COMPUTER SCIENCE

Code No. 083

SAMPLE QUESTION PAPER — SET 2 | 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.mean([3, 6, 9, 12]) will output 7.5.	1

2.	What will be the output of the following code?
	`L = ["Winter", "Monsoon", "Summer"]`
	`print(L[2][0] + L[0][-1])`
	(A) Sr (B) sr (C) SR (D) sR
		1

3.	What will be the output of the following expression? `print(12 < 20 and not 8 > 15 or 4 == 5)` (A) True (B) False (C) Null (D) Error	1
4.	Which SQL keyword is used to remove duplicate rows from the result of a SELECT query?	1

5.	What will be the output of the following Python code?
	`word = "NETWORKS"`
	`print(word[1:-1:2])`
	(A) EWR (B) ETOK (C) NTOK (D) Error
		1

6.	Write the output of the following Python code:
	`for k in range(30, 5, -6):`
	`  print(k, end="#")`
		1

7.	What will be the output of the following Python statement: `print(30 // 4 + 2**3 - 5%2` (A) 14 (B) 15 (C) 16 (D) 13	1

8.	Consider the given SQL query: `SELECT city, AVG(price) FROM houses WHERE AVG(price) > 500000 GROUP BY city;` Simran 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:`
	`  L = [1, 2, 3]`
	`  print(L[5])`
	`except IndexError:`
	`  print("Index issue")`
	`except Exception:`
	`  print("General issue")`
	(A) Index issue (B) General issue (C) IndexError (D) Nothing is printed
		1

10.	What will be the output of the following Python code?
	`d = {"item": "Pen", "cost": 10}`
	`print(d.get("brand", "Generic"))`
	(A) Pen (B) 10 (C) None (D) Generic
		1

11.	What possible output is expected on screen when the following code executes?
	`import random`
	`L = [2, 4, 6, 8, 10]`
	`a = random.randint(0, 1)`
	`b = random.randint(3, 4)`
	`for i in range(a, b):`
	`  print(L[i], end="%")`
	(A) 2%4%6% (B) 4%6%8% (C) 6%8% (D) 2%4%6%8%
		1

12.	What will be the output of the following Python code?
	`count = 10`
	`print(count, end="--")`
	`def update():`
	`  global count`
	`  count = count - 4`
	`  print(count, end="++")`
	`update()`
	`print(count)`
	(A) 10--6++6 (B) 10--10++6 (C) 10--6++10 (D) 6--6++6
		1

13.	Which SQL command is used to add a new row of data into a table? (A) UPDATE (B) INSERT (C) ALTER (D) CREATE	1

14.	What is the output of the following Python code?
	`name = "Data-Structures-2027"`
	`print(name.split("-"))`
	(A) ['Data', 'Structures', '2027'] (B) ['Data-Structures-2027']
	(C) Error (D) ['Data', '-', 'Structures', '-', '2027']
		1

15.	A relation has 6 columns and 10 rows. If 2 new rows and 1 new column are added, what is the	1

	updated degree? (A) Degree: 6 (B) Degree: 7 (C) Degree: 12 (D) Degree: 8	
16.	Which SQL clause restricts the rows returned by a query before any grouping takes place? (A) HAVING (B) WHERE (C) ORDER BY (D) GROUP BY	1
17.	_____ is the protocol used to send e-mail messages from a client to a mail server.	1
18.	Which network device regenerates a weak signal so it can travel a longer distance without loss of quality? (A) Router (B) Repeater (C) Gateway (D) Switch	1
19.	Which markup language is primarily used to store and transport structured data between systems? (A) HTML (B) XML (C) HTTP (D) URL	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): Dictionaries in Python maintain elements in an unpredictable, unordered manner in every version. Reason (R): Since Python 3.7, dictionaries preserve the insertion order of key-value pairs.	1
21.	Assertion (A): A candidate key can be chosen as the primary key of a relation. Reason (R): Every relation can have more than one candidate key, but only one is selected as the primary key.	1

