-governance.

Answer to 25:

```
int n = Integer.parseInt(txtN.getText());
long term = 1, sum = 0;
for (int i = 1; i <= n; i++) { sum += term; term *= 2; }
txtSum.setText("" + sum); // equals 2^n - 1
```

Answer to 27:

```
CREATE TABLE product (PCode INT PRIMARY KEY, PName VARCHAR(20), Price DECIMAL(8,2), Stock INT);
INSERT INTO product VALUES (1, 'Notebook', 45, 120);
INSERT INTO product VALUES (2, 'Calculator', 650, 6);
SELECT * FROM product WHERE Stock < 10;
```

Answers to the other questions are in the notes and long-answer section.

Case-Study Questions

Case 1. A small shop owner keeps stock records in a notebook. Items are often written twice, and he cannot quickly tell which items need reordering. Suggest an IT solution.

Use inventory management software (or a MySQL database with a simple Java front end). Create a table STOCK(ItemCode PRIMARY KEY, ItemName, Qty, ReorderLevel, Rate). The primary key prevents duplicate entries; a query `SELECT ItemName FROM stock WHERE Qty < ReorderLevel`; lists items to reorder. Benefits: no redundancy, quick search, accurate stock value and billing.

Case 2. A school wants students to submit scholarship forms online. What front-end controls and validations would you use?

Text fields for name, roll number, income, account number; radio buttons for gender; combo boxes for class and category; check box for declaration; Submit/Reset buttons. Validations: no empty fields, numeric income, valid account number length, declaration ticked, income below the scholarship limit. Store data in a back-end table with an application number as the primary key.

Case 3. Ravi's program to find the average of three numbers gives 26.66 for 20, 30, 30 instead of 26.67, and sometimes crashes when a field is left empty. Identify the errors and fix them.

Rounding: format the result with `String.format("%.2f", avg)`. Crash: run-time error because `Integer.parseInt("")` fails; check that fields are not empty (or use try-catch) before converting. If he used int division (`sum/3`) he would get 26 — a logical error; use `sum/3.0`.

Case 4. A village has no bank branch nearby. How can IT help villagers?

Common Service Centres and banking correspondents with biometric (Aadhaar-enabled) devices allow cash withdrawal, deposits and DBT payments; UPI and mobile banking enable digital payments; e-governance portals provide certificates and pensions without travel.

Extra Viva Questions (50)

Q	A
What is GIGO?	Garbage In, Garbage Out — wrong input gives wrong output.
What is an instruction set?	The set of basic operations a CPU can perform.
What is booting?	Loading the OS into memory when the computer starts.
Cold vs warm booting?	Starting from power-off vs restarting a running computer.
What is a file?	A named collection of related data stored on disk.
What is a folder?	A container to organise files.
What is multiprogramming?	Keeping several programs in memory so the CPU is always busy.
What is a GUI element called "icon"?	A small picture representing a program or file.
What is source code?	Program written in a high-level language.
What is machine language?	Instructions in binary (0s and 1s).
What is a pixel?	Smallest dot on a display screen.
What is resolution?	Number of pixels displayed (e.g. 1920 × 1080).
What is dpi?	Dots per inch — printer/scanner resolution.
What is ppm?	Pages per minute — printer speed.
What is a computer virus?	A harmful program that spreads and damages data.
What is firmware?	Software permanently stored in ROM.
What is a licence?	Legal permission to use software.
What is source code licence GPL?	GNU General Public License — a free software licence.
Who founded the Free Software Foundation?	Richard Stallman.
Who created Linux?	Linus Torvalds.
Who created Java?	James Gosling (Sun Microsystems).
What is a class in Java?	A blueprint for objects containing data and methods.
What is an object?	An instance of a class.
What is the use of the "new" keyword?	To create an object.
What is a String literal?	Text inside double quotes, e.g. "Hello".
What is a char literal?	A single character inside single quotes, e.g. 'A'.
What is type casting?	Converting one data type to another, e.g. (int) 3.7 = 3.
What is concatenation?	Joining strings with + or concat().
What is an infinite loop?	A loop whose condition never becomes false.
What is a nested loop?	A loop inside another loop.
What is a flowchart?	

