

Marking Scheme Strictly Confidential (For Internal and Restricted use only) Senior Secondary School Examination 2026 (Supplementary) SUBJECT NAME : Computer Science 083 (Q.P. CODE 91/7 Set 4) - ENGLISH VERSION	
General Instructions:	
1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. Its leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in Newspaper/Website, etc. may invite action under various rules of the Board and IPC.”
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In Class-XII, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark (✓) wherever the answer is correct. For wrong answers CROSS ‘X’ be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is the most common mistake which evaluators are committing.
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note “Extra Question”.
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks 70 marks has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
13	• Ensure that you do not make the following common types of errors committed by the Examiner in the past :- • Leaving answer or part thereof unassessed in an answer book.

	• Giving more marks for an answer than assigned to it. • Wrong totaling of marks awarded on an answer. • Wrong transfer of marks from the inside pages of the answer book to the title page. • Wrong question wise totaling on the title page. • Wrong totaling of marks of the two columns on the title page. • Wrong grand total. • Marks in words and figures not tallying/not same. • Wrong transfer of marks from the answer book to online award list. • Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.) • Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the “ Guidelines for Spot Evaluation ” before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

MARKING SCHEME FOR SUPPLEMENTARY EXAM

Computer Science (Subject Code - 083)

सामान्य निर्देश: **General Instructions :**

(i)	<i>This question paper contains 37 questions.</i>
(ii)	<i>All questions are compulsory. However, internal choices have been provided in some questions. Attempt only one of the choices in such questions.</i>
(iii)	<i>The paper is divided into 5 Sections - A, B, C, D and E.</i>
(iv)	<i>Section A, consists of 21 questions (1 to 21). Each question carries 1 mark.</i>
(v)	<i>Section B, consists of 7 questions (22 to 28). Each question carries 2 marks.</i>
(vi)	<i>Section C, consists of 3 questions (29 to 31). Each question carries 3 marks.</i>
(vii)	<i>Section D, consists of 4 questions (32 to 35). Each question carries 4 marks.</i>
(viii)	<i>Section E, consists of 2 questions (36 and 37). Each question carries 5 marks.</i>
(ix)	<i>All programming questions are to be answered using Python Language only.</i>
(x)	<i>In case of MCQs, the text of the correct answer should also be written.</i>

SECTION A

21×1=21

1	Which of the following is a keyword in Python ?				1
	(A)	Break	(B)	None	
	(C)	For	(D)	Class	
Ans	(B) None				

	(1 Mark for writing the correct answer)			
2	What will be the output of the following statement ? <pre>print(18/3 == 18//3)</pre>			1
	(A)	0	(B)	False
	(C)	1	(D)	True
Ans	(D) True			
	(1 Mark for writing the correct answer)			
3	Consider the statements given below and then choose the correct output from the given options : <pre>D={"A": "MUMBAI", "B": "CHENNAI"} print("C" in D)</pre>			1
	(A)	False	(B)	0
	(C)	True	(D)	1
Ans	(A) False			
	(1 Mark for writing the correct answer)			
4	What will be the output of the following Python code ?			1
	<pre>try: num = 5 text = "15" result = str(num) + text print(result) except: print("Error")</pre>			
	(A)	Error	(B)	515
	(C)	20	(D)	75
Ans	(B) 515			
	(1 Mark for writing the correct answer)			
5	What will be the output of the following statement ?			1
	<pre>print("X"* 2,"Y",end = 2 * "X", sep = "#")</pre>			
	(A)	Error	(B)	YY#XX
	(C)	XXYY#	(D)	XX#YXX
Ans	(D) XX#YXX			
	(1 Mark for writing the correct answer)			

6	If L is an empty list, then which of the following expressions are invalid ?				1
	(A)	L + 'Hello'	(B)	L + []	
	(C)	L + [2]	(D)	L * 2	
Ans	(A) L + 'Hello'				
	(1 Mark for writing the correct answer)				
7	Which of the following statements will return the substring "STR" (i.e. the first 3 characters) from the string "STRING" ?				1
	(A)	"STRING"[: -3]	(B)	"STRING"[-3 :: -1]	
	(C)	"STRING"[3 :]	(D)	"STRING".startswith(3)	
Ans	(A) "STRING"[: -3]				
	(1 Mark for writing the correct answer)				
8	Consider the statements given below and then choose the correct output from the given options : K= ('A' , 'B') V= 'TEST' D = dict.fromkeys(K, V) print(D)				1
	(A)	{ 'A': 'TEST' , 'B': None}	(B)	{ 'A': None , 'B': 'TEST' }	
	(C)	{ 'A': 'TEST' , 'B': 'TEST' }	(D)	Error	
Ans	(C) { 'A': 'TEST' , 'B': 'TEST' }				
	(1 Mark for writing the correct answer)				
9	Which of the following is true about clear() in Python ?				1
	(A)	It deletes the dictionary itself with all its elements.			
	(B)	It deletes all items of the dictionary resulting in an empty dictionary.			
	(C)	If D is a dictionary, then clear(D) is the correct statement.			
	(D)	No such function/method exists in Python.			
Ans	(B) It deletes all items of the dictionary resulting in an empty dictionary				
	(1 Mark for writing the correct answer)				
10	Consider the statements given below and then choose the correct output from the given options :				1
	L = ["A", "B"] S= ['C' , 'D'] L.extend(S) print(L)				