SECTION B *Section B consists of 7 questions of 2 marks each.*		
22.	A. Explain the difference between a syntax error and a logical error in Python, with a suitable example of each. **OR** B. Explain the difference between the pop() and remove() list methods in Python, with a suitable example.	2

23.	The code below is intended to return the count of even numbers in a list. It has syntax and logical errors. Rewrite it after removing all errors and underline each correction.
	`def count_even(nums)`
	`  count = 0`
	`  for n in nums`
	`  if n % 2 = 0:`
	`  count = count + 1`
	`  return count`
		2

	`print('Even count:' count_even([1,2,3,4,5,6]))`	

24.	A. (Answer using Python built-in methods/functions only):
	I. Write a statement to check whether a string named code consists of only alphanumeric characters.
	II. Write a statement to reverse the elements of list L3 in place.
	OR
	B. Predict the output of the following Python code:
	`text = "Practice makes a person perfect"`
	`print(text.partition("makes"))`
	`print(text.count("e"))`
		2

25.	A. Write a function count_positive(L) that accepts a list of numbers L and returns the count of positive numbers in it. **OR** B. Write a function remove_key(record, key) that accepts a dictionary record and a key. If the key exists, remove it from the dictionary; otherwise print "Key not found".	2
26.	A. Write suitable SQL commands to: I. View the list of all databases on the server. II. Switch to using a database named "OFFICEDB". **OR** B. Differentiate between a candidate key and an alternate key in a relation, with a suitable example.	2
27.	A. Define the following terms: I. Ethernet card II. WiFi card **OR** B. I. Expand the following terms: HTTPS and VoIP. II. Differentiate between a LAN and a MAN.	2
28.	A. Write SQL commands to: I. Add a PRIMARY KEY constraint on the Roll_No column of an existing table "Students". II. Remove the PRIMARY KEY constraint from table "Students". **OR** B. Explain the purpose of the NOT NULL constraint in SQL, with a suitable example.	2

SECTION C *Section C consists of 3 questions of 3 marks each.*		
29.	A. Write a Python function that displays the number of times the word "Data" appears in a text file named "Report.txt". **OR** B. Write and call a Python function to read lines from a text file "FEEDBACK.TXT" and display	3

	only those lines which end with a question mark (?).	
30.	A list containing records of orders is given as: `L = [("Order101", 2500), ("Order102", 300), ("Order103", 45), ("Order104", 750)]` Write user-defined functions to perform operations on a stack named Orders to: I. push_order() — to push an item containing the order ID and amount, of orders costing more than 100, into the stack. Output: [('Order101', 2500), ('Order102', 300), ('Order104', 750)] II. pop_order() — to pop the items from the stack and display them. Display "No Orders Left" when no elements remain.	3

31.	A. Predict the output of the following Python code:
	`s1 = "IP-26"`
	`s2 = ""`
	`i = 0`
	`while i < len(s1):`
	`  if s1[i] >= '0' and s1[i] <= '9':`
	`  Num = int(s1[i])`
	`  Num = Num*2`
	`  s2 = s2 + str(Num)`
	`  elif s1[i] >= 'A' and s1[i] <= 'Z':`
	`  s2 = s2 + s1[i-1] if i > 0 else s2 + s1[i]`
	`  else:`
	`  s2 = s2 + '*'`
	`  i += 1`
	`print(s2)`
	OR
	B. Predict the output of the following Python code:
	`rivers = ["Ganga", "Yamuna", "Godavari", "Indus", "Narmada", "Alaknanda", "Kaveri"]`
	`result = []`
	`for river in rivers:`
	`  if river[-1] in 'aeiou':`
	`  result.append(river[:2].upper())`
	`print(result)`
		3

