COMPUTER SCIENCE

Code No. 083

SAMPLE QUESTION PAPER — SET 3 | 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([4, 4, 5, 5, 5, 6]) will output 5.	1

2.	What will be the output of the following code?
	`L = ["Ocean", "Forest", "Desert"]`
	`print(L[1][-1] + L[0][0])`
	(A) tO (B) TO (C) to (D) tO
		1

3.	What will be the output of the following expression? `print(not 6 > 3 and 9 == 9 or 2 < 1)` (A) True (B) False (C) Null (D) Error	1
4.	In SQL, which clause is used to arrange the result of a query in a specified order?	1

5.	What will be the output of the following Python code?
	`txt = "PROGRAMMING"`
	`print(txt[2:9:3])`
	(A) OAM (B) OGM (C) RAI (D) Error
		1

6.	Write the output of the following Python code:
	`for k in range(2, 15, 3):`
	`  print(k, end="*")`
		1

7.	What will be the output of the following Python statement: `print(50 % 7 + 3**2 - 20/5)` (A) 11.0 (B) 12.0 (C) 10.0 (D) 13.0	1

8.	Consider the given SQL query: `SELECT * FORM students WHERE marks > 80;` Neha is executing the query but it results in an error. Identify and correct the error.	1

9.	What will be the output of the following Python code?
	`try:`
	`  val = int("abc")`
	`except ValueError:`
	`  print("Conversion error")`
	`except Exception:`
	`  print("Other error")`
	(A) Conversion error (B) Other error (C) ValueError (D) Nothing is printed
		1

10.	What will be the output of the following Python code?
	`d = {"model": "Sedan", "year": 2023}`
	`print(d.get("colour", "Not Set"))`
	(A) Sedan (B) 2023 (C) None (D) Not Set
		1

11.	What possible output is expected on screen when the following code executes?
	`import random`
	`L = [11, 22, 33, 44, 55]`
	`a = random.randint(2, 3)`
	`b = random.randint(3, 3)`
	`for i in range(a, b+1):`
	`  print(L[i], end="~")`
	(A) 33~44~ (B) 44~ (C) 33~ (D) 22~33~44~
		1

12.	What will be the output of the following Python code?
	`total = 8`
	`print(total, end="==")`
	`def change():`
	`  global total`
	`  total = total + 15`
	`  print(total, end="//")`
	`change()`
	`print(total)`
	(A) 8==23//23 (B) 8==8//23 (C) 8==23//8 (D) 23==23//23
		1

13.	Which SQL command permanently deletes rows from a table that satisfy a given condition, without removing the table itself? (A) DROP (B) TRUNCATE (C) DELETE (D) ALTER	1

14.	What is the output of the following Python code?
	`phrase = "one:two:three:four"`
	`print(phrase.split(":"))`
	(A) ['one', 'two', 'three', 'four'] (B) ['one:two:three:four']
	(C) Error (D) ['one', ':', 'two', ':', 'three', ':', 'four']
		1

15.	A relation has 5 columns and 12 rows. If 3 rows are deleted and 2 new columns are added, what is the updated degree and cardinality?	1

	(A) Degree: 7, Cardinality: 9 (B) Degree: 5, Cardinality: 9 (C) Degree: 7, Cardinality: 12 (D) Degree: 5, Cardinality: 15	
16.	Which SQL command is used to permanently save changes made by INSERT, UPDATE or DELETE in a transaction? (A) SAVE (B) COMMIT (C) STORE (D) UPDATE	1
17.	_____ is the protocol that provides a secure, encrypted version of HTTP for web communication.	1
18.	Which of the following network devices operates at the highest level, connecting entirely different types of networks and translating between protocols? (A) Hub (B) Switch (C) Repeater (D) Gateway	1
19.	Which of the following is a unique address assigned to identify a device on a network? (A) URL (B) IP Address (C) Domain Name (D) HTML	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): The expression [10, 20, 30].sort() returns a new sorted list. Reason (R): The sort() method sorts a list in place and returns None.	1
21.	Assertion (A): A table can have more than one foreign key. Reason (R): Each foreign key in a table can reference the primary key of a different (or the same) table.	1