	(A)	['A', 'B', 'C', 'D']	(B)	['A', 'B', 'CD']	
	(C)	['A', 'B', ['CD']]	(D)	['A', 'B', ['C', 'D']]	
Ans	(A) ['A', 'B', 'C', 'D']				
	(1 Mark for writing the correct answer)				
11	Which of the following options is the correct mode to open a binary pickled file to add more data in a previously existing binary pickled file ?				1
	(A)	'rb'	(B)	'ab'	
	(C)	'w'	(D)	'r'	
Ans	(B) 'ab'				
	(1 Mark for writing the correct answer)				
12	State True or False :				1
	In SQL, the UNIQUE constraint on an attribute ensures that values in it are not left empty.				
Ans	False				
	(1 Mark for writing the correct answer)				
13	The degree of the resulting relation after the Cartesian Product of two SQL tables with degrees A and B will be :				1
	(A)	A × B	(B)	A + B	
	(C)	A - B	(D)	A / B	
Ans	(B) A + B				
	(1 Mark for writing the correct answer)				
14	Which of the following is <i>not</i> true about SQL ?				1
	(A)	SQL is case sensitive.			
	(B)	An SQL statement will always end with a colon (:).			
	(C)	SQL stands for Structured Query Language.			
	(D)	SQL is used to retrieve data from tables through queries.			
Ans	(A) SQL is case sensitive. (B) An SQL statement will always end with a colon (:).				
	(1 Mark for writing any one/both correct answer(s))				
15	Which of the following is used to add a primary key to a column in a table created in MySQL ?				1

	(A)	INSERT	(B)	MODIFY	
	(C)	UPDATE	(D)	ALTER	
Ans	(D) ALTER				
	(1 Mark for writing the correct answer)				
16	In MySQL, which of the following operator is used with WHERE clause and returns a True if the value belongs to the set of specified values ?				1
	(A)	DISTINCT	(B)	IN	
	(C)	LIKE	(D)	NOT	
Ans	(B) IN				
	(1 Mark for writing the correct answer)				
17	Which of the following networking medium is uni-directional and most appropriate to be used for long distance wireless communication ?				1
	(A)	Radio waves			
	(B)	Infrared			
	(C)	Bluetooth			
	(D)	Microwaves			
Ans	(D) Microwaves				
	(1 Mark for writing the correct answer)				
18	Which of the following is the correct protocol used for accessing a Web page ?				1
	(A)	HTTP	(B)	FTP	
	(C)	VoIP	(D)	SMTP	
Ans	(A) HTTP				
	(1 Mark for writing the correct answer)				
19	Which of the following options is true about XML ?				1
	(A)	It stands for Expert Manipulating Language.			
	(B)	It is a programming language.			
	(C)	It is a dynamic language used to store and transport data through web pages.			
	(D)	It is same as HTML.			
Ans	(C) It is a dynamic language used to store and transport data through web pages.				
	(1 Mark for writing the correct answer)				

	Questions 20 and 21 are Assertion (A) and Reason (R) based questions. Mark the correct choice as : (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.	
20	Assertion (A) : The upper () function/method in Python returns the string with all lowercase letters of the given string converted to uppercase. Reason (R) : Strings are mutable objects in Python.	1
Ans	(C) Assertion (A) is true, but Reason (R) is false.	
	(1 Mark for writing the correct answer)	
21	Assertion (A) : If we define an attribute of a table as a Foreign key, then UNIQUE and NOT NULL constraints are automatically applied to it. Reason (R) : The Foreign key column of a table takes its values from the Primary key of another table.	1
Ans	(D) Assertion (A) is false, but Reason (R) is true.	
	(1 Mark for writing the correct answer)	

SECTION B

7×2=14

22	Differentiate between find() and index() with respect to strings in Python. Give supporting examples for both.	2
Ans	String.find(<Substring>) The find method searches for the first occurrence of the specified substring within the string. If found, it returns the index of the first occurrence the substring and in case the substring is not found, it returns - 1 Example : T="Hello World" print("'z' found at index:",T.find('z')) # Output:'z' found at index: -1 String.index(<Substring>) The index() method is similar to find(), but it behaves differently when the substring is not found. If the substring is not found, it raises a ValueError. Example : T="Hello World" print("'z' found at index:",T.index('z')) # will raise a ValueError	
	(½ Mark for writing the correct explanation of the find() function) (½ Mark for writing the correct example of the find() function) (½ Mark for writing the correct explanation of the index() function) (½ Mark for writing the correct example of the index() function)	

23	What are default parameters in Python functions ? Explain with the help of an example.	2
Ans	Default parameters in Python functions allow you to assign a default value to one or more formal parameters. In the absence of corresponding actual parameters, the default value is substituted. Example : <pre>def Calc(L=10, W=5): return L*W print(Calc()) # will display 50 print(Calc(100)) # will display 500 print(Calc(50,20)) # will display 1000</pre>	
	<i>(1 Mark for writing the correct explanation)</i> <i>(1 Mark for writing the correct example)</i>	
24	(I) Consider the following tuple named PRICE : <pre>PRICE = (100, 55, 72, 65, 85, 90)</pre> (a) Write a single line statement in Python that displays the contents of the tuple PRICE in ascending order of the values. OR (b) Write a single line statement in Python to find and display the average PRICE of all the values in the given tuple. (II) (a) Write a single line Python statement using built-in functions/methods to display the content of a string S such that every occurrence of the alphabet 'i' of the string S is replaced with an underscore, i.e ' _ '. For example, if the string s is : <pre>S = "time is precious"</pre> then the statement should display the output as : <pre>t_me _s prec_ous</pre> OR (b) Write a Python statement using built-in function/method to delete the first occurrence of element 25 from the list named myList.	2
Ans	(I) (a) <code>print(sorted (PRICE))</code> OR (b) <code>print (sum(PRICE) /len (PRICE))</code>	
	(I) (a) <i>(1 Mark for writing the correct statement)</i> OR (b) <i>(1 Mark for writing the correct statement)</i>	
	(II) (a) <code>print(S.replace('i' , '_'))</code> OR (b) <code>myList.remove(25)</code>	
	(II) (a) <i>(1 Mark for writing the correct statement)</i> OR (b) <i>(1 Mark for writing the correct statement)</i>	

