COMPUTER SCIENCE

Code No. 083

SAMPLE QUESTION PAPER — SET 1 | CLASS XII

Time Allowed: 3 Hours **Maximum Marks: 70**

General Instructions:

1. This question paper contains 37 questions. All questions are compulsory.
2. However, internal choices have been provided in some questions. Attempt only one of the choices in such questions.
3. The paper is divided into 5 Sections: A, B, C, D and E.
4. Section A consists of 21 questions (1 to 21). Each question carries 1 mark.
5. Section B consists of 7 questions (22 to 28). Each question carries 2 marks.
6. Section C consists of 3 questions (29 to 31). Each question carries 3 marks.
7. Section D consists of 4 questions (32 to 35). Each question carries 4 marks.
8. Section E consists of 2 questions (36 to 37). Each question carries 5 marks.
9. All programming questions are to be answered using Python Language only.
10. In case of MCQs, the text of the correct answer should also be written.

SECTION A *Section A consists of 21 questions of 1 mark each.*		
1.	State True or False: Using the statistics module, statistics.mode([1, 2, 2, 3, 4]) will output 2.	1
2.	What will be the output of the following code? `L = ["Python", "Coding", "Rocks"]` `print(L[0][-1] + L[2][0])` (A) nR (B) NR (C) nr (D) Nr	1
3.	What will be the output of the following expression? `print(15 > 10 and 20 < 25 or not 5 > 2)` (A) True (B) False (C) Null (D) Error	1
4.	Which SQL clause is used to filter groups after aggregation (used with GROUP BY)?	1
5.	What will be the output of the following Python code? `str = "DATABASE"` `print(str[-2::-2])` (A) SBTD (B) ESAB (C) ABTS (D) Error	1
6.	Write the output of the following Python code: `for k in range(3, 20, 4):` `  print(k, end="&")`	1
7.	What will be the output of the following Python statement: `print(20 - 2**2*3 + 18/6)` (A) 11.0 (B) 10.0 (C) 9.0 (D) 8.0	1

8.	Consider the given SQL query: `SELECT dept, COUNT(*) FROM staff HAVING COUNT(*) > 3 GROUP BY dept;` Rohan is executing the query but not getting the correct output. Write the correction.	1
9.	What will be the output of the following Python code? `try:` `  x = 10 / 0` `except ZeroDivisionError:` `  print("Divide error")` `except Exception:` `  print("Other error")` (A) Divide error (B) Other error (C) ZeroDivisionError (D) Nothing is printed	1
10.	What will be the output of the following Python code? `d = {"city": "Pune", "pin": 411001}` `print(d.get("state", "Unknown"))` (A) Pune (B) 411001 (C) None (D) Unknown	1
11.	What possible output is expected on screen when the following code executes? `import random` `L = [5, 15, 25, 35]` `a = random.randint(1, 1)` `b = random.randint(1, 2)` `for i in range(a, b+1):` `  print(L[i], end="$")` (A) 15$25$ (B) 5$15$ (C) 25$35$ (D) 5$25$35$	1
12.	What will be the output of the following Python code? `x = 3` `print(x, end="::")` `def modify():` `  global x` `  x = x*4` `  print(x, end="!!")` `modify()` `print(x)` (A) 3::12!!12 (B) 3::3!!12 (C) 3::12!!3 (D) 12::12!!12	1
13.	Which SQL command can change the structure of an existing table? (A) SELECT (B) UPDATE (C) ALTER (D) INSERT	1
14.	What is the output of the following Python code? `st = "Programming Basics"` `print(st.split("a"))` (A) ['Progr', 'mming B', 'sics'] (B) ['Progr','a','mming B','a','sics'] (C) Error (D) ['Progr mming B sics']	1
15.	In SQL, a relation has 4 columns and 8 rows. If 1 column and 2 rows are removed, what is the updated cardinality?	1

