



CLASS 12 · CBSE COMPUTER SCIENCE (083)

Computer Science Solved Board Papers

Chapter-wise and year-wise CBSE board questions with complete answers

2024-2026

- ✓ Part A: every question sorted chapter-wise, grouped by marks, with full answers
- ✓ Part B: complete board papers, each followed by its answers
- ✓ Board weightage table and most-asked topics for every chapter
- ✓ Every program written out in full; every output traced line by line
- ✓ SQL queries with result tables; network case studies solved

WHAT YOU GET

CBSE Computer Science papers 2024–2026. Every question answered. Sorted chapter-wise.

3

board papers

116

solved questions

3

years · 2024–26

14

chapters

62

MCQs solved

X Questions scattered across years



✓ All in one place, chapter-wise

X Don't know what to study first



✓ Weightage + most-asked topics

X Output questions trap you



✓ Every output traced step by step

X Programs lose easy marks



✓ Full programs the board way

PART A**Chapter-wise****A**

- ✓ Weightage table
- ✓ Most-asked topics
- ✓ Every question + solution

PART B**Full papers****B**

- ✓ Exactly as set by CBSE
- ✓ Solutions after each paper
- ✓ Timed 3-hour practice

2026 · 91

2025 · 91

2024 · 91


Complete Notes · Solved PYQs

CLASS 6–12 · ALL SUBJECTS

100%
 QUESTIONS
 SOLVED
Made for **board toppers**

How to use this book

Part A puts every board question of a chapter together, from 1-mark MCQs to 5-mark programs. Finish a chapter, then answer its Part A questions without looking at the answers. Check, mark the ones you got wrong, and repeat them a week later.

Each question shows where it was asked, for example **CBSE 2026 · 91 · Q36**. Use the weightage table and the most-asked topics chart at the start of each chapter to decide what to revise first.

Part B gives full papers. In the last month before the exam, sit with a clock and write one paper in 3 hours, then check it with the answers that follow the paper.

Programs follow the board's marking points: correct function header, file opening mode, loop, condition and output. Trace every output question line by line before you choose an option.

Contents

Part A · Chapter-wise questions with solutions

- | | |
|-------------------------------|---|
| 1. Python Revision Tour 31 Qs | 8. Computer Networks I: Evolution and Data Communication 3 Qs |
| 2. Functions 16 Qs | 9. Computer Networks II: Devices, Topologies and Types 7 Qs |
| 3. Exception Handling 3 Qs | 10. Network Protocols and Web Services 7 Qs |
| 4. Text Files 6 Qs | 11. Database Concepts 4 Qs |
| 5. Binary Files 6 Qs | 12. SQL: DDL, DML and Queries 12 Qs |
| 6. CSV Files 4 Qs | 13. SQL: Aggregates, Grouping and Joins 11 Qs |
| 7. Stack 3 Qs | 14. Interface of Python with MySQL 3 Qs |

Part B · Full board papers, each followed by its solutions

- | | |
|-----------------------------|-----------------------------|
| 1. CBSE 2026 · 91 solutions | 2. CBSE 2025 · 91 solutions |
| | 3. CBSE 2024 · 91 solutions |

116 questions in all. Questions are taken from the CBSE Class 12 Computer Science (083) board papers (Q.P. code 91) and the answers are our own, checked against the official marking schemes; every program output was verified by running the code. Long question stems are condensed in places; code, data, table values and options are as printed in the paper.

CHAPTER 1

Python Revision Tour

Board weightage 2024–2026

Year	2024	2025	2026
Questions	9	11	11
Marks	13	13	13

Most asked topics

Tokens, operators and expressions		8
Strings		8
Python revision		6
Lists		4
Dictionaries		3
Tuples		1
Flow of control		1

31 questions from 3 papers. Repeated questions are shown once with every year they were asked.

1 mark: MCQ and Assertion–Reason

CBSE 2026 · 91 · Q1

1 mark

State True or False: In Python, data type of 74 is same as the data type of 74.0.

Solution

False. `type(74)` is `int`; `type(74.0)` is `float`.

CBSE 2026 · 91 · Q2

1 mark

`s = "the Truth"; print(s.capitalize())` (A) The truth (B) THE TRUTH (C) The Truth (D) the Truth

Solution

(A) The truth. `capitalize()` makes the first character upper case and **all others lower case**.