25	What possible output from the given options is expected to be displayed when the following code is executed ? Justify your answer. <pre>import random ITEMS={1:"PEN", 2: "ERASER", 3: "PENCIL"} for i in range(len(ITEMS)): print(ITEMS[random.randint(0,i)+1],end="*")</pre> (A) PEN*PENCIL*PENCIL* (B) PENCIL*PEN*ERASER* (C) PEN*PENCIL*ERASER* (D) PEN*ERASER*PEN*	2
Ans	(D) PEN*ERASER*PEN* Justification: - Length of dictionary ITEMS is 3 - Loop runs 3 times with value of i as 0, 1, 2 - randint() will return 0 (for i=0) and 0 or 1 (for i=1) and 0 or 1 or 2 (for i=2) - Key of ITEMS can be 1 (for i=0) and 1 or 2 (for i=1) and 1 or 2 or 3 (for i=2) - First value can be PEN, second can be PEN or ERASER and third can be PEN or ERASER or PENCIL - Hence only option (D) is a possible output of the given program.	
	<i>(1 Mark for correct option)</i> <i>(1 mark for correct justification)</i> OR <i>(2 Marks for the specifying error in the program)</i>	
26	The code given below is intended to display all numbers not divisible by 7 from the given list. However, there are syntax and logical errors in the code. Rewrite it after removing all errors. Also, underline all the corrections made. <pre>define display(L): for i in range(0,len(L)) if i % 7 == 0: break else: print(L[i]) numbers = [11,21,33,42,55] display(numbers)</pre>	2
Ans	<pre><u>def</u> display(L) : for i in range (0,len(L)): if <u>L[i]</u>%7==0: <u>continue</u> else: print(L[i]) numbers=[11,21,33,42,55] display(numbers)</pre>	
	<i>(½ Mark for each valid correction of errors - up to 4)</i> Note: Give only 1 mark for any four valid identification of errors without valid corrections.	

27	EcoHarvest Solutions Co. is an agricultural technology firm specializing in farm management and crop optimization. The company stores crop planting details in a database table called PLANTINGS with attributes such as : PlantingID, CropType, PlantingDate, FieldLocation. Details of each harvest, including yield quantity and quality, are stored in another table named HARVESTS with attributes like. HarvestID, PlantingID, YieldQuantity, YieldQuality, HarvestDate. (I) (a) Identify the attribute which should be considered as the FOREIGN KEY for joining the two tables. OR (b) Which constraint should be applied to the attribute HarvestID such that it can be used to uniquely identify every harvest record for all crops? (II) (a) Write the SQL command to change the value of FieldLocation of the Planting whose PlantingID is 'PL005' to 'North Field 3'. OR (b) Write the SQL command to display the records from the table HARVESTS for all records which have excellent YieldQuality.	2
	(I) (a) PlantingID OR (b) PRIMARY KEY OR UNIQUE	
	<i>(1 Mark for writing each correct attribute for FOREIGN KEY)</i> OR <i>(1 Mark for writing the correct constraint for attribute HarvestID)</i>	
	(a) UPDATE PLANTINGS SET Fieldlocation='North Field 3' WHERE PlantingID='PL005'; OR (b) SELECT * FROM HARVESTS WHERE YieldQuality= 'Excellent';	
	<i>(½ Mark for writing UPDATE and SET part correctly)</i> <i>(½ Mark for writing the WHERE clause correctly)</i> OR <i>(½ Mark for writing SELECT and FROM part correctly)</i> <i>(½ Mark for writing the WHERE clause correctly)</i>	
28	(I) (a) Define the term web server. (b) Write one difference between Circuit Switching and Packet Switching techniques used in Computer Networks. OR (II) Differentiate between FTP and SMTP. Give any two points.	2

Ans	(I) (a) A web server is a software application or a hardware device that stores, processes, and serves web content to users over the internet. (b) Difference between Circuit Switching and Packet Switching. <table><tr><th>Circuit Switching</th><th>Packet Switching</th></tr><tr><td>A dedicated, continuous communication path (circuit) is established between the sender and receiver before any data transmission begins. This circuit remains reserved for the entire duration of the communication even if no data is being sent.</td><td>Data is broken down into smaller independent units called packets. Each packet can travel independently across the network, potentially taking different routes, and is reassembled at the destination.</td></tr></table>	Circuit Switching	Packet Switching	A dedicated, continuous communication path (circuit) is established between the sender and receiver before any data transmission begins. This circuit remains reserved for the entire duration of the communication even if no data is being sent.	Data is broken down into smaller independent units called packets. Each packet can travel independently across the network, potentially taking different routes, and is reassembled at the destination.	
Circuit Switching	Packet Switching					
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	<i>(1 Mark for writing correct definition of web server)</i> <i>(1 Mark for writing any one correct difference between Circuit and Packet Switching)</i>					
	(II) FTP • File Transfer Protocol • Application layer protocol used for transferring digital files between client and server on a computer network. • Allows users to upload files to the server and download files from the server. SMTP • Simple Mail Transfer Protocol • It is a standard protocol for sending emails across the Internet. • When email is sent, the email client uses SMTP to send the message to the user's email server, and then email servers use SMTP to relay the message from one server to another until it reaches the recipient's mail server. <i>Any two from the above or equivalent correct point of difference</i>					
	<i>(1 Mark each for writing any two correct differences)</i>					