	(A) Cardinality: 6 (B) Cardinality: 10 (C) Cardinality: 3 (D) Cardinality: 5	
16.	Which SQL command permanently removes a table's structure along with all its data? (A) DELETE (B) TRUNCATE (C) DROP (D) ALTER	1
17.	_____ is a protocol used to transfer files between computers over a network.	1
18.	Which of the following correctly describes the difference between a Hub and a Switch? (A) A switch sends data to all devices; a hub sends only to the intended device (B) A switch sends data only to the intended device; a hub broadcasts to all devices (C) A hub and a switch function identically (D) Both are wireless networking devices	1
19.	Which of the following is used to define the structure and layout of a webpage's content? (A) CSS (B) HTML (C) XML (D) HTTP	1
20.	Q20 and Q21 are Assertion (A) and Reason (R) based questions. Mark the correct choice as: (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true. Assertion (A): A tuple is an immutable data type in Python. Reason (R): Elements of a tuple cannot be changed after creation, but a new tuple can be created by concatenation.	1
21.	Assertion (A): A foreign key can contain duplicate values. Reason (R): A foreign key references the primary key of another (or the same) table and enforces referential integrity.	1

SECTION B *Section B consists of 7 questions of 2 marks each.*		
22.	A. Explain the difference between local scope and global scope of a variable in Python, with a suitable example. **OR** B. Explain the difference between the append() and extend() list methods in Python, with a suitable example.	2
23.	The code below is intended to double every element of a list and return the new list. It has syntax and logical errors. Rewrite it after removing all errors and underline each correction. `def double_list(nums)` `  if len(nums) = 0` `  return nums` `  new_list = []` `  for n in nums:` `  new_list.append(n*2)`	2

	`    return new_list` `result = double_list([1,2,3])` `Print("Doubled: " result)`	
24.	A. (Answer using Python built-in methods/functions only): I. Write a statement to find the index of the last occurrence of the substring "sun" in a string named quote. II. Write a statement to sort the elements of list L2 in ascending order, in place. **OR** B. Predict the output of the following Python code: `msg = "Learning Python is fun and useful"` `print(msg.partition("is"))` `print(msg.count("n"))`	2
25.	A. Write a function remove_duplicates(L) that accepts a list L and returns a new list with duplicate elements removed, preserving the original order. **OR** B. Write a function update_price(catalog, item, new_price) that accepts a dictionary catalog, an item name and a new price. If the item exists, update its price; otherwise print "Item not found".	2
26.	A. Write suitable SQL commands to: I. View the structure of table "Library". II. Create a database named "SCHOOLDB". **OR** B. Differentiate between the DELETE and TRUNCATE commands in SQL, with a suitable example.	2
27.	A. Define the following terms: I. Router II. Bridge **OR** B. I. Expand the following terms: SMTP and POP3. II. Differentiate between a web browser and a web server.	2
28.	A. Write SQL commands to: I. Add a new column "Email" of type varchar(50) to table "Customers". II. Remove the column "Fax" from table "Customers". **OR** B. Explain the purpose of the PRIMARY KEY and UNIQUE constraints in SQL, with an example each.	2

SECTION C

Section C consists of 3 questions of 3 marks each.

29.	A. Write a Python function that counts and displays the number of lines in a text file named "Data.txt" that start with the letter 'S' (irrespective of case). **OR** B. Write and call a Python function to read lines from a text file "NOTES.TXT" and display only those lines which contain more than 5 words.	3
30.	A list containing records of books is given as: `L = [("Atlas", 1200), ("Novel", 300), ("Diary", 45), ("Notebook", 90)]` Write user-defined functions to perform operations on a stack named Books to: I. push_item() — to push an item containing the book name and price, of books costing more than 60, into the stack. Output: [('Atlas', 1200), ('Novel', 300), ('Notebook', 90)] II. pop_item() — to pop the items from the stack and display them. Display "Empty Stack" when no elements remain.	3
31.	A. Predict the output of the following Python code: `s1 = "CS-2027"` `s2 = ""` `i = 0` `while i < len(s1):` `  if s1[i] >= '0' and s1[i] <= '9':` `  Num = int(s1[i])` `  Num += 1` `  s2 = s2 + str(Num)` `  elif s1[i] >= 'A' and s1[i] <= 'Z':` `  s2 = s2 + s1[i+1]` `  else:` `  s2 = s2 + '#'` `  i += 1` `print(s2)` **OR** B. Predict the output of the following Python code: `mountains = ["Everest", "Kilimanjaro", "Denali", "Elbrus", "Aconcagua", "Vinson", "Kosciuszko"]` `result = []` `for peak in mountains:` `  if peak[0] in 'AEIOU':` `  result.append(peak[-1].upper())` `print(result)`	3