CBSE 2026 · 91 · Q3

1 mark

Which expression evaluates to True? (A) `2>3` and `2<3` (B) `3>1` and `2` (C) `3>1` and `3>2` (D) `3>1` and `3<2`

Solution

(C). `True` and `True` → `True`. (A) and (D) give `False`; (B) gives `2` (and returns its last operand), which is `truthy` but not the value `True`, so the scheme also accepted (B).

CBSE 2026 · 91 · Q4

1 mark

```
s='War and Peace by Leo Tolstoy'; print(s.partition("by"))
```

Solution

(A) ('War and Peace ', 'by', ' Leo Tolstoy'). partition() returns a **tuple** of three parts: before the separator, the separator, after it (spaces kept).

CBSE 2026 · 91 · Q5

1 mark

What will be the output of `print("PythonProgram"[-1:2:-2])` ?

Solution

Step -2 from index -1 (= 12, 'm') down to index 3 (excluded): indices 12, 10, 8, 6, 4 → 'm','r','o','P','o'.
Output: **mroPo**.

CBSE 2026 · 91 · Q6

1 mark

```
t = tuple('tuple'); t2 = t[2],; t += t2; print(t)
```

Solution

(C) ('t', 'u', 'p', 'l', 'e', 'p'). tuple('tuple') splits the string into characters; `t[2],` is the one-element tuple ('p,'); += creates a new, longer tuple.

CBSE 2026 · 91 · Q7

1 mark

True about dictionaries: (A) a sequence type (B) cannot have two elements with same key (C) cannot have two elements with same value (D) key and value cannot be the same

Solution

(B). Keys are unique (assigning to an existing key overwrites it). Values may repeat; a dictionary is a mapping, not a sequence.

CBSE 2026 · 91 · Q8

1 mark

If L has 6 elements, which raises an exception? (A) `L.pop(1)` (B) `L.pop(6)` (C) `L.insert(1,6)` (D) `L.insert(6,1)`

Solution

(B) L.pop(6). Valid indices are 0–5, so `IndexError`. `insert()` never fails: an index beyond the end simply appends.

CBSE 2026 · 91 · Q20

1 mark

A–R. (A): `[1,2,3]+'123'` is invalid. (R): a list cannot be concatenated with a string.

Solution

(A) Both true; R is the correct explanation (`TypeError: can only concatenate list to list`).

CBSE 2025 · 91 · Q1

1 mark

State True or False: "A Python List must always contain all its elements of same data type."

Solution

False. A list can hold elements of different types, e.g. `[1, "a", 2.5, [3]]`.

CBSE 2025 · 91 · Q2

1 mark

What will be the output of `print(14%3**2*4)` ? (A) 16 (B) 64 (C) 20 (D) 256

Solution

(C) 20. `**` has the highest precedence: $3**2 = 9$. Then `%` and `*` from left to right: $14 \% 9 = 5$; $5 * 4 = 20$.

CBSE 2025 · 91 · Q3

1 mark

Identify the correct output: `game="Olympic2024"; print(game.index("C"))` (A) 0 (B) 6 (C) -1 (D) `ValueError`

Solution

(D) ValueError. There is a lowercase "c" at index 6 but no uppercase "C"; `index()` raises `ValueError` when the substring is absent (`find()` would return -1).

CBSE 2025 · 91 · Q4

1 mark

Which is the correct identifier? (A) global (B) Break (C) def (D) with

Solution

(B) Break. global, def and with are keywords. Python is case sensitive, so `Break` (capital B) is not the keyword `break`.

CBSE 2025 · 91 · Q5

1 mark

Identify the invalid statement: (A) `print("A",10,end="*")` (B) `print("A",sep="*",10)` (C) `print("A",10,sep="*")` (D) `print("A"*10)`

Solution

(B). A positional argument (10) cannot follow a keyword argument (`sep="*"`); this is a `SyntaxError`.

CBSE 2025 · 91 · Q6

1 mark

`L=['TIC','TAC']; print(L[::-1])` (A) `['CIT','CAT']` (B) `['TIC','TAC']` (C) `['CAT','CIT']` (D) `['TAC','TIC']`

Solution

(D) ['TAC', 'TIC']. `[::-1]` reverses the order of the **elements**; the strings themselves are not reversed.

CBSE 2025 · 91 · Q7

1 mark

Which operator evaluates to True if the variables on either side point to the same memory location? (A) is (B) is not (C) and (D) or

Solution

(A) is, the identity operator (compares object identity, i.e. `id()`).

CBSE 2025 · 91 · Q8

1 mark

```
D={'S01':95,'S02':96}
```

```
for I in D: print(I,end='#') (A) S01#S02# (B) 95#96# (C) S01,95#S02,96# (D) S01#95#S02#96#
```

Solution

(A) S01#S02#. Looping over a dictionary gives its **keys**.