SECTION C

3×3=9

29	(a) Write a user-defined function in Python named <code>Find_Pattern()</code> which reads the contents of a text file named <code>LOGS.TXT</code> and displays all such lines that begin with the word "ERROR" (case-sensitive). For example, if the content of file <code>LOGS.TXT</code> is as follows : <pre>INFO: System startup complete. WARNING: Disk space low on drive C:. ERROR: Failed to connect to database. INFO: User 'admin' logged in. DEBUG: Processing request 'GET /data'. ERROR: Invalid input received from client. SUCCESS: Data saved.</pre>	3
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	Then the function should display the lines : <pre>ERROR: Failed to connect to database. ERROR: Invalid input received from client.</pre>	
Ans.	(a) <pre>def Find_Pattern(): try: F=open("LOGS.TXT", 'r') S=F.readlines() for L in S: if L.startswith("ERROR"): print(L) F.close() except: print('File I/O Error!')</pre> OR <pre>def Find_Pattern(): with open("LOGS.TXT") as F: S=F.readlines() for L in S: if L[:5]=="ERROR": print(L)</pre> OR <i>Any valid equivalent correct code</i>	
	<i>(½ Mark for opening LOGS.TXT to read)</i> <i>(1 Mark for reading the contents of LOGS.TXT)</i> <i>(½ Mark for correct loop to iterate through all lines in the file)</i> <i>(½ Mark for checking each line starting with the word "ERROR")</i> <i>(½ Mark for displaying the matched line)</i>	
	OR (b) Write a user-defined function in Python named <code>ContainsChar()</code> which reads the contents of a text file named <code>DOCUMENT.TXT</code> and displays all such words that contain the letter 'o' (case-insensitive). For example, if the content of file <code>DOCUMENT.TXT</code> is as follows : <pre>"A brown fox quickly jumped over the dog. It loves to frolic."</pre> Then the function should display the following words: <pre>brown fox over dog. loves to frolic.</pre>	

Ans.	OR (b) <pre>def ContainsChar(): try: F = open("DOCUMENT.TXT", 'r') S = F.read() L = S.split() for W in L: if ('o' in W) or ('O' in W): print(W) F.close() except: print('File I/O Error!')W.lower()</pre> OR <pre>def ContainsChar(): with open("DOCUMENT.TXT") as F: S = F.readlines() for L in S: WL = L.split() for W in WL: if 'o' in W.lower(): print(W)</pre> OR <i>Any valid equivalent correct code</i>	
	<i>(½ Mark for opening DOCUMENT.TXT to read)</i> <i>(½ Mark for reading the contents of DOCUMENT.TXT)</i> <i>(1 Mark for correct loop to split and read each word)</i> <i>(½ Mark for checking each word containing letter 'o')</i> <i>(½ Mark for displaying the matched words)</i>	
30	(a) Consider a globally declared dictionary named EMPLOYEE_PERFORMANCE which contains employee IDs and their respective performance scores (out of 100) as key:value pairs. For example, the dictionary EMPLOYEE_PERFORMANCE may contain items as follows : <pre>EMPLOYEE_PERFORMANCE = { "E101": 85, "E102": 92, "E103": 78, "E104": 95, "E105": 80, "E106": 70 }</pre> Write the following user-defined functions to perform the following given operations on a globally declared list implementing a stack named TOP_PERFORMERS_LIST :	3x1=3

	(I) PushHighPerformers(): This function should push all employee IDs from the dictionary EMPLOYEE_PERFORMANCE whose performance score is greater than or equal to 90 into the stack TOP_PERFORMERS_LIST. For example, on execution of the PushHighPerformers() function, the stack TOP_PERFORMERS_LIST should contain ["E102", "E104"] (assuming the order of insertion is E102 then E104) from the above considered example of the dictionary EMPLOYEE_PERFORMANCE. (II) IsPerformanceListEmpty(): This function should check whether the stack TOP_PERFORMERS_LIST is empty or not. If it is empty, the function should return True; otherwise, it should return False. (III) PopPerformer(): This function should pop and return the topmost employee ID from the stack TOP_PERFORMERS_LIST. If the stack is already empty (check using the IsPerformanceListEmpty() function), then the function should display the message "Stack Underflow: No top performer to pop."	
	(a) (I) def PushHighPerformers() : for K,V in EMPLOYEE_PERFORMANCE.items() : if V>=90: TOP_PERFORMERS_LIST.append(K) (II) def IsPerformanceListEmpty() : if len(TOP_PERFORMERS_LIST)==0: return True else: return False (III) def PopPerformer() : if IsPerformanceListEmpty() : print("Stack Underflow:No top performer to pop.") return None else: return TOP_PERFORMERS_LIST.pop() OR <i>Any valid equivalent correct code</i>	
	<i>(½ Mark for checking the condition correctly in PushHighPerformers())</i> <i>(½ Mark for appnding correctly in PushHighPerformers())</i> <i>(½ Mark for checking emptiness correctly in IsPerformanceListEmpty())</i> <i>(½ Mark for returning correctly in IsPerformanceListEmpty())</i> <i>(½ Mark for checking underflow condition correctly in PopPerformer())</i> <i>(½ Mark for popping and retuning correctly in PopPerformer())</i>	

	OR (b) Consider a globally declared list of product prices named PRODUCT_PRICES as follows : <pre>PRODUCT_PRICES = [150.75, 85.00, 299.99, 50.50, 120.00, 99.95, 450.00]</pre> Write the following user-defined functions to perform the following given operations on a globally declared list implementing a stack named DISCOUNT_PRICES : (I) PushDiscPrices(): This function should push all those prices from the list PRODUCT_PRICES which are less than or equal to 100.00 into the stack DISCOUNT_PRICES. For example, on execution of the PushDiscPrices() function, the stack DISCOUNT_PRICES should contain [85.00, 50.50, 99.95] (assuming this order of pushing is based on appearance in the PRODUCT_PRICES list) from the above considered example of the list PRODUCT_PRICES. (II) PopDiscPrices(): This function should pop and display the last (topmost) price from the stack DISCOUNT_PRICES. If the stack is already empty, then the function should display the message "No More Discount Prices to Pop" and return None. (III) ShowDiscPrices(): This function should display all the prices from the stack DISCOUNT_PRICES without deleting any price from the stack. The content of DISCOUNT_PRICES should be displayed as per stack LIFO rule (i.e., last price to first price). If there are no prices in the stack, then display the message "Stack is Empty: No discount prices to show".	
	(b) (I) <pre>def PushDiscPrices(): for price in PRODUCT_PRICES: if price<=100.00: DISCOUNT_PRICES.append(price)</pre> (II) <pre>def PopDiscPrices(): if DISCOUNT_PRICES==[]: # or Checked with len print("No More Discount Prices to Pop") return None else: PoppedPrice=DISCOUNT_PRICES.pop() print("Popped",PoppedPrice) return PoppedPrice # ignore</pre>	