SECTION D *Section D consists of 4 questions of 4 marks each.*		
32.	Consider the table INVENTORY as given below: `+--------+-------------+-------------+-----+-------+` `| item_id| item_name	category	qty	price |` `+--------+-------------+-------------+-----+-------+` `| I001	Notebook	Stationery	15	40 |` `| I002	Marker	Stationery	8	25 |`	4

	<pre>| I003 | Chair | Furniture | 5 | 1200 | | I004 | Table | Furniture | 3 | 3000 | | I005 | Pen | Stationery | 20 | 10 | | I006 | Desk Lamp | Electronics | 6 | 450 | | I007 | Notebook | Stationery | 10 | 45 | +--------+-------------+------------+-----+-------+</pre> A. Write the following queries: I. To display the total quantity for each category whose total quantity exceeds 10. II. To display the records of INVENTORY sorted by item_name in ascending order. III. To display the distinct category names from the INVENTORY table. IV. To display the records of items whose item_name ends with the letter 'r'. **OR** B. Predict the output of the following: <pre>I. SELECT * FROM INVENTORY WHERE category='Stationery'; II. SELECT item_id, item_name FROM INVENTORY WHERE item_name LIKE 'N%'; III. SELECT COUNT(*) FROM INVENTORY WHERE category IN ('Furniture','Electronics'); IV. SELECT AVG(price) FROM INVENTORY WHERE category='Stationery';</pre>	
33.	Meera runs a small library and keeps track of issued books in a CSV file named "Issued.csv", with columns: Book_ID, Book_Title, Member_Name, Issue_Date. Help her by writing the following user-defined functions: I. AddRecord() — to accept a book-issue record from the user and add it to the file "Issued.csv". II. CountRecords() — to count and return the total number of records present in the file "Issued.csv".	4
34.	Consider the two tables given below: **Table: Schools** <pre>+------+---------------+----------+--------+ | S_ID | School_Name | City | Rating | +------+---------------+----------+--------+ | 1 | GreenView | Pune | 4 | | 2 | SunriseAcademy | Mumbai | 5 | | 3 | Hillcrest | Nagpur | 4 | | 4 | Lakeside | Pune | 5 | | 5 | Riverside | Chennai | 4 | +------+---------------+----------+--------+</pre> **Table: Students** <pre>+-------+------+---------------+----------------+ | St_ID | S_ID | Student_Name | Admission_Date | +-------+------+---------------+----------------+ | 1 | 1 | Aarav | 2024-06-01 | | 2 | 2 | Diya | 2024-06-05 | | 3 | 3 | Kabir | 2024-06-02 | | 4 | 4 | Meher | 2024-06-10 | | 5 | 5 | Ishaan | 2024-06-03 | | 6 | 1 | Zara | 2024-06-08 | | 7 | 4 | Reyansh | 2024-06-11 | +-------+------+---------------+----------------+</pre> Write SQL queries to:	4

	I. Display the names of students admitted to any school in 'Pune'. II. Display the admission details of students admitted to schools in 'Mumbai', 'Chennai' or 'Nagpur'. III. Delete all admissions where Admission_Date is after 2024-06-08. IV. A. Display the Cartesian Product of the two tables. **OR** B. Display the student's name along with their school's name.	
35.	A MySQL database named CollegeDB has a faculty table with attributes: Faculty_ID (Integer), Faculty_Name (String), Department (String), Experience (Integer). Connectivity details — Username: college_admin, Password: acad@2026, Host: localhost. Write a Python program to update the Experience of the faculty member whose Faculty_ID is 305 to 12 years.	4