CBSE 2025 · 91 · Q12

1 mark

Which built-in function/method returns a dictionary? (A) `dict()` (B) `keys()` (C) `values()` (D) `items()`

Solution

(A) dict(). `keys()`, `values()` and `items()` return view objects (`dict_keys`, `dict_values`, `dict_items`), not dictionaries.

CBSE 2024 · 91 · Q3

1 mark

Output of `print(16*5/4*2/5-8)` : (a) -3.33 (b) 6.0 (c) 0.0 (d) -13.33

Solution

(c) 0.0. Left to right: $16*5 = 80$; $80/4 = 20.0$; $20.0*2 = 40.0$; $40.0/5 = 8.0$; $8.0 - 8 = 0.0$ (float, because `/` gives a float).

CBSE 2024 · 91 · Q7

1 mark

Identify the invalid statement: (a) `d = dict()` (b) `e = {}` (c) `f = []` (d) `g = dict{}`

Solution

(d) g = dict{}. `dict` is a function and must be called with round brackets; `dict{}` is a `SyntaxError`.

CBSE 2024 · 91 · Q8

1 mark

```
myStr = "MISSISSIPPI"; print(myStr[:4]+"#" + myStr[-5:]) (a) MISSI#SIPPI (b) MISS#SIPPI (c) MISS#IPPIS (d) MISSI#IPPIS
```

Solution

(b) MISS#SIPPI. `[:4]` = indices 0–3 = "MISS"; `[-5:]` = last five characters = "SIPPI".

CBSE 2024 · 91 · Q9

1 mark

Which statement will raise an error? (a) `print("A"*3)` (b) `print(5*3)` (c) `print("15" + 3)` (d) `print("15" + "13")`

Solution

(c). A str cannot be added to an int: `TypeError`. (a) gives AAA, (b) 15, (d) 1513.

CBSE 2024 · 91 · Q10

1 mark

`event="G20 Presidency@2023"; L=event.split(' '); print(L[::-2])` (a) 'G20' (b) ['Presidency@2023'] (c) ['G20'] (d) 'Presidency@2023'

Solution

(b) ['Presidency@2023']. `L = ['G20', 'Presidency@2023']`. `[::-2]` starts from the last element and moves two steps back, so only index 1 is taken; the result is a list.

CBSE 2024 · 91 · Q18

1 mark

A–R. (A): `"Hello".sort()` will give an error. (R): `sort()` does not exist as a method for strings.

Solution

(a) Both true and R explains A: strings are immutable and have no `sort()` method, so `AttributeError` is raised.

2 marks: very short answer

CBSE 2026 · 91 · Q23

2 marks

Write a statement (built-in functions/methods only): (i) to create a new list L1 with the elements of L in ascending order, without modifying L; (ii) to check whether the character ch is an alphabet or a number.

Solution

(i) `L1 = sorted(L)` (`sorted` returns a new list; `L.sort()` would change L). (ii) `ch.isalnum()` (or `ch.isalpha()` or `ch.isdigit()`).

CBSE 2026 · 91 · Q24

2 marks

Assuming D1 is a dictionary: (i)(a) Expression to check if key 'RNo' is present. OR (b) Check if any key in D1 has value 12. (ii)(a) A single built-in statement to add 'RNo':12 if 'RNo' is absent, but return its value if present. OR (b) Delete all elements of D1.

Solution

(i)(a) `'RNo' in D1` (b) `12 in D1.values()`
(ii)(a) `D1.setdefault('RNo', 12)` (b) `D1.clear()`

CBSE 2025 · 91 · Q23

2 marks

Write one example each of (i) Syntax Error (ii) Implicit type conversion.

Solution

- (i) `print(2 ; 5)` or `if x>5 print(x)` (missing colon): the program does not run.
 (ii) `x = 10; y = 20.5; print(x + y)` → 30.5: the int 10 is converted to float automatically.

CBSE 2025 · 91 · Q24

2 marks

- `D={"Suman":40, "Raj":55, "Raman":60}; D1={"Aditi":30, "Amit":90, "Raj":20}` (built-in functions only).
 (i)(a) Display the value for key "Raj" in D. OR (b) Display the length of D1.
 (ii)(a) Append all pairs of D to D1. OR (b) Delete the item with key "Amit" from D1.