	(III) <pre>def ShowDiscPrices(): if not DISCOUNT_PRICES: print("stack is Empty: No discount prices to show.") else: print("Contents of DISCOUNT_PRICES(LIFO Order):") for V in DISCOUNT_PRICES[::-1]: print(V)</pre> OR <i>Any valid equivalent correct code</i>	
	<i>(½ Mark for checking the condition correctly in PushDiscPrices())</i> <i>(½ Mark for appnding correctly in PushDiscPrices())</i> <i>(½ Mark for checking underflow condition correctly in PopDiscPrices())</i> <i>(½ Mark for popping and displaying correctly in PopDiscPrices())</i> <i>(½ Mark for checking condition for empty correctly in ShowDiscPrices())</i> <i>(½ Mark for displaying correctly as per LIFO in ShowDiscPrices())</i>	
31	(a) Predict the output on execution of the following Python code : <pre>SCORES = [5, 12, 7, 20, 10, 18] for X in range(len(SCORES)): if SCORES[X] % 4 == 0: SCORES[X] = SCORES[X] + SCORES[X-1] elif SCORES[X] % 3 == 0: SCORES[X] = SCORES[len(SCORES) - 1 - X] + 5 else: SCORES[X] = SCORES[X] // 2 for Y in range(0, len(SCORES), 2): if Y + 1 < len(SCORES): print(SCORES[Y], SCORES[Y+1], sep="\$") else: print(SCORES[Y], sep="\$")</pre>	3
Ans.	2\$14 3\$23 5\$7	
	<i>(½ Mark for writing each number correctly)</i> <i>Note: Deduct only ½ Mark, if the \$ sign is not written correctly or/and the output format is not correct (e.g., correct line breaks).</i>	

	OR (b) Predict the output on execution of the following Python code : <pre>def Transform(D_A, D_B): D_C = {} D_C.update(D_A) D_A.update(D_B) D_B.update(D_C) return D_C Init_Stock = {"Chocolate": 100, "Cookie": 50} New_Arriv = {"Cookie": 60, "Chocolate": 120} T_Data = Transform(Init_Stock, New_Arriv) print(Init_Stock) print(New_Arriv) print(T_Data)</pre>	
Ans.	<pre>{'Chocolate': 120, 'Cookie': 60} {'Cookie': 50, 'Chocolate': 100} {'Chocolate': 100, 'Cookie': 50}</pre>	
	<i>(½ Mark for writing each item {key:value pair} correctly)</i> Note: <i>Deduct only ½ Mark, if the output format is not correct (e.g., correct line breaks or { } signs).</i> <i>Ignore the order of the items in the dictionaries, if the key:value pairs are not written correctly.</i>	

SECTION D

4×4=16

32	TechMart Inc. manages its product inventory using an SQL table named PRODUCTS . The table consists of the attributes PID , PName , Category , Price , Quantity , and LastUpdated , and contains the following records:	4																																																																								
	<table><tr><th colspan="6">Table : PRODUCTS</th></tr><tr><th>PID</th><th>PName</th><th>Category</th><th>Price</th><th>Quantity</th><th>LastUpdated</th></tr><tr><td>101</td><td>Laptop Pro</td><td>Electronics</td><td>1200</td><td>50</td><td>2024-01-10</td></tr><tr><td>102</td><td>Gaming Mouse</td><td>Peripherals</td><td>45.99</td><td>200</td><td>2023-11-25</td></tr><tr><td>103</td><td>Ergonomic Keyboard</td><td>Peripherals</td><td>75</td><td>150</td><td>2024-02-01</td></tr><tr><td>104</td><td>Smart Speaker</td><td>Electronics</td><td>89.99</td><td>100</td><td>2024-01-15</td></tr><tr><td>105</td><td>USB-C Hub</td><td>Accessories</td><td>29.5</td><td>300</td><td>2023-12-05</td></tr><tr><td>106</td><td>External SSD 1TB</td><td>Storage</td><td>99</td><td>75</td><td>2024-03-01</td></tr><tr><td>107</td><td>Wireless Earbuds</td><td>Audio</td><td>129.99</td><td>120</td><td>2024-02-10</td></tr><tr><td>108</td><td>Desk Lamp</td><td>Home</td><td>35</td><td>180</td><td>2023-10-20</td></tr><tr><td>109</td><td>Web Camera HD</td><td>Peripherals</td><td>60</td><td>NULL</td><td>2024-01-25</td></tr><tr><td>110</td><td>Portable Charger</td><td>Accessories</td><td>49.99</td><td>250</td><td>2023-12-15</td></tr></table>	Table : PRODUCTS						PID	PName	Category	Price	Quantity	LastUpdated	101	Laptop Pro	Electronics	1200	50	2024-01-10	102	Gaming Mouse	Peripherals	45.99	200	2023-11-25	103	Ergonomic Keyboard	Peripherals	75	150	2024-02-01	104	Smart Speaker	Electronics	89.99	100	2024-01-15	105	USB-C Hub	Accessories	29.5	300	2023-12-05	106	External SSD 1TB	Storage	99	75	2024-03-01	107	Wireless Earbuds	Audio	129.99	120	2024-02-10	108	Desk Lamp	Home	35	180	2023-10-20	109	Web Camera HD	Peripherals	60	NULL	2024-01-25	110	Portable Charger	Accessories	49.99	250	2023-12-15	
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	(a) Based on the data given above answer the following questions : (I) Write the SQL statement to display the PName and Price of those PRODUCTS that belong to the 'Electronics' category and have a Price greater than 100.00. (II) Write the SQL statement to display the Category and the total number of products in each category. (III) Write the SQL statement to display the entire PRODUCTS table content, in ascending order of Last date of Updation (showing the earliest updates first). (IV) Write the SQL statement to make the Price of all PRODUCTS whose quantity is not known, to 0.	4×1=4
Ans.	(I) SELECT PNAME,PRICE FROM PRODUCTS WHERE CATEGORY='ELECTRONICS' AND PRICE>100.00 ;	
	<i>(½ Mark for correct SELECT ... FROM ...)</i> <i>(½ Mark for correct WHERE ... AND ...)</i>	
	(II) SELECT CATEGORY, COUNT(*) FROM PRODUCTS GROUP BY CATEGORY;	
	<i>(½ Mark for correct SELECT ... FROM ...)</i> <i>(½ Mark for correct GROUP BY ...)</i>	
	(III) SELECT * FROM PRODUCTS ORDER BY LASTUPDATED;	
	<i>(½ Mark for correct SELECT ... FROM ...)</i> <i>(½ Mark for correct ORDER BY ...)</i>	
	(IV) UPDATE PRODUCTS SET PRICE=0 WHERE QUANTITY IS NULL;	
	<i>(½ Mark for correct UPDATE ... FROM ...)</i> <i>(½ Mark for correct WHERE ... IS NULL)</i>	
	OR (b) Considering the above given table PRODUCTS, write the output on execution of the following SQL commands: (I) SELECT Avg(Quantity) FROM PRODUCTS WHERE Category='Peripherals' ;	
Ans.	(b) (I) AVG (QUANTITY) 175.0	
	<i>(1 Mark for correct output)</i>	
	(II) SELECT DISTINCT Category FROM PRODUCTS ;	