SECTION B *Section B consists of 7 questions of 2 marks each.*		
22.	A. Explain the difference between a text file and a binary file in Python, with a suitable example of each. **OR** B. Explain the difference between the keys() and items() dictionary methods in Python, with a suitable example.	2

23.	The code below is intended to return the sum of squares of numbers in a list. It has syntax and logical errors. Rewrite it after removing all errors and underline each correction.
	`def sum_squares(nums)`
	`  total = 0`
	`  for n in nums:`
	`  total = total + n`
	`  return total`
	`print('Sum of squares:', sum_squares[1,2,3])`
		2

24.	A. (Answer using Python built-in methods/functions only):
	I. Write a statement to check whether a string named response starts with the substring "Yes".
	II. Write a statement to find the sum of all elements of list L4.
	OR
	B. Predict the output of the following Python code:
	`quote = "Discipline builds a better tomorrow"`
	`print(quote.partition("builds"))`
	`print(quote.count("o"))`
		2

25.	A. Write a function count_vowels(s) that accepts a string s and returns the count of vowels (a, e, i, o, u) present in it, irrespective of case. **OR** B. Write a function increase_marks(students, name, extra) that accepts a dictionary students (name to marks), a name, and extra marks. If the name exists, add the extra marks to it; otherwise print "Student not found".	2
26.	A. Write suitable SQL commands to: I. Delete the database named "TEMPDB". II. List all the tables present in the currently used database. **OR** B. Differentiate between a primary key and a unique key in a relation, with a suitable example.	2
27.	A. Define the following terms: I. Twisted pair cable II. Co-axial cable **OR** B. I. Expand the following terms: TCP/IP and TELNET. II. Differentiate between a Bus topology and a Star topology.	2
28.	A. Write SQL commands to: I. Modify the data type of the column "Phone" in table "Contacts" to varchar(15). II. Rename the table "Contacts" to "PhoneBook". **OR** B. Explain the purpose of aliasing in SQL, with a suitable example using the AS keyword.	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 blank lines present in a text file named "Diary.txt". **OR** B. Write and call a Python function to read lines from a text file "LOG.TXT" and display only those	3

	lines which contain the word "ERROR" (irrespective of case).	
30.	A list containing records of tickets is given as: `L = [("Concert", 1500), ("Movie", 250), ("Play", 80), ("Exhibition", 500)]` Write user-defined functions to perform operations on a stack named Tickets to: I. push_ticket() — to push an item containing the ticket name and price, of tickets costing more than 100, into the stack. Output: [('Concert', 1500), ('Movie', 250), ('Exhibition', 500)] II. pop_ticket() — to pop the items from the stack and display them. Display "No Tickets Left" when no elements remain.	3

31.	A. Predict the output of the following Python code:
	`s1 = "AI-30"`
	`s2 = ""`
	`i = 0`
	`while i < len(s1):`
	`  if s1[i] >= '0' and s1[i] <= '9':`
	`  Num = int(s1[i])`
	`  Num = (Num + 3) % 10`
	`  s2 = s2 + str(Num)`
	`  elif s1[i] >= 'A' and s1[i] <= 'Z':`
	`  s2 = s2 + s1[i].lower()`
	`  else:`
	`  s2 = s2 + '@'`
	`  i += 1`
	`print(s2)`
	OR
	B. Predict the output of the following Python code:
	`festivals = ["Diwali", "Holi", "Eid", "Christmas", "Onam", "Pongal", "Baisakhi"]`
	`result = []`
	`for fest in festivals:`
	`  if fest[0] in 'AEIOU':`
	`  result.append(fest[-2:].lower())`
	`print(result)`
		3

SECTION D

Section D consists of 4 questions of 4 marks each.