Solution

- (i)(a) `print(D.get("Raj"))` or `print(D["Raj"])` → 55. (b) `print(len(D1))` → 3.
 (ii)(a) `D1.update(D)` : D1 becomes `{'Aditi': 30, 'Amit': 90, 'Raj': 55, 'Suman': 40, 'Raman': 60}` (Raj's value is overwritten). (b) `D1.pop("Amit")` or `del D1["Amit"]`.

CBSE 2024 · 91 · Q22

2 marks

Output: `LS=["HIMALAYA","NILGIRI","ALASKA","ALPS"]`; `D={}
for S in LS: if len(S)%4==0: D[S]=len(S)
for K in D: print(K,D[K],sep="#")`

Solution

Lengths: HIMALAYA 8, NILGIRI 7, ALASKA 6, ALPS 4. Only 8 and 4 are divisible by 4, so `D = {'HIMALAYA': 8, 'ALPS': 4}`.

```
HIMALAYA#8
ALPS#4
```

CBSE 2024 · 91 · Q23

2 marks

- (A) (i) Remove the item with key "NISHA" from dictionary Students. (ii) Display the number of occurrences of "is" in string message. OR (B) Convert tuple subject to a list and delete its last element.

Solution

- (A)(i) `Students.pop("NISHA")` or `del Students["NISHA"]`. (ii) `print(message.count("is"))` → 3 for "This is his book" (This, is, his).
 (B) `subject = list(subject)` then `subject.pop()` (or `del subject[-1]`).

3 marks: short answer

CBSE 2024 · 91 · Q26

3 marks

```
Output: S="Racecar Car Radar"; L=S.split()
for W in L: x=W.upper()
    if x==x[::-1]: for I in x: print(I,end="*")
    else: for I in W: print(I,end="#")
print()
```

Solution

"RACECAR" is a palindrome → printed in upper case with *. "CAR" is not → original "Car" with #.
"RADAR" is a palindrome → *.

```
R*A*C*E*C*A*R*
C#a#r#
R*A*D*A*R*
```

CBSE BOARD PAPER

2026 · Q.P. Code 91

Time: 3 hours

Maximum marks: 70

Section A: 1 mark each

1. State True or False: In Python, data type of 74 is same as the data type of 74.0. 1
2. `s = "the Truth"; print(s.capitalize())` (A) The truth (B) THE TRUTH (C) The Truth (D) the Truth 1
3. Which expression evaluates to True? (A) $2 > 3$ and $2 < 3$ (B) $3 > 1$ and 2 (C) $3 > 1$ and $3 > 2$ (D) $3 > 1$ and $3 < 2$ 1
4. `s = 'War and Peace by Leo Tolstoy'; print(s.partition("by"))` 1
5. What will be the output of `print("PythonProgram"[-1:2:-2])` ? 1
6. `t = tuple('tuple'); t2 = t[2],; t += t2; print(t)` 1
7. True about dictionaries: (A) a sequence type (B) cannot have two elements with same key (C) cannot have two elements with same value (D) key and value cannot be the same 1
8. If L has 6 elements, which raises an exception? (A) `L.pop(1)` (B) `L.pop(6)` (C) `L.insert(1,6)` (D) `L.insert(6,1)` 1
9. `def f1(a,b=1): / print(a+b,end=' - ') / c=f1(1,2) / print(c,sep='*')` (A) 3-2 (B) 3-2* (C) 3-None (D) 3*None- 1
10. `f1 = open("pqr.dat", "_____")` : correct mode to open in read only mode? (A) a (B) rb (C) r+ (D) rb+ 1
11. State True or False: In Python, logical errors can be handled using try...except...finally statement. 1
12. A table has two candidate keys, one of which is chosen as the primary key. How many alternate keys? (A) 0 (B) 1 (C) 2 (D) 3 1
13. Which SQL command can change the degree of an existing relation? (A) DROP TABLE (B) ALTER TABLE (C) UPDATE...SET (D) DELETE 1
14. Output of `SELECT MACHINE_ID, MACHINE_NAME FROM INVENTORY WHERE QUANTITY <= 100;` (A) all columns, quantity > 100 (B) ID and name, quantity < 100 (C) all columns, quantity ≥ 100 (D) ID and name of machines with quantity less than or equal to 100 1
15. A relation has 2 tuples and 3 attributes. If 2 attributes are deleted and 4 tuples are added, what is the cardinality? (A) 4 (B) 5 (C) 6 (D) 7 1
16. Which aggregate function returns the smallest value from a column? (A) MIN() (B) MAX() (C) SMALL() (D) LOWER() 1