Ans.	(II) DISTINCT CATEGORY Electronics Peripherals Accessories Storage Audio Home	
	<i>(½ Mark for any 3 correct output)</i> <i>(½ Mark for remaining 3 correct output)</i>	
	(III) SELECT COUNT(PID) FROM PRODUCTS WHERE Quantity < 100;	
Ans.	(III) COUNT(PID) 2	
	<i>(1 Mark for correct output)</i>	
	(IV) SELECT PName, Category FROM PRODUCTS WHERE PName LIKE '%Speaker%';	
Ans.	(IV) PName Category Smart Speaker Electronics	
	<i>(1 Mark for correct output)</i>	
	Note: Ignore the headers in all SQL output Questions	
33	A CSV file named "ORDERS.CSV" contains records of customer orders placed on an e-commerce platform. The structure of each record is as follows : [OrderID, CustomerID, OrderDate, TotalAmount, OrderStatus] A sample row for the CSV file is given below for reference : ['ORD001', 'C101', '2024-05-20', 150.75, 'Shipped'] Write the following Python function definitions to perform the specified tasks with the CSV file : (i) RecentOrders(): This function should read the rows from the CSV file and display the OrderID and TotalAmount for all orders placed in the year '2024'. (ii) AddOrder(newOrder): This function should write data at the end of the CSV file. The record is passed as argument to the function.	2+2= 4

Ans.	<pre> import csv (i) def RecentOrders(): with open("ORDERS.CSV", "r") as F: R = csv.reader(F) for r in R: if r[2].startswith("2024"): print("Order ID:", r[0], "Total Amount:", r[3]) OR def RecentOrders(): try: F=open("ORDERS.CSV") R = csv.reader(F) for r in R: if r[2][:4]=="2024": print("Order ID:", r[0], "Total Amount:", r[3]) F.close() except: print('File IO Error!') OR Any valid equivalent correct code (ii) def AddOrder(newOrder): with open("ORDERS.CSV", "a") as F: writer = csv.writer(F) writer.writerow(newOrder) OR def AddOrder(newOrder): F=open("ORDERS.CSV", "a") writer = csv.writer(F) writer.writerow(newOrder) F.close() OR Any valid equivalent correct code </pre>	
	<i>(½ Mark for opening the file)</i> <i>(½ Mark for reading the contents of csv file)</i> <i>(½ Mark for correct loop)</i> <i>(½ Mark for correctly displaying after checking)</i> <i>(½ Mark for opening the file)</i> <i>(½ Mark for correct use of writer())</i> <i>(1 Mark for correct use of writerow())</i>	

34

Consider a database **LIBRARY_CATALOG** containing the following two tables - **PUBLISHERS** and **BOOKS** given below:

Table : PUBLISHERS

PublID	Name	Country	Genre
101	Grand Books	USA	Fiction
102	World Lit Press	UK	Non-Fiction
103	Tech Tome	Germany	Sci-Fi
104	Story Weaver	USA	Fiction
105	Global Insights	Canada	Non-Fiction

Table : BOOKS

BookID	Title	PublID	PublYear	Pages
3001	The Last Horizon	101	2018	450
3002	Echoes of Tomorrow	103	2020	320
3003	A Brief History	102	2015	580
3004	Whispers in the Wind	101	2019	280
3005	Starship Odyssey	103	2021	400
3006	The Silent Shore	104	2022	350
3007	Understanding AI	103	2019	290

Note : The attribute **Pages** in the table **BOOKS** represents the total number of pages in a book, **PublID** represents the Publisher's Identification Number, **PublYear** represents the Year of Publication.

Write the SQL queries for the following :

- (I) (a) To display Title of all **BOOKS** and their corresponding **PublYear** which belong to the 'Fiction' type of **Genre** (from **PUBLISHERS** table) through Equi Join.

4×
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4

Ans.