SECTION D *Section D consists of 4 questions of 4 marks each.*		
32.	Consider the table EMPLOYEES as given below: `+--------+------------+------------+--------+--------+` `| emp_id	emp_name	department	years	salary |` `+--------+------------+------------+--------+--------+` `| E001	Ritika Rao	Sales	4	45000 |` `| E002	Sameer Ali	IT	2	52000 |` `| E003	Priya Menon	Sales	6	48000 |` `| E004	Farah Khan	HR	3	40000 |` `| E005	Amit Sinha	IT	5	60000 |`	4

	`| E006 | Nita Roy | HR | 8 | 55000 |`
	`+--------+-------------+-------------+--------+--------+`
	A. Write the following queries:
	I. To display the total salary for each department whose total salary exceeds 90000.
	II. To display the records of EMPLOYEES sorted by years in descending order.
	III. To display the distinct department names from the EMPLOYEES table.
	IV. To display the records of employees whose emp_name ends with the letter 'i'.
	OR
	B. Predict the output of the following:
	`I. SELECT * FROM EMPLOYEES WHERE department='IT';`
	`II. SELECT emp_id, emp_name FROM EMPLOYEES WHERE emp_name LIKE 'F%';`
	`III. SELECT COUNT(*) FROM EMPLOYEES WHERE department IN ('Sales','HR');`
	`IV. SELECT AVG(salary) FROM EMPLOYEES WHERE department='IT';`	

33.	Arjun runs a small gym and keeps track of member attendance in a CSV file named "Attendance.csv", with columns: Member_ID, Member_Name, Visit_Date, Duration_Min. Help him by writing the following user-defined functions: I. AddVisit() — to accept an attendance record from the user and add it to the file "Attendance.csv". II. TotalDuration() — to calculate and return the total duration (in minutes) of all visits recorded in "Attendance.csv".	4

34.	Consider the two tables given below:
	Table: Authors
	`+------+----------------+-----------+`
	`| A_ID | Author_Name | Country |`
	`+------+----------------+-----------+`
	`| 1 | Ruskin Bond | India |`
	`| 2 | Chetan Bhagat | India |`
	`| 3 | Agatha Christie| UK |`
	`| 4 | Paulo Coelho | Brazil |`
	`+------+----------------+-----------+`
	Table: Books
	`+-------+------+------------------+------------+`
	`| B_ID | A_ID | Book_Title | Year |`
	`+-------+------+------------------+------------+`
	`| 1 | 1 | The Blue Umbrella| 1980 |`
	`| 2 | 2 | Five Point Someone| 2004 |`
	`| 3 | 3 | Murder Express | 1934 |`
	`| 4 | 4 | The Alchemist | 1988 |`
	`| 5 | 1 | Delhi is Not Far | 1994 |`
	`+-------+------+------------------+------------+`
	Write SQL queries to:
	I. Display the names of authors from 'India'.
	II. Display the book titles written by authors from 'UK' or 'Brazil'.
	III. Delete all books published before the year 1980.
	IV. A. Display the Cartesian Product of the two tables.
	OR
		4

	B. Display the book title along with the corresponding author's name.	
35.	A MySQL database named ShopDB has a stock table with attributes: Item_Code (Integer), Item_Name (String), Category (String), Units (Integer). Connectivity details — Username: shop_admin, Password: stock@2026, Host: localhost. Write a Python program to update the Units of the item whose Item_Code is 512 to 75.	4

SECTION E *Section E consists of 2 questions of 5 marks each.*		
36.	Mr. Dinesh, a school administrator, maintains student records with fields: Student_ID, Student_Name, Grade, Attendance_Percent. Write Python functions to: I. Input student data and append it to a binary file named "Students.dat". [2] II. Display the details of all students whose Attendance_Percent is below 75. [3]	5