SECTION E *Section E consists of 2 questions of 5 marks each.*		
36.	Ms. Kavita, an HR manager, maintains employee records with fields: Emp_ID, Emp_Name, Department, Salary. Write Python functions to: I. Input employee data and append it to a binary file named "Employees.dat". [2] II. Display the details of all employees working in the "Sales" department. [3]	5
37.	BrightFuture Ltd. is setting up a new office campus in Pune, while its headquarters remains in Delhi. The Pune campus will have four blocks: Admin, Research, Production and Support. Distances between blocks: `Admin - Research: 40 m` `Admin - Production: 150 m` `Admin - Support: 85 m` `Research - Production: 55 m` `Research - Support: 65 m` `Production - Support: 45 m` Number of computers in each block: `Admin: 45  Research: 30  Production: 100  Support: 25` I. Suggest the best block to place the server, with reasoning. II. Suggest the placement of: a) Repeater b) Switch III. Suggest and describe a suitable cable layout connecting the blocks within the campus. IV. Which cable would be most suitable for a high-speed wired link to the Delhi headquarters? V. A. What is the purpose of a Gateway in a network? **OR** B. Which type of network (PAN, LAN, MAN or WAN) connects the Pune campus with the Delhi headquarters?	5

COMPUTER SCIENCE

Code No. 083 — Marking Scheme

MARKING SCHEME — SET 1 | CLASS XII

SECTION A		
1.	True. 2 occurs twice in the list (highest frequency), so it is the mode.	1
2.	L[0][-1] = 'n' (last character of "Python"); L[2][0] = 'R' (first character of "Rocks"). Output: nR. Answer: (A) nR	1
3.	15>10 is True, 20<25 is True, not 5>2 is False. True and True = True; True or False = True. Answer: (A) True	1
4.	The HAVING clause is used to filter groups after aggregation.	1
5.	"DATABASE" indices: D0 A1 T2 A3 B4 A5 S6 E7. str[-2::-2] starts at index 6 ('S') and steps back by 2: indices 6,4,2,0 -> S,B,T,D. Answer: (A) SBTD	1
6.	Output: 3&7&11&15&19&	1
7.	** has highest precedence: 2**2=4. Then 4*3=12 (left to right with *). 18/6=3.0. So 20-12+3.0 = 11.0. Answer: (A) 11.0	1
8.	GROUP BY must come before HAVING. Correct query: SELECT dept, COUNT(*) FROM staff GROUP BY dept HAVING COUNT(*) > 3;	1
9.	10/0 raises ZeroDivisionError, which is caught by the first matching except block. Answer: (A) Divide error	1
10.	"state" key is not present in the dictionary, so get() returns the default value. Answer: (D) Unknown	1
11.	a is always 1. b can be 1 or 2. If b=2, loop runs for i=1,2, printing L[1]=15 and L[2]=25 as "15$25$". Answer: (A) 15$25$ (one valid possible output)	1
12.	x=3 printed as "3::". Inside modify(), global x is updated to 3*4=12, printed as "12!!". After the call, x remains 12 (global), printed as "12". Output: 3::12!!12 Answer: (A)	1
13.	ALTER modifies the structure of an existing table. Answer: (C) ALTER	1
14.	Splitting "Programming Basics" on 'a' (which occurs twice) gives 3 parts: 'Progr', 'mming B', 'sics'. Answer: (A)	1
15.	Cardinality = number of rows. 8 rows - 2 removed = 6. Answer: (A) Cardinality: 6	1
16.	DROP removes both the table structure and its data permanently. Answer: (C) DROP	1
17.	FTP (File Transfer Protocol)	1

18.	A switch sends data only to the intended device (based on MAC address), while a hub broadcasts to all connected devices. Answer: (B)	1
19.	HTML defines the structure and layout of a webpage's content. Answer: (B) HTML	1
20.	Tuples are indeed immutable, and R correctly explains why (elements can't change, but a new tuple can be formed by concatenation). Answer: (a) Both A and R are true, and R is the correct explanation of A.	1
21.	A is true (foreign keys can repeat). R is also true (describes what a foreign key does) but does not directly explain why duplicates are allowed. Answer: (b) Both A and R true, R is not the correct explanation of A.	1