(I) (a)

```
SELECT TITLE,PUBLYEAR FROM BOOKS, PUBLISHERS
WHERE PUBLISHERS.PUBLID=BOOKS.PUBLID AND GENRE= "Fiction";
OR
SELECT TITLE,PUBLYEAR FROM BOOKS B, PUBLISHERS P
WHERE P.PUBLID=B.PUBLID AND GENRE= "Fiction";
```

(½ Mark for correct **SELECT ... FROM ...**)
(½ Mark for correct **WHERE ... AND ...**)

OR

- (I) (b) To display Title of all **BOOKS** and their corresponding **PublYear** which belong to the 'Fiction' type of **Genre** (from **PUBLISHERS** table) through Natural Join.

Ans	SELECT TITLE, PUBLYEAR FROM BOOKS NATURAL JOIN PUBLISHERS WHERE GENRE='Fiction';																				
	(½ Mark for correct SELECT ... FROM ... NATURAL JOIN ...) (½ Mark for correct WHERE ...)																				
	(II) To display Name of all PUBLISHERS and their corresponding Title of BOOKS in ascending order of PublYear.																				
Ans.	SELECT NAME, TITLE FROM PUBLISHERS P, BOOKS B WHERE P.PUBLID=B.PUBLID ORDER BY PUBLYEAR; OR SELECT NAME, TITLE FROM PUBLISHERS NATURAL JOIN BOOKS ORDER BY PUBLYEAR;																				
	(½ Mark for correct SELECT ... FROM ...) (½ Mark for correct ORDER BY ...)																				
	(III) To delete all records from the table BOOKS whose PublYear is older than 2020.																				
Ans.	DELETE FROM BOOKS WHERE PUBLYEAR<2020;																				
	(½ Mark for correct DELETE FROM ...) (½ Mark for correct WHERE ...)																				
	(IV) To open the database LIBRARY_CATALOG and then display the names of all tables present in the database.																				
Ans	USE LIBRARY_CATALOG; SHOW TABLES;																				
	(½ Mark for correct USE ...) (½ Mark for correct SHOW ...)																				
35	A table named EQUITY in INVESTMENT database has the following structure: <table><tr><td>Field</td><td>Type</td><td>Remarks</td></tr><tr><td>Code</td><td>Char(6)</td><td>Code of stock</td></tr><tr><td>Name</td><td>Varchar(15)</td><td>Name of stock</td></tr><tr><td>Exchange</td><td>Char(3)</td><td>Name of exchange</td></tr><tr><td>LTP</td><td>Float</td><td>Last traded Price</td></tr><tr><td>Volumne</td><td>int</td><td>Amount of stock</td></tr></table>		Field	Type	Remarks	Code	Char(6)	Code of stock	Name	Varchar(15)	Name of stock	Exchange	Char(3)	Name of exchange	LTP	Float	Last traded Price	Volumne	int	Amount of stock	4
Field	Type	Remarks																			
Code	Char(6)	Code of stock																			
Name	Varchar(15)	Name of stock																			
Exchange	Char(3)	Name of exchange																			
LTP	Float	Last traded Price																			
Volumne	int	Amount of stock																			

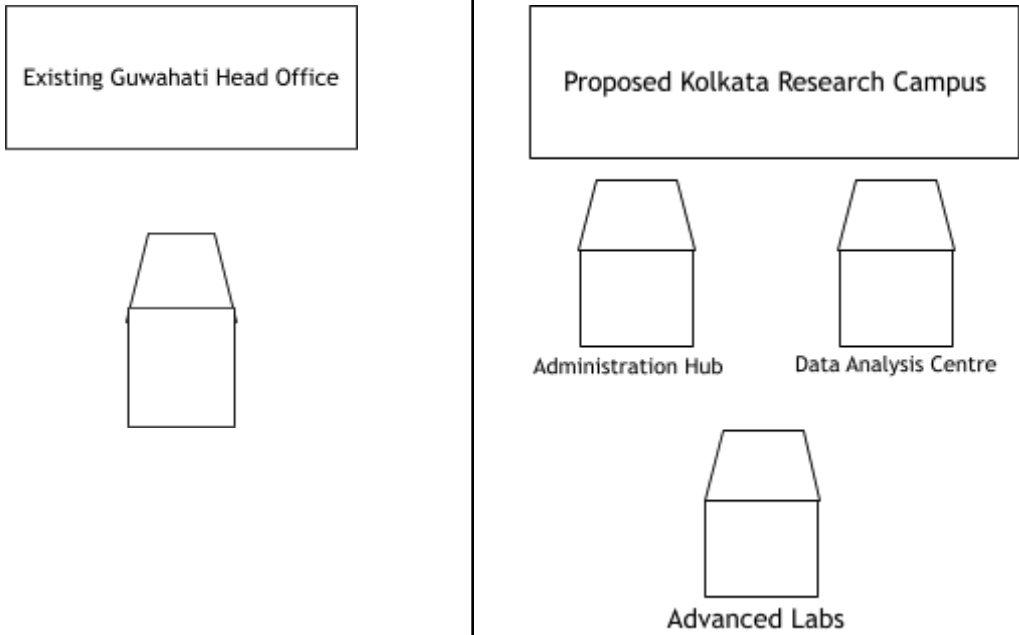
	Write a function in Python to display all the records where Exchange is BSE from the EQUITY table. Also display the total number of such records. Assume the following for Python database connectivity : • Host - localhost • User - Finman • Password - Stk2026	
Ans.	<pre>import pymysql as MS # OR import mysql.connector as MS def DisplayBSE(): Con = MS.connect(host="localhost", user="Finman", password="Stk2026", database="INVESTMENT") Cur = Con.cursor() Query = "SELECT * FROM EQUITY WHERE Exchange='BSE'" Cur.execute(Query) Recs = Cur.fetchall() for R in Recs: print(R) print("Total records:",Cur.rowcount) # OR len(Recs) Con.close()</pre> OR Any equivalent valid and correct code	
	<i>(1 Mark for correct use of connect)</i> <i>(½ Mark for creating the cursor)</i> <i>(½ Mark for correct formation of query)</i> <i>(½ Mark for correct execution of the query)</i> <i>(½ Mark for correctly fetching the data with/without using fetchall)</i> <i>(½ Mark for correctly displaying the data)</i> <i>(½ Mark for correctly displaying the number of records)</i> Note: <i>(½ Mark for importing any valid module for connectivity, if the marks allocated are less than 4)</i>	