37.	GreenLeaf Retailers is setting up a new warehouse campus in Nagpur, while its head office continues to operate from Mumbai. The Nagpur campus will have four sections: Receiving, Storage, Packing and Dispatch.
	Distances between sections:
	`Receiving - Storage: 35 m`
	`Receiving - Packing: 120 m`
	`Receiving - Dispatch: 95 m`
	`Storage - Packing: 50 m`
	`Storage - Dispatch: 60 m`
	`Packing - Dispatch: 40 m`
	Number of computers in each section:
	`Receiving: 20  Storage: 80  Packing: 55  Dispatch: 30`
	I. Suggest the best section to place the server, with reasoning.
	II. Suggest the placement of: a) Hub/Switch b) Repeater
	III. Suggest and describe a suitable cable layout connecting the sections within the campus.
	IV. Which cable would be most suitable for a high-speed wired link to the Mumbai head office?
	V. A. What is the purpose of a Router in a network?
	OR
	B. Which type of network (PAN, LAN, MAN or WAN) connects the Nagpur campus with the Mumbai head office?
		5

COMPUTER SCIENCE

Code No. 083 — Marking Scheme

MARKING SCHEME — SET 2 | CLASS XII

SECTION A		
1.	True. Mean = (3+6+9+12)/4 = 30/4 = 7.5.	1
2.	L[2][0] = 'S' (first char of "Summer"); L[0][-1] = 'r' (last char of "Winter"). Output: Sr. Answer: (A) Sr	1
3.	12<20 True; 8>15 False so not False=True; 4==5 False. True and True=True; True or False=True. Answer: (A) True	1
4.	DISTINCT	1
5.	"NETWORKS" indices 0-7. word[1:-1:2] takes indices 1,3,5 (stop before index7): E,W,R -> "EWR". Answer: (A) EWR	1
6.	Output: 30#24#18#12#6#	1
7.	30//4=7. 2**3=8. 5%2=1. 7+8-1=14. Answer: (A) 14	1
8.	AVG(price) cannot be used in WHERE; aggregate conditions must use HAVING after GROUP BY. Correct query: SELECT city, AVG(price) FROM houses GROUP BY city HAVING AVG(price) > 500000;	1
9.	L has only indices 0-2, so L[5] raises IndexError, caught by the matching except block. Answer: (A) Index issue	1
10.	"brand" key is not present, so get() returns the default value. Answer: (D) Generic	1
11.	a is always 0. b can be 3 or 4. If b=4, range(0,4) gives i=0,1,2,3, printing L[0..3] = 2,4,6,8. Answer: (D) 2%4%6%8% (one valid possible output)	1
12.	count=10 printed as "10--". Inside update(), global count becomes 10-4=6, printed as "6++". After the call, count remains 6 (global), printed as "6". Output: 10--6++6 Answer: (A)	1
13.	INSERT adds a new row of data into a table. Answer: (B) INSERT	1
14.	Splitting on '-' gives three parts: 'Data', 'Structures', '2027'. Answer: (A)	1
15.	Degree = number of columns. 6 columns + 1 new column = 7. (Rows added don't affect degree.) Answer: (B) Degree: 7	1
16.	WHERE filters individual rows before any grouping occurs. Answer: (B) WHERE	1
17.	SMTP (Simple Mail Transfer Protocol)	1

18.	A Repeater regenerates and amplifies a weak signal so it can travel further without degradation. Answer: (B) Repeater	1
19.	XML (Extensible Markup Language) is used to store and transport structured data between systems. Answer: (B) XML	1
20.	A is false (dictionaries do maintain insertion order since Python 3.7); R is true and correctly describes the actual behaviour. Answer: (d) A is false but R is true.	1
21.	Both statements are true, and R directly explains why a candidate key can become the primary key (there may be several candidates, one is chosen). Answer: (a) Both A and R true, R is the correct explanation.	1

SECTION B		
22.	A. A syntax error breaks the language's grammar rules and is caught before execution, e.g. missing a colon: if x > 0 (no colon). A logical error runs without crashing but produces a wrong result, e.g. using + instead of * to compute area. [2] OR B. pop() removes and returns an element by index (default last), e.g. L.pop(1); remove() deletes the first matching element by value, e.g. L.remove(5). [2]	2