32.	Consider the table VEHICLES as given below:
	`+--------+-------------+-------------+------+---------+`
	`| veh_id | model  | type  | year | price  |`
	`+--------+-------------+-------------+------+---------+`
	`| V001  | Swift  | Hatchback  | 2021 | 650000  |`
	`| V002  | Creta  | SUV  | 2022 | 1500000 |`
	`| V003  | i20  | Hatchback  | 2020 | 700000  |`
	`| V004  | Fortuner  | SUV  | 2023 | 3800000 |`
	`| V005  | Baleno  | Hatchback  | 2022 | 750000  |`
	`| V006 | Seltos | SUV | 2021 | 1600000 |
		4

	+--------+-------------+-------------+------+---------+
	A. Write the following queries:
	I. To display the average price for each type whose average price exceeds 1000000.
	II. To display the records of VEHICLES sorted by price in ascending order.
	III. To display the distinct type names from the VEHICLES table.
	IV. To display the records of vehicles whose model starts with the letter 'S'.
	OR
	B. Predict the output of the following:
	`I. SELECT * FROM VEHICLES WHERE type='SUV';`
	`II. SELECT veh_id, model FROM VEHICLES WHERE model LIKE '%a';`
	`III. SELECT COUNT(*) FROM VEHICLES WHERE year IN (2021,2022);`
	`IV. SELECT MAX(price) FROM VEHICLES WHERE type='Hatchback';`	

33.	Ananya manages a small bakery and keeps track of orders in a CSV file named "Orders.csv", with columns: Order_ID, Customer_Name, Item, Amount. Help her by writing the following user-defined functions: I. AddOrder() — to accept an order record from the user and add it to the file "Orders.csv". II. HighestOrder() — to find and return the record with the highest Amount from "Orders.csv".	4
34.	Consider the two tables given below: **Table: Doctors** +------+----------------+---------------+ | D_ID | Doctor_Name | Specialty | +------+----------------+---------------+ | 1 | Dr. Iyer | Cardiology | | 2 | Dr. Kapoor | Orthopedics | | 3 | Dr. Sen | Cardiology | | 4 | Dr. Nair | Dermatology | +------+----------------+---------------+ **Table: Appointments** +-------+------+---------------+------------+ | Ap_ID | D_ID | Patient_Name | Ap_Date | +-------+------+---------------+------------+ | 1 | 1 | Rakesh | 2025-01-05 | | 2 | 2 | Sunita | 2025-01-06 | | 3 | 3 | Vivek | 2025-01-07 | | 4 | 4 | Kiran | 2025-01-08 | | 5 | 1 | Meena | 2025-01-09 | +-------+------+---------------+------------+ Write SQL queries to: I. Display the names of doctors specialising in 'Cardiology'. II. Display the appointment details for patients seeing doctors with specialty 'Orthopedics' or 'Dermatology'. III. Delete all appointments scheduled before 2025-01-07. IV. A. Display the Cartesian Product of the two tables. **OR** B. Display the patient's name along with their doctor's name.	4

35.	A MySQL database named ClinicDB has a patients table with attributes: Patient_ID (Integer), Patient_Name (String), Age (Integer), Doctor_Assigned (String). Connectivity details — Username: clinic_admin, Password: care@2026, Host: localhost. Write a Python program to update the Doctor_Assigned of the patient whose Patient_ID is 118 to 'Dr. Sen'.	4

SECTION E *Section E consists of 2 questions of 5 marks each.*		
36.	Mr. Suresh, a warehouse manager, maintains inventory records with fields: Item_ID, Item_Name, Category, Stock_Qty. Write Python functions to: I. Input item data and append it to a binary file named "Inventory.dat". [2] II. Display the details of all items whose Stock_Qty is below 10 (low-stock alert). [3]	5