SECTION B		
22.	A. A local variable is defined inside a function and accessible only within it; a global variable is defined outside all functions and accessible throughout the program. Example: def f(): x = 5 # local x = 10 # global, unaffected by the local x inside f() [2] OR B. append() adds a single item to the end of a list, while extend() adds all items of an iterable individually. E.g. [1,2].append([3,4]) gives [1,2,[3,4]], but [1,2].extend([3,4]) gives [1,2,3,4]. [2]	2
23.	Corrected code (corrections underlined in the actual answer sheet): `def double_list(nums):` `  if len(nums) == 0:` `  return nums` `  new_list = []` `  for n in nums:` `  new_list.append(n*2)` `  return new_list` `result = double_list([1,2,3])` `print("Doubled:", result)` Corrections: colon after def line; '=' changed to '==' in if condition; colon after if; consistent indentation for the if-block and for-loop body; 'Print' changed to lowercase 'print'; comma (or +str conversion) used instead of invalid string+list concatenation. [2]	2
24.	A. I. quote.rfind("sun") II. L2.sort() [2] OR B. partition("is") splits into (before, sep, after): ('Learning Python ', 'is', ' fun and useful'). count("n"): 'Learning'(2) + 'Python'(1) + 'fun'(1) + 'and'(1) = 5. [2]	2
25.	A. def remove_duplicates(L): `def remove_duplicates(L):` `  result = []` `  for item in L:` `  if item not in result:` `  result.append(item)` `  return result` [2] OR	2

	B. `def update_price(catalog, item, new_price):` `    if item in catalog:` `        catalog[item] = new_price` `    else:` `        print("Item not found")` [2]	
26.	A. I. DESCRIBE Library; II. CREATE DATABASE SCHOOLDB; [2] OR B. DELETE removes rows matching a condition (or all rows) but keeps the table structure and can be rolled back within a transaction; TRUNCATE removes all rows at once, resets identity counters, and cannot be conditioned with WHERE. E.g. DELETE FROM Customers WHERE City='Pune'; vs TRUNCATE TABLE Customers; [2]	2
27.	A. I. Router: a device that forwards data packets between different networks, directing traffic based on IP addresses. II. Bridge: a device that connects and filters traffic between two segments of the same network, operating at the data link layer. [2] OR B. I. SMTP = Simple Mail Transfer Protocol; POP3 = Post Office Protocol version 3. II. A web browser is client software used to request and display web pages; a web server is software/hardware that stores and serves web pages on request. [2]	2
28.	A. I. ALTER TABLE Customers ADD Email varchar(50); II. ALTER TABLE Customers DROP COLUMN Fax; [2] OR B. PRIMARY KEY uniquely identifies each row and does not allow NULLs (only one per table); UNIQUE ensures all values in a column are distinct but allows one NULL and can apply to multiple columns. E.g. PRIMARY KEY(Roll_No); UNIQUE(Email). [2]	2

SECTION C		
29.	A. `def count_s_lines():` `    f = open("Data.txt", "r")` `    count = 0` `    for line in f:` `        if line.strip() != "" and line.strip()[0].upper() == 'S':` `            count += 1` `    print(count)` `    f.close()` [3] OR B. `def show_long_lines():` `    f = open("NOTES.TXT", "r")` `    for line in f:` `        if len(line.split()) > 5:` `            print(line)` `    f.close()`	3

	show_long_lines() [3]	
30.	I. `Books = []` `def push_item():` `  L = [("Atlas",1200),("Novel",300),("Diary",45),("Notebook",90)]` `  for item in L:` `  if item[1] > 60:` `  Books.append(item)` `  print(Books)` II. `def pop_item():` `  while Books:` `  print(Books.pop())` `  print("Empty Stack")` [1.5 + 1.5]	3
31.	A. Trace: i=0 'C' upper -> s2+=s1[1]='S'. i=1 'S' upper -> s2+=s1[2]='-'. i=2 '-' else -> s2+='#'. i=3 '2' digit -> Num=3 -> s2+='3'. i=4 '0' digit -> Num=1 -> s2+='1'. i=5 '2' digit -> Num=3 -> s2+='3'. i=6 '7' digit -> Num=8 -> s2+='8'. Output: S-#3138 [3] OR B. Peaks starting with a vowel: Everest(E)->last 't'->T; Elbrus(E)->last 's'->S; Aconcagua(A)->last 'a'->A. Others don't start with a vowel. Output: ['T', 'S', 'A'] [3]	3