23.	Corrected code:
	`def count_even(nums):`
	`  count = 0`
	`  for n in nums:`
	`  if n % 2 == 0:`
	`  count = count + 1`
	`  return count`
	`print('Even count:', count_even([1,2,3,4,5,6]))`
	Corrections: colon after def line; colon after for; '=' changed to '==' in if condition; consistent indentation for the for-loop and if-block; comma used instead of invalid string+int concatenation. [2]
		2

24.	A. I. code.isalnum() II. L3.reverse() [2] OR B. partition("makes") -> ('Practice ', 'makes', ' a person perfect'). count("e"): Practice(1) + makes(1) + person(1) + perfect(2) = 5. [2]	2

25.	`def count_positive(L):`
	`  count = 0`
	`  for n in L:`
	`  if n > 0:`
	`  count += 1`
	`  return count`
	[2] OR
	`def remove_key(record, key):`
	`  if key in record:`
	`  del record[key]`
	`  else:`
		2

	print("Key not found") [2]	
26.	A. I. SHOW DATABASES; II. USE OFFICEDB; [2] OR B. A candidate key is any minimal set of attributes that can uniquely identify a tuple (there may be several in a relation); an alternate key is a candidate key that is not chosen as the primary key. E.g. in a Students table, both Roll_No and Email could be candidate keys; if Roll_No is chosen as primary key, Email becomes the alternate key. [2]	2
27.	A. I. Ethernet card: a network interface card that enables a computer to connect to a wired LAN using Ethernet cabling. II. WiFi card: a network interface card that enables a computer to connect to a wireless network. [2] OR B. I. HTTPS = HyperText Transfer Protocol Secure; VoIP = Voice over Internet Protocol. II. A LAN (Local Area Network) covers a small area like a single building or campus; a MAN (Metropolitan Area Network) covers a larger area such as a city, connecting multiple LANs. [2]	2
28.	A. I. ALTER TABLE Students ADD PRIMARY KEY (Roll_No); II. ALTER TABLE Students DROP PRIMARY KEY; [2] OR B. NOT NULL ensures a column cannot store a NULL (empty) value, forcing every row to have a value for that field. E.g. Name varchar(30) NOT NULL; ensures every student record has a name. [2]	2

SECTION C		

29.	A.
	`def count_data_word():`
	`  f = open("Report.txt", "r")`
	`  text = f.read()`
	`  words = text.split()`
	`  count = 0`
	`  for w in words:`
	`  if w == "Data":`
	`  count += 1`
	`  print(count)`
	`  f.close()`
	[3] OR
	B.
	`def show_questions():`
	`  f = open("FEEDBACK.TXT", "r")`
	`  for line in f:`
	`  if line.strip().endswith("?"):`
	`  print(line)`
	`  f.close()`
	`show_questions()`
	[3]
		3

30.	I.	3

	``
	Orders = []
	def push_order():
	    L = [("Order101",2500),("Order102",300),("Order103",45),
	("Order104",750)]
	    for item in L:
	        if item[1] > 100:
	            Orders.append(item)
	    print(Orders)
	``
	II.
	``
	def pop_order():
	    while Orders:
	        print(Orders.pop())
	    print("No Orders Left")
	``
	[1.5 + 1.5]	

31.	A. Trace: i=0 'I' upper, i not>0 -> s2+=s1[0]='I' -> "I". i=1 'P' upper, i>0 -> s2+=s1[0]='I' -> "II". i=2 '-' else -> s2+='*' -> "II*". i=3 '2' digit -> Num=2*2=4 -> s2+='4' -> "II*4". i=4 '6' digit -> Num=6*2=12 -> s2+='12' -> "II*412". Output: II*412 [3] OR B. Rivers ending in a vowel: Ganga(a)->'GA'; Yamuna(a)->'YA'; Godavari(i)->'GO'; Indus(s, skip); Narmada(a)->'NA'; Alaknanda(a)->'AL'; Kaveri(i)->'KA'. Output: ['GA', 'YA', 'GO', 'NA', 'AL', 'KA'] [3]	3