37.	SkyTech Solutions is setting up a new development centre in Kochi, while its main office remains in Bengaluru. The Kochi centre will have four wings: Design, Development, Testing and Support.
	Distances between wings:
	`Design - Development: 30 m`
	`Design - Testing: 140 m`
	`Design - Support: 75 m`
	`Development - Testing: 45 m`
	`Development - Support: 55 m`
	`Testing - Support: 35 m`
	Number of computers in each wing:
	`Design: 25  Development: 95  Testing: 60  Support: 20`
	I. Suggest the best wing to place the server, with reasoning.
	II. Suggest the placement of: a) Switch b) Repeater
	III. Suggest and describe a suitable cable layout connecting the wings within the centre.
	IV. Which cable would be most suitable for a high-speed wired link to the Bengaluru main office?
	V. A. What is the purpose of a Modem in a network?
	OR
	B. Which type of network (PAN, LAN, MAN or WAN) connects the Kochi centre with the Bengaluru main office?
		5

COMPUTER SCIENCE

Code No. 083 — Marking Scheme

MARKING SCHEME — SET 3 | CLASS XII

SECTION A		
1.	True. 5 occurs three times (highest frequency), so it is the mode.	1
2.	L[1][-1] = 't' (last char of "Forest"); L[0][0] = 'O' (first char of "Ocean"). Output: tO. Answer: (A) tO	1
3.	6>3 True, not True=False; 9==9 True; 2<1 False. False and True=False; False or False=False. Answer: (B) False	1
4.	ORDER BY	1
5.	"PROGRAMMING" indices 0-10. txt[2:9:3] takes indices 2,5,8: O,A,M -> "OAM". Answer: (A) OAM	1
6.	Output: 2*5*8*11*14*	1
7.	50%7=1. 3**2=9. 20/5=4.0. 1+9-4.0=6.0.	1
8.	'FORM' should be 'FROM'. Correct query: SELECT * FROM students WHERE marks > 80;	1
9.	int("abc") raises ValueError, caught by the matching except block. Answer: (A) Conversion error	1
10.	"colour" key is not present, so get() returns the default value. Answer: (D) Not Set	1
11.	a can be 2 or 3. b is always 3. If a=2, range(2,4) gives i=2,3, printing L[2]=33 and L[3]=44 as "33~44~". Answer: (A) 33~44~ (one valid possible output)	1
12.	total=8 printed as "8==". Inside change(), global total becomes 8+15=23, printed as "23//". After the call, total remains 23 (global), printed as "23". Output: 8==23//23 Answer: (A)	1
13.	DELETE removes rows matching a condition without dropping the table. Answer: (C) DELETE	1
14.	Splitting on ':' gives four parts: 'one', 'two', 'three', 'four'. Answer: (A)	1
15.	Degree = columns = 5+2 = 7. Cardinality = rows = 12-3 = 9. Answer: (A) Degree: 7, Cardinality: 9	1
16.	COMMIT permanently saves changes made during a transaction. Answer: (B) COMMIT	1
17.	HTTPS (HyperText Transfer Protocol Secure)	1
18.	A Gateway connects dissimilar networks and translates between different protocols. Answer: (D) Gateway	1
19.	An IP Address uniquely identifies a device on a network. Answer: (B) IP Address	1

20.	A is false: sort() modifies the list in place and returns None, it does not return a new sorted list. R is true. Answer: (d) A is false but R is true.	1
21.	Both statements are true, and R directly explains why a table can have multiple foreign keys (each can reference a different table's primary key). Answer: (a) Both A and R true, R is the correct explanation.	1

SECTION B		
22.	A. A text file stores data as readable ASCII/Unicode characters, e.g. a .txt file with plain sentences. A binary file stores data in the same format used internally by the program (e.g. via pickle), e.g. a .dat file storing serialized Python objects; it is not human-readable in a text editor. [2] OR B. keys() returns a view of all the keys in a dictionary, e.g. d.keys(); items() returns a view of (key, value) pairs, e.g. d.items(). [2]	2