17. Correct expanded form of RJ 45? (A) Radio Jockey 45 (B) Registered Jockey 45 (C) Radio Jack 45 (D) Registered Jack 45 1
18. Which device serves as the entry and exit point of a network, as all data coming in or going out must first pass through it? (A) Modem (B) Gateway (C) Switch (D) Repeater 1
19. Expand the term XML. 1
20. A–R. (A): `[1,2,3]+'123'` is invalid. (R): a list cannot be concatenated with a string. 1
21. A–R. (A): The PRIMARY KEY constraint ensures each value in the column(s) is unique and cannot be NULL. (R): Candidate keys are not eligible to become a primary key. 1

Section B: 2 marks each

22. Difference between default parameters and positional parameters; give a header that uses both. 2
23. Write a statement (built-in functions/methods only): (i) to create a new list L1 with the elements of L in ascending order, without modifying L; (ii) to check whether the character ch is an alphabet or a number. 2
24. Assuming D1 is a dictionary: (i)(a) Expression to check if key 'RNo' is present. OR (b) Check if any key in D1 has value 12. (ii)(a) A single built-in statement to add 'RNo':12 if 'RNo' is absent, but return its value if present. OR (b) Delete all elements of D1. 2
25. Which output(s) will NOT be displayed? How many times does the loop run? `a=[1,2,3,4,5,6]` / `for i in range(4):` / `j=random.randrange(i,5)` / `print(a[j],end=' -')` (A) 3-4-5-4- (B) 2-2-4-5- (C) 4-3-3-5- (D) 5-1-2-4- 2
26. Rewrite after removing errors (count vowels): `def CountVowels(s):` / `c=0` / `for ch in range(s):` / `if 'aeiouAEIOU' in ch:` / `c+=1` / `return(ch)` 2
27. Table W_STOCK: W_Code CHAR(5), W_Description VARCHAR(20), B_Qty INTEGER, U_Price FLOAT. (i)(a) Create the table with W_Code as primary key. OR (b) Can U_Price be the primary key? Justify. (ii)(a) Add attribute E_Date (DATE). OR (b) Remove column B_Qty. 2
28. (A) List one advantage and one disadvantage of Bus topology. 2
- OR**
- (B) What is protocol in the context of computer networks? Which protocol is used to transmit hypertext across the web? 2

Section C: 3 marks each

29. (a) Write a function that counts and returns the number of digits in "Space.txt" (sample returns 11). OR (b) Display the words in which lowercase 'e' appears at least twice in 'Space.txt'. 3

30. (a) FruitStack holds dictionaries {'Name', 'Origin', 'Price', 'Expiry'}. Write (i) push_fruit(FruitStack, Fruit): push if Price < 100; (ii) pop_fruit(FruitStack): pop and return, or display "UNDERFLOW"; (iii) display(FruitStack): from the top, or 'EMPTY STACK'.
OR (b) **OR**: accept 10 integers; push three-digit even ones; then pop all and display. Input 12, 31, 320, 457, 6, 92, 924, 220, 1, 218 → output 218 220 924 320.
31. (a) Output: `def Exam2026(given):
 new=[]
 for ch in given[1:-1]:
 if ch.isupper():
 new.reverse()
 elif ch not in new:
 new.append(ch)
 elif ch in new:
 new.pop()
 print(new)
Exam2026("Gold-24Medals")`
OR (b) **OR**: `def Exam2026(given):
 new=0
 while given:
 if new%2:
 new+=given%10
 else:
 new+=given%5
 print(new,end=' ')
 given//=10
Exam2026(123456)`

Section D: 4 marks each

32. Table STOCK (13.1). (a) Write queries: (i) Type and maximum Price for each Type; (ii) increase Price by 0.5 where Type is 'F'; (iii) total value of stock (total of Qty × Price); (iv) details of records where Code starts with 'A'.
OR (b) **OR**, outputs: (i) `SELECT Volume, Qty, Price FROM STOCK WHERE Type IN ('F','D');` (ii) `SELECT Code, Qty FROM STOCK WHERE Price BETWEEN 30 AND 50;` (iii) `SELECT DISTINCT Type FROM STOCK;` (iv) `SELECT Volume, count(*) FROM STOCK GROUP BY Volume;`
33. "States.csv" (with a header row) has [State, Capital, Population, Language], e.g. ['Andhra Pradesh','Amaravati',52221000,'Telugu']. Write a program that appends all records with population more than 10000000 to 'More.csv' (do not copy the header).
34. CUSTOMERS and LOANS (13.4). Write queries for: (i) number of LOANS records with RoI above 7.0; (ii) names of customers whose L_Amt is above 1000000; (iii) C_ID, C_Name and Terms of records with L_Date after 31 December 2024; (iv)(a) details of all loans in descending order of RoI, **OR** (b) C_ID and average term for each C_ID from LOANS.
35. Table Account in MySQL database SCHOOL: Stud_id int, Sname, Class, Fees float. Display records of students whose fees is less than 5000. Username admin, password root, host localhost.