SECTION D		

32.	A. I.
	```SELECT department, SUM(salary) FROM EMPLOYEES GROUP BY department HAVING SUM(salary) > 90000;```
	II.
	```SELECT * FROM EMPLOYEES ORDER BY years DESC;```
	III.
	```SELECT DISTINCT department FROM EMPLOYEES;```
	IV.
	```SELECT * FROM EMPLOYEES WHERE emp_name LIKE '%i';```
	[1 each] OR
	B. I. Displays rows where department='IT' (E002 Sameer Ali, E005 Amit Sinha).
	II. Displays emp_id, emp_name starting with 'F' (E004 Farah Khan).
	III. Displays count of rows where department is Sales or HR: 4.
	IV. Displays average salary of IT employees: (52000+60000)/2 = 56000.0. [1 each]
		4

33.	I.
	``
	import csv
	def AddVisit():
	    f = open("Attendance.csv", "a", newline="")
	    w = csv.writer(f)
	    mid = input("Member ID: ")
	``
		4

	name = input("Member Name: ")
	vdate = input("Visit Date: ")
	dur = input("Duration (min): ")
	w.writerow([mid, name, vdate, dur])
	f.close()
	[2]
	II.
	import csv
	def TotalDuration():
	f = open("Attendance.csv", "r")
	r = csv.reader(f)
	total = 0
	for row in r:
	total += int(row[3])
	f.close()
	return total
	[2]	

34.	I. SELECT Author_Name FROM Authors WHERE Country='India'; II. SELECT Book_Title FROM Books, Authors WHERE Books.A_ID=Authors.A_ID AND Country IN ('UK','Brazil'); III. DELETE FROM Books WHERE Year < 1980; IV. A. SELECT * FROM Authors, Books; [1 each] OR IV. B. SELECT Book_Title, Author_Name FROM Books, Authors WHERE Books.A_ID = Authors.A_ID;	4
35.	import mysql.connector as sql con = sql.connect(host='localhost', user='shop_admin', password='stock@2026', database='ShopDB') cur = con.cursor() cur.execute("UPDATE stock SET Units=75 WHERE Item_Code=512") con.commit() print(cur.rowcount, 'record(s) updated') con.close() [4]	4

SECTION E		
36.	I. import pickle def add_student(): f = open("Students.dat", "ab") sid = input("Student ID: ") name = input("Student Name: ") grade = input("Grade: ") att = float(input("Attendance %: ")) rec = {'Student_ID':sid, 'Student_Name':name, 'Grade':grade, 'Attendance_Percent':att} pickle.dump(rec, f) f.close()	5

	[2]
	II.
	`def show_low_attendance():`
	`  f = open("Students.dat", "rb")`
	`  try:`
	`  while True:`
	`  rec = pickle.load(f)`
	`  if rec['Attendance_Percent'] < 75:`
	`  print(rec)`
	`  except EOFError:`
	`  f.close()`
	[3]	

37.	I. Server should be placed in the Storage section, since it has the maximum number of computers (80), minimising overall cable length for the majority of users. II. a) Switch: placed in each of the four sections, to efficiently connect the computers within that section. b) Repeater: placed on the Receiving-Packing link (the longest, 120 m), to maintain signal strength. III. A suitable layout connects Receiving-Storage, Storage-Packing, Storage-Dispatch and Packing-Dispatch directly (following the shortest available links); a Star topology centred on Storage (the largest section) 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 Router directs data packets between different networks, choosing efficient paths so data reaches the correct destination network. OR V. B. This would form a WAN (Wide Area Network), since it connects computers across two different cities.	5