23.	Corrected code:
	`def sum_squares(nums):`
	`  total = 0`
	`  for n in nums:`
	`  total = total + n**2`
	`  return total`
	`print('Sum of squares:', sum_squares([1,2,3]))`
	Corrections: colon after def line; total = total + n**2 (missing square, and moved inside the for loop with correct indentation); sum_squares([1,2,3]) called with parentheses and a list, not square brackets. [2]
		2

24.	A. I. response.startswith("Yes") II. sum(L4) [2] OR B. partition("builds") -> ('Discipline ', 'builds', ' a better tomorrow'). count("o"): Discipline(0) + builds(0) + tomorrow(3) = 3. [2]	2

25.	`def count_vowels(s):`
	`  count = 0`
	`  for ch in s.lower():`
	`  if ch in 'aeiou':`
	`  count += 1`
	`  return count`
	[2] OR
	`def increase_marks(students, name, extra):`
	`  if name in students:`
	`  students[name] += extra`
	`  else:`
	`  print("Student not found")`
	[2]
		2

26.	A. I. DROP DATABASE TEMPDB; II. SHOW TABLES; [2] OR B. A primary key uniquely identifies each row and cannot contain NULL, with only one per	2

	table; a unique key also ensures distinct values but can allow one NULL and a table may have multiple unique keys. E.g. PRIMARY KEY(Roll_No), UNIQUE(Email). [2]	
27.	A. I. Twisted pair cable: a cable made of pairs of insulated copper wires twisted together to reduce electromagnetic interference; commonly used in LANs. II. Co-axial cable: a cable with a central copper conductor surrounded by insulation and a metallic shield, offering better shielding and higher bandwidth than twisted pair. [2] OR B. I. TCP/IP = Transmission Control Protocol/Internet Protocol; TELNET = Terminal Network. II. In a Bus topology, all devices share a single central cable; in a Star topology, all devices connect individually to a central hub/switch, so one device's failure doesn't affect others. [2]	2
28.	A. I. ALTER TABLE Contacts MODIFY Phone varchar(15); II. RENAME TABLE Contacts TO PhoneBook; [2] OR B. Aliasing gives a table or column a temporary name for the duration of a query, making output more readable. E.g. SELECT Student_Name AS Name FROM Students; [2]	2

SECTION C		

29.	A.
	`def count_blank_lines():`
	`  f = open("Diary.txt", "r")`
	`  count = 0`
	`  for line in f:`
	`  if line.strip() == "":`
	`  count += 1`
	`  print(count)`
	`  f.close()`
	[3] OR
	B.
	`def show_errors():`
	`  f = open("LOG.TXT", "r")`
	`  for line in f:`
	`  if "error" in line.lower():`
	`  print(line)`
	`  f.close()`
	`show_errors()`
	[3]
		3

30.	I.
	`Tickets = []`
	`def push_ticket():`
	`  L = [("Concert",1500),("Movie",250),("Play",80),("Exhibition",500)]`
	`  for item in L:`
	`  if item[1] > 100:`
	`  Tickets.append(item)`
	`  print(Tickets)`
	II.
	`def pop_ticket():`
		3

	``
	    while Tickets:
	        print(Tickets.pop())
	    print("No Tickets Left")
	``
	[1.5 + 1.5]	

31.	A. Trace: i=0 'A' upper -> s2+=s1[0].lower()='a' -> "a". i=1 'I' upper -> s2+=s1[1].lower()='i' -> "ai". i=2 '-' else -> s2+='@' -> "ai@". i=3 '3' digit -> Num=(3+3)%10=6 -> s2+='6' -> "ai@6". i=4 '0' digit -> Num=(0+3)%10=3 -> s2+='3' -> "ai@63". Output: ai@63 [3] OR B. Festivals starting with a vowel: Eid(E)->last2 'id'; Onam(O)->last2 'am'. Others (Diwali, Holi, Christmas, Pongal, Baisakhi) don't start with a vowel. Output: ['id', 'am'] [3]	3