Section E: 5 marks each

36. RESOURCES.DAT stores tuples (R_ID, R_Name, R_Expertise, Charges), e.g. (12,'P. Velusami','Machine Learning',5000). Write (i) Append() to input a resource person's data and write it; (ii) Update() to increase the Charges of each person by 500. (2+3)
37. Sanjeevani group (Head Office Hyderabad) sets up a University in Amritsar with blocks ADMIN (25 computers), ACADEMIC (600), HOSTEL (120), SPORTS (50). Distances: ADMIN–ACADEMIC 60 m, ADMIN–HOSTEL 160 m, ADMIN–SPORTS 80 m, ACADEMIC–HOSTEL 40 m, ACADEMIC–SPORTS 120 m, HOSTEL–SPORTS 150 m; Hyderabad–Amritsar 2000 km. (i) Server location with justification. (ii) Cable layout. (iii) Two wired media for computers inside a block. (iv) Medium used by an FM channel: (A) Radio (B) Micro (C) Infrared waves. (v)(a) Full name of the protocol for online audio-visual sessions, **OR** (b) where to install a repeater, with justification.

Solutions · CBSE 2026 · 91

- Q1** **False.** `type(74)` is `int`; `type(74.0)` is `float`.
-
- Q2** **(A) The truth.** `capitalize()` makes the first character upper case and **all others lower case**.
-
- Q3** **(C).** `True and True` → `True`. (A) and (D) give `False`; (B) gives 2 (and returns its last operand), which is truthy but not the value `True`, so the scheme also accepted (B).
-
- Q4** **(A) ('War and Peace ', 'by', ' Leo Tolstoy').** `partition()` returns a **tuple** of three parts: before the separator, the separator, after it (spaces kept).
-
- Q5** Step -2 from index -1 (= 12, 'm') down to index 3 (excluded): indices 12, 10, 8, 6, 4 → 'm','r','o','P','o'. Output: **mroPo**.
-
- Q6** **(C) ('t', 'u', 'p', 'l', 'e', 'p').** `tuple('tuple')` splits the string into characters; `t[2]`, is the one-element tuple ('p,'); `+=` creates a new, longer tuple.
-
- Q7** **(B).** Keys are unique (assigning to an existing key overwrites it). Values may repeat; a dictionary is a mapping, not a sequence.
-
- Q8** **(B) L.pop(6).** Valid indices are 0–5, so `IndexError`. `insert()` never fails: an index beyond the end simply appends.
-
- Q9** **(C) 3-None.** `f1` prints `1+2 = 3` followed by `'.'`. `f1` has no return, so `c = None`; printing a single value ignores `sep`.
-
- Q10** **(B) rb.** `.dat` is a binary file; read-only binary mode is `rb` (`r+` and `rb+` also allow writing).
-
- Q11** **False.** A logical error produces a wrong result without raising any exception, so there is nothing for except to catch; only run-time errors (exceptions) can be handled.
-
- Q12** **(B) 1.** Alternate keys = candidate keys – primary key = $2 - 1 = 1$.
-
- Q13** **(B) ALTER TABLE:** adding or dropping a column changes the number of attributes (degree).
-
- Q14** **(D).** Only the two named columns, and `<=` includes 100.
-
- Q15** **(C) 6.** Cardinality counts rows: $2 + 4 = 6$. Deleting attributes changes only the degree ($3 - 2 = 1$).
-
- Q16** **(A) MIN().**
-
- Q17** **(D) Registered Jack 45.**
-
- Q18** **(B) Gateway.**
-
- Q19** **eXtensible Markup Language.**
-

Q20 (A) Both true; R is the correct explanation (TypeError: can only concatenate list to list).

Q21 (C) A is true; R is false: the primary key is always chosen from the candidate keys.

Q22 Default parameters have a value in the header that is used if no argument is passed; positional parameters get their values from the arguments according to their position. In a header, default parameters come after positional ones: `def Q22(X, Y=10):` (X positional, Y default).

Q23 (i) `L1 = sorted(L)` (sorted returns a new list; `L.sort()` would change L). (ii) `ch.isalnum()` (or `ch.isalpha()` or `ch.isdigit()`).