	A diagram showing the steps of an algorithm using symbols.
What is pseudocode?	Algorithm written in simple English-like statements.
What is a database schema?	The structure/design of a database.
What is a record?	A row of a table.
What is a composite key?	A primary key made of two or more columns.
What is data integrity?	Accuracy and consistency of data.
What is a query language?	A language to retrieve and manipulate data (SQL).
Is SQL case-sensitive?	Keywords are not; data comparisons may depend on settings.
What does SHOW DATABASES do?	Lists all databases on the server.
Can we insert values for only some columns?	Yes, by listing the column names in INSERT.
What is the default value of an unspecified column?	NULL (unless a default is defined).
What is a portal?	A website giving access to many services.
What is m-governance?	Government services through mobile phones (e.g. UMANG app).
What is a MOOC?	Massive Open Online Course.
What is a virtual classroom?	Online live class with video, chat and shared screen.
What is CSC?	Common Service Centre — village-level e-service point.
What is DBT?	Direct Benefit Transfer — subsidies sent directly to bank accounts.
What is a URL?	Address of a web page.
What is HTTPS?	Secure version of HTTP that encrypts data.
What is a password?	Secret word used to verify a user's identity.

PRACTICE & REVISION

Information Technology · +2 1st Year (Class XI)

Information Technology – Quick Revision

Abbreviation	Full form	Abbreviation	Full form
CPU	Central Processing Unit	ALU	Arithmetic Logic Unit
RAM	Random Access Memory	ROM	Read Only Memory
EPROM	Erasable Programmable ROM	EEPROM	Electrically Erasable PROM
OCR	Optical Character Recognition	OMR	Optical Mark Reader
BCR	Bar Code Reader	MICR	Magnetic Ink Character Recognition
VDU	Visual Display Unit	LCD / LED	Liquid Crystal / Light Emitting Diode Display
DMP	Dot Matrix Printer	FOSS	Free and Open Source Software
IDE	Integrated Development Environment	RAD	Rapid Application Development
DBMS	Database Management System	SQL	Structured Query Language
DDL / DML	Data Definition / Manipulation Language	HRMS	Human Resource Management System
HTML	HyperText Markup Language	XML	eXtensible Markup Language
ASCII	American Standard Code for Information Interchange	ISCII	Indian Script Code for Information Interchange

Predict the output: `String s = "Bhubaneswar"; s.substring(0, 4).toUpperCase()`
 "BHUB"

Predict the output: `int a = 17, b = 5; a / b` and `a % b`
 3 and 2.

Write a query to display all records of students whose marks are not between 400 and 450.

```
SELECT * FROM student WHERE Marks NOT BETWEEN 400 AND 450;
```

IT – Extra Practical Programs and Queries

P11. Convert temperature from Celsius to Fahrenheit ($F = 9C/5 + 32$).

```
double c = Double.parseDouble(txtC.getText());
double f = 9 * c / 5 + 32;
txtF.setText("" + f);
```

P12. Calculate electricity bill: first 100 units Rs 3/unit, next 100 units Rs 5/unit, above 200 units Rs 7/unit.

```
int u = Integer.parseInt(txtUnits.getText());
double bill;
if (u <= 100) bill = u * 3;
else if (u <= 200) bill = 100 * 3 + (u - 100) * 5;
else bill = 100 * 3 + 100 * 5 + (u - 200) * 7;
txtBill.setText("Rs " + bill);
```

Test: 250 units $\rightarrow 300 + 500 + 350 = \text{Rs } 1150$.

P13. Check whether a year is a leap year.

```
int y = Integer.parseInt(txtYear.getText());
if ((y % 4 == 0 && y % 100 != 0) || y % 400 == 0)
    lblOut.setText("Leap year");
else
    lblOut.setText("Not a leap year");
```

P14. Print the Fibonacci series up to n terms in a text area.

```
int n = Integer.parseInt(txtN.getText());
int a = 0, b = 1;
txtArea.setText("");
for (int i = 1; i <= n; i++) {
    txtArea.append(a + " ");
    int c = a + b;
    a = b;
    b = c;
}
```

$n = 7 \rightarrow 0 \ 1 \ 1 \ 2 \ 3 \ 5 \ 8$

P15. Check whether a number is a palindrome (e.g. 121).

```
int n = Integer.parseInt(txtN.getText());
int orig = n, rev = 0;
while (n > 0) { rev = rev * 10 + n % 10; n = n / 10; }
lblOut.setText(rev == orig ? "Palindrome" : "Not palindrome");
```