SECTION D		
32.	A. I. `SELECT category, SUM(qty) FROM INVENTORY GROUP BY category HAVING SUM(qty) > 10;` II. `SELECT * FROM INVENTORY ORDER BY item_name ASC;` III. `SELECT DISTINCT category FROM INVENTORY;` IV. `SELECT * FROM INVENTORY WHERE item_name LIKE '%r';` [1 each] OR B. I. Displays rows where category='Stationery' (I001, I002, I005, I007). II. Displays item_id, item_name for names starting with 'N' (I001 Notebook, I007 Notebook). III. Displays count of rows where category is Furniture or Electronics: 3. IV. Displays average price of Stationery items: (40+25+10+45)/4 = 30.0. [1 each]	4
33.	I. `import csv` `def AddRecord():`	4

	f = open("Issued.csv", "a", newline="") w = csv.writer(f) bid = input("Book ID: ") title = input("Book Title: ") member = input("Member Name: ") idate = input("Issue Date: ") w.writerow([bid, title, member, idate]) f.close() [2] II. import csv def CountRecords(): f = open("Issued.csv", "r") r = csv.reader(f) count = sum(1 for row in r) print(count) f.close() [2]	
34.	I. SELECT Student_Name FROM Students, Schools WHERE Students.S_ID=Schools.S_ID AND City='Pune'; II. SELECT * FROM Students, Schools WHERE Students.S_ID=Schools.S_ID AND City IN ('Mumbai','Chennai','Nagpur'); III. DELETE FROM Students WHERE Admission_Date > '2024-06-08'; IV. A. SELECT * FROM Schools, Students; [1 each] OR IV. B. SELECT Student_Name, School_Name FROM Students, Schools WHERE Students.S_ID = Schools.S_ID;	4
35.	import mysql.connector as sql con = sql.connect(host='localhost', user='college_admin', password='acad@2026', database='CollegeDB') cur = con.cursor() cur.execute("UPDATE faculty SET Experience=12 WHERE Faculty_ID=305") con.commit() print(cur.rowcount, 'record(s) updated') con.close() [4]	4

SECTION E		
36.	I. import pickle def add_employee(): f = open("Employees.dat", "ab") eid = input("Employee ID: ") name = input("Employee Name: ") dept = input("Department: ") sal = float(input("Salary: ")) rec = {'Emp_ID':eid, 'Emp_Name':name, 'Department':dept, 'Salary':sal} pickle.dump(rec, f)	5

	`` f.close() ``` [2] II. ``` def show_sales(): f = open("Employees.dat", "rb") try: while True: rec = pickle.load(f) if rec['Department'] == 'Sales': print(rec) except EOFError: f.close() ``` [3]	
37.	I. Server should be placed in the Production block, since it has the maximum number of computers (100), minimising overall cable length and traffic load for the majority of users. II. a) Repeater: placed between Admin and Production (the longest link, 150 m), to boost the signal over distance. b) Switch: placed in each of the four blocks, to efficiently connect the computers within that block. III. A suitable layout connects Admin-Research, Research-Production, Research-Support and Production-Support directly (following the shortest available links), forming a partial mesh so that no single link is excessively long; a Star topology centred on Production (the largest block) is also acceptable. IV. Fiber-optic cable, since it supports high-speed, long-distance data transmission with minimal signal loss, suitable for a link between two cities. V. A. A Gateway connects two dissimilar networks (using different protocols) and translates data between them, enabling communication across different network architectures. OR V. B. This would form a WAN (Wide Area Network), since it connects computers across two different cities.	5