Q24 (i)(a) `'RNo' in D1` (b) `12 in D1.values()`
(ii)(a) `D1.setdefault('RNo', 12)` (b) `D1.clear()`

Q25 j ranges: $i=0 \rightarrow 0-4$ (values 1–5); $i=1 \rightarrow 1-4$ (2–5); $i=2 \rightarrow 2-4$ (3–5); $i=3 \rightarrow 3-4$ (4–5). In (D) the second value 1 is impossible (minimum is 2). (A), (B), (C) fit. Answer: **(D) 5-1-2-4** will not be displayed; the loop runs **4** times.

Q26

```
def CountVowels(s):
    c = 0
    for ch in s:
        if ch in 'aeiouAEIOU':
            c += 1
    return c
```

not range(s)
operands swapped
+= not =+
return the count

`c+=1` is legal but sets `c` to `+1` each time (a logical error).

Q27

```
(i)(a) CREATE TABLE W_STOCK
      ( W_Code CHAR(5) PRIMARY KEY,
        W_Description VARCHAR(20),
        B_Qty INTEGER,
        U_Price FLOAT );
(ii)(a) ALTER TABLE W_STOCK ADD COLUMN E_Date DATE;
(ii)(b) ALTER TABLE W_STOCK DROP COLUMN B_Qty;
```

(i)(b) **No**: `U_Price` may contain duplicate (two items with the same price) and NULL values, so it cannot uniquely identify records.

Q28(A) Advantage: cost-effective as it needs the least cable (also easy to install/extend for small networks). Disadvantage: failure of the main backbone cable brings down the entire network (also: fault isolation is difficult; frequent collisions; slows down with heavy traffic).

Q28(B) A protocol is a set of rules that need to be followed by communicating devices in order to have successful and reliable data communication. Hypertext is transmitted using **HTTP (HyperText Transfer Protocol)**.

Q29

```
def CountDigits():
    with open("Space.txt", "r") as F:
        Data = F.read()
    C = 0
    for CH in Data:
        if CH.isdigit():
            C += 1
    return C
```

Digits in 1969, 400, 2030 $\rightarrow 4 + 3 + 4 = 11$.

```
def showWords():
    with open("Space.txt", "r") as F:
        for word in F.read().split():
            if word.count('e') >= 2:
                print(word, end=' ')
```

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Q30

```
def push_fruit(FruitStack, Fruit):
    if Fruit['Price'] < 100:
        FruitStack.append(Fruit)

def pop_fruit(FruitStack):
    if FruitStack == []:
        print('UNDERFLOW')
    else:
        return FruitStack.pop()

def display(FruitStack):
    if FruitStack == []:
        print('EMPTY STACK')
    else:
        for ele in FruitStack[::-1]:
            print(ele)
```

OR

```
Stack = []
for C in range(10):
    Num = int(input("Integer: "))
    if 100 <= Num <= 999 and Num % 2 == 0:
        Stack.append(Num)
while Stack:
    print(Stack.pop(), end=' ')
```

218 220 924 320

Q31

given[1:-1] = "old-24Medal". o $\rightarrow$ ['o']; l $\rightarrow$ ['o','l']; d $\rightarrow$ ['o','l','d']; - $\rightarrow$ [...,'-']; 2 $\rightarrow$ [...,'2']; 4 $\rightarrow$ ['o','l','d','-','2','4']; M (upper) $\rightarrow$ reverse $\rightarrow$ ['4','2','-','d','l','o']; e $\rightarrow$ append 'e'; d (present) $\rightarrow$ pop removes the last item 'e'; a $\rightarrow$ append 'a'; l (present) $\rightarrow$ pop removes 'a'.

['4', '2', '-', 'd', 'l', 'o']

OR given 123456: new 0 even $\rightarrow +6\%5=1 \rightarrow 1$. 12345: new odd $\rightarrow +5 \rightarrow 6$. 1234: even $\rightarrow +4\%5=4 \rightarrow 10$. 123: even $\rightarrow +3 \rightarrow 13$. 12: odd $\rightarrow +2 \rightarrow 15$. 1: odd $\rightarrow +1 \rightarrow 16$.