SECTION D		

32.	A. I.
	`SELECT type, AVG(price) FROM VEHICLES GROUP BY type HAVING AVG(price) > 1000000;`
	II.
	`SELECT * FROM VEHICLES ORDER BY price ASC;`
	III.
	`SELECT DISTINCT type FROM VEHICLES;`
	IV.
	`SELECT * FROM VEHICLES WHERE model LIKE 'S%';`
	[1 each] OR
	B. I. Displays rows where type='SUV' (V002 Creta, V004 Fortuner, V006 Seltos).
	II. Displays veh_id, model ending in 'a' (V002 Creta, V005 Baleno).
	III. Displays count of rows where year is 2021 or 2022: 4.
	IV. Displays maximum price among Hatchbacks: 750000. [1 each]
		4

33.	I.
	``
	import csv
	def AddOrder():
	    f = open("Orders.csv", "a", newline="")
	    w = csv.writer(f)
	    oid = input("Order ID: ")
	    cust = input("Customer Name: ")
	    item = input("Item: ")
	    amt = input("Amount: ")
	    w.writerow([oid, cust, item, amt])
	    f.close()
	``
	[2]
	II.
	``
	import csv
	def HighestOrder():
	    f = open("Orders.csv", "r")
	    r = csv.reader(f)
	``
		4

	`    best = None`
	`    for row in r:`
	`        if best is None or float(row[3]) > float(best[3]):`
	`            best = row`
	`    f.close()`
	`    return best`
	[2]	

34.	I. SELECT Doctor_Name FROM Doctors WHERE Specialty='Cardiology'; II. SELECT * FROM Appointments, Doctors WHERE Appointments.D_ID=Doctors.D_ID AND Specialty IN ('Orthopedics','Dermatology'); III. DELETE FROM Appointments WHERE Ap_Date < '2025-01-07'; IV. A. SELECT * FROM Doctors, Appointments; [1 each] OR IV. B. SELECT Patient_Name, Doctor_Name FROM Appointments, Doctors WHERE Appointments.D_ID = Doctors.D_ID;	4

35.	`import mysql.connector as sql`
	`con = sql.connect(host='localhost', user='clinic_admin',`
	`password='care@2026', database='ClinicDB')`
	`cur = con.cursor()`
	`cur.execute("UPDATE patients SET Doctor_Assigned='Dr. Sen' WHERE`
	`Patient_ID=118")`
	`con.commit()`
	`print(cur.rowcount, 'record(s) updated')`
	`con.close()`
	[4]
		4

SECTION E		

36.	I.
	`import pickle`
	`def add_item():`
	`    f = open("Inventory.dat", "ab")`
	`    iid = input("Item ID: ")`
	`    name = input("Item Name: ")`
	`    cat = input("Category: ")`
	`    qty = int(input("Stock Qty: "))`
	`    rec = {'Item_ID':iid, 'Item_Name':name, 'Category':cat,`
	`'Stock_Qty':qty}`
	`    pickle.dump(rec, f)`
	`    f.close()`
	[2]
	II.
	`def show_low_stock():`
	`    f = open("Inventory.dat", "rb")`
	`    try:`
	`        while True:`
	`            rec = pickle.load(f)`
	`            if rec['Stock_Qty'] < 10:`
	`                print(rec)`
		5

	``
	    except EOFError:
	        f.close()
	``
	[3]	

37.	I. Server should be placed in the Development wing, since it has the maximum number of computers (95), minimising overall cable length for the majority of users. II. a) Switch: placed in each of the four wings, to efficiently connect the computers within that wing. b) Repeater: placed on the Design-Testing link (the longest, 140 m), to maintain signal strength. III. A suitable layout connects Design-Development, Development-Testing, Development-Support and Testing-Support directly (following the shortest available links); a Star topology centred on Development (the largest wing) 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 Modem converts digital signals from a computer into analog signals for transmission over telephone lines (and back), enabling internet connectivity. OR V. B. This would form a WAN (Wide Area Network), since it connects computers across two different cities.	5