SECTION E

4×4=16

36	A file CLINICAL_TRIALS.DAT stores records of the following structure : [TRIAL_ID, PATIENT_NAME, DRUG_TESTED, DOSAGE_MG, OUTCOME_SCORE] Where : • TRIAL_ID - Unique identifier for the clinical trial participant (string type) • PATIENT_NAME - Name of the patient (string type)	2+3=5
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	• DRUG_TESTED - Name of the drug administered (string type, e.g., "DrugX", "DrugY", "Placebo") • DOSAGE_MG - Dosage of the drug in milligrams (integer type) • OUTCOME_SCORE - Numerical score indicating the treatment outcome (float type, higher score means better outcome) Write user-defined functions in Python for the following tasks : (I) RecordTrialData() : This function should input data for clinical trial participants and write it to the binary file CLINICAL_TRIALS.DAT. (II) AdjustLowDosage() : This function should increase the DOSAGE_MG of all participants whose OUTCOME_SCORE is below 0.5 by 20% and rewrite the updated records into the file CLINICAL_TRIALS.DAT.	
Ans	(I) <pre>import pickle def RecordTrialData(): FW=open('CLINICAL_TRIALS.DAT','ab') TRAIL_ID = input("TRIAL_ID:") PATIENT_NAME = input("PATIENT_NAME:") DRUG_TESTED = input("DRUG_TESTED: ") DOSAGE_MG = int(input("DOSAGE_MG : ")) OUTCOME_SCORE = float(input("OUTCOME_SCORE:")) Recs=[TRAIL_ID,PATIENT_NAME,DRUG_TESTED,DOSAGGE_MG, OUTCOME_SCORE] pickle.dump(Recs,FW) FW.close()</pre> OR Any other equivalent code (with/without loop) (II) <pre>def AdjustLowDosage(): FR=open('CLINICAL_TRIALS.DAT','rb') NewRecs=[] try: while True: Rec=pickle.load(FR) if Rec[4]<0.5: Rec[3]=Rec[3]+Rec[3]*(20/100) #OR Rec[3]*=1.20 NewRecs.append(Rec) except: print("Updation over") FR.close() FW=open('CLINICAL_TRIALS.DAT','wb') for R in NewRecs: pickle.dump(R,FW) FW.close()</pre> OR Any other equivalent code (response with rb+ mode also to be considered)	

	For part (i) (½ Mark for opening the file) (1 Mark for accepting data and forming the list) (½ Mark for writing data to the file) For part (ii) (½ Mark for opening the files) (1 Mark for try, except blocks and loop) (½ Mark for if condition) (½ Mark for updating record) (½ Mark for writing updated data to the file)	
37	You are the lead network architect for “The Green Sprout Institute,” a rapidly expanding agricultural research and development organization with its head office located in Guwahati, Assam. The Green Sprout Institute is undergoing significant expansion, which includes : • Acquiring a new, larger central research campus in Kolkata, to house advanced laboratory equipment and a large administrative and research staff. • Integrating four smaller remote field-testing stations across various agricultural regions in Assam : These stations will primarily focus on automated sensor data collection and transfer the data securely to the central research campus in Kolkata. • The new Kolkata Research Campus will comprise of three distinct sections/blocks : Advanced Labs, Data Analysis Centre, and Administrative Hub, as shown in the conceptual layout below :	5×1=5
	Existing Guwahati Head Office 	

Distance between the sections of Proposed Kolkata Research Campus :

Section to Section	Distance
Advanced Labs to Data Analysis Centre	280 metres
Data Analysis Centre to Administrative Hub	320 metres
Administrative Hub to Advanced Labs	250 metres

- Each section in the Kolkata Research Campus will have the following number of computers / devices:

Section	Number of computers / devices
Advanced Labs	100
Data Analysis Centre	60
Administrative Hub	150

As the lead network architect, you need to propose a comprehensive network design and implementation plan that addresses all the key issues of The Green Sprout Institute's expansion goals. Answer the questions given below in this respect :

(I)	Suggest a device to be installed in each of the sections of the Kolkata Research Campus to connect the cables of individual computers/devices within that section.
Ans	Switch / Hub
	(1 Mark for writing correct device name)
(II)	Suggest the most appropriate location (Section) to install the SERVER in the Kolkata campus (out of the 3 sections) to get the best and most effective connectivity and security for critical research data. Justify your answer.
Ans	Administration Hub Reason : It has maximum number of computers OR Advanced Lab Reason : It requires minimum cable length
	(½ Mark for writing any correct location name) (½ Mark for writing valid justification)
(III)	Draw the cable layout to reliably connect various sections within the Kolkata Campus.

Ans	OR Drawing with Cable connecting two other buildings from Advanced Lab	
	(1 Mark for drawing the any valid cable layout)	
(IV)	What type of network out of PAN, LAN, MAN, WAN will be set up when the central Guwahati Head Office is connected with the new Kolkata Research Campus?	
Ans	WAN	
	(1 Mark for the correct answer)	
(V)	(a)	Which secure and high-bandwidth wired transmission medium should preferably be used to connect the Guwahati Head Office with the Kolkata Research Campus for transferring large datasets and research files ?
Ans		Fibre-optic cable
		(1 Mark for the correct answer)
		OR
	(b)	Which specific protocol will be used if researchers at the Guwahati HQ need to have Collaborative Research Sessions using video conferencing with Kolkata Research Centre ?
Ans		VoIP OR Voice Over Internet Protocol
		(1 Mark for the correct answer)