1-6-10-13-15-16-

Q32

- (i) SELECT Type, MAX(Price) FROM STOCK GROUP BY Type;
- (ii) UPDATE STOCK SET Price = Price + 0.5 WHERE Type = 'F';
- (iii) SELECT SUM(Qty * Price) FROM STOCK; -- 41665.00
- (iv) SELECT * FROM STOCK WHERE Code LIKE 'A%'; -- AF0.5, AT1.0

OR

- (i) 0.5 300 38.00
0.5 250 36.50
1.0 50 52.00
- (ii) AF0.5 300
MF0.5 250
PT0.5 78
- (iii) F
T
D
- (iv) 0.5 3
1.0 3

(ii) BETWEEN is inclusive, so PT0.5 at exactly 30.00 is included.

Q33

```
import csv
with open('States.csv') as F1:
    with open('More.csv', 'a', newline='') as F2:
        R = csv.reader(F1)
        W = csv.writer(F2)
        RECS = list(R)
        for rec in RECS[1:]:
            # skip the header row
            if int(rec[2]) > 10000000:
                W.writerow(rec)
```

For Andhra Pradesh (52221000), Goa (1458545) and Kerala (35699443), More.csv receives the Andhra Pradesh and Kerala rows. Mode 'w' was also accepted.

Q34

- (i) SELECT COUNT(*) FROM LOANS WHERE RoI > 7.0; -- 3
- (ii) SELECT C_Name FROM CUSTOMERS, LOANS
WHERE CUSTOMERS.C_ID = LOANS.C_ID AND L_Amt > 1000000; -- Abdul
- (iii) SELECT C.C_ID, C_Name, Terms FROM CUSTOMERS C, LOANS L
WHERE C.C_ID = L.C_ID AND L_Date > '2024-12-31';
- (iv)(a) SELECT * FROM LOANS ORDER BY RoI DESC;
- (iv)(b) SELECT C_ID, AVG(Terms) FROM LOANS GROUP BY C_ID;

(iii) gives 00003 David Xavier 60; 00001 Raj Malhotra 48; 00003 David Xavier 36; 00004 Damini Iyer 60. Write **C.C_ID** (not just C_ID) in a join, or MySQL reports an ambiguous column.

Q35

```
import mysql.connector as pm # or import pymysql as pm
DB = pm.connect(host='localhost', user='admin',
                password='root', database='SCHOOL')
CUR = DB.cursor()
SQL = "SELECT * FROM Account WHERE Fees < 5000"
CUR.execute(SQL)
Data = CUR.fetchall()
for D in Data:
    print(D)
DB.close()
```

(Looping directly over the cursor, for C in CUR: print(C) , also works.)

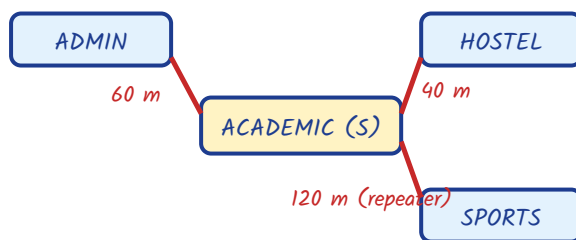
Q36 Assumption: each tuple dumped separately.

```
import pickle
def Append():
    F = open("RESOURCES.DAT", "ab")
    R_ID = int(input("Resource Person ID: "))
    R_Name = input("Resource Person Name: ")
    R_Expertise = input("Area of Expertise: ")
    Charges = int(input("Hourly Charges: "))
    pickle.dump((R_ID, R_Name, R_Expertise, Charges), F)
    F.close()

def Update():
    F = open("RESOURCES.DAT", "rb+")
    try:
        while True:
            Pos = F.tell()
            Rec = pickle.load(F)
            Newrec = list(Rec)          # tuples are immutable
            Newrec[3] += 500
            F.seek(Pos)
            pickle.dump(tuple(Newrec), F)
    except EOFError:
        F.close()
```

(12, 'P. Velusami', 'Machine Learning', 5000) becomes (... , 5500). A tuple cannot be changed, so it is converted to a list, modified and converted back. Reading everything with 'rb' and rewriting with 'wb' is also accepted.

Q37 (i) **ACADEMIC** block: maximum computers (600); it also needs the minimum cable to other blocks.
(ii) Star from **ACADEMIC**:



(Minimum-length alternative: ACADEMIC–HOSTEL 40, ACADEMIC–ADMIN 60, ADMIN–SPORTS 80 = 180 m.)

(iii) Any two: **twisted pair (Ethernet) cable, coaxial cable, optical fibre.**

(iv) **(A) Radio waves.**

(v)(a) **Voice over Internet Protocol (VoIP).** (b) **Between ACADEMIC and SPORTS**, because that cable run is 120 m, more than 100 m.



All the best for your boards!

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