P16. Display day name using switch with a combo box index.

```
int d = cmbDay.getSelectedIndex(); // 0 to 6
String name;
switch (d) {
    case 0: name = "Sunday"; break;
    case 1: name = "Monday"; break;
    case 2: name = "Tuesday"; break;
    case 3: name = "Wednesday"; break;
    case 4: name = "Thursday"; break;
    case 5: name = "Friday"; break;
    default: name = "Saturday";
}
lblDay.setText(name);
```

P17. Count the vowels in a word typed in a text field.

```
String s = txtWord.getText().toLowerCase();
int count = 0;
for (int i = 0; i < s.length(); i++) {
    char ch = s.charAt(i);
    if (ch=='a' || ch=='e' || ch=='i' || ch=='o' || ch=='u') count++;
}
lblOut.setText("Vowels: " + count);
```

P18. Calculate compound interest using Math.pow ($A = P(1 + R/100)^T$).

```
double p = Double.parseDouble(txtP.getText());
double r = Double.parseDouble(txtR.getText());
double t = Double.parseDouble(txtT.getText());
double amt = p * Math.pow(1 + r / 100, t);
txtCI.setText("" + Math.round(amt - p));
```

Output-based questions

1. `int i = 1, s = 0; while (i <= 5) { s += i; i += 2; }` What is s?

i = 1, 3, 5 → s = 9.

2. `for (int k = 5; k >= 1; k--) txtArea.append(k + " ");`

5 4 3 2 1

3. `int x = 5; do { x = x + 5; } while (x < 5);` Final value of x?

10 (do-while runs once even though the condition is false).

4. `"Information".length()` and `" IT ".trim().length()`?

11 and 2.

5. `Math.pow(3, 2) + Math.round(2.5)?`

$9.0 + 3 = 12.0$

SQL practice on table EMPLOYEE

EmpId	Name	Dept	Salary	City
E1	Ramesh	Sales	32000	Cuttack
E2	Sunita	HR	41000	Bhubaneswar
E3	Manoj	Sales	28000	Puri
E4	Rekha	IT	55000	Bhubaneswar
E5	Amit	IT	NULL	Sambalpur

a) Names of employees in Bhubaneswar.

```
SELECT Name FROM employee WHERE City = 'Bhubaneswar'; -- Sunita, Rekha
```

b) Name and annual salary with heading "Annual".

```
SELECT Name, Salary * 12 AS Annual FROM employee;
```

c) Employees whose salary is not known.

```
SELECT * FROM employee WHERE Salary IS NULL; -- Amit
```

d) Employees of Sales or IT earning above 30000.

```
SELECT Name FROM employee WHERE Dept IN ('Sales','IT') AND Salary > 30000; -- Ramesh, Rekha
```

e) Names ending with 'a'.

```
SELECT Name FROM employee WHERE Name LIKE '%a'; -- Sunita, Rekha
```

f) Different departments.

```
SELECT DISTINCT Dept FROM employee; -- Sales, HR, IT
```

g) Employees with salary from 28000 to 41000.

```
SELECT Name FROM employee WHERE Salary BETWEEN 28000 AND 41000; -- Ramesh, Sunita, Manoj
```

h) Employees not living in Puri or Cuttack.

```
SELECT Name FROM employee WHERE City NOT IN ('Puri','Cuttack');
```

Viva-voce - quick answers

Question	Answer
What is a variable?	A named memory location whose value can change.
What is a keyword?	A reserved word with special meaning in Java (int, if, class).
What does getText() return?	The text of a control as a String.
Which control hides typed characters?	JPasswordField.
What is a NULL value?	An unknown / missing value; not zero or blank.
What is the degree of a table?	Number of columns.
Name a utility software.	Antivirus / disk defragmenter / WinZip.
What is bytecode?	Intermediate code produced by the Java compiler, run by the JVM.

Last-Minute Exam Tips

Information Technology

- SQL: end every query with a semicolon; put text and dates in single quotes ('Science', '2026-10-04').
- Use IS NULL, not = NULL; remember BETWEEN includes both end values.
- In Java, always convert text to numbers with Integer.parseInt()/Double.parseDouble() before calculating.
- Write full forms of abbreviations (OCR, OMR, MICR, EEPROM, FOSS) correctly.

THE NIGHT BEFORE THE EXAM

Revise only formula boxes, name reactions, grammar rules and your own mistake list. Sleep well — a fresh mind solves problems faster than a tired one. Carry admit card, two pens, pencil, scale, eraser and a geometry box. Good luck!